

## **LED for Automotive, Consumer and Industry Applications**

### Safety Instructions

The use of new chip technologies means that OSRAM LEDs are delivering higher and higher levels of optical performance. Thus, even eye safety issues might increasingly need to be considered. In general, the EU product safety legislation requires conformity with EC directives (such as the "Low Voltage Directive") which define the "essential requirements", e.g., protection of health and safety, that goods must meet when they are placed on the market. We therefore recommend that the current version of the IEC 62471 standard is taken into account right from the outset, i.e. at the equipment development stage, and that suitable protection facilities are provided in your laboratories.

### Eye Safety Information

The light output of modern High-Power-LEDs is strong enough for eye irritation and temporal blinding effects. Therefore, in general, do not stare into the light beam of any LED at close range. Optical radiation hazards by LED-based lamps, lamp systems or luminaires have to be assessed and classified according to the requirements of IEC62471 ("Photobiological safety of lamps and lamp systems").

Within the risk grouping system of this IEC standard, most LEDs specified in this catalogue fall into the "exempt" group. However, high-power "blue" LEDs and the most important "white" LEDs for general lighting may need some attention. Due to their dominating photochemical hazard potential, extensive deliberate long-term direct viewing from close distance can indeed be hazardous. Under worst case conditions of classification, these high power light sources can even be allocated to the "moderate risk group" i.e. safety bases on aversion reactions against bright light. However, under real circumstances (for exposure time, eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. This is valid for single LEDs under the mentioned conditions and operating conditions defined in the data sheet. Complex Multi-LED-designs, additional optics or extreme application conditions demand a separate evaluation of the entire system.

As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. As for any bright light source, when viewing into it (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

### Remarks:

User shall not reverse engineer by disassembling or analysis of the LEDs without having the prior written consent of OSRAM Opto Semiconductors GmbH. When defective LEDs are found, user shall inform to OSRAM Opto Semiconductors GmbH directly before disassembling or analysis.

The appearance and specifications of the product may be modified for improvement without notice.

### Sicherheitshinweise

OSRAM LEDs erreichen aufgrund von neuen Chip-Technologien immer höhere optische Leistungen. Deshalb müssen auch Sicherheitsaspekte bezüglich Augensicherheit zunehmend in Betracht gezogen werden. Generell fordern die EU Produkt-Sicherheitsgesetze Konformität mit den EU Richtlinien (z.B. die "Niederspannungsrichtlinie"), die wesentliche Forderungen festlegen, z.B. an Sicherheit und Gesundheitsschutz, die die auf den Markt gebrachten Produkte erfüllen müssen. Wir empfehlen daher, schon bei der Entwicklung von Geräten, die zu diesem Zeitpunkt gültige Norm IEC 62471 zu beachten und insbesondere auf den Gebrauch von entsprechenden Schutzvorrichtungen in Ihren Labors hinzuweisen.

### Informationen zur Augensicherheit

Die Lichtausbeute der modernen Hochleistung-LEDs ist stark genug, um Augenreizungen und zeitliche Blindheitseffekte hervorzurufen. Daher sollten Sie generell nicht aus kurzer Entfernung in den Lichtstrahl jeglicher LED blicken. Risiken durch optische Strahlung, die durch LED-basierte Lampen, Lampen-Systeme oder Leuchter entstehen, müssen eingeschätzt und nach der Forderungen des IEC62471 Standards ("Photobiological safety of lamps and lamp systems") bewertet werden.

Im Rahmen des Risikogruppensystems des IEC Standards fallen die meisten in diesem Katalog beschriebenen LEDs in die "exempt" (befreit) Gruppe. Jedoch sollten hochleistungsfähige blaue LEDs und die wichtigsten weißen LEDs näher betrachtet werden. Auf Grund ihres hohen photochemischen Risiko-Potenzials kann das langfristige, bewusste, direkte Ansehen gefährlich sein. Bei ungünstigsten Bedingungen der Anordnung können die Hochleistungs-LEDs sogar der "moderate risk group" (gemäßigte Risikogruppe) zugeordnet werden, d.h. die Sicherheit beruht auf Aversions-Reaktionen auf helles Licht. Unter realen Umständen (in Bezug auf Belichtungszeit, Pupillen, Betrachtungsabstand) kann jedoch angenommen werden, dass keine Gefahr für die Augen von diesen Geräten ausgeht. Dies gilt für einzelne LEDs unter den genannten Konditionen und im Datenblatt definierten Betriebsbedingungen. Komplexe Multi-LED Designs, zusätzliche Optik oder außergewöhnliche Anwendungsbedingungen fordern eine gesonderte Bewertung des ganzen Systems.

Prinzipiell ist jedoch zu erwähnen, dass starke Lichtquellen auf Grund ihrer Blendwirkung ein hohes, sekundäres Gefahrenpotenzial besitzen. Wie bei jeder hellen Lichtquelle kann das direkte Anschauen (z.B. Scheinwerfer) zur Reduzierung der Sehschärfe oder zu Nachbildern führen, was Reizungen, Irritationen und sogar Unfälle verursachen kann.

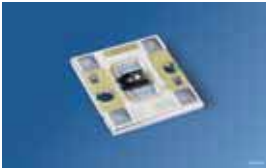
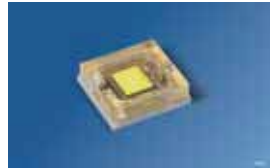
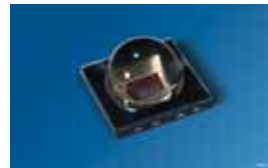
### Anmerkungen:

Der Anwender darf keinen Ausbau oder Analyse der LEDs vornehmen, ohne die vorherige schriftliche Zustimmung von OSRAM Opto Semiconductors GmbH zu haben. Wenn defekte LEDs gefunden werden, soll der Anwender baldmöglichst OSRAM Opto Semiconductors GmbH informieren, bevor er einen Ausbau oder eine Analyse vornimmt. Erscheinungsform und technische Daten des Produktes können zwecks Verbesserung ohne Benachrichtigung geändert werden.

## Automotive Applications

### Exterior

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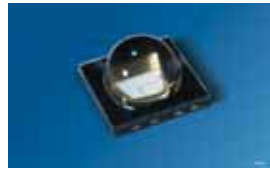
**OSRAM OSTAR Headlamp****OSRAM OSTAR Compact****OSLON ECE****OSLON Black Flat****OSLON Black****Golden DRAGON****Platinum DRAGON****Advanced Power TOPLED****Power TOPLED****Power TOPLED****MULTILED****Multi TOPLED**

## Interior

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**OSLON**



**OSLON Black**



**Advanced Power TOPLED**



**Power TOPLED**



**Power TOPLED**



**TOPLED**



**SIDELED**



**Mini TOPLED**



**SMARTLED**



**SMARTLED XR**



**PointLED**



**Micro SIDELED**



**MULTILED**



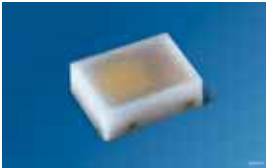
**Multi TOPLED**

## Consumer Applications

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### Mobile Applications

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**CERAMOS**



**FIREFLY**

### Backlighting

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**Multi CERAMOS**



**Micro SIDELED**

## Industry Applications

### Projection

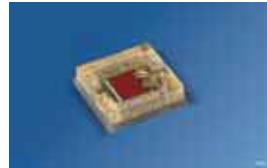
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OSRAM OSTAR Projection Cube



OSRAM OSTAR Projection Power



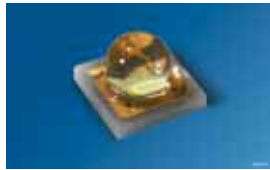
OSRAM OSTAR Projection Compact

### Signs and Signals

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OSLON SX



OSLON Signal



OSLON Black



Golden DRAGON



Platinum DRAGON



TOPLED



TOPLED Black



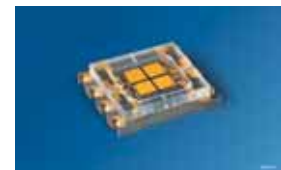
MULTILED



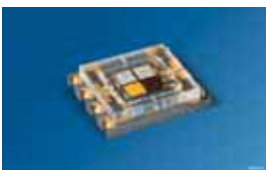
Multi CERAMOS



Multi CHIPLD



OSRAM OSTAR SMT



OSRAM OSTAR Stage

## Electronic Equipment

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Advanced Power TOPLED Plus



Power TOPLED



Power TOPLED



TOPLED



SIDELED



Mini TOPLED



CHIPLED 1206



CHIPLED 0805



CHIPLED 0603



CHIPLED 0402



CHIPLED with lens



SMARTLED



SMARTLED XR



PointLED



FIREFLY



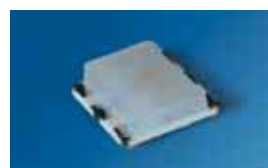
Micro SIDELED



MULTILED



Multi TOPLED



Multi CHIPLED



TOPLED Compact

## White Goods

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**Golden DRAGON**



**TOPLED**



**SIDELED**



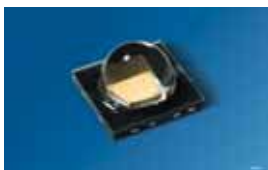
**CHIPLED 0603**



**Micro SIDELED**

## Transportation

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**OSLON Black**



**OSRAM OSTAR Headlamp**



**Advanced Power TOPLED Plus**

## Automotive Applications

## Exterior

## OSRAM OSTAR Headlamp

| Package                                                                           | Type                            | Emission color | Color coordinates Cx/Cy typ. | $\Phi_V$      | at $I_f$ | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|---------------------------------|----------------|------------------------------|---------------|----------|-----------------------------------------------|---------------|--------------|
|                                                                                   |                                 |                |                              | [lm]          | [mA]     |                                               |               |              |
|  | LE UW D1W1 01-5L6M-GMKM-T01     | ○ ultra white  | 0.31 / 0.32                  | 112 ... 224   | 700      | 120                                           | Q65110A8591   | 1            |
|                                                                                   | LE UW D1W2 01-7M7N-GMKM-T01     |                |                              | 224 ... 400   |          |                                               | Q65110A8590   |              |
|                                                                                   | LE UW D1W3 01-7N7P-GMKM-T01     |                |                              | 355 ... 630   |          |                                               | Q65110A8588   |              |
|                                                                                   | LE UW D1W4 01-5P6Q-GMKM-T01     |                |                              | 450 ... 900   |          |                                               | Q65110A8593   |              |
|                                                                                   | LE UW D1W5 01-7P8Q-GMKM-T01     |                |                              | 560 ... 1120  |          |                                               | Q65110A8589   |              |
|  | LE UW U1A2 01-5P8P-ebvF68ebzB68 | ○ ultra white  | 0.322 / 0.334                | 450 ... 710   | 1000     | 120                                           | Q65111A2089   | 1            |
|                                                                                   | LE UW U1A3 01-8P8Q-ebvF68ebzB68 |                |                              | 630 ... 1120  |          |                                               | Q65111A2088   |              |
|                                                                                   | LE UW U1A4 01-7Q6R-ebvF68ebzB68 |                |                              | 900 ... 1400  |          |                                               | Q65111A2087   |              |
|                                                                                   | LE UW U1A5 01-5R8R-ebvF68ebzB68 |                |                              | 1120 ... 1800 |          |                                               | Q65111A2086   |              |

## OSRAM OSTAR Compact

| Package                                                                             | Type                 | Emission color | $\lambda_{dom}$ (typ.) / Cx/Cy | $\Phi_V$    | at $I_f$ | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|----------------------|----------------|--------------------------------|-------------|----------|-----------------------------------------------|---------------|--------------|
|                                                                                     |                      |                | [nm / -]                       | [lm]        | [mA]     |                                               |               |              |
|  | LE UW Q9WP-8M7N-GMKM | ○ ultra white  | 0.31 / 0.32                    | 250 ... 400 | 1400     | 120                                           | Q65110A9235   | 2            |

## Automotive Applications

## Exterior

## OSLON ECE

| Package                                                                           | Type                  | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |            |            |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-----------------------|----------------|-----------------------------------------|------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                       |                |                                         | $\Phi_V$   | $I_V$ typ. | at $I_F$ |                                                              |               |                 |
|                                                                                   |                       |                | [nm / -]                                | [lm]       | [cd]       | [mA]     |                                                              |               |                 |
|  | LUW CN7M-HYJY-EMKM-1  | ○ ultra white  | 0.32 / 0.32                             | 33 ... 61  | 32.9       | 200      | 90                                                           | Q65110A9509   | 3               |
|  | LUW CN7N-KYLX-EMKM-46 | ○ ultra white  | 0.32 / 0.32                             | 82 ... 130 | 56.2       | 350      | 80                                                           | Q65110A9810   | 3               |

## OSLON Black Flat

| Package                                                                             | Type                  | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |             |            |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-----------------------|----------------|-----------------------------------------|-------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                       |                |                                         | $\Phi_V$    | $I_V$ typ. | at $I_F$ |                                                              |               |                 |
|                                                                                     |                       |                | [nm / -]                                | [lm]        | [cd]       | [mA]     |                                                              |               |                 |
|  | LUW H9QP-8L7M-HNJJN-1 | ○ ultra white  | 0.322 / 0.334                           | 159 ... 250 | 67.5       | 700      | 120                                                          | Q65111A1706   | 4               |

## OSLON Black

| Package                                                                             | Type                | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |           |            |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|---------------------|----------------|-----------------------------------------|-----------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                     |                |                                         | $\Phi_V$  | $I_V$ typ. | at $I_F$ |                                                              |               |                 |
|                                                                                     |                     |                | [nm / -]                                | [lm]      | [cd]       | [mA]     |                                                              |               |                 |
|  | LA H9GP-JYKY-24-1   | ● amber        | 617                                     | 52 ... 97 | 36.6       | 350      | 90                                                           | Q65111A1982   | 5               |
|                                                                                     | LR H9GP-HZKX-1-1    | ● red          | 625                                     | 39 ... 82 | 29.7       |          |                                                              | Q65111A1707   |                 |
|                                                                                     | LY H9GP-HZKX-36-1   | ● yellow       | 590                                     |           |            |          |                                                              | Q65111A1708   |                 |
|                                                                                     | LS H9GP-HYJY-1-9B9C | ● super red    | 633                                     | 33 ... 61 | 23.1       |          |                                                              | Q65111A2566   |                 |

## Automotive Applications

## Exterior

## DRAGON

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |          |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $\Phi_V$ | $I_V$ typ. | at $\ell$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [lm]     | [cd]       | [mA]      |                                                              |               |                 |

## Golden DRAGON

|                                                                                    |                      |                             |             |            |      |     |     |             |   |
|------------------------------------------------------------------------------------|----------------------|-----------------------------|-------------|------------|------|-----|-----|-------------|---|
|   | LR W5SM-HZJZ-1-1     | ● red                       | 625         | 39 ... 71  | 18.2 | 400 | 120 | Q65111A2604 | 6 |
|                                                                                    | LA W5SM-JYKY-24-1    | ● amber                     | 617         | 52 ... 97  | 24.6 |     |     | Q65111A2606 |   |
|                                                                                    | LY W5SM-HZJZ-36-1    | ● yellow                    | 590         | 39 ... 71  | 18.2 |     |     | Q65111A2600 |   |
|                                                                                    | LY W5SM-HZJZ-46-1    |                             |             |            |      |     |     | Q65111A2817 |   |
|   | LUW W5SM-JZKZ-6P7Q-1 | ○ ultra white               | 0.31 / 0.32 | 61 ... 112 | 28.5 | 350 | 120 | Q65111A2586 | 7 |
|                                                                                    | LUW W5SM-KXLX-5P7R-1 |                             |             | 71 ... 130 | 33.2 |     |     | Q65111A2585 |   |
|                                                                                    | LW W5SM-JYKY-JKQL-1  | ○ white                     | 0.33 / 0.33 | 52 ... 97  | 24.6 | 350 | 120 | Q65111A2601 | 7 |
|  | LCY W5SM-HZJZ-5E-1   | ● color on demand<br>yellow | 0.56 / 0.42 | 39 ... 71  | 18.2 | 350 | 120 | Q65111A2605 | 7 |

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |          |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $\Phi_V$ | $I_V$ typ. | at $\ell$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [lm]     | [cd]       | [mA]      |                                                              |               |                 |

## Platinum DRAGON

|                                                                                     |                   |                                                                                            |             |            |      |     |     |             |   |
|-------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------|-------------|------------|------|-----|-----|-------------|---|
|  | LR W5SN-JYKY-1    |  red    | 625         | 52 ... 97  | 24.6 | 700 | 120 | Q65110A6011 | 8 |
|                                                                                     | LA W5SN-JZKZ-24   |  amber  | 617         | 61 ... 112 | 28.5 |     |     | Q65110A6010 |   |
|                                                                                     | LY W5SN-KXLX-35   |  yellow | 590         | 71 ... 130 | 33.2 |     |     | Q65111A0327 |   |
|                                                                                     | LY W5SN-KXLX-46   |                                                                                            |             | 52 ... 97  | 24.6 |     |     | Q65111A0328 |   |
|                                                                                     | LY W5SN-JYKY-46   |                                                                                            |             |            |      |     |     | Q65110A5712 |   |
|  | LW W5SN-KYLY-JKQL |  white  | 0.33 / 0.33 | 82 ... 150 | 38.3 | 700 | 120 | Q65110A8946 | 8 |

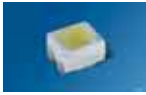
## Automotive Applications

## Exterior

## Advanced Power TOPLED

| Package                                                                           | Type                | Emission color                                                                                              | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |  |  |
|-----------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|--|--|
|                                                                                   |                     |                                                                                                             |                                         | $I_V$          | $\Phi_V$<br>typ. | at $\phi$ |                                                              |               |                 |  |  |
|                                                                                   |                     |                                                                                                             | [nm / -]                                | [mcd]          | [mlm]            | [mA]      |                                                              |               |                 |  |  |
|  | LA G6SP-DAEB-24-1   |  amber                     | 617                                     | 4500 ... 11200 | 24600            | 140       | 120                                                          | Q65111A0336   | 9               |  |  |
|                                                                                   | LR G6SP-CBEA-1-1    |  red                       | 623                                     | 3550 ... 9000  | 19700            |           |                                                              | Q65111A0536   |                 |  |  |
|                                                                                   | LY G6SP-CADB-36-1   |  yellow                    | 590                                     | 2800 ... 7100  | 15500            |           |                                                              | Q65110A4721   |                 |  |  |
|                                                                                   | LS G6SP-CADB-1-1    |  super red                 | 630                                     |                |                  |           |                                                              | Q65111A1078   |                 |  |  |
|  | LCY G6SP-CBDB-5E    |  color on demand<br>yellow | 0.56 / 0.42                             | 3550 ... 7100  | 16700            | 140       | 120                                                          | Q65110A8813   | 10              |  |  |
|  | LW G6CP-EAFA-JKQL-1 |  white                     | 0.33 / 0.33                             | 7100 ... 14000 | 33100            | 140       | 120                                                          | Q65110A8947   | 10              |  |  |

## Power TOPLED

| Package                                                                             | Type                 | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|----------------------|----------------|-----------------------------------------|---------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                      |                |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                     |                      |                | [nm / -]                                | [mcd]         | [mlm]            | [mA]      |                                                              |               |                 |
|  | LA E67F-BACA-24-3A4B | ● amber        | 617                                     | 1800 ... 3550 | 8000             | 50        | 120                                                          | Q65110A9090   | 11              |
|                                                                                     | LA E67F-BACA-24-3B5A |                |                                         |               |                  |           |                                                              | Q65110A9089   |                 |
|                                                                                     | LY E67F-AABA-35-1    | ● yellow       | 590                                     | 1120 ... 2240 | 5000             |           |                                                              | Q65110A9019   |                 |
|                                                                                     | LY E67F-ABBB-46-1    |                |                                         | 1400 ... 2800 | 6300             |           |                                                              | Q65110A9018   |                 |
|                                                                                     | LS E67F-ABBB-1-1     | ● super red    | 633                                     |               | Q65111A1118      |           |                                                              |               |                 |
|                                                                                     | LR E67F-ABCA-1-1     | ● red          | 625                                     | 1400 ... 3550 | 7400             |           |                                                              | Q65111A2785   |                 |
|  | LR E6SF-ABCA-1-1     | ● red          | 625                                     | 1400 ... 3550 | 7430             | 50        | 120                                                          | Q65111A0958   | 11              |
|                                                                                     | LA E6SF-BBCB-24-1    | ● amber        | 617                                     | 2240 ... 4500 | 10110            |           |                                                              | Q65110A6262   |                 |
|                                                                                     | LY E6SF-V2AB-35-1    | ● yellow       | 590                                     | 900 ... 1800  | 4050             |           |                                                              | Q65110A7525   |                 |
|                                                                                     | LY E6SF-AABA-46-1    |                |                                         | 1120 ... 2240 | 5040             |           |                                                              | Q65110A6209   |                 |
|  | LA ETSF-BACB-24-1    | ● amber        | 617                                     | 1800 ... 4500 | 9500             | 50        | 120                                                          | Q65110A9777   | 11              |
|                                                                                     | LY ETSF-ABCA-46-1    | ● yellow       | 590                                     | 1400 ... 3550 | 7400             |           |                                                              | Q65110A9779   |                 |
|  | LW ETSF-AABB-JKPL-1  | ○ white        | 0.33 / 0.33                             | 1120 ... 2800 | 5900             | 30        | 120                                                          | Q65111A0196   | 12              |
|                                                                                     | LW E6SG-AABA-JKPL-1  | ○ white        | 0.33 / 0.33                             | 1120 ... 2240 | 5000             | 30        | 120                                                          | Q65110A8964   | 12              |

## Automotive Applications

## Exterior

## Power TOPLED

| Package                                                                           | Type                 | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |           | Viewing<br>angle at 50<br>% $I_v$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|----------------------|----------------|-----------------------------------------|----------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                      |                |                                         | $E_v$          | $\Phi_v$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                   |                      |                | [nm / -]                                | [lux]          | [mlm]            | [mA]      |                                                              |               |                 |
|  | LA E63F-EBGA-24-3A4B | amber          | 617                                     | 9000 ... 22400 | 6300             | 50        | 30                                                           | Q65110A4103   | 13              |
|                                                                                   | LS E63F-DBFA-1       | super red      | 633                                     | 5600 ... 14000 | 3900             |           |                                                              | Q65110A4105   |                 |
|                                                                                   | LY E63F-DBEB-35-1    | yellow         | 590                                     | 5600 ... 11200 | 3400             |           |                                                              | Q65110A4108   |                 |
|                                                                                   | LY E63F-EAFA-46-1    |                |                                         | 7100 ... 14000 | 4200             |           |                                                              | Q65110A4107   |                 |

| Package                                                                            | Type                 | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |           | Viewing<br>angle at 50<br>% $I_v$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|------------------------------------------------------------------------------------|----------------------|----------------|-----------------------------------------|----------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                    |                      |                |                                         | $I_v$          | $\Phi_v$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                    |                      |                | [nm / -]                                | [mcd]          | [mlm]            | [mA]      |                                                              |               |                 |
|  | LS E65F-BBDA-1       | super red      | 633                                     | 2240 ... 5600  | 4500             | 50        | 60                                                           | Q65110A4106   | 14              |
|                                                                                    | LA E65F-CBEA-24-3A4B | amber          | 617                                     | 3550 ... 9000  | 7200             |           |                                                              | Q65110A4104   |                 |
|                                                                                    | LY E65F-CBDB-35      | yellow         | 590                                     | 3550 ... 7100  | 6100             |           |                                                              | Q65110A6456   |                 |
|                                                                                    | LY E65F-DAEB-46-1    |                |                                         | 4500 ... 11200 | 8900             |           |                                                              | Q65111A1412   |                 |

## Automotive Applications

## Exterior

## MULTILED

| Package                                                                           | Type             | Emission color                                                                           | $\lambda_{\text{dom}}$<br>(typ.)/<br>Cx/Cy |                |                           |                  | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------|--------------------------------------------|----------------|---------------------------|------------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                  |                                                                                          | [nm / -]                                   | $I_V$<br>[mcd] | $\Phi_V$<br>typ.<br>[mlm] | at $\xi$<br>[mA] |                                                              |               |                 |
|  | LYYYG6SF-CADB-45 |  yellow | 587                                        | 2800 ... 7100  | 14850                     | 50               | 120                                                          | Q65110A8529   | 15              |

## Multi TOPLED

| Package                                                                            | Type                        | Emission color                                                                                                                                                                      | $\lambda_{\text{dom}}$<br>(typ.) | $I_V$ [mcd]   |               |                  | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------|---------------|------------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                    |                             |                                                                                                                                                                                     | [nm]                             | color 1       | color 2       | at $\xi$<br>[mA] |                                                              |               |                 |
|  | LAY T67F-AABB-1-1+AABA-45-1 |  amber<br> yellow | 617 / 590                        | 1120 ... 2800 | 1120 ... 2240 | 50               | 120                                                          | Q65110A7526   | 16              |

## Automotive Applications

## Interior

## OSLON

| Package                                                                           | Type                 | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|---------------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                      |                                                                                               |                                         | $\Phi_V$      | $I_V$ typ. | at $\phi$ |                                                              |               |                 |
|                                                                                   |                      |                                                                                               | [nm / -]                                | [lm]          | [cd]       | [mA]      |                                                              |               |                 |
|  | LA CN5M-GAHA-24-1    |  amber       | 617                                     | 18 ... 35.5   | 18.7       | 140       | 60                                                           | Q65111A1207   | 17              |
|                                                                                   | LY CN5M-FAGA-36-1    |  yellow      | 590                                     | 11.2 ... 22.4 | 11.8       |           |                                                              | Q65110A8680   |                 |
|  | LT CN5M-GAHB-25-1    |  true green  | 528                                     | 18 ... 45     | 22.1       | 140       | 60                                                           | Q65110A9086   | 17              |
|  | LUW CN5M-GBHB-5P7R-1 |  ultra white | 0.32 / 0.31                             | 22.4 ... 45   | 23.6       | 140       | 60                                                           | Q65111A3434   | 3               |

| Package                                                                             | Type              | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |             |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|-------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                   |                                                                                               |                                         | $\Phi_E$    | at $\phi$ |                                                              |               |                 |
|                                                                                     |                   |                                                                                               | [nm / -]                                | [mW]        | [mA]      |                                                              |               |                 |
|  | LD CN5M-4Q4R-35-1 |  deep blue | 453                                     | 100 ... 180 | 140       | 60                                                           | Q65110A8683   | 17              |
|                                                                                     | LD CN5M-1R1S-35-1 |                                                                                               |                                         | 112 ... 201 |           |                                                              | Q65110A9085   |                 |

## Automotive Applications

## Interior

## OSLON Black

| Package                                                                           | Type                    | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_V$   | $I_V$ typ. | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------------|----------------|-----------------------------------------|------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                         |                |                                         | [lm]       | [cd]       | [mA]     |                                                              |               |                 |
|  | LB H9GP-GYHY-35-1       | ● blue         | 470                                     | 21 ... 39  | 15         | 350      | 90                                                           | Q65111A1710   | 5               |
|                                                                                   | LT H9GP-JZKZ-26-1       | ● true green   | 528                                     | 61 ... 112 | 43.3       |          |                                                              | Q65111A1717   |                 |
|  | LCW H9GP-JZKY-4R9T-1    | ○ warm white   | 0.42 / 0.4                              | 61 ... 97  | 38.7       | 350      | 90                                                           | Q65111A0920   | 5               |
|                                                                                   | LCW H9GP-JZKZ-409Q-1    |                |                                         | 61 ... 112 | 42.4       |          |                                                              | Q65111A0921   |                 |
|                                                                                   | LCW H9GP-KXLX-4J8K-1    |                |                                         | 71 ... 130 | 49.2       |          |                                                              | Q65111A0923   |                 |
|                                                                                   | LCW H9GP-JZLX-4L8N-1    |                |                                         | 61 ... 130 | 46.8       |          |                                                              | Q65111A0922   |                 |
|                                                                                   | LCW H9GP-JZKY-4U9X-1    |                |                                         | 61 ... 97  | 38.7       |          |                                                              | Q65111A0919   |                 |
|                                                                                   | LUW H9GP-KYLY-4C8E-1    | ○ ultra white  | 0.31 / 0.32                             | 82 ... 150 | 55.7       | 350      | 90                                                           | Q65111A0924   | 5               |
|                                                                                   | LUW H9GP-KYLY-5F8G-1    |                |                                         |            |            |          |                                                              | Q65111A0925   |                 |
|                                                                                   | LUW H9GP.CE-KYLY-EMKM-1 |                |                                         |            |            |          |                                                              | Q65111A1881   |                 |

| Package                                                                             | Type              | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_E$    | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-------------------|----------------|-----------------------------------------|-------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                   |                |                                         | [mW]        | [mA]     |                                                              |               |                 |
|  | LD H9GP-3T2U-35-1 | ● deep blue    | 455                                     | 355 ... 560 | 350      | 90                                                           | Q65111A1709   | 5               |

## Automotive Applications

## Interior

## Advanced Power TOPLED

| Package                                                                           | Type                | Emission color            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |             | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|---------------------|---------------------------|-----------------------------------------|----------------|------------------|-------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                     |                           |                                         | $I_V$          | $\Phi_V$<br>typ. | at $\theta$ |                                                              |               |                 |
|                                                                                   |                     |                           | [nm / -]                                | [mcd]          | [lm]             | [mA]        |                                                              |               |                 |
|  | LB G6SP-V2BB-35-1   | ● blue                    | 470                                     | 900 ... 2800   | 5800             | 140         | 120                                                          | Q65110A4678   | 10              |
|                                                                                   | LT G6SP-CBEB-25-1   | ● true green              | 528                                     | 3550 ... 11200 | 21900            |             |                                                              | Q65110A5874   |                 |
|  | LCB G6SP-DBFA-4J5L  | ● color on demand<br>blue | 0.2 / 0.3                               | 5600 ... 14000 | 30800            | 140         | 120                                                          | Q65111A0342   | 10              |
|                                                                                   | LW G6SP-EAFA-JKQL-1 | ○ white                   | 0.33 / 0.33                             | 7100 ... 14000 | 33100            | 140         | 120                                                          | Q65110A9043   | 10              |
|  | LCW G6CP-DAFA-4J8K  | ○ warm white              | 0.42 / 0.4                              | 4500 ... 14000 | 29000            | 140         | 120                                                          | Q65111A0081   | 10              |
|                                                                                   | LCW G6CP-DAFA-4L8N  |                           |                                         |                |                  |             |                                                              | Q65111A0082   |                 |
|                                                                                   | LCW G6CP-DAFA-409Q  |                           |                                         |                |                  |             |                                                              | Q65111A0083   |                 |
|                                                                                   | LCW G6CP-DAFA-4R9T  |                           |                                         |                |                  |             |                                                              | Q65111A0079   |                 |
|                                                                                   | LCW G6CP-DAFA-4U9X  |                           |                                         |                |                  |             |                                                              | Q65111A0080   |                 |

## Automotive Applications

## Interior

## Power TOPLED

| Package                                                                             | Type               | Emission color          | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|--------------------|-------------------------|-----------------------------------------|---------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                    |                         |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                     |                    |                         | [nm / -]                                | [mcd]         | [mlm]            | [mA]      |                                                              |               |                 |
|    | LO E67F-BADA-24-1  | orange                  | 606                                     | 1800 ... 5600 | 11100            | 50        | 120                                                          | Q65111A0963   | 11              |
|    | LO E6SF-ABCB-24-1  | orange                  | 606                                     | 1400 ... 4500 | 8850             | 50        | 120                                                          | Q65110A7524   | 11              |
|    | LB E6SG-T1U2-35    | blue                    | 470                                     | 280 ... 710   | 1485             | 30        | 120                                                          | Q65110A7883   | 12              |
|                                                                                     | LT E6SG-AABB-35-1  | true green              | 525                                     | 1120 ... 2800 | 5880             |           |                                                              | Q65111A0322   |                 |
|   | LCB E6SG-AABB-2J8L | color on demand<br>blue | 0.2 / 0.3                               | 1120 ... 2800 | 5880             | 30        | 120                                                          | on request    | 12              |
|                                                                                     | LCW E6SG-V1AB-4R9T | warm white              | 0.42 / 0.4                              | 710 ... 1800  | 3765             | 30        | 120                                                          | Q65110A7737   | 12              |
|                                                                                     | LCW E6SG-V1AB-4U9X |                         |                                         |               |                  |           |                                                              | Q65110A7736   |                 |
|                                                                                     | LCW E6SG-V2BA-4L8N |                         |                                         | 900 ... 2240  | 4710             |           |                                                              | Q65110A7734   |                 |
|                                                                                     | LCW E6SG-V2BA-4J8K |                         |                                         |               |                  |           |                                                              | Q65110A7735   |                 |
|                                                                                     | LCW E6SG-V2BA-4O9Q |                         |                                         |               |                  |           |                                                              | Q65110A7733   |                 |
|  | LP E675-P2R1-25    | pure green              | 560                                     | 56 ... 140    | 294              | 50        | 120                                                          | Q65110A7298   | 18              |

| Package                                                                             | Type               | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|--------------------|----------------|-----------------------------------------|----------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                    |                |                                         | $E_V$          | $\Phi_V$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                     |                    |                | [nm / -]                                | [lux]          | [mlm]            | [mA]      |                                                              |               |                 |
|  | LO E63B-DAEB-24-1  | orange         | 606                                     | 4500 ... 11200 | 3900             | 50        | 30                                                           | Q65110A2338   | 19              |
|  | LB E63C-T2V2-35-34 | blue           | 469                                     | 355 ... 1120   | 400              | 30        | 20                                                           | Q65110A1974   | 20              |
|                                                                                     | LT E63C-BADB-35-1  | true green     | 525                                     | 1800 ... 7100  | 2700             |           |                                                              | Q65110A1981   |                 |

## Automotive Applications

## Interior

## TOPLED

| Package                                                                             | Type               | Emission color                                              | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy    |              |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |             |  |
|-------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------|--------------------------------------------|--------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|-------------|--|
|                                                                                     |                    |                                                             |                                            | $I_V$        | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |             |  |
|                                                                                     |                    |                                                             | [nm / -]                                   | [mcd]        | [mlm]            | [mA]         |                                                              |               |                 |             |  |
|    | LS T676-P2S1-1     | <span style="color: red;">●</span> super red                | 633                                        | 56 ... 224   | 420              | 20           | 120                                                          | Q65110A2153   | 21              |             |  |
|                                                                                     | LO T676-Q2T1-24    | <span style="color: orange;">●</span> orange                | 606                                        | 90 ... 355   | 670              |              |                                                              | Q65110A2150   |                 |             |  |
|                                                                                     | LY T676-Q2T1-26    | <span style="color: yellow;">●</span> yellow                | 587                                        |              |                  |              |                                                              | Q65110A2156   |                 |             |  |
|                                                                                     | LA T676-Q2T1-24    | <span style="color: orange;">●</span> amber                 | 615                                        |              |                  |              |                                                              | Q65110A9273   |                 |             |  |
|    | LS T67F-T2V2-1-1   | <span style="color: red;">●</span> super red                | 633                                        | 355 ... 900  | 1880             | 20           | 120                                                          | Q65110A9233   | 21              |             |  |
|                                                                                     | LR T67F-U1AA-1-1   | <span style="color: red;">●</span> red                      | 625                                        | 450 ... 1400 | 2780             |              |                                                              | Q65110A9232   |                 |             |  |
|                                                                                     | LA T67F-U2AB-24-1  | <span style="color: orange;">●</span> amber                 | 617                                        | 560 ... 1800 | 3540             |              |                                                              | Q65110A9268   |                 |             |  |
|                                                                                     | LO T67F-V1AB-24-1  | <span style="color: orange;">●</span> orange                | 606                                        | 710 ... 1800 | 3770             |              |                                                              | Q65110A9230   |                 |             |  |
|                                                                                     | LY T67F-U1AA-36-1  | <span style="color: yellow;">●</span> yellow                | 590                                        | 450 ... 1400 | 2780             |              |                                                              | Q65110A9231   |                 |             |  |
|                                                                                     | LP T67F-N1Q2-24    | <span style="color: green;">●</span> pure green             | 560                                        | 28 ... 112   | 210              |              |                                                              | Q65111A1851   |                 |             |  |
|                                                                                     | LP T67F-P1R2-35    |                                                             | 45 ... 180                                 | 340          | Q65111A1852      |              |                                                              |               |                 |             |  |
|                                                                                     | LG T67F-R1T1-24    |                                                             | <span style="color: green;">●</span> green | 570          | 112 ... 355      |              |                                                              | 700           |                 | Q65111A1826 |  |
|   | LB T673-L2P1-25    | <span style="color: blue;">●</span> blue                    | 471                                        | 14 ... 56    | 105              | 10           | 120                                                          | Q65111A1007   | 21              |             |  |
|                                                                                     | LT T673-N2S1-25    | <span style="color: green;">●</span> true green             | 529                                        | 35.5 ... 224 | 390              |              |                                                              | Q65110A1968   |                 |             |  |
|                                                                                     | LT T673-L2N2-35    |                                                             |                                            | 14 ... 45    | 90               | 2            |                                                              | Q65110A5953   |                 |             |  |
|  | LCB T67S-P2R2-2J8L | <span style="color: blue;">●</span> color on demand<br>blue | 0.2 / 0.3                                  | 56 ... 180   | 355              | 10           | 120                                                          | Q65111A2936   | 21              |             |  |
|  | LG T676-P1Q2-24    | <span style="color: green;">●</span> green                  | 570                                        | 45 ... 112   | 240              | 20           | 120                                                          | Q65110A2178   | 21              |             |  |
|                                                                                     | LP T676-L1M2-25    | <span style="color: green;">●</span> pure green             | 560                                        | 11.2 ... 28  | 60               | 20           | 120                                                          | Q65110A2179   | 21              |             |  |
|                                                                                     | LG T67K-G2K1-24    | <span style="color: green;">●</span> green                  | 570                                        | 2.24 ... 9   | 16               | 2            | 120                                                          | Q65110A2184   | 21              |             |  |
|                                                                                     | LP T67K-E1G2-25    | <span style="color: green;">●</span> pure green             | 560                                        | 0.71 ... 2.8 | 5                | 2            | 120                                                          | Q65110A2187   | 21              |             |  |
|  | LH T674-L2P1-1     | <span style="color: red;">●</span> hyper red                | 645                                        | 14 ... 56    | 105              | 10           | 120                                                          | Q65110A3596   | 21              |             |  |
|  | LW T673-P1S1-FKPL  | <span style="color: white;">○</span> white                  | 0.33 / 0.33                                | 45 ... 224   | 400              | 10           | 120                                                          | Q65111A2043   | 21              |             |  |
|  | LW T6SG-V2BA-JKPL  | <span style="color: white;">○</span> white                  | 0.33 / 0.33                                | 900 ... 2240 | 4710             | 20           | 120                                                          | Q65110A8982   | 52              |             |  |
|                                                                                     | LW T6SG-V1AA-JKPL  |                                                             |                                            | 710 ... 1400 | 3165             |              |                                                              | Q65110A8981   |                 |             |  |

## Automotive Applications

## Interior

## TOPLED

| Package                                                                             | Type                   | Emission color            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|------------------------|---------------------------|-----------------------------------------|---------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                        |                           |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                     |                        |                           | [nm / -]                                | [mcd]         | [mlm]            | [mA]         |                                                              |               |                 |
|    | LA T67D-U2AA-24-1      | ● amber                   | 617                                     | 560 ... 1400  | 2940             | 20           | 120                                                          | Q65110A9889   | 21              |
|                                                                                     | LO T67D-U2AA-24-1      | ● orange                  | 606                                     |               |                  |              |                                                              | Q65110A9919   |                 |
|                                                                                     | LR T67D-U1V2-1-1       | ● red                     | 625                                     | 450 ... 1120  | 2360             |              |                                                              | Q65110A9920   |                 |
|                                                                                     | LS T67D-T2V1-1-1       | ● super red               | 633                                     | 355 ... 900   | 1880             |              |                                                              | Q65110A9896   |                 |
|                                                                                     | LY T67D-U1V2-36-1      | ● yellow                  | 590                                     | 450 ... 1120  | 2360             |              |                                                              | Q65110A9898   |                 |
|    | LW TTSD-U1V1-JKPL-1    | ○ white                   | 0.33 / 0.33                             | 450 ... 900   | 2030             | 20           | 120                                                          | Q65111A0300   | 52              |
|                                                                                     | LW TTSD-U2V2-JKPL-1    |                           |                                         | 560 ... 1120  | 2520             |              |                                                              | Q65111A0301   |                 |
|                                                                                     | LCB TTSD-T2V1-2J8L     | ● color on demand<br>blue | 0.2 / 0.3                               | 355 ... 900   | 1880             | 10           |                                                              | Q65111A1160   |                 |
|    | LB TTSD-R1T2-25-1      | ● blue                    | 469                                     | 112 ... 450   | 810              | 20           | 120                                                          | Q65111A1639   | 52              |
|                                                                                     | LT TTSD-T2V2-36-1      | ● true green              | 525                                     | 355 ... 1120  | 2140             | 10           |                                                              | Q65111A2711   |                 |
|  | LW TVSG.BB-AZBZ-FBKC-1 | ○ white                   | 0.33 / 0.34                             | 1500 ... 2800 | 6500             | 20           | 120                                                          | Q65111A2884   | 24              |
|                                                                                     | LW TVSG.BB-BXCX-LBNC-1 |                           |                                         | 1800 ... 3300 | 7700             |              |                                                              | Q65111A2473   |                 |
|                                                                                     | LW TVSG.CB-AZBZ-JKPL-1 |                           | 0.33 / 0.33                             | 1500 ... 2800 | 6450             |              |                                                              | Q65111A2760   |                 |
|                                                                                     | LW TVSG.CB-BXCX-JKPL-1 |                           |                                         | 1800 ... 3300 | 7650             |              |                                                              | Q65111A3555   |                 |

## Automotive Applications

## Interior

## SIDELED

| Package                                                                             | Type              | Emission color                                                                                            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy                                                   |               |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |    |  |
|-------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|----|--|
|                                                                                     |                   |                                                                                                           |                                                                                           | $I_V$         | $\Phi_V$<br>typ. | at $I_F$ |                                                              |               |                 |    |  |
|                                                                                     |                   |                                                                                                           | [nm / -]                                                                                  | [mcd]         | [mlm]            | [mA]     |                                                              |               |                 |    |  |
|    | LB A673-L2P1-35   |  blue                    | 470                                                                                       | 14 ... 56     | 105              | 10       | 120                                                          | Q65110A1950   | 22              |    |  |
|                                                                                     | LT A673-N2S1-25   |  true green              | 529                                                                                       | 35.5 ... 224  | 390              |          |                                                              | Q65110A1962   |                 |    |  |
|                                                                                     | LT A6SG-V1AB-36   |  true green              | 528                                                                                       | 710 ... 1800  | 3765             | 20       | 120                                                          | Q65110A6030   | 53              |    |  |
|                                                                                     | LT A6SG-V2AB-35   |                                                                                                           |                                                                                           | 900 ... 1800  | 4050             |          |                                                              | Q65110A7884   |                 |    |  |
|    | LCB A6SG-U2AB     |  color on demand<br>blue | 0.2 / 0.3                                                                                 | 1800 ... 560  | 3540             | 20       | 120                                                          | on request    | 53              |    |  |
|   | LG A676-P1Q2-24   |  green                   | 570                                                                                       | 45 ... 112    | 235              | 20       | 120                                                          | Q65110A2285   | 22              |    |  |
|                                                                                     | LP A676-L1M2-25   |  pure green            | 560                                                                                       | 11.2 ... 28   | 60               | 20       | 120                                                          | Q65110A2286   | 22              |    |  |
|                                                                                     | LG A67K-G2K1-24   |  green                 | 570                                                                                       | 2.24 ... 9    | 15               | 2        | 120                                                          | Q65110A2291   | 22              |    |  |
|                                                                                     | LP A67K-E1G2-25   |  pure green            | 560                                                                                       | 0.71 ... 2.8  | 5                | 2        | 120                                                          | Q65110A2294   | 22              |    |  |
|                                                                                     | LO A67K-K1M2-24   |  orange                | 606                                                                                       | 7.1 ... 28    | 55               | 2        | 120                                                          | Q65110A4969   | 22              |    |  |
|                                                                                     | LS A67K-J1L2-1    |  super red             | 630                                                                                       | 4.5 ... 18    | 35               |          |                                                              | Q65110A2018   |                 |    |  |
|                                                                                     | LY A67K-J2M1-26   |  yellow                | 587                                                                                       | 5.6 ... 22.4  | 40               |          |                                                              | Q65110A2067   |                 |    |  |
|                                                                                     | LP A675-N1P2-25   |  pure green            | 560                                                                                       | 28 ... 71     | 150              | 30       | 120                                                          | Q65110A2310   | 22              |    |  |
|                                                                                     | LS A67F-U1AA-1    |  super red             | 633                                                                                       | 450 ... 1400  | 2780             | 30       | 120                                                          | Q65110A4723   | 22              |    |  |
|                                                                                     | LR A67F-U2AB-1    |  red                   | 625                                                                                       | 560 ... 1800  | 3540             |          |                                                              | Q65110A4729   |                 |    |  |
|                                                                                     | LA A67F-AABB-24-1 |  amber                 | 617                                                                                       | 1120 ... 2800 | 5880             |          |                                                              | Q65111A0513   |                 |    |  |
|                                                                                     | LO A67F-V2BB-24   |  orange                | 606                                                                                       | 900 ... 2800  | 5550             |          |                                                              | Q65110A4867   |                 |    |  |
|                                                                                     | LY A67F-U2AB-36   |  yellow                |                                                                                           | 560 ... 1800  | 3540             |          |                                                              | Q65110A4722   |                 |    |  |
|                                                                                     | LS A676-P2S1-1    |  super red             | 633                                                                                       | 56 ... 224    | 420              | 20       | 120                                                          | Q65110A2261   | 22              |    |  |
|                                                                                     | LA A676-Q2T1-1    |  amber                 | 615                                                                                       | 90 ... 355    | 670              |          |                                                              | Q65110A2255   |                 |    |  |
|                                                                                     | LO A676-Q2T1-24   |  orange                | 606                                                                                       |               |                  |          |                                                              | Q65110A2258   |                 |    |  |
|                                                                                     | LY A676-Q2T1-26   |  yellow                | 587                                                                                       |               |                  |          |                                                              | Q65110A2264   |                 |    |  |
|  | LW A673-P1S1-FKPL |  white                 | 0.33 / 0.33                                                                               | 45 ... 224    | 400              | 10       | 120                                                          | Q65111A2075   | 22              |    |  |
|                                                                                     | LW A67C-T2U2-5K8L |  white                 | 0.33 / 0.33                                                                               | 355 ... 710   | 1600             | 20       | 120                                                          | Q65110A1928   | 22              |    |  |
|                                                                                     | LW A67C-S2U2-5K8L |                                                                                                           |                                                                                           | 224 ... 710   | 1400             |          |                                                              | Q65110A1929   |                 |    |  |
|                                                                                     |                   | LW A6SG-V2BA-JKPL                                                                                         |  white | 0.33 / 0.33   | 900 ... 2240     | 4710     | 20                                                           | 120           | Q65110A8994     | 53 |  |

## Automotive Applications

## Interior

## Mini TOPLED

| Package                                                                             | Type                                                                                          | Emission color                                                                                            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                  |          |      | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------|----------|------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                                                                                               |                                                                                                           | $I_V$                                   | $\Phi_V$<br>typ. | at $I_f$ |      |                                                              |               |                 |
|                                                                                     |                                                                                               |                                                                                                           | [nm / -]                                | [mcd]            | [mlm]    | [mA] |                                                              |               |                 |
|    | LB M673-L1N2-25                                                                               |  blue                    | 471                                     | 11.2 ... 45      | 80       | 10   | 120                                                          | Q65111A1010   | 23              |
|                                                                                     | LT M673-N1R2-25                                                                               |  true green              | 529                                     | 28 ... 180       | 310      |      |                                                              | Q65110A5930   |                 |
|    | LS M676-P2S1-1                                                                                |  super red               | 633                                     | 56 ... 224       | 420      | 20   | 120                                                          | Q65110A2364   | 23              |
|                                                                                     | LA M676-Q2T1-1                                                                                |  amber                   | 615                                     | 90 ... 355       | 670      |      |                                                              | Q65110A2358   |                 |
|                                                                                     | LO M676-Q2T1-24                                                                               |  orange                  | 606                                     |                  |          |      |                                                              | Q65110A2361   |                 |
|                                                                                     | LY M676-Q2T1-26                                                                               |  yellow                  | 587                                     |                  |          |      |                                                              | Q65110A2367   |                 |
|                                                                                     | LG M676-N2Q1-24                                                                               |  green                   | 570                                     | 35.5 ... 90      | 190      |      |                                                              | Q65110A2389   |                 |
|                                                                                     | LP M676-L1M2-25                                                                               |  pure green              | 560                                     | 11.2 ... 28      | 60       |      |                                                              | Q65110A7809   |                 |
|   | LCB M67S-K2M1-2J8L                                                                            |  color on demand<br>blue | 0.2 / 0.3                               | 9 ... 22.4       | 40       | 2    | 120                                                          | Q65111A2807   | 23              |
|  | LG M676-N2Q1-24                                                                               |  green                 | 570                                     | 35.5 ... 90      | 190      | 20   | 120                                                          | Q65110A2389   | 23              |
|                                                                                     | LP M676-L1M2-25                                                                               |  pure green            | 560                                     | 11.2 ... 28      | 60       | 20   | 120                                                          | Q65110A7809   | 23              |
|                                                                                     | LG M67K-G1J2-24                                                                               |  green                 | 570                                     | 1.8 ... 7.1      | 13.4     | 2    | 120                                                          | Q65110A2395   | 23              |
|                                                                                     | LP M67K-D2G1-25                                                                               |  pure green            | 560                                     | 0.56 ... 2.24    | 4.2      | 2    | 120                                                          | Q65110A2398   | 23              |
|                                                                                     | LS M67K-H2L1-1                                                                                |  super red             | 630                                     | 3.55 ... 14      | 25       | 2    | 120                                                          | Q65110A2028   | 23              |
|                                                                                     | LO M67K-J2M1-24                                                                               |  orange                | 606                                     | 5.6 ... 22.4     | 42       |      |                                                              | Q65110A2055   |                 |
|                                                                                     | LY M67K-J1L2-26                                                                               |  yellow                | 587                                     | 4.5 ... 18       | 33.8     |      |                                                              | Q65110A2076   |                 |
|                                                                                     | LG M67K-G1H2-24                                                                               |  green                 | 570                                     | 1.8 ... 4.5      | 9.5      |      |                                                              | Q65110A2393   |                 |
|                                                                                     | LG M67K-H1J2-24                                                                               |                                                                                                           |                                         | 2.8 ... 7.1      | 14.8     |      |                                                              | Q65110A2394   |                 |
|                                                                                     | LG M67K-G1J2-24                                                                               |                                                                                                           |                                         | 1.8 ... 7.1      | 13.4     |      |                                                              | Q65110A2395   |                 |
|                                                                                     | LP M67K-D2F1-25                                                                               |                                                                                                           |                                         | 0.56 ... 1.4     | 2.9      |      |                                                              | Q65110A2396   |                 |
|                                                                                     | LP M67K-E2G1-25                                                                               |  pure green            | 560                                     | 0.9 ... 2.24     | 4.7      |      |                                                              | Q65110A2397   |                 |
|                                                                                     | LP M67K-D2G1-25                                                                               |                                                                                                           |                                         | 0.56 ... 2.24    | 4.2      |      |                                                              | Q65110A2398   |                 |
|                                                                                     | LP M675-M2P1-25                                                                               |  pure green            | 560                                     | 22.4 ... 56      | 120      | 30   | 120                                                          | Q65110A2399   | 23              |
| LO M67F-U2AB-24                                                                     |  orange    | 606                                                                                                       | 560 ... 1800                            | 3540             | 20       | 120  | Q65110A8973                                                  | 23            |                 |
| LS M67F-S2U2-1                                                                      |  super red | 633                                                                                                       | 224 ... 710                             | 1400             |          |      | Q65110A8888                                                  |               |                 |
| LY M67F-T2V2-36                                                                     |  yellow    | 590                                                                                                       | 355 ... 1120                            | 2210             |          |      | Q65110A8980                                                  |               |                 |
| LA M67F-V1AB-24                                                                     |  amber     | 617                                                                                                       | 710 ... 1800                            | 3770             |          |      | Q65111A1848                                                  |               |                 |
|  | LW M673-P1R2-FKPL                                                                             |  white                 | 0.33 / 0.33                             | 45 ... 180       | 340      | 10   | 120                                                          | Q65111A2039   | 23              |
|                                                                                     | LW M67C-S1T2-5K8L                                                                             |  white                 | 0.33 / 0.33                             | 180 ... 450      | 950      | 20   | 120                                                          | Q65110A1936   | 23              |
|                                                                                     | LW M67C-T1U2-5K8L                                                                             |                                                                                                           |                                         | 280 ... 710      | 1490     |      |                                                              | Q65110A1937   |                 |
|                                                                                     | LW M67C-S1U2-5K8L                                                                             |                                                                                                           |                                         | 180 ... 710      | 1340     |      |                                                              | Q65110A1938   |                 |

## Automotive Applications

## Interior

## Mini TOPLED

| Package                                                                           | Type               | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |           | Viewing angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|--------------------|----------------|-----------------------------------------|--------------|------------------|-----------|-----------------------------------------------------------|---------------|--------------|
|                                                                                   |                    |                |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\ell$ |                                                           |               |              |
|                                                                                   |                    |                | [nm / -]                                | [mcd]        | [mlm]            | [mA]      |                                                           |               |              |
|  | LCW MTSG-U2V2-4L8N | ○ warm white   | 0.38 / 0.38                             | 560 ... 1120 | 2520             | 10        | 120                                                       | Q65111A2101   | 28           |

## SMARTLED

| Package                                                                             | Type                | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |           | Viewing angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|---------------------|----------------|-----------------------------------------|--------------|------------------|-----------|-----------------------------------------------------------|---------------|--------------|
|                                                                                     |                     |                |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\ell$ |                                                           |               |              |
|                                                                                     |                     |                | [nm / -]                                | [mcd]        | [mlm]            | [mA]      |                                                           |               |              |
|   | LG L29K-F2J1-24     | ● green        | 570                                     | 1.4 ... 5.6  | 14               | 2         | 160                                                       | Q65110A1745   | 25           |
|                                                                                     | LS L29K-G1J2-1      | ● super red    | 630                                     | 1.8 ... 7.1  | 18               |           |                                                           | Q65110A1757   |              |
|                                                                                     | LO L29K-H2L1-24     | ● orange       | 606                                     | 3.55 ... 14  | 35               |           |                                                           | Q65110A1751   |              |
|                                                                                     | LY L29K-H1K2-26     | ● yellow       | 587                                     | 2.8 ... 11.2 | 28               |           |                                                           | Q65110A1766   |              |
|                                                                                     | LS L296-N1Q2-1      | ● super red    | 633                                     | 28 ... 112   | 280              | 20        | 160                                                       | Q65110A1754   | 25           |
|                                                                                     | LA L296-P1R2        | ● amber        | 615                                     | 45 ... 180   | 450              |           |                                                           | Q65110A3235   |              |
|                                                                                     | LO L296-P1S1-24     | ● orange       | 606                                     | 45 ... 224   | 538              |           |                                                           | Q65110A1905   |              |
|                                                                                     | LY L296-P1R2-26     | ● yellow       | 587                                     | 45 ... 180   | 450              |           |                                                           | Q65110A1764   |              |
|                                                                                     | LP L296-J2L2-25     | ● pure green   | 560                                     | 5.6 ... 18   | 35               |           |                                                           | Q65110A3342   |              |
|  | LW L283-Q1R2-3K8L-1 | ○ white        | 0.32 / 0.31                             | 71 ... 180   | 502              | 10        | 170 (horizontal)<br>130 (vertical)                        | Q65110A1647   | 25           |
|                                                                                     | LW L283-P2R1-3K8L-1 |                |                                         | 56 ... 140   | 392              |           |                                                           | Q65110A1550   |              |

## SMARTLED XR

|                                                                                     |                 |             |     |            |     |    |     |             |    |
|-------------------------------------------------------------------------------------|-----------------|-------------|-----|------------|-----|----|-----|-------------|----|
|  | LS L196-N1R2-1  | ● super red | 633 | 28 ... 180 | 430 | 20 | 150 | Q65111A0708 | 26 |
|                                                                                     | LY L196-P1S1-26 | ● yellow    | 587 | 45 ... 224 | 555 |    |     | Q65111A0703 |    |

## Automotive Applications

## Interior

## PointLED

| Package                                                                             | Type                 | Emission color            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|----------------------|---------------------------|-----------------------------------------|--------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                      |                           |                                         | $I_V$        | $\Phi_V$<br>typ. | at $f_z$ |                                                              |               |                 |
|                                                                                     |                      |                           | [nm / -]                                | [mcd]        | [mlm]            | [mA]     |                                                              |               |                 |
|    | LS P47F-U1AA-1-1     | ● super red               | 633                                     | 450 ... 1400 | 2780             | 30       | 120                                                          | Q65110A4859   | 27              |
|                                                                                     | LR P47F-U2AB-1-1     | ● red                     | 625                                     | 560 ... 1800 | 3540             |          |                                                              | Q65110A4861   |                 |
|                                                                                     | LA P47F-V2BB-24-3A4B | ● amber                   | 617                                     | 900 ... 2800 | 5550             |          |                                                              | Q65110A4857   |                 |
|                                                                                     | LA P47F-V2BB-24-3B5A |                           |                                         |              |                  |          |                                                              | Q65110A9267   |                 |
|                                                                                     | LY P47F-U2AB-36-4A5B | ● yellow                  | 590                                     | 560 ... 1800 | 3540             |          |                                                              | Q65110A9266   |                 |
|                                                                                     | LY P47F-U2AB-36-3B5A |                           |                                         |              |                  |          |                                                              | Q65110A4860   |                 |
|                                                                                     | LP P47F-P2S1-35      | ● pure green              | 560                                     | 56 ... 224   | 420              |          |                                                              | Q65111A1828   |                 |
|                                                                                     | LP P47F-P1R1-24      |                           |                                         | 45 ... 140   | 280              |          |                                                              | Q65111A1827   |                 |
|    | LB P4SG-S2U1-35-1    | ● blue                    | 470                                     | 224 ... 560  | 1180             | 20       | 120                                                          | Q65110A8252   | 27              |
|                                                                                     | LT P4SG-V1AB-36-1    | ● true green              | 528                                     | 710 ... 1800 | 3770             |          |                                                              | Q65110A7127   |                 |
|   | LCB P473-P2R2        | ● color on demand<br>blue | 0.2 / 0.3                               | 180 ... 56   | 350              | 10       | 120                                                          | on request    | 54              |
|  | LO P476-R2T1-24      | ● orange                  | 606                                     | 140 ... 355  | 740              | 20       | 120                                                          | Q65110A7018   | 54              |
|                                                                                     | LY P476-Q2T1-26      | ● yellow                  | 587                                     | 90 ... 355   | 670              | 20       | 120                                                          | Q65110A4881   | 54              |
|                                                                                     | LS P47K-H1K2-1       | ● super red               | 630                                     | 2.8 ... 11.2 | 21               | 2        | 120                                                          | Q65110A2733   | 54              |
|                                                                                     | LY P47K-J1L2-26      | ● yellow                  | 587                                     | 4.5 ... 18   | 34               |          |                                                              | Q65110A2738   |                 |
|                                                                                     | LG P47K-G2K1-24      | ● green                   | 570                                     | 2.24 ... 9   | 17               |          |                                                              | Q65110A2730   |                 |
|  | LW P473-Q2S1-FKPL-1  | ○ white                   | 0.33 / 0.33                             | 90 ... 224   | 470              | 10       | 120                                                          | Q65111A2066   | 54              |
|                                                                                     | LW P4SG-V2AB-JKPL-1  | ○ white                   | 0.33 / 0.33                             | 900 ... 1800 | 4050             | 20       | 120                                                          | Q65110A9047   | 27              |

## Automotive Applications

## Interior

## Micro SIDELED

| Package                                                                           | Type            | Emission color                                                                              | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |  |  |
|-----------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|-----------------------------------------|--------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|--|--|
|                                                                                   |                 |                                                                                             |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\phi$ |                                                              |               |                 |  |  |
|                                                                                   |                 |                                                                                             | [nm / -]                                | [mcd]        | [mlm]            | [mA]      |                                                              |               |                 |  |  |
|  | LS Y876-P2S1-1  |  super red | 633                                     | 56 ... 224   | 420              | 20        | 120                                                          | Q65110A2412   | 29              |  |  |
|                                                                                   | LO Y876-Q2T1-24 |  orange    | 606                                     | 90 ... 355   | 670              |           |                                                              | Q65110A2410   |                 |  |  |
|                                                                                   | LY Y876-Q2T1-26 |  yellow    | 587                                     |              |                  |           |                                                              | Q65110A2415   |                 |  |  |
|                                                                                   | LG Y876-P1Q2-24 |  green     | 570                                     | 45 ... 112   | 240              |           |                                                              | Q65110A8025   |                 |  |  |
|                                                                                   | LR Y8SF-U1V2-1  |  red       | 625                                     | 450 ... 1120 | 2400             | 20        | 120                                                          | Q65110A8972   | 29              |  |  |
|                                                                                   | LY Y8SF-U1V2-36 |  yellow    | 590                                     |              |                  |           |                                                              | Q65110A8977   |                 |  |  |

## MULTILED

| Package                                                                             | Type               | Emission color                                                                            | Cx/Cy       | $I_v$         |                            | Viewing angle at 50 % $I_v$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------|-------------|---------------|----------------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                    |                                                                                           |             | [mcd]         | at $\phi$<br>[mA]          |                                                     |               |              |
|  | LTRBGFSF-ABCB-QKY0 |  white | 0.31 / 0.31 | 1400 ... 4500 | 20 (T)<br>20 (R)<br>10 (B) | 120                                                 | Q65110A9484   | 42           |

## Multi TOPLED

| Package                                                                             | Type                      | Emission color                                                                                                                                                                              | $\lambda_{\text{dom}}$ (typ.) | $I_v$ [mcd] |              |                   | Viewing angle at 50 % $I_v$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------|--------------|-------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                           |                                                                                                                                                                                             |                               | color 1     | color 2      | at $\phi$<br>[mA] |                                                     |               |              |
|  | LOG T77K-JL-1-0+GJ-1      |  orange<br> green     | 606 / 570                     | 4.5 ... 18  | 1.8 ... 7.1  | 2                 | 120                                                 | Q65110A3338   | 51           |
|                                                                                     | LSG T77K-JL-1-0+HK-1-0    |  super red<br> green  | 630 / 570                     | 4.5 ... 18  | 2.8 ... 11.2 | 2                 | 120                                                 | Q65111A0238   | 51           |
|  | LSY T676-P2R1-1-0+Q2S1-35 |  super red<br> yellow | 633 / 587                     | 56 ... 140  | 90 ... 224   | 20                | 120                                                 | Q65110A2446   | 16           |
|                                                                                     | LSG T676-P7Q7-1+N7P7-24   |  super red<br> green  | 633 / 570                     | 56 ... 140  | 35.5 ... 90  | 20                | 120                                                 | Q65110A4186   | 16           |
|                                                                                     | LSG T676-P7R-1-0+N7P9-24  |                                                                                                                                                                                             |                               | 56 ... 180  | 35.5 ... 100 |                   |                                                     | Q65111A1615   |              |

## Consumer Applications

## Mobile Applications

## CERAMOS

| Package                                                                             | Type                  | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |             |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-----------------------|----------------|-----------------------------------------|-------------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                       |                |                                         | $\Phi_V$    | $I_V$ typ. | at $\ell$ |                                                              |               |                 |
|                                                                                     |                       |                | [nm / -]                                | [lm]        | [cd]       | [mA]      |                                                              |               |                 |
|    | LUW C9EP-7K6L-EG      | ○ ultra white  | 0.31 / 0.32                             | 90 ... 140  | 38         | 500       | 120                                                          | Q65111A1126   | 30              |
|    | LUW C9SP-8K6L-EG      | ○ ultra white  | 0.31 / 0.32                             | 100 ... 140 | 39.6       | 500       | 120                                                          | Q65111A1127   | 30              |
|    | LUW C9EN-N4N6-EG      | ○ ultra white  | 0.31 / 0.32                             | 75 ... 105  | 28         | 500       | 120                                                          | Q65110A9846   | 30              |
|   | LUW CAEP-LFLZ-G3-E    | ○ ultra white  | 0.33 / 0.36                             | 125 ... 180 | 45.8       | 500       | 120                                                          | Q65111A0768   | 55              |
|  | LUW CAEP.G4-MXMZ-G3-1 | ○ ultra white  | 0.33 / 0.36                             | 180 ... 280 | 69         | 1000      | 120                                                          | Q65111A2947   | 55              |
|                                                                                     | LUW CAEP.G4-MYNX-G3-1 |                |                                         | 210 ... 330 | 81         |           |                                                              | Q65111A1991   |                 |

## FIREFLY

| Package                                                                             | Type                | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |            |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|---------------------|----------------|-----------------------------------------|------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                     |                |                                         | $I_V$      | $\Phi_V$<br>typ. | at $\ell$ |                                                              |               |                 |
|                                                                                     |                     |                | [nm / -]                                | [mcd]      | [mlm]            | [mA]      |                                                              |               |                 |
|  | LT VH9G-Q2S2-25-1   | ● true green   | 532                                     | 90 ... 280 | 560              | 5         | 140 (horizontal)<br>165 (vertical)                           | Q65110A9228   | 31              |
|                                                                                     | LB VH9G-N1P2-35-1   | ● blue         | 470                                     | 28 ... 71  | 150              |           |                                                              | Q65110A8083   |                 |
|  | LW VH8G-Q2S2-4M6N-1 | ○ white        | 0.285 / 0.275                           | 90 ... 280 | 560              | 5         | 140 (horizontal)<br>180 (vertical)                           | Q65110A8090   | 31              |
|  | LA VH9F-Q1R2-24     | ● amber        | 615                                     | 71 ... 180 | 380              | 5         | 140 (horizontal)<br>165 (vertical)                           | Q65110A8082   | 31              |
|                                                                                     | LR VH9F-P2R1-1      | ● red          | 625                                     | 56 ... 140 | 290              |           |                                                              | Q65110A8088   |                 |

## Consumer Applications

## Backlighting

## Multi CERAMOS

| Package                                                                           | Type               | Emission color | Cx/Cy       | Viewing angle at 50 % I <sub>V</sub> 2φ typ. [°] |                               | Ordering Code | Package Fig. |    |
|-----------------------------------------------------------------------------------|--------------------|----------------|-------------|--------------------------------------------------|-------------------------------|---------------|--------------|----|
|                                                                                   |                    |                |             | I <sub>V</sub> [mcd]                             | at I <sub>F</sub> [mA]        |               |              |    |
|  | LRTDC9TP-EAFB-GHQN | ○ white        | 0.28 / 0.21 | 7100 ... 18000                                   | 140 (R)<br>160 (T)<br>125 (D) | 120           | Q65110A8562  | 32 |

## Micro SIDELED

| Package                                                                           | Type                | Emission color | $\lambda_{dom}$ (typ.)/<br>Cx/Cy<br>[nm / -] | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] |                        |                  | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|---------------------|----------------|----------------------------------------------|-----------------------------------------------|------------------------|------------------|---------------|--------------|
|                                                                                   |                     |                |                                              | $I_V$<br>[mcd]                                | $\Phi_V$ typ.<br>[mlm] | at $I_f$<br>[mA] |               |              |
|  | LW Y1SG-AEBE-EKFM-1 | ○ white        | 0.3 / 0.28                                   | 1000 ... 1600                                 | 3900                   | 20               | 120           | Q65110A9541  |
|                                                                                   | LW Y1SG-AEBE-GKJM-1 |                |                                              |                                               |                        |                  |               | Q65110A9542  |
|                                                                                   | LW Y1SG-AFBF-EKFM-1 |                |                                              | 1200 ... 1800                                 | 4500                   |                  |               | Q65110A9543  |
|                                                                                   | LW Y1SG-AFBF-GKJM-1 |                |                                              |                                               |                        |                  |               | Q65110A9544  |
|                                                                                   | LW Y1SG-BFCF-EKFM-1 |                |                                              | 1600 ... 2200                                 | 5700                   |                  |               | Q65110A9545  |
|                                                                                   | LW Y1SG-BFCF-GKJM-1 |                |                                              |                                               |                        |                  |               | Q65110A9546  |

## Industry Applications

## Projection

## OSRAM OSTAR Projection

| Package | Type | Emission color | Color coordinates<br>Cx/Cy typ. | $\Phi_V$ | at $I_f$ | Viewing angle at<br>50 % $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|---------------------------------|----------|----------|-----------------------------------------------------------|---------------|-----------------|
|         |      |                |                                 | [lm]     | [mA]     |                                                           |               |                 |

## OSRAM OSTAR Projection Cube

|                                                                                   |                 |                                                                                                   |               |             |     |     |             |    |
|-----------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------|---------------|-------------|-----|-----|-------------|----|
|  | LCG H9RM-KZLZ-1 |  converted green | 0.318 / 0.642 | 97 ... 180  | 350 | 120 | Q65111A1779 | 33 |
|  | LCG H9RN-MXNX-1 |  converted green | 0.318 / 0.642 | 180 ... 330 | 700 | 120 | Q65111A1778 | 33 |

| Package | Type | Emission color | $\lambda_{dom}$ (typ.)/<br>Cx/Cy | $\Phi_V$ | at $I_f$ | Viewing angle at<br>50 % $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|----------------------------------|----------|----------|-----------------------------------------------------------|---------------|-----------------|
|         |      |                | [nm / -]                         | [lm]     | [mA]     |                                                           |               |                 |

## OSRAM OSTAR Projection Power

|                                                                                     |                  |                                                                                                     |               |               |      |     |             |    |
|-------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------|---------------|---------------|------|-----|-------------|----|
|  | LE A P3W-TXTZ-1  |  amber           | 617           | 2800 ... 4500 | 6000 | 120 | Q65110A9038 | 66 |
|  | LE CG P3W-8U6V-1 |  converted green | 0.318 / 0.642 | 6300 ... 9000 | 6000 | 130 | Q65111A1846 | 66 |
|                                                                                     | LE B P3W-GXHX-24 |  blue            | 459           | 18 ... 33     | 6000 | 120 | Q65110A9036 | 66 |

## Industry Applications

## Projection

## OSRAM OSTAR Projection

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy<br><br>[nm / -] | $\Phi_V$ | at $\xi$ | Viewing angle at<br>50 % $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|---------------------------------------------------------|----------|----------|-----------------------------------------------------------|---------------|-----------------|
|         |      |                |                                                         | [lm]     | [mA]     |                                                           |               |                 |

## OSRAM OSTAR Projection Compact

|                                                                                     |                   |                                                                                                     |               |              |      |     |             |    |
|-------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------|---------------|--------------|------|-----|-------------|----|
|    | LE A Q9WM-HYJY-1  |  amber             | 617           | 33 ... 61    | 350  | 120 | Q65111A1647 | 35 |
|    | LE T Q9WM-JXKX-25 |  true green        | 525           | 45 ... 82    | 350  | 120 | Q65110A9131 | 35 |
|    | LE A Q9WN-JZKZ-1  |  amber             | 617           | 61 ... 112   | 700  | 120 | Q65111A1648 | 36 |
|   | LE T Q9WN-KZLZ-25 |  true green      | 525           | 97 ... 180   | 700  | 120 | Q65110A9134 | 36 |
|  | LE A Q9WP-KZLZ-1  |  amber           | 617           | 97 ... 180   | 1400 | 120 | Q65110A9145 | 34 |
|  | LE T Q9WP-MXNX-24 |  true green      | 536           | 180 ... 330  | 1400 | 120 | Q65110A9137 | 34 |
|  | LE CG Q9WP-6N5P-1 |  converted green | 0.318 / 0.642 | 315 ... 500  | 1400 | 130 | Q65111A1356 | 34 |
|  | LE A Q6WP-MYNY-1  |  amber           | 617           | 210 ... 390  | 1400 | 120 | Q65111A2071 | 38 |
|  | LE CG Q6WP-5Q8Q-1 |  converted green | 0.318 / 0.642 | 710 ... 1120 | 1400 | 130 | Q65111A2074 | 38 |

## Industry Applications

## Projection

## OSRAM OSTAR Projection

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy<br><br>[nm / -] | $\Phi_E$ | at $\varphi$ | Viewing angle at<br>50 % $I_V$<br>2 $\varphi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|---------------------------------------------------------|----------|--------------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                                         | [mW]     | [mA]         |                                                              |               |                 |

## OSRAM OSTAR Projection Compact

|                                                                                    |                   |        |     |               |      |     |             |    |
|------------------------------------------------------------------------------------|-------------------|--------|-----|---------------|------|-----|-------------|----|
|   | LE B Q9WP-3V7A-24 | ● blue | 459 | 900 ... 1590  | 1400 | 120 | Q65110A9144 | 34 |
|   | LE B Q9WM-4S3T-24 | ● blue | 460 | 250 ... 400   | 350  | 120 | Q65111A2345 | 35 |
|   | LE B Q9WN-2U2V-24 | ● blue | 460 | 500 ... 900   | 700  | 120 | Q65111A2386 | 36 |
|  | LE B Q6WP-5B5C-24 | ● blue | 459 | 1800 ... 3150 | 1400 | 120 | Q65111A2073 | 38 |

| Package                                                                             | Type                               | Emission color                    | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | color 1<br>$\Phi_V$ | color 2<br>$\Phi_V$ | color 3<br>$\Phi_E$ | at $\varphi$ | Viewing angle at<br>50 % $I_V$<br>2 $\varphi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|------------------------------------|-----------------------------------|----------------------------------------------|---------------------|---------------------|---------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                                    |                                   |                                              | [lm]                | [lm]                | [mW]                |              |                                                              |               |                 |
|  | LE ATB N7WM-HYJX-1+JYKX-23+4S3T-CE | ● amber<br>● true green<br>● blue | 617 / 525<br>/ 460                           | 33 ... 52           | 52 ... 82           | 250 ...<br>400      | 350          | 120                                                          | Q65111A0733   | 56              |

| Package                                                                             | Type                       | Emission color    | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | color 1<br>$\Phi_E$ | color 2<br>$\Phi_V$ | at $\varphi$ | Viewing angle at 50<br>% $I_V$<br>2 $\varphi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|----------------------------|-------------------|----------------------------------------------|---------------------|---------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                            |                   |                                              | [mW]                | [lm]                |              |                                                              |               |                 |
|  | LE BA Q6WM-4S3T-CE+HYJY-23 | ● blue<br>● amber | 460 / 617                                    | 250 ... 400         | 33 ... 61           | 350          | 120                                                          | Q65111A1646   | 37              |

## Industry Applications

## Signs and Signals

## OSLON SX

| Package                                                                           | Type                 | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|---------------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                      |                                                                                               |                                         | $\Phi_V$      | $I_V$ typ. | at $\phi$ |                                                              |               |                 |
|                                                                                   |                      |                                                                                               | [nm / -]                                | [lm]          | [cd]       | [mA]      |                                                              |               |                 |
|  | LA CN5M-GAHA-24-1    |  amber       | 617                                     | 18 ... 35.5   | 18.7       | 140       | 60                                                           | Q65111A1207   | 17              |
|                                                                                   | LY CN5M-FAGA-36-1    |  yellow      | 590                                     | 11.2 ... 22.4 | 11.8       |           |                                                              | Q65110A8680   |                 |
|  | LT CN5M-GAHB-25-1    |  true green  | 528                                     | 18 ... 45     | 22.1       | 140       | 60                                                           | Q65110A9086   | 17              |
|  | LUW CN5M-GBHB-5P7R-1 |  ultra white | 0.32 / 0.31                             | 22.4 ... 45   | 23.6       | 140       | 60                                                           | Q65111A3434   | 3               |

| Package                                                                             | Type              | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |             |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|-------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                   |                                                                                               |                                         | $\Phi_E$    | at $\phi$ |                                                              |               |                 |
|                                                                                     |                   |                                                                                               | [nm / -]                                | [mW]        | [mA]      |                                                              |               |                 |
|  | LD CN5M-4Q4R-35-1 |  deep blue | 453                                     | 100 ... 180 | 140       | 60                                                           | Q65110A8683   | 17              |
|                                                                                     | LD CN5M-1R1S-35-1 |                                                                                               |                                         | 112 ... 201 |           |                                                              | Q65110A9085   |                 |

## Industry Applications

## Signs and Signals

## OSLON Signal

| Package                                                                           | Type              | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy<br>[nm / -] | $\Phi_V$      | $I_V$ typ. | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                   |                                                                                               |                                                     | [lm]          | [cd]       | [mA]     |                                                              |               |                 |
|  | LV CK7P-JYKZ-25   |  verde green | 505                                                 | 52 ... 112    | 48.6       | 350      | 80                                                           | Q65111A2323   | 39              |
|  | LB CL7P-HZJZ-3B6B |  blue        | 0.12 / 0.16                                         | 39 ... 71     | 32.6       | 350      | 80                                                           | Q65111A2433   | 39              |
|  | LA CP7P-JUKR-34   |  amber       | 617                                                 | 65.8 ... 89.2 | 43.1       | 350      | 80                                                           | Q65111A3124   | 39              |
|                                                                                   | LY CP7P-JRJU-45   |  yellow      | 590                                                 | 52 ... 71     | 34.2       | 350      | 80                                                           | Q65111A3125   | 39              |

## Industry Applications

## Signs and Signals

## OSLON Black

| Package                                                                           | Type                 | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |            |            |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                      |                                                                                               |                                         | $\Phi_V$   | $I_V$ typ. | at $I_F$ |                                                              |               |                 |
|                                                                                   |                      |                                                                                               | [nm / -]                                | [lm]       | [cd]       | [mA]     |                                                              |               |                 |
|  | LA H9GP-JYKY-24-1    |  amber       | 617                                     | 52 ... 97  | 36.6       | 350      | 90                                                           | Q65111A1982   | 5               |
|                                                                                   | LR H9GP-HZKX-1-1     |  red         | 625                                     | 39 ... 82  | 29.7       |          |                                                              | Q65111A1707   |                 |
|                                                                                   | LY H9GP-HZKX-36-1    |  yellow      | 590                                     |            |            |          |                                                              | Q65111A1708   |                 |
|                                                                                   | LS H9GP-HYJY-1-9B9C  |  super red   | 633                                     | 33 ... 61  | 23.1       |          |                                                              | Q65111A2566   |                 |
|  | LB H9GP-GYHY-35-1    |  blue        | 470                                     | 21 ... 39  | 15         | 350      | 90                                                           | Q65111A1710   | 5               |
|                                                                                   | LT H9GP-JZKZ-26-1    |  true green  | 528                                     | 61 ... 112 | 43.3       |          |                                                              | Q65111A1717   |                 |
|  | LUW H9GP-KYLY-4C8E-1 |  ultra white | 0.31 / 0.32                             | 82 ... 150 | 55.7       | 350      | 90                                                           | Q65111A0924   | 5               |
|                                                                                   | LUW H9GP-KYLY-5F8G-1 |                                                                                               |                                         |            |            |          |                                                              | Q65111A0925   |                 |

| Package                                                                             | Type              | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_E$    | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-------------------|----------------|-----------------------------------------|-------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                   |                |                                         | [mW]        | [mA]     |                                                              |               |                 |
|  | LD H9GP-3T2U-35-1 | ● deep blue    | 455                                     | 355 ... 560 | 350      | 90                                                           | Q65111A1709   | 5               |

## Industry Applications

## Signs and Signals

## DRAGON

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |          |            |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $\Phi_V$ | $I_V$ typ. | at $\phi$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [lm]     | [cd]       | [mA]      |                                                              |               |                 |

## Golden DRAGON

|                                                                                   |                 |                                                                                              |     |           |      |     |     |             |   |
|-----------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------|-----|-----------|------|-----|-----|-------------|---|
|  | LB W5SM-FZHX-35 |  blue       | 467 | 15 ... 33 | 7.9  | 350 | 120 | Q65110A9221 | 6 |
|                                                                                   | LT W5SM-JYKY-25 |  true green | 528 | 52 ... 97 | 24.6 | 350 | 120 | Q65110A9212 | 6 |
|                                                                                   | LT W5SM-JXKX-36 |                                                                                              |     | 45 ... 82 | 21   |     |     | Q65110A8417 |   |

| Package                                                                             | Type            | Emission color                                                                                | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |             |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------|-----------------------------------------|-------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                 |                                                                                               |                                         | $\Phi_E$    | at $\phi$ |                                                              |               |                 |
|                                                                                     |                 |                                                                                               | [nm / -]                                | [mW]        | [mA]      |                                                              |               |                 |
|  | LD W5SM-4S4T-35 |  deep blue | 455                                     | 250 ... 450 | 350       | 120                                                          | Q65110A9216   | 6               |

## Industry Applications

## Signs and Signals

## DRAGON

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_V$ | $I_V$ typ. | at $\varphi$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\varphi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|------------|--------------|-----------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | [lm]     | [cd]       | [mA]         |                                                                 |               |                 |

## Platinum DRAGON

|                                                                                    |                    |                                                                                                 |            |            |      |     |     |             |   |
|------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------|------------|------------|------|-----|-----|-------------|---|
|   | LB W5SN-GZJX-35    |  blue          | 470        | 24 ... 52  | 12.5 | 700 | 120 | Q65110A7464 | 8 |
|                                                                                    | LB W5SN-GYHZ-25    |                                                                                                 |            | 21 ... 45  | 10.9 |     |     | Q65110A9222 |   |
|                                                                                    | LT W5SN-KYLY-25    |  true green    | 528        | 82 ... 150 | 38.3 | 700 | 120 | Q65110A9211 | 8 |
|   | LCW W5SN-KYLY-4L8N |  warm white    | 0.42 / 0.4 | 82 ... 150 | 38.3 | 700 | 120 | Q65110A7706 | 8 |
|                                                                                    | LCW W5SN-KXLX-409Q |                                                                                                 |            | 71 ... 130 | 33.2 |     |     | Q65110A7708 |   |
|                                                                                    | LCW W5SN-KYLY-4J8K |                                                                                                 |            | 82 ... 150 | 38.3 |     |     | Q65110A7707 |   |
|                                                                                    | LCW W5SN-KXLX-4U9X |                                                                                                 |            | 71 ... 130 | 33.2 |     |     | Q65110A9713 |   |
|                                                                                    | LCW W5SN-KYLY-4R9T |                                                                                                 |            | 82 ... 150 | 38.3 |     |     | Q65110A9717 |   |
|  | LV W5SN-KXLX-25    |  verde green | 505        | 71 ... 130 | 33.2 | 700 | 120 | Q65111A0320 | 8 |

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_E$ | at $\varphi$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\varphi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|--------------|-----------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | [mW]     | [mA]         |                                                                 |               |                 |

|                                                                                     |                 |                                                                                               |     |             |     |     |             |   |
|-------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------|-----|-------------|-----|-----|-------------|---|
|  | LD W5SN-1U2V-35 |  deep blue | 455 | 450 ... 900 | 700 | 120 | Q65111A0040 | 8 |
|-------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------|-----|-------------|-----|-----|-------------|---|

## Industry Applications

## Signs and Signals

## TOPLED

| Package                                                                           | Type             | Emission color                                                                           | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------|-----------------------------------------|--------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                  |                                                                                          |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                   |                  |                                                                                          | [nm / -]                                | [mcd]        | [mlm]            | [mA]         |                                                              |               |                 |
|  | LR T68F-U1AA-1-1 |  red    | 625                                     | 450 ... 1400 | 2780             | 20           | 120                                                          | Q65110A7321   | 65              |
|  | LY T686-Q2T1-26  |  yellow | 587                                     | 90 ... 355   | 670              | 20           | 120                                                          | Q65110A2213   | 21              |
|  | LV T6SG-V1BB-25  |  verde  | 505                                     | 710 ... 2800 | 5270             | 20           | 120                                                          | Q65111A1658   | 21              |

## TOPLED Black

|                                                                                    |                   |                                                                                                |     |               |      |    |    |             |    |
|------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----|---------------|------|----|----|-------------|----|
|  | LO T66F-AACA-24-1 |  orange      | 606 | 1120 ... 3550 | 2335 | 20 | 55 | Q65111A0147 | 57 |
|                                                                                    | LR T66F-AABB-1-1  |  red        | 625 | 1120 ... 2800 | 1960 |    |    | Q65111A1792 |    |
|                                                                                    | LY T66F-ABBB-46-1 |  yellow     | 590 | 1400 ... 2800 | 2100 |    | 55 | Q65110A8570 |    |
|                                                                                    | LY T66F-AABA-35-1 |                                                                                                |     | 1120 ... 2240 | 1680 |    |    | Q65110A8569 |    |
|                                                                                    | LB T66G-U1BA-59   |  blue       | 470 | 450 ... 2240  | 1345 | 20 | 55 | Q65111A0145 | 57 |
|                                                                                    | LT T66G-BBDA-29   |  true green | 528 | 2240 ... 5600 | 3920 |    |    | Q65111A0146 |    |

| Package                                                                             | Type              | Emission color                                                                                 | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |            |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|----------------|------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                   |                                                                                                |                                         | $E_V$          | $I_V$ typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                     |                   |                                                                                                | [nm / -]                                | [lux]          | [mcd]      | [mA]         |                                                              |               |                 |
|  | LO T64F-CBEB-24-1 |  orange     | 606                                     | 3550 ... 11200 | 6040       | 20           | 30                                                           | Q65111A0265   | 40              |
|                                                                                     | LR T64F-BBDB-1-1  |  red        | 625                                     | 2240 ... 7100  | 3820       |              |                                                              | Q65111A0256   |                 |
|                                                                                     | LY T64F-BBDA-35-1 |  yellow     | 590                                     | 2240 ... 5600  | 3210       |              |                                                              | Q65111A0257   |                 |
|                                                                                     | LY T64F-CADB-46-1 |                                                                                                |                                         | 2800 ... 7100  | 4050       |              |                                                              | Q65111A0258   |                 |
|                                                                                     | LB T64G-V1CA-59   |  blue       | 470                                     | 710 ... 3550   | 1740       | 20           | 30                                                           | Q65111A0143   | 40              |
|                                                                                     | LT T64G-DAFA-29   |  true green | 528                                     | 4500 ... 14000 | 7580       |              |                                                              | Q65111A0144   |                 |
|                                                                                     | LV T64G-BBEA-25   |  verde      | 505                                     | 2240 ... 9000  | 4590       |              |                                                              | Q65111A2028   |                 |

## Industry Applications

## Signs and Signals

## MULTILED

| Package                                                                           | Type                            | Emission color            | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd]  |              |             |                   | Viewing angle at 50 % $I_V$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|---------------------------------|---------------------------|----------------------------------------------|--------------|--------------|-------------|-------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                   |                                 |                           |                                              | color 1      | color 2      | color 3     | at $\phi$<br>[mA] |                                                     |               |              |
|  | LRTBGFTM-S5T9-1+U7V5-29+R5S7-49 | red<br>true green<br>blue | 625 / 528 / 470                              | 201 ... 630  | 560 ... 1250 | 125 ... 355 | 20                | 120                                                 | Q65111A3098   | 41           |
|  | LRTBGFTG-T7AW-1+V7A7-29+R5T9-49 | red<br>true green<br>blue | 625 / 528 / 470                              | 355 ... 1800 | 900 ... 2240 | 125 ... 630 | 20                | 120                                                 | Q65110A8177   | 42           |
|                                                                                   | LRTBGFTM-ST7-1+VV9-29+Q5R7-49   | red<br>true green<br>blue | 625 / 528 / 470                              | 180 ... 560  | 710 ... 1590 | 80 ... 224  | 10                | 120                                                 | Q65110A9407   | 42           |

| Package                                                                             | Type                  | Emission color    | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd] |              |                   | Viewing angle at 50 % $I_V$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|-----------------------|-------------------|----------------------------------------------|-------------|--------------|-------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                       |                   |                                              | color 1     | color 2      | at $\phi$<br>[mA] |                                                     |               |              |
|  | LRT GFTM-ST7-1+VV9-29 | red<br>true green | 625 / 528                                    | 180 ... 560 | 710 ... 1590 | 10                | 120                                                 | Q65111A0439   | 58           |

## Multi CERAMOS

| Package                                                                             | Type                            | Emission color            | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd]   |                |               |                   | Viewing angle at 50 % $I_V$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|---------------------------------|---------------------------|----------------------------------------------|---------------|----------------|---------------|-------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                                 |                           |                                              | color 1       | color 2        | color 3       | at $\phi$<br>[mA] |                                                     |               |              |
|  | LRTBC9TP-CWD5-1+D5E7-25+A7CW-49 | red<br>true green<br>blue | 625 / 528 / 470                              | 2800 ... 8000 | 5000 ... 14000 | 1400 ... 4500 | 140               | 120                                                 | Q65111A2182   | 32           |

## Industry Applications

## Signs and Signals

## Multi CHIPLED

| Package                                                                           | Type                         | Emission color                                             | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd] |             |            |                   | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------|----------------------------------------------|-------------|-------------|------------|-------------------|-----------------------------------------------|---------------|--------------|
|                                                                                   |                              |                                                            |                                              | color 1     | color 2     | color 3    | at $\phi$<br>[mA] |                                               |               |              |
|  | LRTBR98G-R5T-1+S7T7-35+PQ-47 | <div>● red</div> <div>● true green</div> <div>● blue</div> | 625 / 503 / 470                              | 125 ... 450 | 224 ... 710 | 56 ... 180 | 20                | 120                                           | Q65111A3103   | 43           |

## OSRAM OSTAR SMT

| Package                                                                           | Type                | Emission color | Color coordinates<br>Cx/Cy typ. | $\Phi_V$    |                   | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|---------------------|----------------|---------------------------------|-------------|-------------------|-----------------------------------------------|---------------|--------------|
|                                                                                   |                     |                |                                 | [lm]        | at $\phi$<br>[mA] |                                               |               |              |
|  | LE UW S2W-PXQX-4P7R | ○ ultra white  | 0.31 / 0.32                     | 450 ... 820 | 700               | 120                                           | Q65111A0205   | 44           |

| Package                                                                             | Type                              | Emission color                                               | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | color 1<br>$\Phi_V$ | color 2<br>$\Phi_V$ | color 3<br>$\Phi_E$ | at $\phi$<br>[mA] | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------|----------------------------------------------|---------------------|---------------------|---------------------|-------------------|-----------------------------------------------|---------------|--------------|
|                                                                                     |                                   |                                                              |                                              | [lm]                | [lm]                | [mW]                |                   |                                               |               |              |
|  | LE ATB S2W-JWKW-1+MANA-25+2U2V-24 | <div>● amber</div> <div>● true green</div> <div>● blue</div> | 617 / 529 / 464                              | 45 ... 112          | 180 ... 355         | 500 ... 900         | 700               | 120                                           | Q65111A2488   | 44           |

## OSRAM OSTAR Stage

| Package                                                                             | Type         | Emission color                                                                           | $\lambda_{\text{dom}}$<br>(typ.)/<br>Cx/Cy<br><br>[nm / -] | color 1<br>$\Phi_V$ | color 2<br>$\Phi_V$ | color 3<br>$\Phi_E$ | color 4<br>$\Phi_V$ | at $\phi$<br>[mA] | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------------------------------------------|---------------|--------------|
|                                                                                     |              |                                                                                          |                                                            | [lm]                | [lm]                | [mW]                | [lm]                |                   |                                               |               |              |
|  | LE RTDUW S2W | <div>● red</div> <div>● true green</div> <div>● deep blue</div> <div>○ ultra white</div> | 625 / 527 / 453 / 0.31 / 0.32                              | 45 ... 112          | 90 ... 180          | 560 ... 900         | 140 ... 224         | 700               | 120                                           | Q65111A0884   | 44           |

## Industry Applications

## Electronic Equipment

## Advanced Power TOPLED Plus

| Package                                                                           | Type               | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |           |            |           | Viewing<br>angle at 50<br>% $I_v$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|--------------------|----------------|-----------------------------------------|-----------|------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                    |                |                                         | $\Phi_v$  | $I_v$ typ. | at $\phi$ |                                                              |               |                 |
|                                                                                   |                    |                | [nm / -]                                | [lm]      | [cd]       | [mA]      |                                                              |               |                 |
|  | LUW G5GP-GXHY-5C8E | ○ ultra white  | 0.31 / 0.32                             | 18 ... 39 | 7.4        | 100       | 135                                                          | Q65110A9093   | 59              |
|                                                                                   | LUW G5GP-GXHY-5F8G |                |                                         |           |            |           |                                                              | Q65110A9091   |                 |

| Package                                                                             | Type                         | Emission color           | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |           | Viewing<br>angle at 50<br>% $I_v$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|------------------------------|--------------------------|-----------------------------------------|---------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                              |                          |                                         | $I_v$         | $\Phi_v$<br>typ. | at $\phi$ |                                                              |               |                 |
|                                                                                     |                              |                          | [nm / -]                                | [mcd]         | [mlm]            | [mA]      |                                                              |               |                 |
|   | LA G5AP-CZDZ-24-1            | ● amber                  | 617                                     | 3900 ... 7100 | 24200            | 100       | 145                                                          | Q65111A1021   | 59              |
|  | LMW G5AP-7C8D-NZN6-<br>DF-LH | ○ multiphosphor<br>white | 0.26 / 0.22                             | 3550 ... 7100 | 23400            | 100       | 135                                                          | Q65110A9418   | 59              |
|                                                                                     | LUW G5AP-5D5E-BG-<br>P4P6-LH | ○ ultra white            | 0.25 / 0.2                              | 4500 ... 8000 | 27500            | 100       | 135                                                          | Q65110A9419   | 59              |

## Industry Applications

## Electronic Equipment

## Power TOPLED

| Package                                                                             | Type                 | Emission color            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                  |              |      | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |  |
|-------------------------------------------------------------------------------------|----------------------|---------------------------|-----------------------------------------|------------------|--------------|------|--------------------------------------------------------------|---------------|-----------------|--|
|                                                                                     |                      |                           | $I_V$                                   | $\Phi_V$<br>typ. | at $\varphi$ |      |                                                              |               |                 |  |
|                                                                                     |                      |                           | [nm / -]                                | [mcd]            | [lm]         | [mA] |                                                              |               |                 |  |
|    | LA E67F-BACA-24-3A4B | ● amber                   | 617                                     | 1800 ... 3550    | 8000         | 50   | 120                                                          | Q65110A9090   | 11              |  |
|                                                                                     | LA E67F-BACA-24-3B5A |                           |                                         |                  |              |      |                                                              | Q65110A9089   |                 |  |
|                                                                                     | LY E67F-AABA-35-1    | ● yellow                  | 590                                     | 1120 ... 2240    | 5000         |      |                                                              | Q65110A9019   |                 |  |
|                                                                                     | LY E67F-ABBB-46-1    |                           |                                         | 1400 ... 2800    | 6300         |      |                                                              | Q65110A9018   |                 |  |
|                                                                                     | LS E67F-ABBB-1-1     | ● super red               | 633                                     |                  |              |      |                                                              | Q65111A1118   |                 |  |
|                                                                                     | LO E67F-BADA-24-1    | ● orange                  | 606                                     | 1800 ... 5600    | 11100        |      |                                                              | Q65111A0963   |                 |  |
|                                                                                     | LR E67F-ABCA-1-1     | ● red                     | 625                                     | 1400 ... 3550    | 7400         |      |                                                              | Q65111A2785   |                 |  |
|    | LR E6SF-ABCA-1-1     | ● red                     | 625                                     | 1400 ... 3550    | 7430         | 50   | 120                                                          | Q65111A0958   | 11              |  |
|                                                                                     | LA E6SF-BBCB-24-1    | ● amber                   | 617                                     | 2240 ... 4500    | 10110        |      |                                                              | Q65110A6262   |                 |  |
|                                                                                     | LO E6SF-ABCB-24-1    | ● orange                  | 606                                     | 1400 ... 4500    | 8850         |      |                                                              | Q65110A7524   |                 |  |
|                                                                                     | LY E6SF-V2AB-35-1    | ● yellow                  | 590                                     | 900 ... 1800     | 4050         |      |                                                              | Q65110A7525   |                 |  |
|                                                                                     | LY E6SF-AABA-46-1    |                           |                                         | 1120 ... 2240    | 5040         |      |                                                              | Q65110A6209   |                 |  |
|   | LA ETSF-BACB-24-1    | ● amber                   | 617                                     | 1800 ... 4500    | 9500         | 50   | 120                                                          | Q65110A9777   | 11              |  |
|                                                                                     | LY ETSF-AABA-35-1    | ● yellow                  | 590                                     | 1120 ... 2240    | 5000         |      |                                                              | Q65110A9778   |                 |  |
|  | LB E6SG-T1U2-35      | ● blue                    | 470                                     | 280 ... 710      | 1485         | 30   | 120                                                          | Q65110A7883   | 12              |  |
|                                                                                     | LT E6SG-AABB-35-1    | ● true green              | 525                                     | 1120 ... 2800    | 5880         |      |                                                              | Q65111A0322   |                 |  |
|  | LCB E6SG-AABB-2J8L   | ● color on demand<br>blue | 0.2 / 0.3                               | 1120 ... 2800    | 5880         | 30   | 120                                                          | on request    | 12              |  |
|                                                                                     | LCW E6SG-V1AB-4R9T   | ○ warm white              | 0.42 / 0.4                              | 710 ... 1800     | 3765         | 30   | 120                                                          | Q65110A7737   | 12              |  |
|                                                                                     | LCW E6SG-V1AB-4U9X   |                           |                                         |                  |              |      |                                                              | Q65110A7736   |                 |  |
|                                                                                     | LCW E6SG-V2BA-4L8N   |                           |                                         | 900 ... 2240     | 4710         |      |                                                              | Q65110A7734   |                 |  |
|                                                                                     | LCW E6SG-V2BA-4J8K   |                           |                                         |                  |              |      |                                                              | Q65110A7735   |                 |  |
|                                                                                     | LCW E6SG-V2BA-4O9Q   |                           |                                         |                  |              |      |                                                              | Q65110A7733   |                 |  |
|  | LP E675-P2R1-25      | ● pure green              | 560                                     | 56 ... 140       | 294          | 50   | 120                                                          | Q65110A7298   | 18              |  |
|  | LW E6SG-AABA-JKPL-1  | ○ white                   | 0.33 / 0.33                             | 1120 ... 2800    | 5900         | 30   | 120                                                          | Q65111A0196   | 12              |  |
|                                                                                     | LW E6SG-AABA-JKPL-1  | ○ white                   | 0.33 / 0.33                             | 1120 ... 2240    | 5000         | 30   | 120                                                          | Q65110A8964   | 12              |  |

## Industry Applications

## Electronic Equipment

## Power TOPLED

| Package                                                                           | Type                 | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|----------------------|----------------|-----------------------------------------|----------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                      |                |                                         | $E_V$          | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                   |                      |                | [nm / -]                                | [lux]          | [mlm]            | [mA]         |                                                              |               |                 |
|  | LA E63F-EBGA-24-3A4B | ● amber        | 617                                     | 9000 ... 22400 | 6300             | 50           | 30                                                           | Q65110A4103   | 13              |
|                                                                                   | LS E63F-DBFA-1       | ● super red    | 633                                     | 5600 ... 14000 | 3900             |              |                                                              | Q65110A4105   |                 |
|                                                                                   | LY E63F-DBEB-35-1    | ● yellow       | 590                                     | 5600 ... 11200 | 3400             |              |                                                              | Q65110A4108   |                 |
|                                                                                   | LY E63F-EAFA-46-1    |                |                                         | 7100 ... 14000 | 4200             |              |                                                              | Q65110A4107   |                 |
|  | LB E63C-T2V2-35-34   | ● blue         | 469                                     | 355 ... 1120   | 400              | 30           | 20                                                           | Q65110A1974   | 20              |
|                                                                                   | LT E63C-BADB-35-1    | ● true green   | 525                                     | 1800 ... 7100  | 2700             |              |                                                              | Q65110A1981   |                 |

| Package                                                                             | Type                 | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |                |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|----------------------|----------------|-----------------------------------------|----------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                      |                |                                         | $I_V$          | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                     |                      |                | [nm / -]                                | [mcd]          | [mlm]            | [mA]         |                                                              |               |                 |
|  | LS E65F-BBDA-1       | ● super red    | 633                                     | 2240 ... 5600  | 4500             | 50           | 60                                                           | Q65110A4106   | 14              |
|                                                                                     | LA E65F-CBEA-24-3A4B | ● amber        | 617                                     | 3550 ... 9000  | 7200             |              |                                                              | Q65110A4104   |                 |
|                                                                                     | LY E65F-CBDB-35      | ● yellow       | 590                                     | 3550 ... 7100  | 6100             |              |                                                              | Q65110A6456   |                 |
|                                                                                     | LY E65F-DAEB-46-1    |                |                                         | 4500 ... 11200 | 8900             |              |                                                              | Q65111A1412   |                 |

## Industry Applications

## Electronic Equipment

## TOPLED

| Package                                                                             | Type               | Emission color                                                                                           | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |  |  |
|-------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|--|--|
|                                                                                     |                    |                                                                                                          |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |  |  |
|                                                                                     |                    |                                                                                                          | [nm / -]                                | [mcd]        | [mlm]            | [mA]         |                                                              |               |                 |  |  |
|    | LS T676-P2S1-1     |  super red              | 633                                     | 56 ... 224   | 420              | 20           | 120                                                          | Q65110A2153   | 21              |  |  |
|                                                                                     | LO T676-Q2T1-24    |  orange                 | 606                                     | 90 ... 355   | 670              |              |                                                              | Q65110A2150   |                 |  |  |
|                                                                                     | LY T676-Q2T1-26    |  yellow                 | 587                                     |              |                  |              |                                                              | Q65110A2156   |                 |  |  |
|                                                                                     | LA T676-Q2T1-24    |  amber                  | 615                                     |              |                  |              |                                                              | Q65110A9273   |                 |  |  |
|    | LS T67F-T2V2-1-1   |  super red              | 633                                     | 355 ... 900  | 1880             | 20           | 120                                                          | Q65110A9233   | 21              |  |  |
|                                                                                     | LR T67F-U1AA-1-1   |  red                    | 625                                     | 450 ... 1400 | 2780             |              |                                                              | Q65110A9232   |                 |  |  |
|                                                                                     | LA T67F-U2AB-24-1  |  amber                  | 617                                     | 560 ... 1800 | 3540             |              |                                                              | Q65110A9268   |                 |  |  |
|                                                                                     | LY T67F-U1AA-36-1  |  yellow                 | 590                                     | 450 ... 1400 | 2780             |              |                                                              | Q65110A9231   |                 |  |  |
|                                                                                     | LP T67F-N1Q2-24    |  pure green             | 560                                     | 28 ... 112   | 210              |              |                                                              | Q65111A1851   |                 |  |  |
|                                                                                     | LP T67F-P1R2-35    |                                                                                                          |                                         | 45 ... 180   | 340              |              |                                                              | Q65111A1852   |                 |  |  |
|                                                                                     | LG T67F-R1T1-24    |  green                  | 570                                     | 112 ... 355  | 700              |              |                                                              | Q65111A1826   |                 |  |  |
|   | LB T673-L2P1-25    |  blue                   | 471                                     | 14 ... 56    | 105              | 10           | 120                                                          | Q65111A1007   | 21              |  |  |
|                                                                                     | LT T673-N2S1-25    |  true green           | 529                                     | 35.5 ... 224 | 390              |              |                                                              | Q65110A1968   |                 |  |  |
|                                                                                     | LT T673-L2N2-35    |                                                                                                          |                                         | 14 ... 45    | 90               | 2            |                                                              | Q65110A5953   |                 |  |  |
|  | LCB T67S-P2R2-2J8L |  color on demand blue | 0.2 / 0.3                               | 56 ... 180   | 355              | 10           | 120                                                          | Q65111A2936   | 21              |  |  |
|  | LG T676-P1Q2-24    |  green                | 570                                     | 45 ... 112   | 240              | 20           | 120                                                          | Q65110A2178   | 21              |  |  |
|                                                                                     | LP T676-L1M2-25    |  pure green           | 560                                     | 11.2 ... 28  | 60               | 20           | 120                                                          | Q65110A2179   | 21              |  |  |
|                                                                                     | LG T67K-G2K1-24    |  green                | 570                                     | 2.24 ... 9   | 16.86            | 2            | 120                                                          | Q65110A2184   | 21              |  |  |
|                                                                                     | LP T67K-E1F2-25    |  pure green           | 560                                     | 0.71 ... 1.8 | 3.765            | 2            | 120                                                          | Q65110A2185   | 21              |  |  |
|                                                                                     | LP T67K-F1G2-25    |                                                                                                          |                                         | 1.12 ... 2.8 | 5.88             |              |                                                              | Q65110A2186   |                 |  |  |
|                                                                                     | LP T67K-E1G2-25    |                                                                                                          |                                         | 0.71 ... 2.8 | 5.265            |              |                                                              | Q65110A2187   |                 |  |  |
|  | LH T674-L2P1-1     |  hyper red            | 645                                     | 14 ... 56    | 105              | 10           | 120                                                          | Q65110A3596   | 21              |  |  |
|  | LW T673-P1S1-FKPL  |  white                | 0.33 / 0.33                             | 45 ... 224   | 400              | 10           | 120                                                          | Q65111A2043   | 21              |  |  |
|  | LW T6SG-V2BA-JKPL  |  white                | 0.33 / 0.33                             | 900 ... 2240 | 4710             | 20           | 120                                                          | Q65110A8982   | 52              |  |  |
|                                                                                     | LW T6SG-V1AA-JKPL  |                                                                                                          |                                         | 710 ... 1400 | 3165             |              |                                                              | Q65110A8981   |                 |  |  |

## Industry Applications

## Electronic Equipment

## TOPLED

| Package                                                                           | Type              | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------|----------------|-----------------------------------------|--------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                   |                |                                         | $I_V$        | $\Phi_V$<br>typ. | at $I_F$ |                                                              |               |                 |
|                                                                                   |                   |                | [nm / -]                                | [mcd]        | [lm]             | [mA]     |                                                              |               |                 |
|  | LA T67D-U2AA-24-1 | amber          | 617                                     | 560 ... 1400 | 2940             | 20       | 120                                                          | Q65110A9889   | 21              |
|                                                                                   | LO T67D-U2AA-24-1 | orange         | 606                                     |              |                  |          |                                                              | Q65110A9919   |                 |
|                                                                                   | LR T67D-U1V2-1-1  | red            | 625                                     | 450 ... 1120 | 2360             |          |                                                              | Q65110A9920   |                 |
|                                                                                   | LS T67D-T2V1-1-1  | super red      | 633                                     | 355 ... 900  | 1880             |          |                                                              | Q65110A9896   |                 |
|                                                                                   | LY T67D-U1V2-36-1 | yellow         | 590                                     | 450 ... 1120 | 2360             |          |                                                              | Q65110A9898   |                 |

## Industry Applications

## Electronic Equipment

## SIDELED

| Package                                                                            | Type              | Emission color                                                                                            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |           | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |  |  |
|------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------|------------------|-----------|--------------------------------------------------------------|---------------|-----------------|--|--|
|                                                                                    |                   |                                                                                                           |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\neq$ |                                                              |               |                 |  |  |
|                                                                                    |                   |                                                                                                           | [nm / -]                                | [mcd]         | [mlm]            | [mA]      |                                                              |               |                 |  |  |
|   | LB A673-L2P1-35   |  blue                    | 470                                     | 14 ... 56     | 105              | 10        | 120                                                          | Q65110A1950   | 22              |  |  |
|                                                                                    | LT A673-N2S1-25   |  true green              | 529                                     | 35.5 ... 224  | 390              |           |                                                              | Q65110A1962   |                 |  |  |
|                                                                                    | LT A6SG-V1AB-36   |  true green              | 528                                     | 710 ... 1800  | 3765             | 20        | 120                                                          | Q65110A6030   | 53              |  |  |
|                                                                                    | LT A6SG-V2AB-35   |                                                                                                           |                                         | 900 ... 1800  | 4050             |           |                                                              | Q65110A7884   |                 |  |  |
|   | LCB A6SG-U2AB     |  color on demand<br>blue | 0.2 / 0.3                               | 1800 ... 560  | 3540             | 20        | 120                                                          | on request    | 53              |  |  |
|  | LG A676-P1Q2-24   |  green                  | 570                                     | 45 ... 112    | 235              | 20        | 120                                                          | Q65110A2285   | 22              |  |  |
|                                                                                    | LP A676-L1M2-25   |  pure green            | 560                                     | 11.2 ... 28   | 60               | 20        | 120                                                          | Q65110A2286   | 22              |  |  |
|                                                                                    | LG A67K-G2K1-24   |  green                 | 570                                     | 2.24 ... 9    | 15               | 2         | 120                                                          | Q65110A2291   | 22              |  |  |
|                                                                                    | LP A67K-E1G2-25   |  pure green            | 560                                     | 0.71 ... 2.8  | 5                | 2         | 120                                                          | Q65110A2294   | 22              |  |  |
|                                                                                    | LO A67K-K1M2-24   |  orange                | 606                                     | 7.1 ... 28    | 55               | 2         | 120                                                          | Q65110A4969   | 22              |  |  |
|                                                                                    | LS A67K-J1L2-1    |  super red             | 630                                     | 4.5 ... 18    | 35               |           |                                                              | Q65110A2018   |                 |  |  |
|                                                                                    | LY A67K-J2M1-26   |  yellow                | 587                                     | 5.6 ... 22.4  | 40               |           |                                                              | Q65110A2067   |                 |  |  |
|                                                                                    | LP A675-N1P2-25   |  pure green            | 560                                     | 28 ... 71     | 150              | 30        | 120                                                          | Q65110A2310   | 22              |  |  |
|                                                                                    | LS A67F-U1AA-1    |  super red             | 633                                     | 450 ... 1400  | 2780             | 30        | 120                                                          | Q65110A4723   | 22              |  |  |
|                                                                                    | LR A67F-U2AB-1    |  red                   | 625                                     | 560 ... 1800  | 3540             |           |                                                              | Q65110A4729   |                 |  |  |
|                                                                                    | LA A67F-AABB-24-1 |  amber                 | 617                                     | 1120 ... 2800 | 5880             |           |                                                              | Q65111A0513   |                 |  |  |
|                                                                                    | LO A67F-V2BB-24   |  orange                | 606                                     | 900 ... 2800  | 5550             |           |                                                              | Q65110A4867   |                 |  |  |
|                                                                                    | LY A67F-U2AB-36   |  yellow                |                                         | 560 ... 1800  | 3540             |           |                                                              | Q65110A4722   |                 |  |  |
|                                                                                    | LS A676-P2S1-1    |  super red             | 633                                     | 56 ... 224    | 420              | 20        | 120                                                          | Q65110A2261   | 22              |  |  |
|                                                                                    | LA A676-Q2T1-1    |  amber                 | 615                                     | 90 ... 355    | 670              |           |                                                              | Q65110A2255   |                 |  |  |
|                                                                                    | LO A676-Q2T1-24   |  orange                | 606                                     |               |                  |           |                                                              | Q65110A2258   |                 |  |  |
|                                                                                    | LY A676-Q2T1-26   |  yellow                | 587                                     |               |                  |           |                                                              | Q65110A2264   |                 |  |  |

## Industry Applications

## Electronic Equipment

## Mini TOPLED

| Package                                                                             | Type               | Emission color                                                                                            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                    |                                                                                                           |                                         | $I_V$         | $\Phi_V$<br>typ. | at $I_F$ |                                                              |               |                 |
|                                                                                     |                    |                                                                                                           | [nm / -]                                | [mcd]         | [mlm]            | [mA]     |                                                              |               |                 |
|    | LB M673-L1N2-25    |  blue                    | 471                                     | 11.2 ... 45   | 80               | 10       | 120                                                          | Q65111A1010   | 23              |
|                                                                                     | LT M673-N1R2-25    |  true green              | 529                                     | 28 ... 180    | 310              |          |                                                              | Q65110A5930   |                 |
|    | LS M676-P2S1-1     |  super red               | 633                                     | 56 ... 224    | 420              | 20       | 120                                                          | Q65110A2364   | 23              |
|                                                                                     | LA M676-Q2T1-1     |  amber                   | 615                                     | 90 ... 355    | 670              |          |                                                              | Q65110A2358   |                 |
|                                                                                     | LO M676-Q2T1-24    |  orange                  | 606                                     |               |                  |          |                                                              | Q65110A2361   |                 |
|                                                                                     | LY M676-Q2T1-26    |  yellow                  | 587                                     |               |                  |          |                                                              | Q65110A2367   |                 |
|                                                                                     | LG M676-N2Q1-24    |  green                   | 570                                     | 35.5 ... 90   | 190              |          |                                                              | Q65110A2389   |                 |
|                                                                                     | LP M676-L1M2-25    |  pure green              | 560                                     | 11.2 ... 28   | 60               |          |                                                              | Q65110A7809   |                 |
|   | LCB M67S-K2M1-2J8L |  color on demand<br>blue | 0.2 / 0.3                               | 9 ... 22.4    | 40               | 2        | 120                                                          | Q65111A2807   | 23              |
|  | LG M676-N2Q1-24    |  green                 | 570                                     | 35.5 ... 90   | 190              | 20       | 120                                                          | Q65110A2389   | 23              |
|                                                                                     | LP M676-L1M2-25    |  pure green            | 560                                     | 11.2 ... 28   | 60               | 20       | 120                                                          | Q65110A7809   | 23              |
|                                                                                     | LG M67K-G1J2-24    |  green                 | 570                                     | 1.8 ... 7.1   | 13.4             | 2        | 120                                                          | Q65110A2395   | 23              |
|                                                                                     | LP M67K-D2G1-25    |  pure green            | 560                                     | 0.56 ... 2.24 | 4.2              | 2        | 120                                                          | Q65110A2398   | 23              |
|                                                                                     | LS M67K-H2L1-1     |  super red             | 630                                     | 3.55 ... 14   | 25               | 2        | 120                                                          | Q65110A2028   | 23              |
|                                                                                     | LO M67K-J2M1-24    |  orange                | 606                                     | 5.6 ... 22.4  | 42               |          |                                                              | Q65110A2055   |                 |
|                                                                                     | LY M67K-J1L2-26    |  yellow                | 587                                     | 4.5 ... 18    | 33.8             |          |                                                              | Q65110A2076   |                 |
|                                                                                     | LG M67K-G1J2-24    |  green                 | 570                                     | 1.8 ... 7.1   | 13.4             |          |                                                              | Q65110A2395   |                 |
|                                                                                     | LP M67K-D2G1-25    |  pure green            | 560                                     | 0.56 ... 2.24 | 4.2              |          |                                                              | Q65110A2398   |                 |
|                                                                                     | LP M675-M2P1-25    |  pure green            | 560                                     | 22.4 ... 56   | 120              | 30       | 120                                                          | Q65110A2399   | 23              |
|                                                                                     | LO M67F-U2AB-24    |  orange                | 606                                     | 560 ... 1800  | 3540             | 20       | 120                                                          | Q65110A8973   | 23              |
|                                                                                     | LS M67F-S2U2-1     |  super red             | 633                                     | 224 ... 710   | 1400             |          |                                                              | Q65110A8888   |                 |
|                                                                                     | LY M67F-T2V2-36    |  yellow                | 590                                     | 355 ... 1120  | 2210             |          |                                                              | Q65110A8980   |                 |
|                                                                                     | LA M67F-V1AB-24    |  amber                 | 617                                     | 710 ... 1800  | 3770             |          |                                                              | Q65111A1848   |                 |
|  | LW M673-P1R2-FKPL  |  white                 | 0.33 / 0.33                             | 45 ... 180    | 340              | 10       | 120                                                          | Q65111A2039   | 23              |
|                                                                                     | LW M67C-S1T2-5K8L  |  white                 | 0.33 / 0.33                             | 180 ... 450   | 950              | 20       | 120                                                          | Q65110A1936   | 23              |
|                                                                                     | LW M67C-T1U2-5K8L  |                                                                                                           |                                         | 280 ... 710   | 1490             |          |                                                              | Q65110A1937   |                 |
|                                                                                     | LW M67C-S1U2-5K8L  |                                                                                                           |                                         | 180 ... 710   | 1340             |          |                                                              | Q65110A1938   |                 |
|  | LCW MTSG-U2V2-4L8N |  warm white            | 0.38 / 0.38                             | 560 ... 1120  | 2520             | 10       | 120                                                          | Q65111A2101   | 28              |

## Industry Applications

## Electronic Equipment

## CHIPLED

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |       |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|-------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $I_V$ | $\Phi_V$<br>typ. | at $I_f$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [mcd] | [mlm]            | [mA]     |                                                              |               |                 |

## CHIPLED 1206

|                                                                                   |              |                                                                                             |     |            |    |    |     |             |    |
|-----------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-----|------------|----|----|-----|-------------|----|
|  | LH N974-KN-1 |  hyper red | 645 | 7.1 ... 45 | 15 | 20 | 160 | Q62702P5192 | 60 |
|-----------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-----|------------|----|----|-----|-------------|----|

## CHIPLED 0805

|                                                                                   |               |                                                                                             |     |            |     |    |     |             |    |
|-----------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------|-----|------------|-----|----|-----|-------------|----|
|  | LS R976-NR-1  |  super red | 633 | 28 ... 180 | 330 | 20 | 160 | Q62702P5178 | 46 |
|                                                                                   | LO R976-PS-1  |  orange    | 606 | 45 ... 280 | 520 |    |     | Q62702P5101 |    |
|                                                                                   | LY R976-PS-36 |  yellow    | 588 |            |     |    |     | Q62702P5177 |    |

## CHIPLED 0603

|                                                                                     |                   |                                                                                                |     |            |     |    |                                    |             |    |
|-------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----|------------|-----|----|------------------------------------|-------------|----|
|  | LS Q971-KN-1      |  super red  | 628 | 7.1 ... 45 | 60  | 20 | 160                                | Q65110A4282 | 61 |
|                                                                                     | LO Q971-JM-1      |  orange     | 606 | 4.5 ... 28 | 40  |    |                                    | Q65110A4285 |    |
|                                                                                     | LY Q971-H1L2-36   |  yellow     | 587 | 2.8 ... 18 | 20  |    |                                    | Q62703Q4699 |    |
|                                                                                     | LG Q971-KN-1      |  green      | 570 | 7.1 ... 45 | 60  |    |                                    | Q62702P5189 |    |
|                                                                                     | LS Q976-NR-1      |  super red  | 633 | 28 ... 180 | 330 | 20 | 160                                | Q62702P5187 | 47 |
|                                                                                     | LO Q976-PS-25     |  orange     | 605 | 45 ... 280 | 520 |    |                                    | Q62702P5188 |    |
|                                                                                     | LY Q976-P1S2-36   |  yellow     | 587 |            |     |    |                                    | Q62702P5276 |    |
|                                                                                     | LG Q976-MP-24     |  green      | 572 | 18 ... 71  | 130 |    | 130                                | Q65110A8842 |    |
|  | LT Q39E-Q1S2-25-1 |  true green | 530 | 71 ... 280 | 440 | 5  | 155 (horizontal)<br>135 (vertical) | Q65110A7998 | 48 |

## CHIPLED 0402

|                                                                                     |                   |                                                                                                |     |            |     |   |                                    |             |    |
|-------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----|------------|-----|---|------------------------------------|-------------|----|
|  | LB QH9G-N1P2-35-1 |  blue       | 466 | 28 ... 71  | 150 | 5 | 155 (horizontal)<br>170 (vertical) | Q65110A8032 | 49 |
|                                                                                     | LT QH9G-Q2S2-25-1 |  true green | 525 | 90 ... 280 | 560 |   |                                    | Q65110A9219 |    |
|  | LR QH9F-P2R1-1    |  red        | 625 | 56 ... 140 | 290 | 5 | 120 (horizontal)<br>130 (vertical) | Q65110A8031 | 49 |
|                                                                                     | LY QH9F-P1R1-36   |  yellow     | 590 | 45 ... 140 | 280 |   |                                    | Q65110A8028 |    |

## Industry Applications

## Electronic Equipment

## SMARTLED

| Package                                                                           | Type                | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|---------------------|----------------|-----------------------------------------|--------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                     |                |                                         | $I_V$        | $\Phi_V$<br>typ. | at $I_F$ |                                                              |               |                 |
|                                                                                   |                     |                | [nm / -]                                | [mcd]        | [lm]             | [mA]     |                                                              |               |                 |
|  | LG L29K-F2J1-24     | ● green        | 570                                     | 1.4 ... 5.6  | 14               | 2        | 160                                                          | Q65110A1745   | 25              |
|                                                                                   | LS L29K-G1J2-1      | ● super red    | 630                                     | 1.8 ... 7.1  | 18               |          |                                                              | Q65110A1757   |                 |
|                                                                                   | LO L29K-H2L1-24     | ● orange       | 606                                     | 3.55 ... 14  | 35               |          |                                                              | Q65110A1751   |                 |
|                                                                                   | LY L29K-H1K2-26     | ● yellow       | 587                                     | 2.8 ... 11.2 | 28               |          |                                                              | Q65110A1766   |                 |
|                                                                                   | LS L296-N1Q2-1      | ● super red    | 633                                     | 28 ... 112   | 280              | 20       | 160                                                          | Q65110A1754   | 25              |
|                                                                                   | LA L296-P1R2        | ● amber        | 615                                     | 45 ... 180   | 450              |          |                                                              | Q65110A3235   |                 |
|                                                                                   | LO L296-P1S1-24     | ● orange       | 606                                     | 45 ... 224   | 538              |          |                                                              | Q65110A1905   |                 |
|                                                                                   | LY L296-P1R2-26     | ● yellow       | 587                                     | 45 ... 180   | 450              |          |                                                              | Q65110A1764   |                 |
|                                                                                   | LP L296-J2L2-25     | ● pure green   | 560                                     | 5.6 ... 18   | 35               |          |                                                              | Q65110A3342   |                 |
|  | LW L283-P2R1-3K8L-1 | ○ white        | 0.32 / 0.31                             | 56 ... 140   | 392              | 10       | 170 (horizontal)<br>130 (vertical)                           | Q65110A1550   | 25              |
|                                                                                   | LW L283-Q1R2-3K8L-1 |                |                                         | 71 ... 180   | 502              |          |                                                              | Q65110A1647   |                 |

## SMARTLED XR

|                                                                                     |                 |             |     |            |     |    |     |             |    |
|-------------------------------------------------------------------------------------|-----------------|-------------|-----|------------|-----|----|-----|-------------|----|
|  | LS L196-N1R2-1  | ● super red | 633 | 28 ... 180 | 430 | 20 | 150 | Q65111A0708 | 26 |
|                                                                                     | LY L196-P1S1-26 | ● yellow    | 587 | 45 ... 224 | 555 |    |     | Q65111A0703 |    |

## Industry Applications

## Electronic Equipment

## PointLED

| Package                                                                             | Type                  | Emission color                                                                                              | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                       |                                                                                                             |                                         | $I_V$        | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                     |                       |                                                                                                             | [nm / -]                                | [mcd]        | [mlm]            | [mA]         |                                                              |               |                 |
|    | LS P47F-U1AA-1-1      |  super red                 | 633                                     | 450 ... 1400 | 2780             | 30           | 120                                                          | Q65110A4859   | 27              |
|                                                                                     | LR P47F-U2AB-1-1      |  red                       | 625                                     | 560 ... 1800 | 3540             |              |                                                              | Q65110A4861   |                 |
|                                                                                     | LA P47F-V2BB-24-3A4B  |  amber                     | 617                                     | 900 ... 2800 | 5550             |              |                                                              | Q65110A4857   |                 |
|                                                                                     | LA P47F-V2BB-24-3B5A  |                                                                                                             |                                         |              |                  |              |                                                              | Q65110A9267   |                 |
|                                                                                     | LY P47F-U2AB-36-4A5B  |  yellow                    | 590                                     | 560 ... 1800 | 3540             |              |                                                              | Q65110A9266   |                 |
|                                                                                     | LY P47F-U2AB-36-3B5A  |                                                                                                             |                                         |              |                  |              |                                                              | Q65110A4860   |                 |
|                                                                                     | LP P47F-P2S1-35       |  pure green                | 560                                     | 56 ... 224   | 420              |              |                                                              | Q65111A1828   |                 |
|                                                                                     | LP P47F-P1R1-24       |                                                                                                             |                                         | 45 ... 140   | 280              |              |                                                              | Q65111A1827   |                 |
|    | LB P4SG-S2U1-35-1     |  blue                      | 470                                     | 224 ... 560  | 1180             | 20           | 120                                                          | Q65110A8252   | 27              |
|                                                                                     | LT P4SG-V1AB-36-1     |  true green                | 528                                     | 710 ... 1800 | 3770             |              |                                                              | Q65110A7127   |                 |
|   | LCB P473-P2R2         |  color on demand<br>blue | 0.2 / 0.3                               | 180 ... 56   | 350              | 10           | 120                                                          | on request    | 54              |
|  | LG P47K-G2K1-24       |  green                   | 570                                     | 2.24 ... 9   | 17               | 2            | 120                                                          | Q65110A2730   | 54              |
|                                                                                     | LO P476-R2T1-24       |  orange                  | 606                                     | 140 ... 355  | 740              | 20           | 120                                                          | Q65110A7018   | 54              |
|                                                                                     | LY P476-Q2T1-26       |  yellow                  | 587                                     | 90 ... 355   | 670              | 20           | 120                                                          | Q65110A4881   | 54              |
|                                                                                     | LS P47K-H1K2-1        |  super red               | 630                                     | 2.8 ... 11.2 | 21               | 2            | 120                                                          | Q65110A2733   | 54              |
|                                                                                     | LY P47K-J1L2-26       |  yellow                  | 587                                     | 4.5 ... 18   | 34               |              |                                                              | Q65110A2738   |                 |
|  | LW P473-Q2S1-FKPL-1   |  white                   | 0.33 / 0.33                             | 90 ... 224   | 470              | 10           | 120                                                          | Q65111A2066   | 54              |
|                                                                                     | LW P4SG-V2AB-JKPL-1   |  white                   | 0.33 / 0.33                             | 900 ... 1800 | 4050             | 20           | 120                                                          | Q65110A9047   | 27              |
|                                                                                     | LW P4SG-V2AB-JKPL-1-F |                                                                                                             |                                         |              |                  |              |                                                              | Q65110A9048   |                 |

## Industry Applications

## Electronic Equipment

## FIREFLY

| Package                                                                           | Type                | Emission color                                                                               | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |            |               |          | Viewing angle at 50 % $I_V$ 2 $\phi$ typ. [°] | Ordering Code | Package Fig. |
|-----------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------|-----------------------------------------|------------|---------------|----------|-----------------------------------------------|---------------|--------------|
|                                                                                   |                     |                                                                                              |                                         | $I_V$      | $\Phi_V$ typ. | at $I_f$ |                                               |               |              |
|                                                                                   |                     |                                                                                              | [nm / -]                                | [mcd]      | [mlm]         | [mA]     |                                               |               |              |
|  | LT VH9G-Q2S2-25-1   |  true green | 532                                     | 90 ... 280 | 560           | 5        | 140 (horizontal)<br>165 (vertical)            | Q65110A9228   | 31           |
|                                                                                   | LB VH9G-N1P2-35-1   |  blue       | 470                                     | 28 ... 71  | 150           |          |                                               | Q65110A8083   |              |
|  | LW VH8G-Q2S2-4M6N-1 |  white      | 0.285 / 0.275                           | 90 ... 280 | 560           | 5        | 140 (horizontal)<br>180 (vertical)            | Q65110A8090   | 31           |
|  | LA VH9F-Q1R2-24     |  amber      | 615                                     | 71 ... 180 | 380           | 5        | 140 (horizontal)<br>165 (vertical)            | Q65110A8082   | 31           |
|                                                                                   | LR VH9F-P2R1-1      |  red        | 625                                     | 56 ... 140 | 290           |          |                                               | Q65110A8088   |              |

## Micro SIDELED

| Package                                                                             | Type              | Emission color                                                                                 | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |               |          | Viewing angle at 50<br>% $I_V$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|---------------|----------|--------------------------------------------------------|---------------|--------------|
|                                                                                     |                   |                                                                                                |                                         | $I_V$        | $\Phi_V$ typ. | at $I_f$ |                                                        |               |              |
|                                                                                     |                   |                                                                                                | [nm / -]                                | [mcd]        | [mlm]         | [mA]     |                                                        |               |              |
|  | LS Y876-P2S1-1    |  super red  | 633                                     | 56 ... 224   | 420           | 20       | 120                                                    | Q65110A2412   | 29           |
|                                                                                     | LO Y876-Q2T1-24   |  orange     | 606                                     | 90 ... 355   | 670           |          |                                                        | Q65110A2410   |              |
|                                                                                     | LY Y876-Q2T1-26   |  yellow     | 587                                     |              |               |          |                                                        | Q65110A2415   |              |
|                                                                                     | LG Y876-P1Q2-24   |  green      | 570                                     | 45 ... 112   | 240           |          |                                                        | Q65110A8025   |              |
|  | LW Y8SG-V1AA-3K6L |  white      | 0.3 / 0.28                              | 710 ... 1400 | 3170          | 20       | 120                                                    | Q65110A7980   | 29           |
|  | LB Y8SG-T1U2-35-1 |  blue       | 470                                     | 280 ... 710  | 1490          | 20       | 120                                                    | Q65110A8976   | 29           |
|                                                                                     | LT Y8SG-V1AB-36-1 |  true green | 528                                     | 710 ... 1800 | 3770          |          |                                                        | Q65110A8975   |              |
|                                                                                     | LR Y8SF-U1V2-1    |  red        | 625                                     | 450 ... 1120 | 2400          | 20       | 120                                                    | Q65110A8972   | 29           |
|                                                                                     | LY Y8SF-U1V2-36   |  yellow     | 590                                     |              |               |          |                                                        | Q65110A8977   |              |

## Industry Applications

## Electronic Equipment

## MULTILED

| Package                                                                           | Type            | Emission color | $\lambda_{\text{dom}}$<br>(typ.)/<br>Cx/Cy<br><br>[nm / -] | $I_V$         | $\Phi_V$<br>typ.<br>[mlm] | at $I_f$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-----------------|----------------|------------------------------------------------------------|---------------|---------------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                 |                |                                                            | [mcd]         |                           | [mA]     |                                                              |               |                 |
|  | LYYG6SF-CADB-45 | ● yellow       | 587                                                        | 2800 ... 7100 | 14850                     | 50       | 120                                                          | Q65110A8529   | 15              |

| Package                                                                             | Type                            | Emission color                  | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd]  |              |             | at $I_f$ | Viewing<br>angle at 50 % $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------------------------------------------|--------------|--------------|-------------|----------|-----------------------------------------------------------|---------------|-----------------|
|                                                                                     |                                 |                                 |                                              | color 1      | color 2      | color 3     |          |                                                           |               |                 |
|   | LRTBGFUG-S5T9-1+U7V5-29+R5S7-49 | ● red<br>● true green<br>● blue | 625 / 528 / 470                              | 201 ... 630  | 560 ... 1250 | 125 ... 355 | 20       | 120                                                       | Q65111A3098   | 41              |
|  | LRTBGFTG-T7AW-1+V7A7-29+R5T9-49 | ● red<br>● true green<br>● blue | 625 / 528 / 470                              | 355 ... 1800 | 900 ... 2240 | 125 ... 630 | 20       | 120                                                       | Q65110A8177   | 42              |
|                                                                                     | LRTBGFTM-ST7-1+V9-29+Q5R7-49    | ● red<br>● true green<br>● blue | 625 / 528 / 470                              | 180 ... 560  | 710 ... 1590 | 80 ... 224  | 10       | 120                                                       | Q65110A9407   | 42              |

| Package                                                                             | Type               | Emission color | Cx/Cy       | $I_V$         | at $I_f$                   | Viewing angle at 50 % $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|--------------------|----------------|-------------|---------------|----------------------------|--------------------------------------------------------|---------------|-----------------|
|                                                                                     |                    |                |             | [mcd]         | [mA]                       |                                                        |               |                 |
|  | LTRBGFSF-ABCB-QKY0 | ○ white        | 0.31 / 0.31 | 1400 ... 4500 | 20 (T)<br>20 (R)<br>10 (B) | 120                                                    | Q65110A9484   | 42              |

| Package                                                                             | Type                 | Emission color        | $\lambda_{\text{dom}}$<br>(typ.)<br><br>[nm] | $I_V$ [mcd] |              | at $I_f$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|----------------------|-----------------------|----------------------------------------------|-------------|--------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                      |                       |                                              | color 1     | color 2      |          |                                                              |               |                 |
|  | LRT GFTM-ST7-1+V9-29 | ● red<br>● true green | 625 / 528                                    | 180 ... 560 | 710 ... 1590 | 10       | 120                                                          | Q65111A0439   | 58              |

## Industry Applications

## Electronic Equipment

## Multi TOPLED

| Package                                                                             | Type                        | Emission color      | $\lambda_{\text{dom}}$<br>(typ.)<br>[nm] | $I_v$ [mcd]   |               |                  | Viewing angle at 50 % $I_v$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|-----------------------------|---------------------|------------------------------------------|---------------|---------------|------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                             |                     |                                          | color 1       | color 2       | at $I_f$<br>[mA] |                                                     |               |              |
|    | LAY T67F-AABB-1-1+AABA-45-1 | amber<br>yellow     | 617 / 590                                | 1120 ... 2800 | 1120 ... 2240 | 50               | 120                                                 | Q65110A7526   | 16           |
|    | LOG T77K-JL-1-0+GJ-1        | orange<br>green     | 606 / 570                                | 4.5 ... 18    | 1.8 ... 7.1   | 2                | 120                                                 | Q65110A3338   | 51           |
|    | LSY T676-P2R1-1-0+Q2S1-35   | super red<br>yellow | 633 / 587                                | 56 ... 140    | 90 ... 224    | 20               | 120                                                 | Q65110A2446   | 16           |
|                                                                                     | LSG T676-P7Q7-1+N7P7-24     | super red<br>green  | 633 / 570                                | 56 ... 140    | 35.5 ... 90   | 20               | 120                                                 | Q65110A4186   | 16           |
|                                                                                     | LSG T676-P7R-1-0+N7P9-24    |                     |                                          | 56 ... 180    | 35.5 ... 100  |                  |                                                     | Q65111A1615   |              |
|  | LSG T77K-JL-1-0+HK-1-0      | super red<br>green  | 630 / 570                                | 4.5 ... 18    | 2.8 ... 11.2  | 2                | 120                                                 | Q65111A0238   | 51           |

## Multi CHIPLED

| Package                                                                             | Type               | Emission color | Cx/Cy         | $I_v$         |                            | Viewing angle at 50 % $I_v$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|--------------------|----------------|---------------|---------------|----------------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                    |                |               | [mcd]         | at $I_f$<br>[mA]           |                                                     |               |              |
|  | LTRBR8SF-8A7B-0117 | white          | 0.267 / 0.231 | 1590 ... 2500 | 25 (T)<br>17 (R)<br>15 (B) | 130                                                 | Q65111A2354   | 62           |

## TOPLED Compact

| Package                                                                             | Type                     | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy<br>[nm / -] | $I_v$         |                        |                  | Viewing angle at 50 % $I_v$<br>2 $\phi$ typ.<br>[°] | Ordering Code | Package Fig. |
|-------------------------------------------------------------------------------------|--------------------------|----------------|-----------------------------------------------------|---------------|------------------------|------------------|-----------------------------------------------------|---------------|--------------|
|                                                                                     |                          |                |                                                     | [mcd]         | $\Phi_V$ typ.<br>[mlm] | at $I_f$<br>[mA] |                                                     |               |              |
|  | LUW JLSH-5B8B-I4Q7-EG-LP | ultra white    | 0.29 / 0.27                                         | 1800 ... 2800 | 7360                   | 20               | 110                                                 | Q65111A1048   | 63           |

## Industry Applications

## White Goods

## DRAGON

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |          |            |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|----------|------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $\Phi_V$ | $I_V$ typ. | at $\varphi$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [lm]     | [cd]       | [mA]         |                                                              |               |                 |

## Golden DRAGON

|                                                                                   |                    |              |            |            |      |     |     |             |   |
|-----------------------------------------------------------------------------------|--------------------|--------------|------------|------------|------|-----|-----|-------------|---|
|  | LCW W5SM-JXKY-409Q | ○ warm white | 0.42 / 0.4 | 45 ... 97  | 23.4 | 350 | 120 | Q65110A9681 | 7 |
|                                                                                   | LCW W5SM-JXKX-4U9X |              |            | 45 ... 82  | 21   |     |     | Q65110A9692 |   |
|                                                                                   | LCW W5SM-JYKY-4L8N |              |            | 52 ... 97  | 24.6 |     |     | Q65110A9694 |   |
|                                                                                   | LCW W5SM-JYKY-4R9T |              |            |            |      |     |     | Q65110A9693 |   |
|                                                                                   | LCW W5SM-JYKZ-4J8K |              |            | 52 ... 112 | 27.1 |     |     | Q65110A9698 |   |

## TOPLED

| Package                                                                             | Type                   | Emission color            | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |              | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|------------------------|---------------------------|-----------------------------------------|---------------|------------------|--------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                        |                           |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\varphi$ |                                                              |               |                 |
|                                                                                     |                        |                           | [nm / -]                                | [mcd]         | [mlm]            | [mA]         |                                                              |               |                 |
|  | LW TTSD-U1V1-JKPL-1    | ○ white                   | 0.33 / 0.33                             | 450 ... 900   | 2030             | 20           | 120                                                          | Q65111A0300   | 52              |
|                                                                                     | LW TTSD-U2V2-JKPL-1    |                           |                                         | 560 ... 1120  | 2520             |              |                                                              | Q65111A0301   |                 |
|  | LB TTSD-R1T2-25-1      | ● blue                    | 469                                     | 112 ... 450   | 810              | 20           | 120                                                          | Q65111A1639   | 52              |
|  | LCB TTSD-T2V1-2J8L     | ● color on demand<br>blue | 0.2 / 0.3                               | 355 ... 900   | 1880             | 10           | 120                                                          | Q65111A1160   | 52              |
|  | LT TTSD-T2V2-36-1      | ● true green              | 525                                     | 355 ... 1120  | 2140             | 10           | 120                                                          | Q65111A2711   | 52              |
|  | LW TVSG.BB-AZBZ-FBKC-1 | ○ white                   | 0.33 / 0.34                             | 1500 ... 2800 | 6500             | 20           | 120                                                          | Q65111A2884   | 24              |
|                                                                                     | LW TVSG.BB-BXCX-LBNC-1 |                           |                                         | 1800 ... 3300 | 7700             |              |                                                              | Q65111A2473   |                 |
|                                                                                     | LW TVSG.CB-AZBZ-JKPL-1 | ○ white                   | 0.33 / 0.33                             | 1500 ... 2800 | 6450             | 20           | 120                                                          | Q65111A2760   | 24              |
|                                                                                     | LW TVSG.CB-BXCX-JKPL-1 |                           |                                         | 1800 ... 3300 | 7650             |              |                                                              | Q65111A3555   |                 |

## Industry Applications

## White Goods

## SIDELED

| Package                                                                           | Type              | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |              |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------|----------------|-----------------------------------------|--------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                   |                |                                         | $I_V$        | $\Phi_V$<br>typ. | at $I_f$ |                                                              |               |                 |
|                                                                                   |                   |                | [nm / -]                                | [mcd]        | [mlm]            | [mA]     |                                                              |               |                 |
|  | LW A673-P1S1-FKPL | ○ white        | 0.33 / 0.33                             | 45 ... 224   | 400              | 10       | 120                                                          | Q65111A2075   | 22              |
|                                                                                   | LW A67C-T2U2-5K8L | ○ white        | 0.33 / 0.33                             | 355 ... 710  | 1600             | 20       | 120                                                          | Q65110A1928   | 22              |
|                                                                                   | LW A67C-S2U2-5K8L |                |                                         | 224 ... 710  | 1400             |          |                                                              | Q65110A1929   |                 |
|                                                                                   | LW A6SG-V2BA-JKPL | ○ white        | 0.33 / 0.33                             | 900 ... 2240 | 4710             | 20       | 120                                                          | Q65110A8994   | 53              |

## CHIPLED

| Package | Type | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |       |                  |          | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|---------|------|----------------|-----------------------------------------|-------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|         |      |                |                                         | $I_V$ | $\Phi_V$<br>typ. | at $I_f$ |                                                              |               |                 |
|         |      |                | [nm / -]                                | [mcd] | [mlm]            | [mA]     |                                                              |               |                 |

## CHIPLED 0603

|                                                                                     |                     |             |            |            |     |    |                                    |             |    |
|-------------------------------------------------------------------------------------|---------------------|-------------|------------|------------|-----|----|------------------------------------|-------------|----|
|  | LG Q971-KN-1        | ● green     | 570        | 7.1 ... 45 | 60  | 20 | 160                                | Q62702P5189 | 61 |
|                                                                                     | LS Q976-NR-1        | ● super red | 633        | 28 ... 180 | 330 | 20 | 160                                | Q62702P5187 | 47 |
|  | LW Q38E-Q1S2-3K6L-1 | ○ white     | 0.3 / 0.28 | 71 ... 280 | 530 | 5  | 150 (horizontal)<br>130 (vertical) | Q65110A7210 | 48 |
|                                                                                     | LW Q38E-Q2R2-3K5L   |             |            | 90 ... 180 | 410 |    |                                    | Q65110A7939 |    |
|                                                                                     | LW Q38G-Q1S1-3K6L-1 | ○ white     | 0.3 / 0.28 | 71 ... 224 | 440 | 5  | 150 (horizontal)<br>130 (vertical) | Q65110A7209 | 48 |
|                                                                                     | LW Q38G-Q2R2-3K5L-1 |             |            | 90 ... 180 | 410 |    |                                    | Q65110A7584 |    |
|  | LB Q39E-L2N2-35-1   | ● blue      | 470        | 14 ... 45  | 70  | 5  | 155 (horizontal)<br>135 (vertical) | Q65110A7212 | 48 |
|                                                                                     | LB Q39E-N1P1-35-1   |             |            | 28 ... 56  | 110 |    |                                    | Q65110A7941 |    |
|  | LG Q976-MP-24       | ● green     | 572        | 18 ... 71  | 130 | 20 | 130                                | Q65110A8842 | 47 |

## Industry Applications

## White Goods

## Micro SIDELED

| Package                                                                           | Type                | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |          | Viewing<br>angle at 50<br>% $I_v$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|---------------------|----------------|-----------------------------------------|---------------|------------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                     |                |                                         | $I_v$         | $\Phi_v$<br>typ. | at $I_f$ |                                                              |               |                 |
|                                                                                   |                     |                | [nm / -]                                | [mcd]         | [mlm]            | [mA]     |                                                              |               |                 |
|  | LW Y1SG-AEBE-EKFM-1 | ○ white        | 0.3 / 0.28                              | 1000 ... 1600 | 3900             | 20       | 120                                                          | Q65110A9541   | 64              |
|                                                                                   | LW Y1SG-AEBE-GKJM-1 |                |                                         |               |                  |          |                                                              | Q65110A9542   |                 |
|                                                                                   | LW Y1SG-AFBF-EKFM-1 |                |                                         | 1200 ... 1800 | 4500             |          |                                                              | Q65110A9543   |                 |
|                                                                                   | LW Y1SG-AFBF-GKJM-1 |                |                                         |               |                  |          |                                                              | Q65110A9544   |                 |
|                                                                                   | LW Y1SG-BFCF-EKFM-1 |                |                                         | 1600 ... 2200 | 5700             |          |                                                              | Q65110A9545   |                 |
|                                                                                   | LW Y1SG-BFCF-GKJM-1 |                |                                         |               |                  |          |                                                              | Q65110A9546   |                 |

## Industry Applications

## Transportation

## OSLON Black

| Package                                                                           | Type                    | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy | $\Phi_V$   | $I_V$ typ. | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------------|----------------|-----------------------------------------|------------|------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                         |                |                                         | [lm]       | [cd]       | [mA]     |                                                              |               |                 |
|  | LCW H9GP-JZKY-4R9T-1    | ○ warm white   | 0.42 / 0.4                              | 61 ... 97  | 38.7       | 350      | 90                                                           | Q65111A0920   | 5               |
|                                                                                   | LCW H9GP-JZKX-409Q-1    |                |                                         | 61 ... 112 | 42.4       |          |                                                              | Q65111A0921   |                 |
|                                                                                   | LCW H9GP-KXLX-4J8K-1    |                |                                         | 71 ... 130 | 49.2       |          |                                                              | Q65111A0923   |                 |
|                                                                                   | LCW H9GP-JZLX-4L8N-1    |                |                                         | 61 ... 130 | 46.8       |          |                                                              | Q65111A0922   |                 |
|                                                                                   | LCW H9GP-JZKY-4U9X-1    |                |                                         | 61 ... 97  | 38.7       |          |                                                              | Q65111A0919   |                 |
|                                                                                   | LUW H9GP.CE-KYLY-EMKM-1 | ○ ultra white  | 0.31 / 0.32                             | 82 ... 150 | 55.7       | 350      | 90                                                           | Q65111A1881   | 5               |

## OSRAM OSTAR Headlamp

| Package                                                                             | Type                            | Emission color | Color coordi-<br>nates Cx/Cy<br>typ. | $\Phi_V$      | at $I_F$ | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|---------------------------------|----------------|--------------------------------------|---------------|----------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                                 |                |                                      | [lm]          | [mA]     |                                                              |               |                 |
|  | LE UW D1W1 01-5L6M-GMKM-T01     | ○ ultra white  | 0.31 / 0.32                          | 112 ... 224   | 700      | 120                                                          | Q65110A8591   | 1               |
|                                                                                     | LE UW D1W2 01-7M7N-GMKM-T01     |                |                                      | 224 ... 400   |          |                                                              | Q65110A8590   |                 |
|                                                                                     | LE UW D1W3 01-7N7P-GMKM-T01     |                |                                      | 355 ... 630   |          |                                                              | Q65110A8588   |                 |
|                                                                                     | LE UW D1W4 01-5P6Q-GMKM-T01     |                |                                      | 450 ... 900   |          |                                                              | Q65110A8593   |                 |
|                                                                                     | LE UW D1W5 01-7P8Q-GMKM-T01     |                |                                      | 560 ... 1120  |          |                                                              | Q65110A8589   |                 |
|  | LE UW U1A2 01-5P8P-ebvF68ebzB68 | ○ ultra white  | 0.322 / 0.334                        | 450 ... 710   | 1000     | 120                                                          | Q65111A2089   | 1               |
|                                                                                     | LE UW U1A3 01-8P8Q-ebvF68ebzB68 |                |                                      | 630 ... 1120  |          |                                                              | Q65111A2088   |                 |
|                                                                                     | LE UW U1A4 01-7Q6R-ebvF68ebzB68 |                |                                      | 900 ... 1400  |          |                                                              | Q65111A2087   |                 |
|                                                                                     | LE UW U1A5 01-5R8R-ebvF68ebzB68 |                |                                      | 1120 ... 1800 |          |                                                              | Q65111A2086   |                 |

## Industry Applications

## Transportation

## Advanced Power TOPLED Plus

| Package                                                                           | Type              | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |               |                  |             | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-----------------------------------------------------------------------------------|-------------------|----------------|-----------------------------------------|---------------|------------------|-------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                   |                   |                |                                         | $I_V$         | $\Phi_V$<br>typ. | at $\angle$ |                                                              |               |                 |
|                                                                                   |                   |                | [nm / -]                                | [mcd]         | [lm]             | [mA]        |                                                              |               |                 |
|  | LD G5AP-4M4N-35-1 | ● deep blue    | 457                                     | 25 ... 45     | 200              | 100         | 145                                                          | Q65110A8037   | 59              |
|                                                                                   | LT G5AP-CZEX-36-1 | ● true green   | 528                                     | 3900 ... 8200 | 26600            |             |                                                              | Q65110A8431   |                 |
|                                                                                   | LR G5AP-BZCZ-1-1  | ● red          | 623                                     | 2400 ... 4500 | 15200            | 100         | 145                                                          | Q65110A8036   | 59              |
|                                                                                   | LY G5AP-CZDZ-36-1 | ● yellow       | 590                                     | 3900 ... 7100 | 24200            | 100         | 145                                                          | Q65111A1319   | 59              |

| Package                                                                             | Type               | Emission color | $\lambda_{\text{dom}}$ (typ.)/<br>Cx/Cy |           |            |             | Viewing<br>angle at 50<br>% $I_V$<br>2 $\phi$<br>typ.<br>[°] | Ordering Code | Package<br>Fig. |
|-------------------------------------------------------------------------------------|--------------------|----------------|-----------------------------------------|-----------|------------|-------------|--------------------------------------------------------------|---------------|-----------------|
|                                                                                     |                    |                |                                         | $\Phi_V$  | $I_V$ typ. | at $\angle$ |                                                              |               |                 |
|                                                                                     |                    |                | [nm / -]                                | [lm]      | [cd]       | [mA]        |                                                              |               |                 |
|  | LCW G5GP-FZHX-5L7N | ○ warm white   | 0.42 / 0.4                              | 15 ... 33 | 6.4        | 100         | 135                                                          | Q65110A9081   | 59              |
|                                                                                     | LCW G5GP-FYGY-5R8T |                |                                         | 13 ... 24 | 5          |             |                                                              | Q65110A9079   |                 |

Dimensions in mm (inch)

Figure 1:

For detailed information  
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Figure 2: OSRAM OSTAR Projection Compact

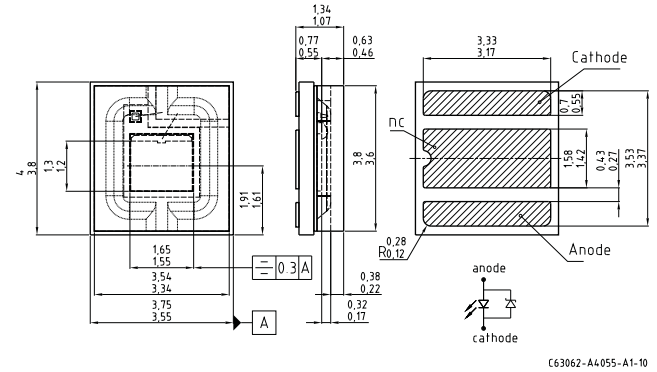


Figure 3: OSLOX SX

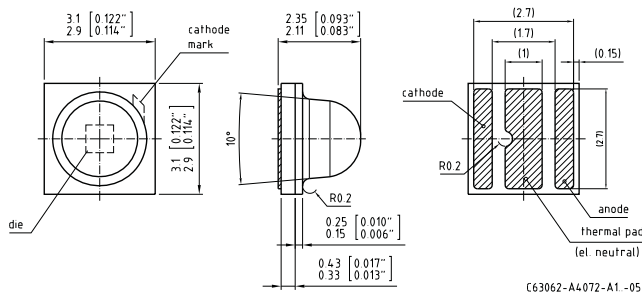


Figure 4: OSLOX Black Flat

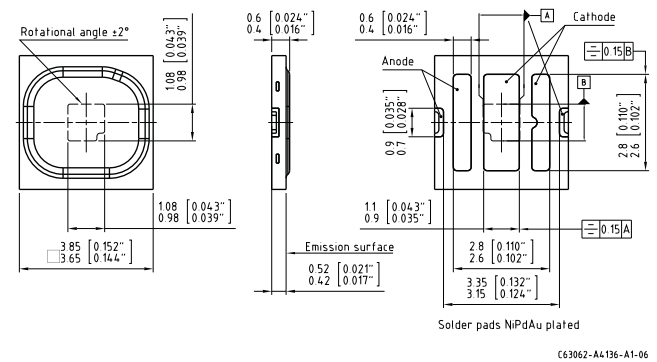


Figure 5: OSLOX Black

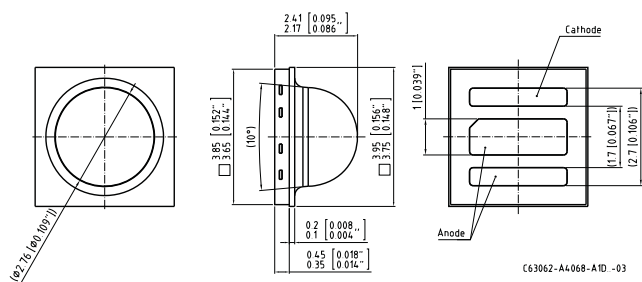
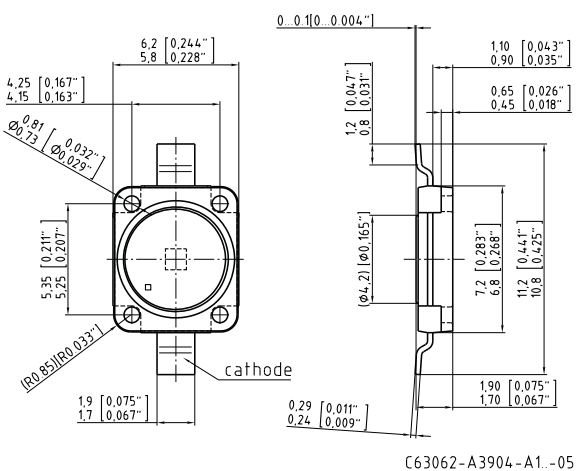


Figure 6: Golden DRAGON



**Figure 7: Golden DRAGON**

Top view dimensions: 6.2 [0.244"], 5.8 [0.228"], 4.25 [0.167"], 4.15 [0.163"], 0.81 [0.032"], 0.73 [0.029"], 5.35 [0.211"], 5.25 [0.207"], R0.85 [R0.033"], 1.9 [0.075"], 1.7 [0.067"].

Side view dimensions: 1.10 [0.043"], 0.90 [0.035"], 0.65 [0.026"], 0.45 [0.018"], 1.2 [0.047"], 0.8 [0.031"], 0.10 [0.004"], 7.2 [0.283"], 6.8 [0.268"], 11.2 [0.441"], 10.8 [0.425"], 1.90 [0.075"], 1.70 [0.067"], 0.29 [0.011"], 0.24 [0.009"].

Cathode view dimensions: 0.29 [0.011"], 0.24 [0.009"].

C63062-A3904-A6 -09

**Figure 8: Platinum DRAGON**

Top view dimensions: 6.2 [0.244"], 5.8 [0.228"], 4.25 [0.167"], 4.15 [0.163"], 0.81 [0.032"], 0.73 [0.029"], 5.35 [0.211"], 5.25 [0.207"], R0.85 [R0.033"], 1.9 [0.075"], 1.7 [0.067"].

Side view dimensions: 1.10 [0.043"], 0.90 [0.035"], 0.65 [0.026"], 0.45 [0.018"], 1.2 [0.047"], 0.8 [0.031"], 0.10 [0.004"], 7.2 [0.283"], 6.8 [0.268"], 11.2 [0.441"], 10.8 [0.425"], 1.90 [0.075"], 1.70 [0.067"], 0.29 [0.011"], 0.24 [0.009"].

Cathode view dimensions: 0.29 [0.011"], 0.24 [0.009"].

C63062-A3905-A1 -09

**Figure 9: Advanced Power TOPLED**

Top view dimensions: 3.5 [0.138"], 3.1 [0.122"], 2.8 [0.110"], 2.6 [0.102"], 3.2 [0.126"], 2.8 [0.110"], (Ø2.4 [0.094]), Package marking, 0.7 [0.028"], 0.5 [0.020"], 0.5 [0.020], 0.3 [0.012], 0.7 [0.028"], 0.5 [0.020].

Side view dimensions: 2.0 [0.078"], 1.6 [0.062"], 0...0.15 [0.006], 3.6 [0.142"], 3.2 [0.126"], 0.9 [0.035"], 0.4 [0.016].

Symbol dimensions: A, C, A.

GPLY6099

**Figure 10: Advanced Power TOPLED**

Top view dimensions: 3.5 [0.138"], 3.1 [0.122"], 2.8 [0.110"], 2.6 [0.102"], 3.2 [0.126"], 2.8 [0.110"], (Ø2.6 [0.102]), Package marking, 0.7 [0.028"], 0.5 [0.020], 0.5 [0.020], 0.3 [0.012], 0.7 [0.028"], 0.5 [0.020].

Side view dimensions: 2.1 [0.083"], 1.7 [0.067"], 0...0.15 [0.006], 3.6 [0.142"], 3.2 [0.126"], 0.9 [0.035"], 0.4 [0.016].

Symbol dimensions: A, C, A, Protection Diode.

GPLY6117

**Figure 11: Power TOPLED**

Top view dimensions: 3.0 [0.118"], 2.6 [0.102"], 2.3 [0.091"], 2.1 [0.083"], 0.8 [0.031"], 0.6 [0.024"], 3.4 [0.134"], 3.0 [0.118"], (2.4) [0.095"], Package marking, 0.18 [0.007"], 0.12 [0.005].

Side view dimensions: 2.1 [0.083"], 1.7 [0.067"], 0.9 [0.035"], 0.7 [0.028"], 0.1 [0.004] (typ.), 3.7 [0.146"], 3.3 [0.130"], 4±1, 1.1 [0.043"], 0.5 [0.020], 0.6 [0.024"], 0.4 [0.016].

Symbol dimensions: A, C, A.

GPLY6084

**Figure 12: Power TOPLED**

Top view dimensions: 3.0 [0.118"], 2.6 [0.102"], 2.3 [0.091"], 2.1 [0.083"], 0.8 [0.031"], 0.6 [0.024"], 3.4 [0.134"], 3.0 [0.118"], (2.4) [0.095"], package marking, 0.18 [0.007"], 0.12 [0.005].

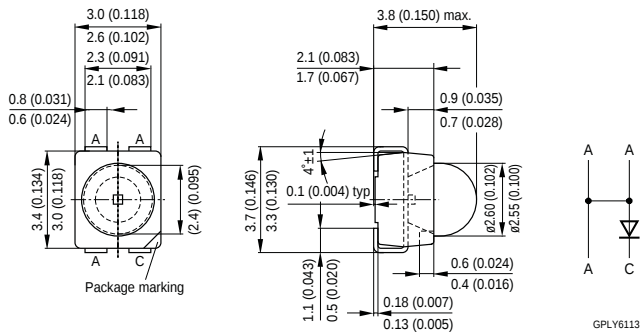
Side view dimensions: 2.1 [0.083"], 1.7 [0.067"], 0.9 [0.035"], 0.7 [0.028"], 0.1 [0.004] (typ.), 3.7 [0.146"], 3.3 [0.130"], 1.1 [0.043"], 0.5 [0.020], 0.6 [0.024"], 0.4 [0.016].

Symbol dimensions: C Cathode, A Anode.

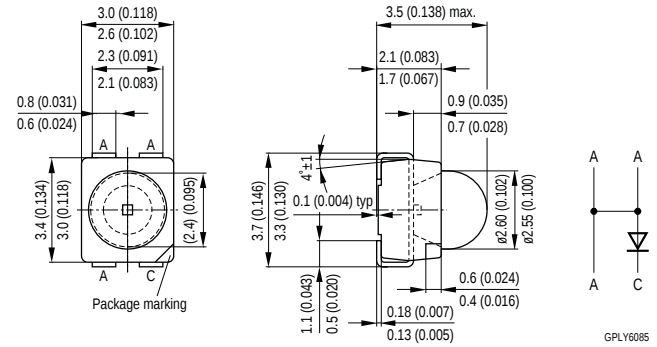
C63062-A3861-A21-02

Dimensions in mm (inch)

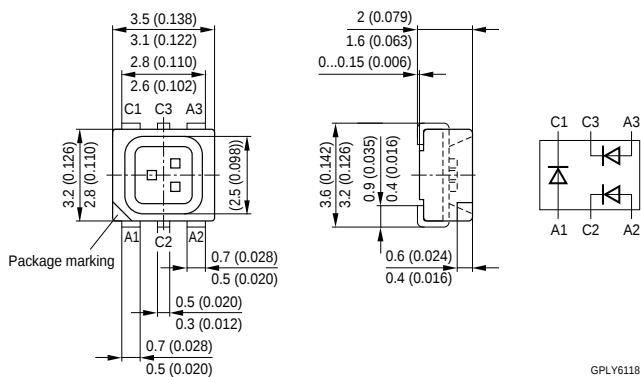
**Figure 13: Power TOPLED with lens**



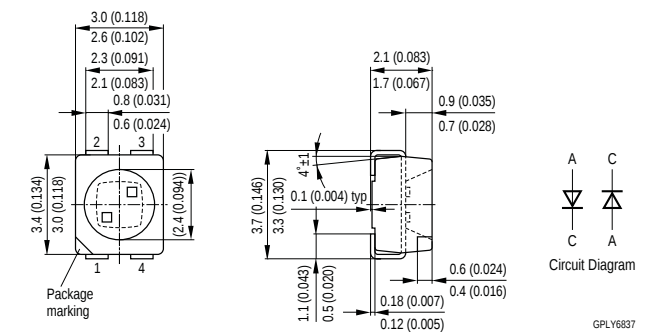
**Figure 14: Power TOPLED with lens**



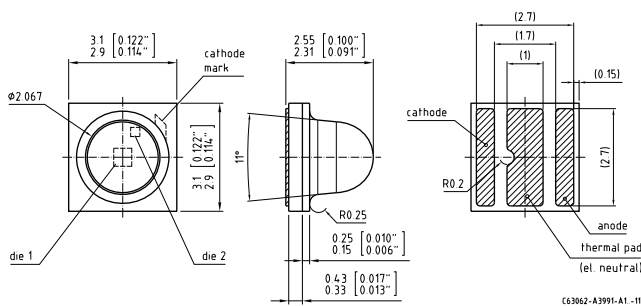
**Figure 15: MULTILED**



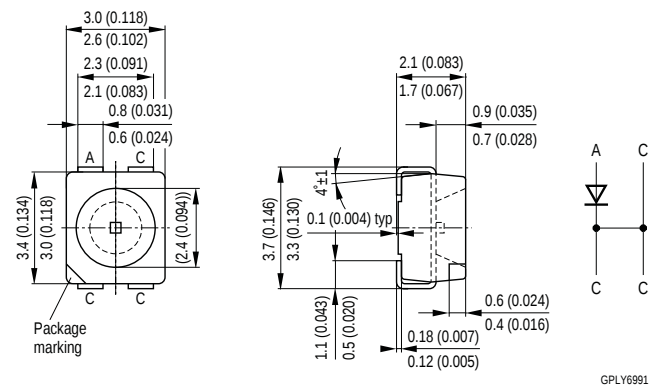
**Figure 16: Multi TOPLED**



**Figure 17: OSLO SX**

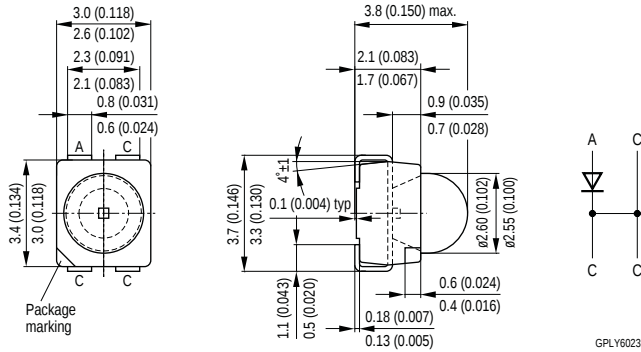


**Figure 18: Power TOPLED**

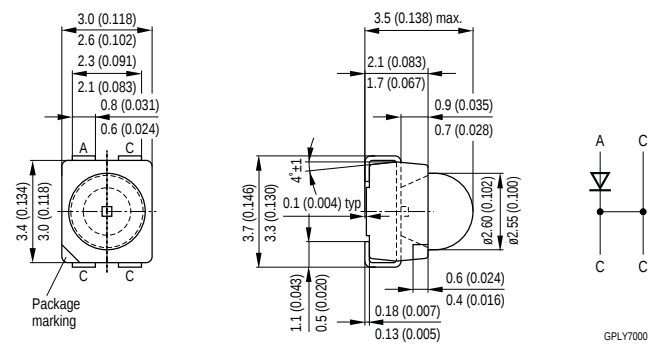


Dimensions in mm (inch)

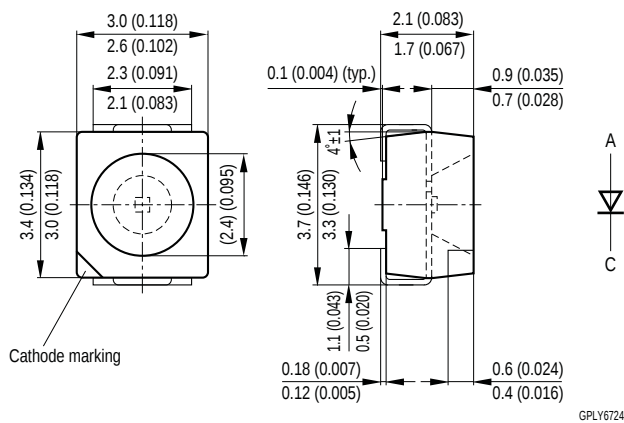
**Figure 19: Power TOPLED with lens**



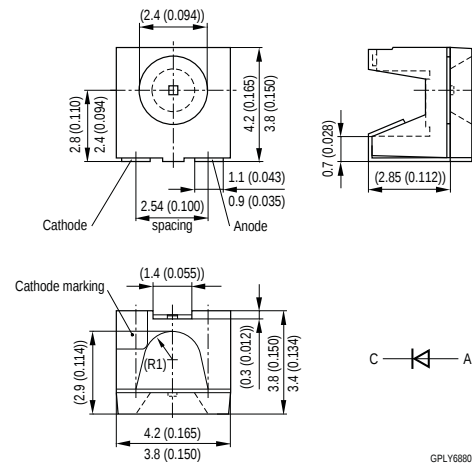
**Figure 20: Power TOPLED with lens**



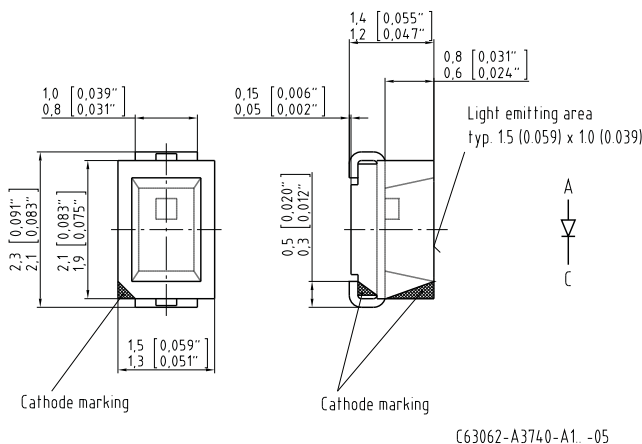
**Figure 21: TOPLED**



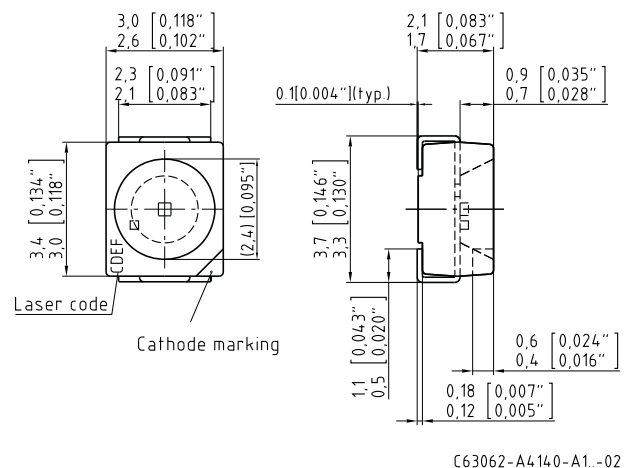
**Figure 22: SIDELED**



**Figure 23: Mini TOPLED**

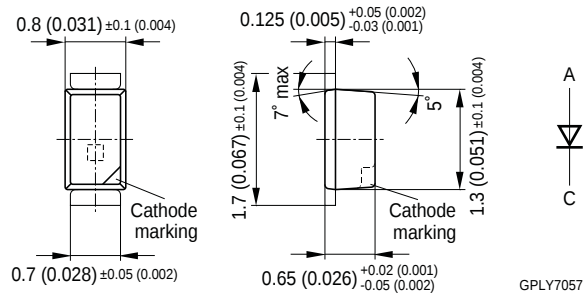


**Figure 24: TOPLED**

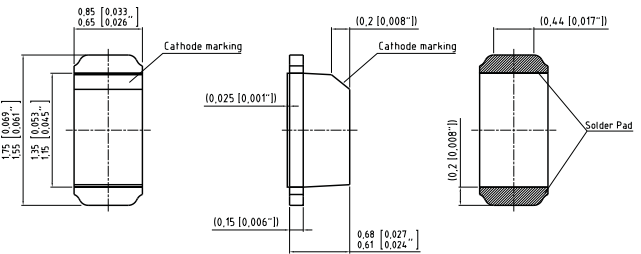


Dimensions in mm (inch)

**Figure 25: SMARTLED 0603**

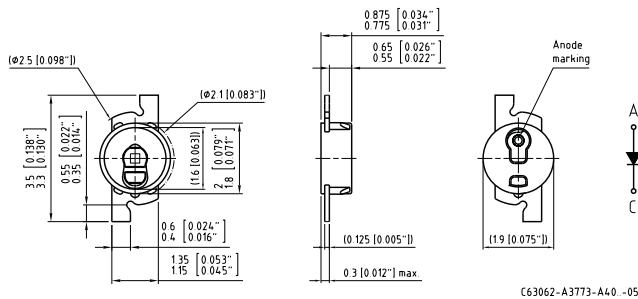


**Figure 26: SMARTLED XR**

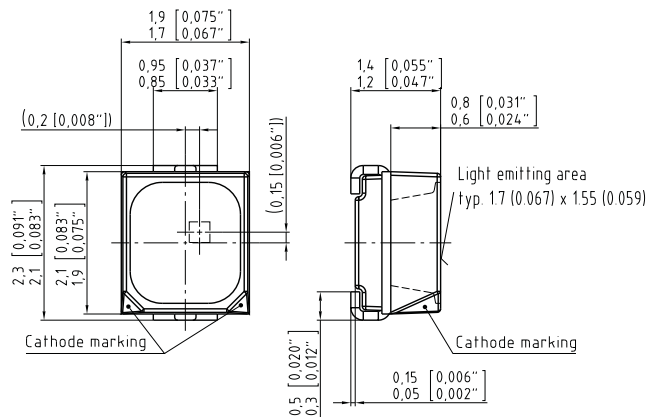


C63062-A0013-A1 - 05

**Figure 27: PointLED**

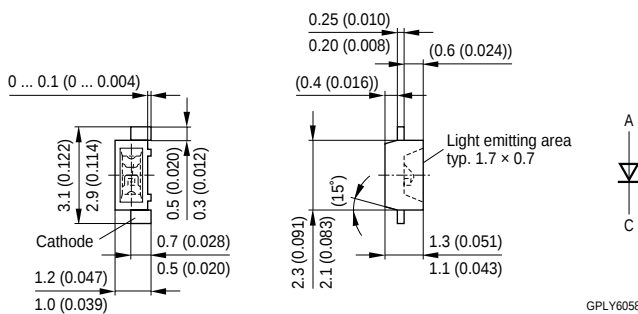


**Figure 28: Mini TOPLED**

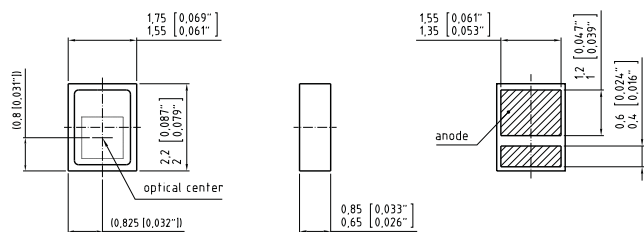


C63062-A4.112-A1 - 06

**Figure 29: Micro SIDELED**



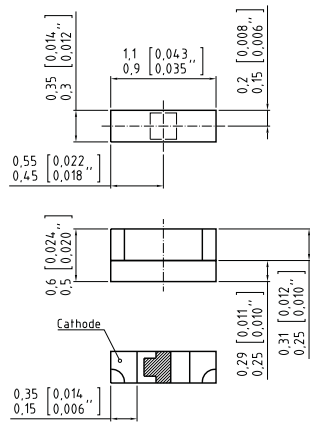
**Figure 30: CERAMOS**



C63062-A3939-A2 - 04

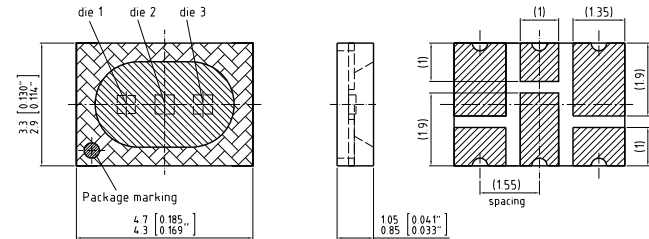
Dimensions in mm (inch)

**Figure 31: FIREFLY**



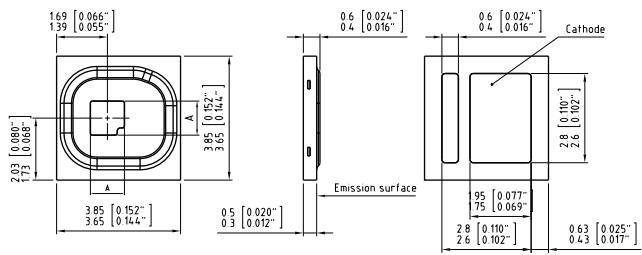
C63062-A4024-A1 -03

**Figure 32: Multi CERAMOS**



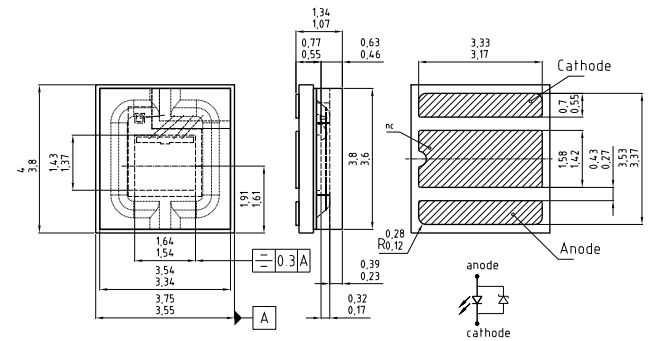
C63062-A3928-A1 -08

**Figure 33: OSRAM OSTAR Projection Cube**



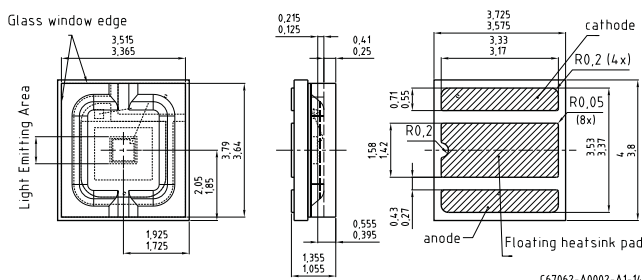
C63062-A4135-A1 -05

**Figure 34: OSRAM OSTAR Projection Compact**



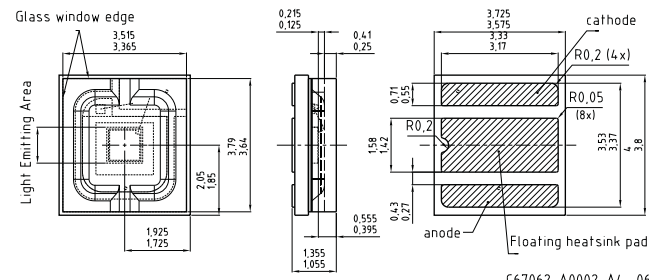
C63062-A4055-A3 -05

**Figure 35: OSRAM OSTAR Projection Compact**



C67062-A0002-A1-14

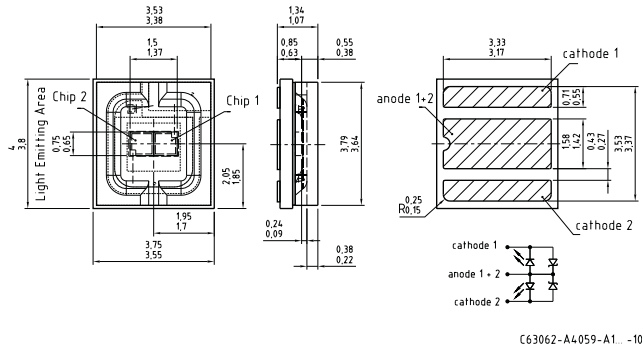
**Figure 36: OSRAM OSTAR Projection Compact**



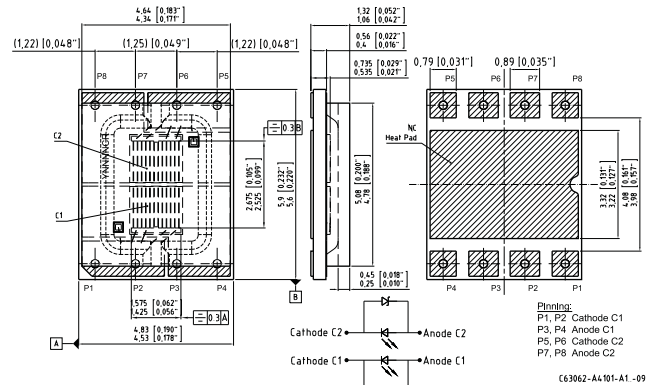
C67062-A0002-A4 -06

Dimensions in mm (inch)

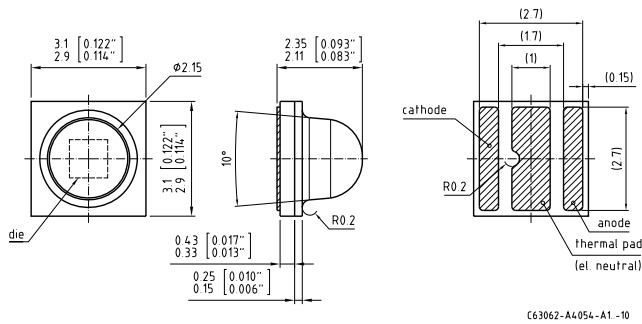
**Figure 37: OSRAM OSTAR Projection Compact**



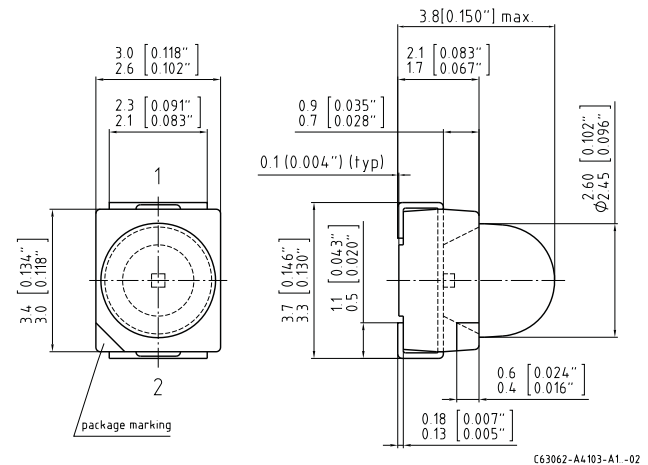
**Figure 38: OSRAM OSTAR Projection Compact**



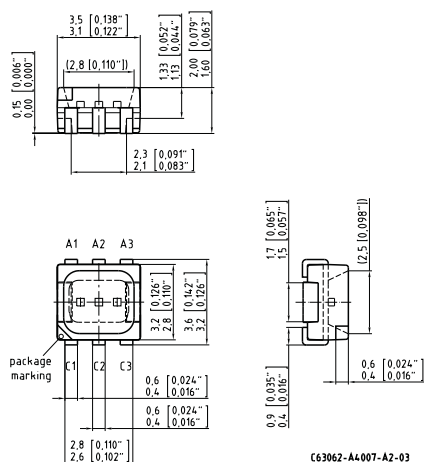
**Figure 39: OSLOX LX**



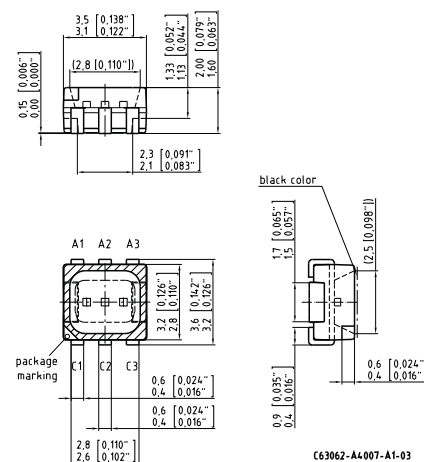
**Figure 40: TOPLED Black**



**Figure 41: MULTILED**

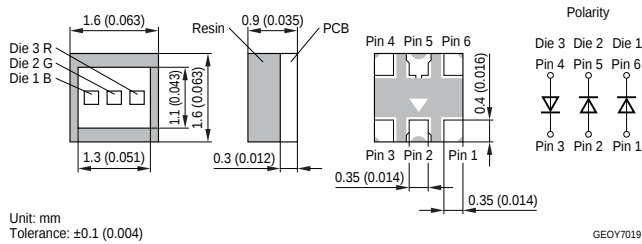


**Figure 42: MULTILED**

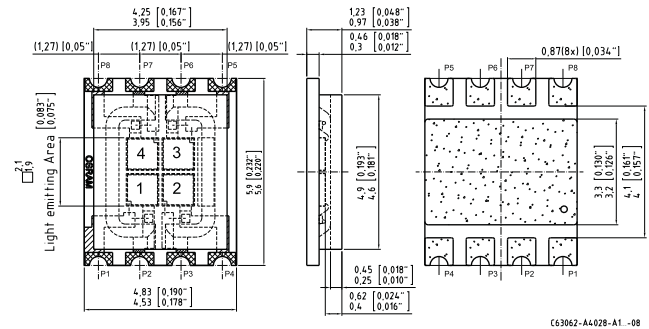


Dimensions in mm (inch)

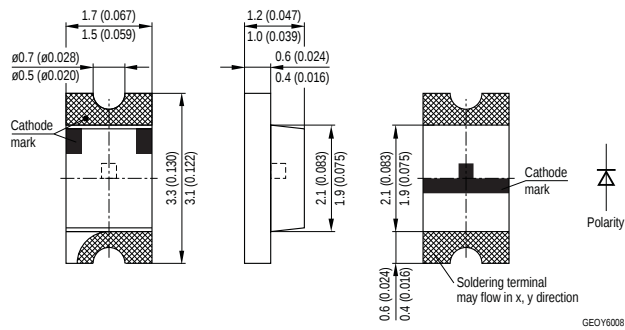
**Figure 43: Multi CHIPLED**



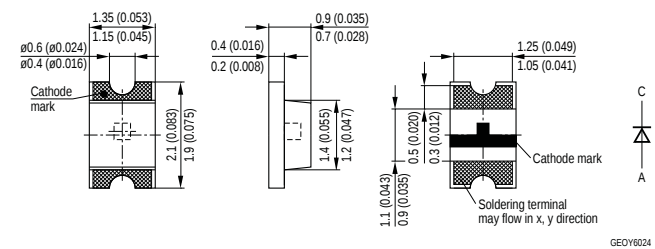
**Figure 44: OSRAM OSTAR Projection SMT**



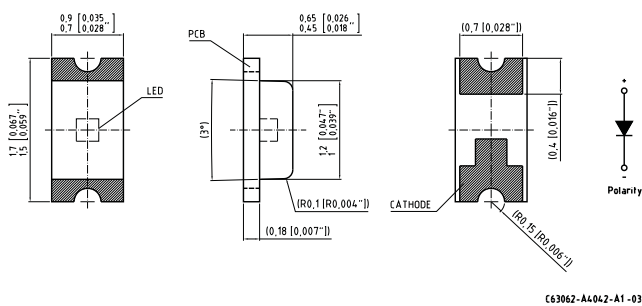
**Figure 45: CHIPLED 1206**



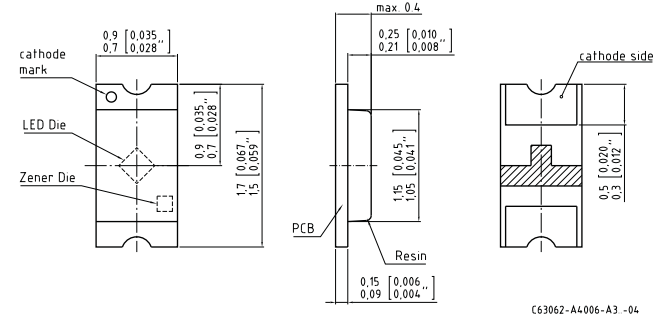
**Figure 46: CHIPLED 0805**



**Figure 47: CHIPLED 0603**

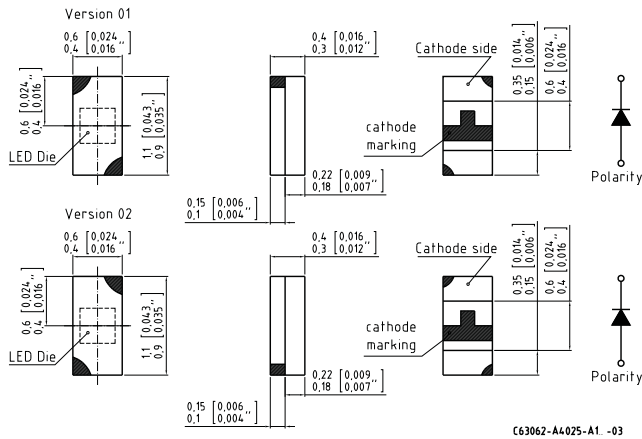


**Figure 48: CHIPLED 0603**

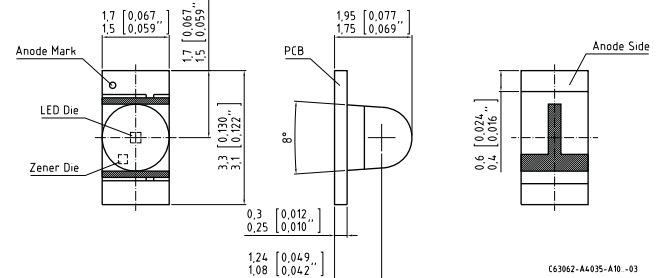


Dimensions in mm (inch)

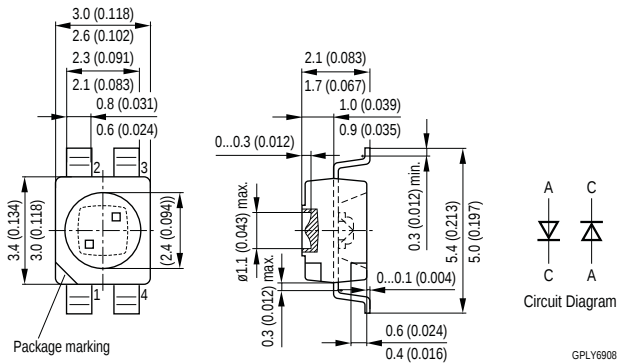
**Figure 49: CHIPLED 0402**



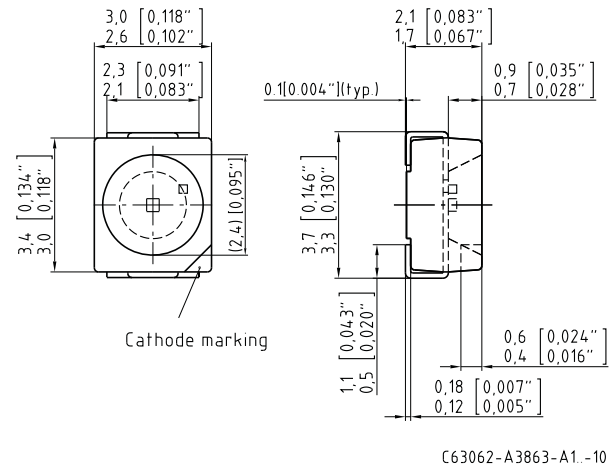
**Figure 50: CHIPLED with lens**



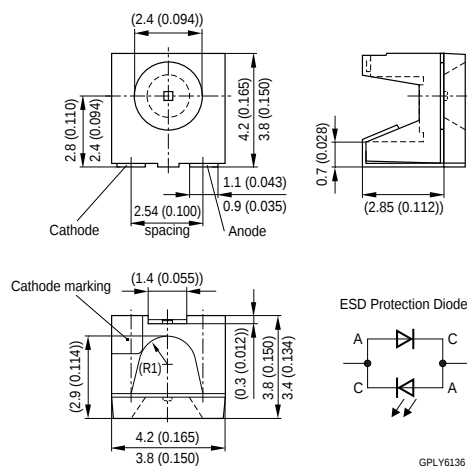
**Figure 51: Multi TOPLED RG**



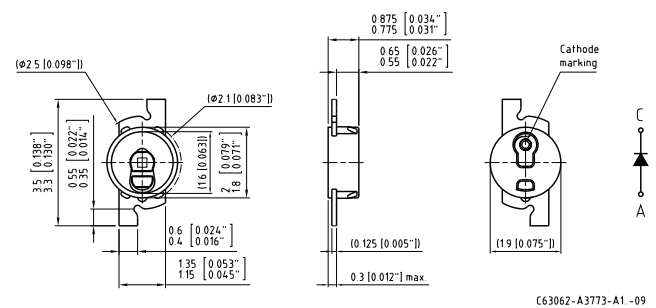
**Figure 52: TOPLED**



**Figure 53: SIDELED**

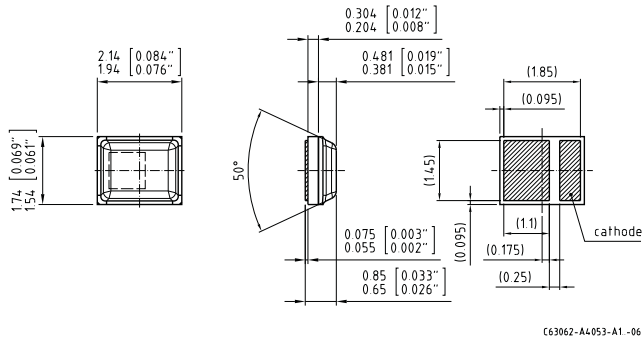


**Figure 54: PointLED**

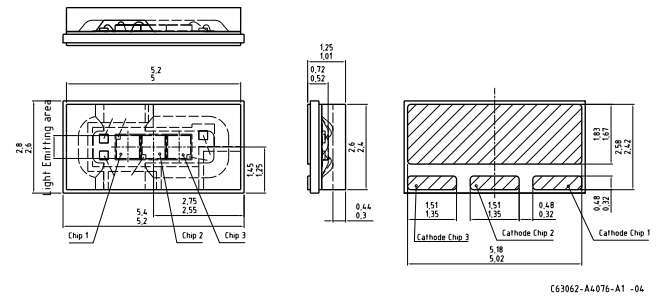


Dimensions in mm (inch)

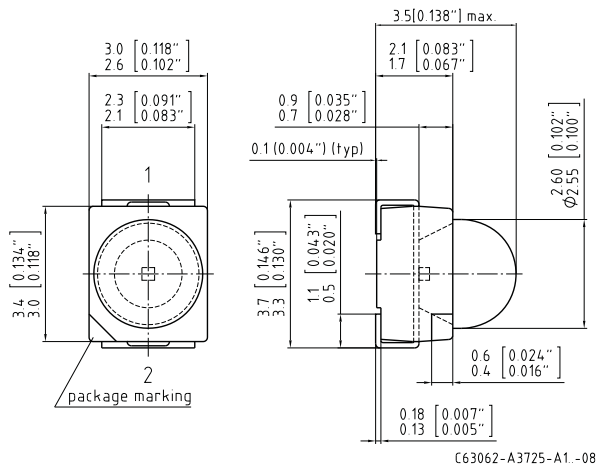
**Figure 55: CERAMOS**



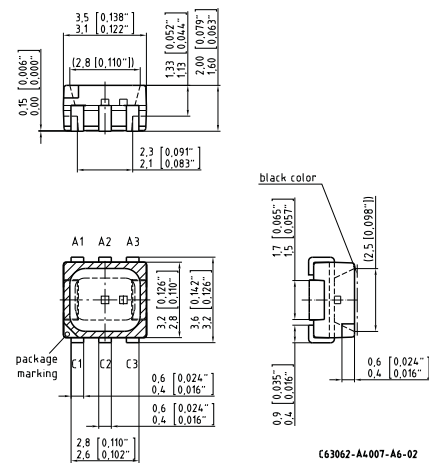
**Figure 56: OSRAM OSTAR Projection Compact**



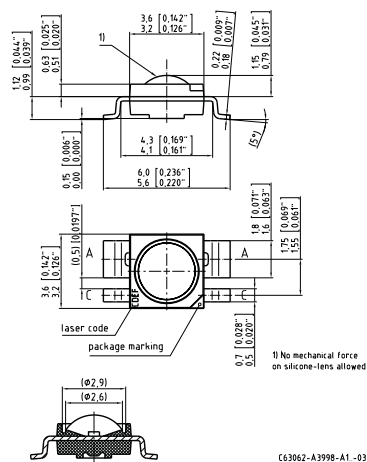
**Figure 57: TOPLED Black**



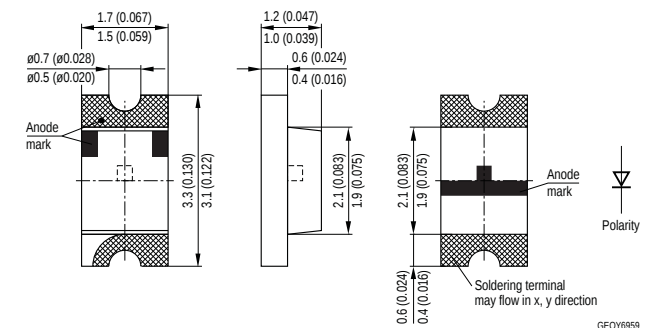
**Figure 58: MULTILED**



**Figure 59: Advanced Power TOPLED Plus**

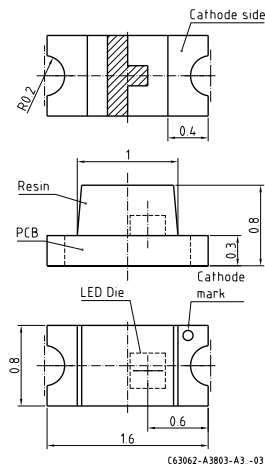


**Figure 60: CHIPLD 1206**

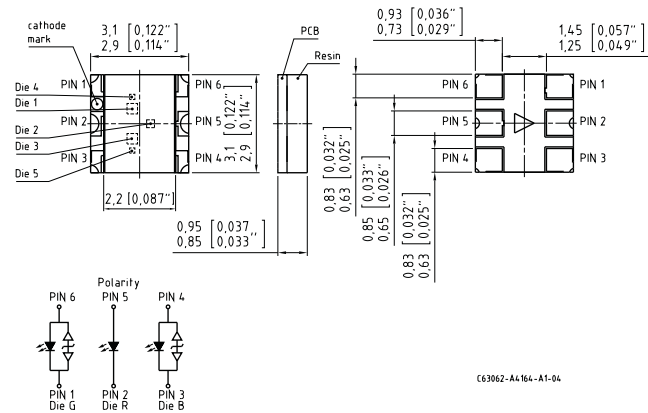


Dimensions in mm (inch)

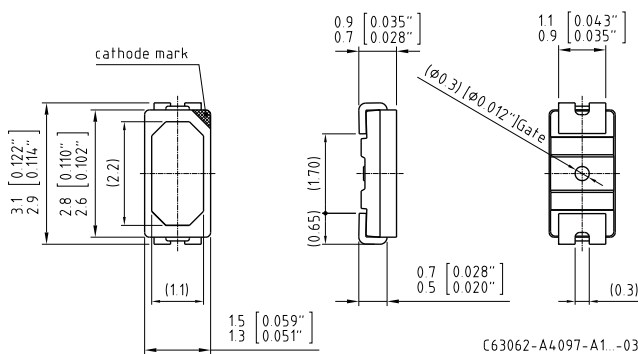
**Figure 61: CHIPLED 0603**



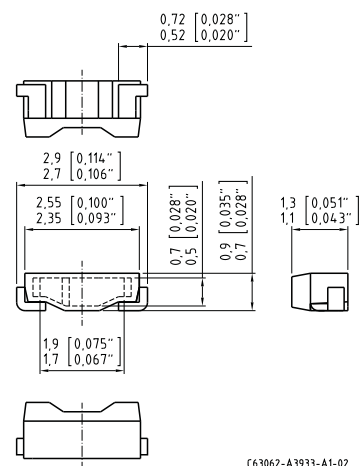
**Figure 62: Multi CHIPLED**



**Figure 63: TOPLED Compact**

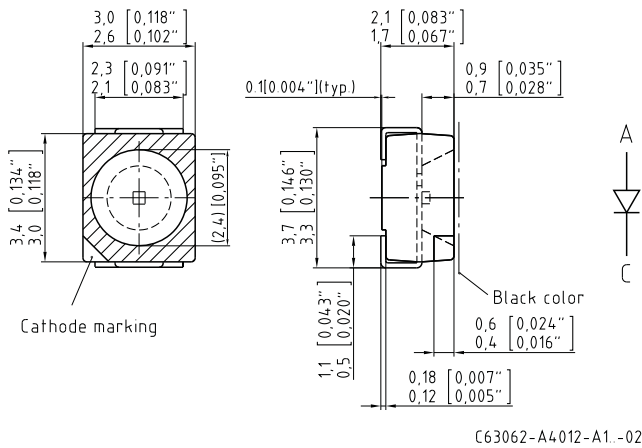


**Figure 64: Micro SIDELED**

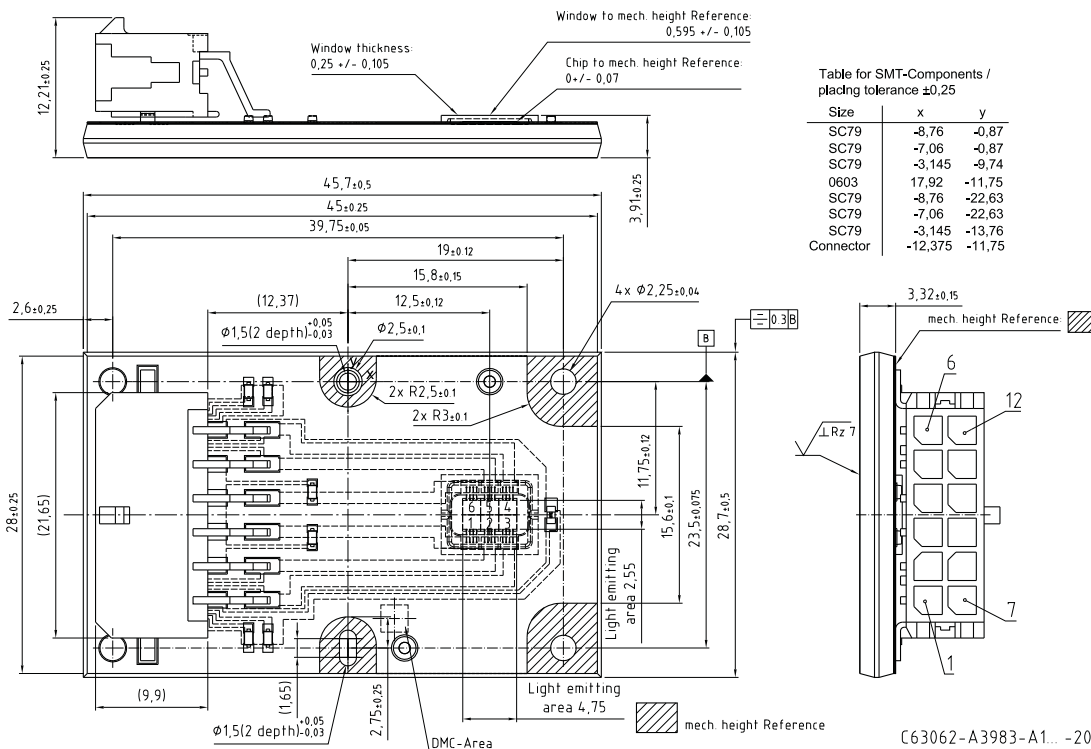


Dimensions in mm (inch)

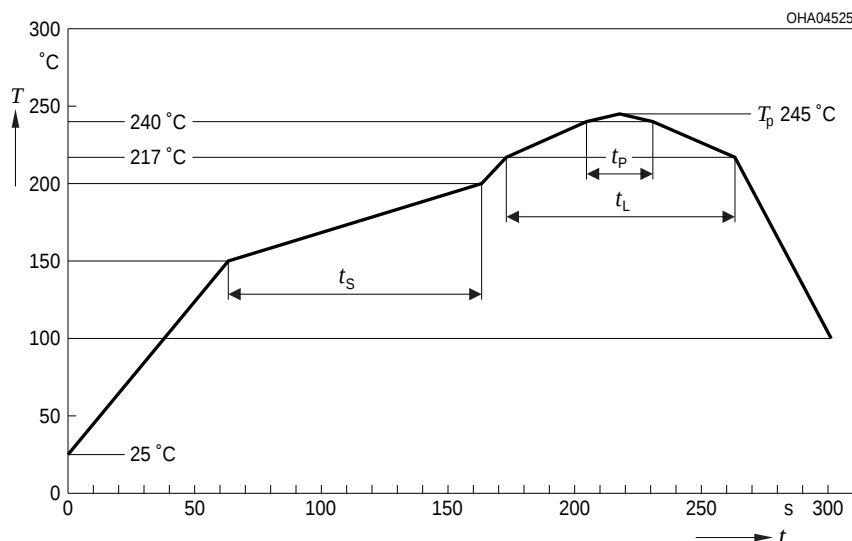
**Figure 65: TOPLED**



**Figure 66: OSRAM OSTAR Projection Power**



Reflow soldering profile acc. to J-STD-020D.01



Components under 2.5 mm height

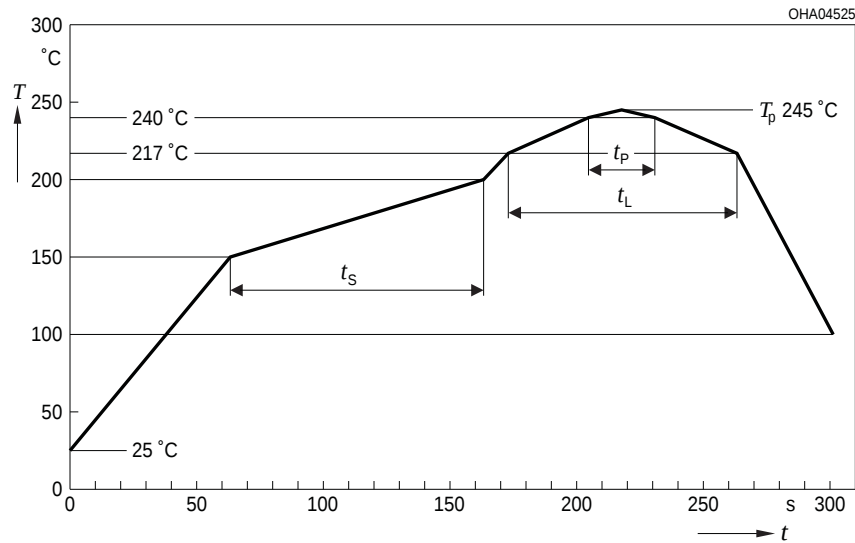
OHA04612

| Profil-Charakteristik<br>Profile Feature                                                      | Symbol<br>Symbol | Pb-Free (SnAgCu) Assembly |                |         | Einheit<br>Unit    |
|-----------------------------------------------------------------------------------------------|------------------|---------------------------|----------------|---------|--------------------|
|                                                                                               |                  | Minimum                   | Recommendation | Maximum |                    |
| Ramp-up Rate to Preheat*)<br>$25^{\circ}\text{C} \leq T \leq 150^{\circ}\text{C}$             |                  |                           | 2              | 3       | K/s                |
| Time from $T_{Smin}$ to $T_{Smax}$<br>$150^{\circ}\text{C} \leq T_S \leq 200^{\circ}\text{C}$ | $t_S$            | 60                        | 100            | 120     | s                  |
| Ramp-up Rate to Peak*)<br>$T_{Smax} \leq T \leq T_P$                                          |                  |                           | 2              | 3       | K/s                |
| Liquidus Temperature                                                                          | $T_L$            | 217                       |                |         | $^{\circ}\text{C}$ |
| Time above Liquidus temperature                                                               | $t_L$            |                           | 80             | 100     | s                  |
| Time<br>$25^{\circ}\text{C} \leq T \leq T_P$                                                  |                  |                           |                | 480     | s                  |
| Peak Temperature                                                                              | $T_P$            |                           | 245            | 260     | $^{\circ}\text{C}$ |
| Time within $5^{\circ}\text{C}$ of the specified peak<br>temperature $T_P - 5\text{ K}$       | $t_P$            | 10                        | 20             | 30      | s                  |
| Ramp-down Rate*)<br>$T_P \leq T \leq 100^{\circ}\text{C}$                                     |                  |                           | 3              | 6       | K/s                |

All temperatures refer to the center of the package, measured on the top of the component

\*) slope calculation  $\Delta T/\Delta t$ :  $\Delta t$  max. 5 s; fulfillment for the whole T-range

Reflow soldering profile acc. to J-STD-020D.01



Components over 2.5 mm height

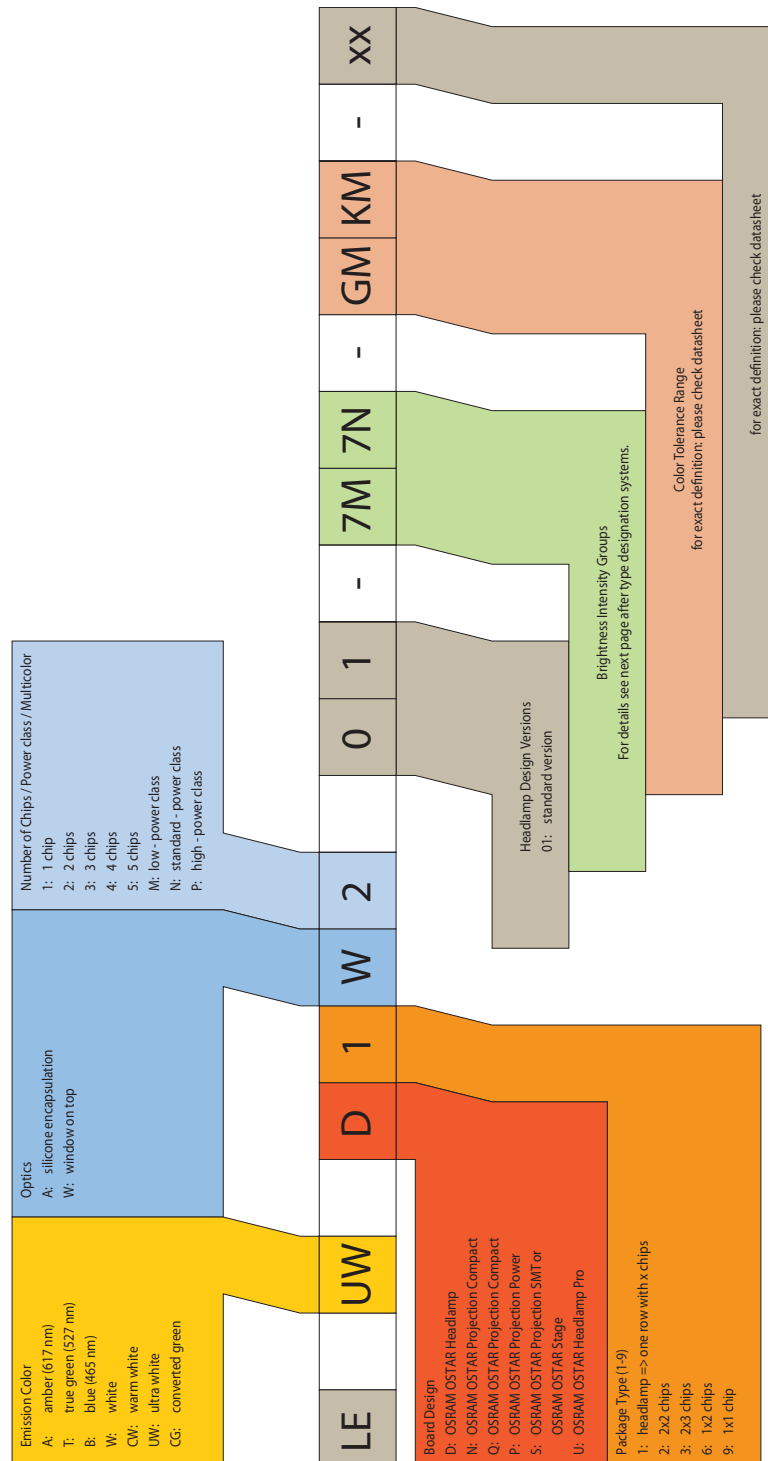
OHA04613

| Profil-Charakteristik<br>Profile Feature                                          | Symbol<br>Symbol | Pb-Free (SnAgCu) Assembly |                |         | Einheit<br>Unit |
|-----------------------------------------------------------------------------------|------------------|---------------------------|----------------|---------|-----------------|
|                                                                                   |                  | Minimum                   | Recommendation | Maximum |                 |
| Ramp-up Rate to Preheat*)<br>$25\text{ °C} \leq T \leq 150\text{ °C}$             |                  |                           | 2              | 3       | K/s             |
| Time from $T_{Smin}$ to $T_{Smax}$<br>$150\text{ °C} \leq T_S \leq 200\text{ °C}$ | $t_S$            | 60                        | 100            | 120     | s               |
| Ramp-up Rate to Peak*)<br>$T_{Smax} \leq T \leq T_P$                              |                  |                           | 2              | 3       | K/s             |
| Liquidus Temperature                                                              | $T_L$            | 217                       |                |         |                 |
| Time above Liquidus temperature                                                   | $t_L$            |                           | 80             | 100     | s               |
| Time<br>$25\text{ °C} \leq T \leq T_P$                                            |                  |                           |                | 480     | s               |
| Peak Temperature                                                                  | $T_P$            |                           | 245            | 250     | °C              |
| Time within 5 °C of the specified peak<br>temperature $T_P \pm 5\text{ K}$        | $t_p$            | 10                        | 20             | 30      | s               |
| Ramp-down Rate*<br>$T_P \leq T \leq 100\text{ °C}$                                |                  |                           | 3              | 4       | K/s             |

All temperatures refer to the center of the package, measured on the top of the component

\* slope calculation  $\Delta T/\Delta t$ :  $\Delta t$  max. 5 s; fulfillment for the whole T-range

## OSRAM OSTAR type designation system



### Premolded LED type designation system

| Wavelength<br>( $\lambda_{\text{em, typ.}}$ )                                                                                                            |  | Emission Color                                                                                                                | Color coordinates according to<br>CIE1931/Emission color:                                                                          |  |   |   |   | Package Type                                                                                                                                  |   |  |    |    | Lead / Package Properties                                                                                                                                                                                                                      |  |    |   |  | Encapsulant Type / Lens Properties                                                                                                                                                                                                                                                                                                    |  |  |  |  | Chip Technology / Power Class                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  | Brightness Intensity Groups                               |  |  |  |  | Color Tolerance Range                                                                  |  |  |  |  | Forward Voltage                                                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| D: 460 nm<br>B: 470 nm<br>V: 505 nm<br>T: 528 nm<br>P: 560 nm<br>G: 570 nm<br>Y: 587 nm<br>O: 606 nm<br>A: 617 nm<br>R: 625 nm<br>S: 633 nm<br>H: 645 nm |  | deep blue<br>blue<br>verde<br>true green<br>pure green<br>green<br>yellow<br>orange<br>amber<br>red<br>super-red<br>hyper-red | W: white<br>UW: ultra white<br>CW: warm white<br>MW: multiphosphor white<br>CY: color on demand yellow<br>CB: color on demand blue |  |   |   |   | A: SIDELED<br>E: Power TOPLED<br>F: OSLUX<br>G: APT / APT Plus<br>M: Mini TOPLED<br>P: PointLED<br>T: TOPLED<br>W: DRAGON<br>Y: Micro SIDELED |   |  |    |    | 1: 0.8 mm package height<br>3: 0.6 mm package height<br>4: trough hole<br>5: gullwing leads<br>6: folded leads<br>8: reflector standard<br>T: folded leads, improved corrosion stability<br>V: folded leads, improved corrosion stability, UX3 |  |    |   |  | 1: narrow lens ~ 20°<br>3: lens 30° ... 70°<br>4: lens 30° ... 70° black package<br>5: lens 40° ... 80°<br>6: lens 40° ... 80° black package<br>7: colorless clear or colored diffused resin<br>8: black surface<br>A: outcoupling lens 135° ... 145°<br>C: white conversion on chip level<br>F: outcoupling lens 135°<br>S: silicone |  |  |  |  | 3: standard InGaN<br>5: high-optical power (HOP)<br>6: standard InGaAlP<br>B: HOP 2000<br>C: standard InGaN enhanced brightness<br>D: ThinGaN, Thinfilm low brightness performance<br>F: ThinGaN, Thinfilm standard high brightness<br>G: ThinGaN<br>K: InGaAlP low current<br>L: low cost performance<br>M: standard performance<br>N: high performance<br>P: power performance<br>S: standard InGaN low current |  |  |  |  | For details see next page after type designation systems. |  |  |  |  | for exact definition and detailed description of white binning: please check datasheet |  |  |  |  | -0: total forward voltage range<br>-1: total forward voltage range, delivery in single groups |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| L                                                                                                                                                        |  | A                                                                                                                             | -                                                                                                                                  |  | E | 6 | S | F                                                                                                                                             | - |  | BB | CB | -                                                                                                                                                                                                                                              |  | 24 | - |  | 1                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |                                                           |  |  |  |  |                                                                                        |  |  |  |  |                                                                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| L: Light emitting diode                                                                                                                                  |  |                                                                                                                               |                                                                                                                                    |  |   |   |   |                                                                                                                                               |   |  |    |    |                                                                                                                                                                                                                                                |  |    |   |  |                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |                                                           |  |  |  |  |                                                                                        |  |  |  |  |                                                                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

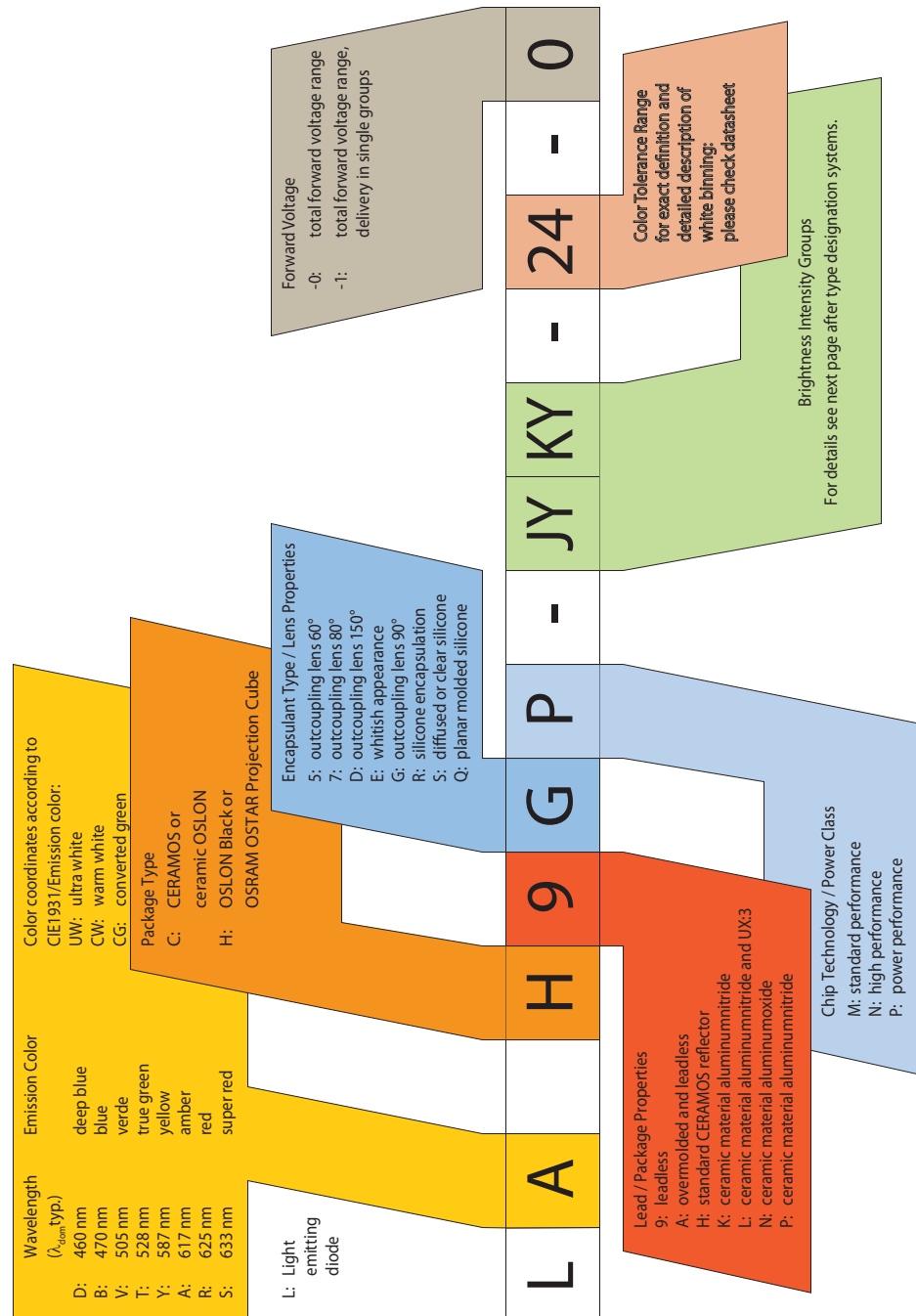
### Taping of LEDs

All SMT LEDs are available in 8 mm resp. 12 mm tapes.

### Gurtung von Lumineszenzdioden

Alle SMT-LED werden im 8- bzw. 12-mm Gurt geliefert.

## Ceramics based LED type designation system



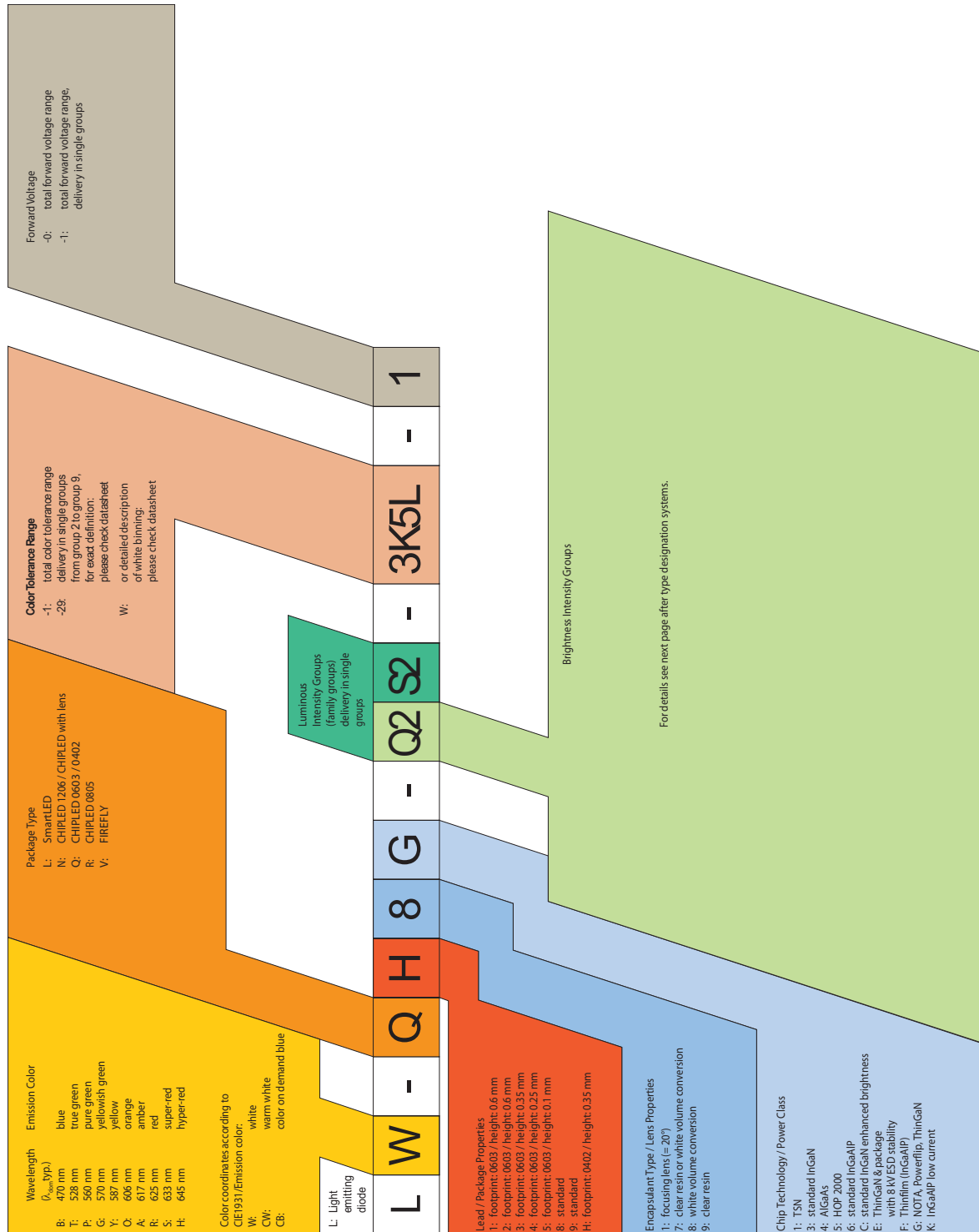
## Taping of LEDs

All SMT LEDs are available in 8 mm resp. 12 mm tapes.

## Gurtung von Lumineszenzdioden

Alle SMT-LED werden im 8- bzw. 12-mm Gurt geliefert.

## Miniature package LED type designation system



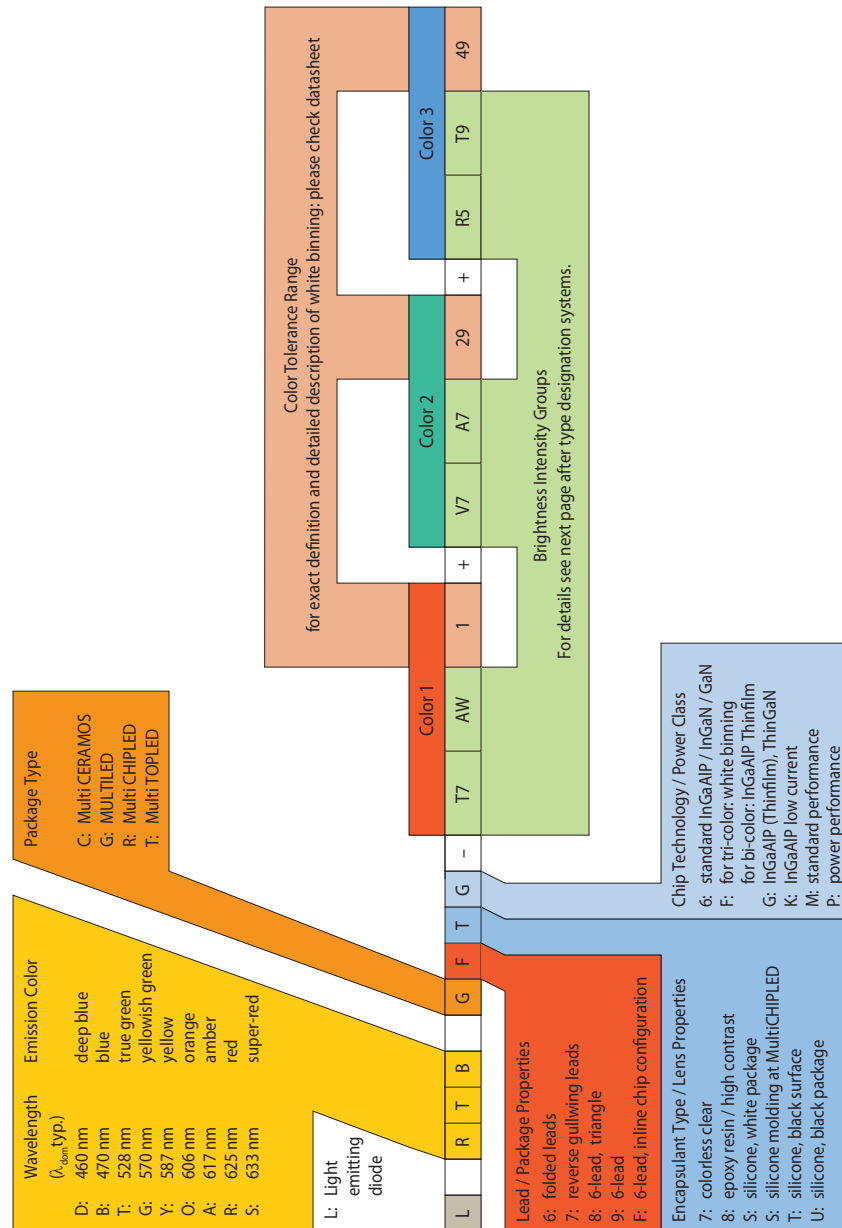
## Taping of LEDs

All SMT LEDs are available in 8 mm resp. 12 mm tapes.

## Gurtung von Lumineszenzdioden

Alle SMT-LED werden im 8- bzw. 12-mm Gurt geliefert.

## Multi chip LED type designation system



## Taping of LEDs

All SMT LEDs are available in 8 mm resp. 12 mm tapes.

## Gurtung von Lumineszenzdioden

Alle SMT-LED werden im 8- bzw. 12-mm Gurt geliefert.

### Brightness Intensity Groups

| 1/1 Grouping |        |         | 1/2 Grouping |        |         | 1/3 Grouping |           |           | 1/4 Grouping |           |           | 1/6 Grouping |      |      |
|--------------|--------|---------|--------------|--------|---------|--------------|-----------|-----------|--------------|-----------|-----------|--------------|------|------|
| Bin          | min.   | max.    | Bin          | min.   | max.    | Bin          | min.      | max.      | Bin          | min.      | max.      | Bin          | min. | max. |
| C            | 0.28   | 0.45    | C1           | 0.28   | 0.36    |              |           |           | 1C           | 0.28      | 0.32      |              |      |      |
|              |        |         | C2           | 0.36   | 0.45    |              |           |           | 2C           | 0.32      | 0.36      |              |      |      |
|              |        |         |              |        |         | 3C           | 0.36      | 0.40      |              |           |           |              |      |      |
| D            | 0.45   | 0.71    | D1           | 0.45   | 0.56    |              |           |           | 4C           | 0.40      | 0.45      |              |      |      |
|              |        |         | D2           | 0.56   | 0.71    |              |           |           | 1D           | 0.45      | 0.50      |              |      |      |
|              |        |         |              |        |         | 2D           | 0.50      | 0.56      |              |           |           |              |      |      |
| E            | 0.71   | 1.12    | E1           | 0.71   | 0.90    |              |           |           | 3D           | 0.56      | 0.63      |              |      |      |
|              |        |         | E2           | 0.90   | 1.12    |              |           |           | 4D           | 0.63      | 0.71      |              |      |      |
|              |        |         |              |        |         | 1E           | 0.71      | 0.80      |              |           |           |              |      |      |
| F            | 1.12   | 1.80    | F1           | 1.12   | 1.40    |              |           |           | 2E           | 0.80      | 0.90      |              |      |      |
|              |        |         | F2           | 1.40   | 1.80    |              |           |           | 3E           | 0.90      | 1.00      |              |      |      |
|              |        |         |              |        |         | 4E           | 1.00      | 1.12      |              |           |           |              |      |      |
| G            | 1.80   | 2.80    | G1           | 1.80   | 2.24    |              |           |           | 1F           | 1.12      | 1.25      |              |      |      |
|              |        |         | G2           | 2.24   | 2.80    |              |           |           | 2F           | 1.25      | 1.40      |              |      |      |
|              |        |         |              |        |         | 3F           | 1.40      | 1.59      |              |           |           |              |      |      |
| H            | 2.80   | 4.50    | H1           | 2.80   | 3.55    |              |           |           | 4F           | 1.59      | 1.80      |              |      |      |
|              |        |         | H2           | 3.55   | 4.50    |              |           |           | 1G           | 1.80      | 2.01      |              |      |      |
|              |        |         |              |        |         | 2G           | 2.01      | 2.24      |              |           |           |              |      |      |
| J            | 4.50   | 7.10    | J1           | 4.50   | 5.60    |              |           |           | 3G           | 2.24      | 2.50      |              |      |      |
|              |        |         | J2           | 5.60   | 7.10    |              |           |           | 4G           | 2.50      | 2.80      |              |      |      |
|              |        |         |              |        |         | 1H           | 2.80      | 3.15      |              |           |           |              |      |      |
| K            | 7.10   | 11.2    | K1           | 7.10   | 9.00    |              |           |           | 2H           | 3.15      | 3.55      |              |      |      |
|              |        |         | K2           | 9.00   | 11.2    |              |           |           | 3H           | 3.55      | 4.00      |              |      |      |
|              |        |         |              |        |         | 4H           | 4.00      | 4.50      |              |           |           |              |      |      |
| L            | 11.2   | 18.0    | L1           | 11.2   | 14.0    |              |           |           | 1J           | 4.50      | 5.00      |              |      |      |
|              |        |         | L2           | 14.0   | 18.0    |              |           |           | 2J           | 5.00      | 5.60      |              |      |      |
|              |        |         |              |        |         | 3J           | 5.60      | 6.30      |              |           |           |              |      |      |
| M            | 18.0   | 28.0    | M1           | 18.0   | 22.4    |              |           |           | 4J           | 6.30      | 7.10      |              |      |      |
|              |        |         | M2           | 22.4   | 28.0    |              |           |           | 1K           | 7.10      | 8.00      |              |      |      |
|              |        |         |              |        |         | 2K           | 8.00      | 9.00      |              |           |           |              |      |      |
| N            | 28.0   | 45.0    | N1           | 28.0   | 35.5    |              |           |           | 3K           | 9.00      | 10.00     |              |      |      |
|              |        |         | N2           | 35.5   | 45.0    |              |           |           | 4K           | 10.00     | 11.2      |              |      |      |
|              |        |         |              |        |         | 1L           | 11.2      | 12.5      |              |           |           |              |      |      |
| P            | 45.0   | 71.0    | P1           | 45.0   | 56.0    |              |           |           | 2L           | 12.5      | 14.0      |              |      |      |
|              |        |         | P2           | 56.0   | 71.0    |              |           |           | 3L           | 14.0      | 15.9      |              |      |      |
|              |        |         |              |        |         | 4L           | 15.9      | 18.0      |              |           |           |              |      |      |
| Q            | 71.0   | 112     | Q1           | 71.0   | 90.0    |              |           |           | 1M           | 18.0      | 20.1      |              |      |      |
|              |        |         | Q2           | 90.0   | 112     |              |           |           | 2M           | 20.1      | 22.4      |              |      |      |
|              |        |         |              |        |         | 3M           | 22.4      | 25.0      |              |           |           |              |      |      |
| R            | 112    | 180     | R1           | 112    | 140     |              |           |           | 4M           | 25.0      | 28.0      |              |      |      |
|              |        |         | R2           | 140    | 180     |              |           |           | 1N           | 28.0      | 31.5      |              |      |      |
|              |        |         |              |        |         | 2N           | 31.5      | 35.5      |              |           |           |              |      |      |
| S            | 180    | 280     | S1           | 180    | 224     |              |           |           | 3N           | 35.5      | 40.0      |              |      |      |
|              |        |         | S2           | 224    | 280     |              |           |           | 4N           | 40.0      | 45.0      |              |      |      |
|              |        |         |              |        |         | 1P           | 45.0      | 50.0      |              |           |           |              |      |      |
| T            | 280    | 450     | T1           | 280    | 355     |              |           |           | 2P           | 50.0      | 56.0      |              |      |      |
|              |        |         | T2           | 355    | 450     |              |           |           | 3P           | 56.0      | 63.0      |              |      |      |
|              |        |         |              |        |         | 4P           | 63.0      | 71.0      |              |           |           |              |      |      |
| U            | 450    | 710     | U1           | 450    | 560     |              |           |           | 1Q           | 71.0      | 80.0      |              |      |      |
|              |        |         | U2           | 560    | 710     |              |           |           | 2Q           | 80.0      | 90.0      |              |      |      |
|              |        |         |              |        |         | 3Q           | 90.0      | 100.0     |              |           |           |              |      |      |
| V            | 710    | 1 120   | V1           | 710    | 900     |              |           |           | 4Q           | 100.0     | 112       |              |      |      |
|              |        |         | V2           | 900    | 1 120   |              |           |           | 1R           | 112       | 125       |              |      |      |
|              |        |         |              |        |         | 2R           | 125       | 140       |              |           |           |              |      |      |
| AW           | 1 120  | 1 800   | AA           | 1 120  | 1 400   | AX           | 1 120     | 1 300     | 3R           | 140       | 159       |              |      |      |
|              |        |         | AB           | 1 400  | 1 800   | AY           | 1 300     | 1 500     | 4R           | 159       | 180       |              |      |      |
|              |        |         |              |        |         | AZ           | 1 500     | 1 800     | 1S           | 180       | 201       |              |      |      |
| BW           | 1 800  | 2 800   | BA           | 1 800  | 2 240   | BX           | 1 800     | 2 100     | 2S           | 201       | 224       |              |      |      |
|              |        |         | BB           | 2 240  | 2 800   | BY           | 2 100     | 2 400     | 3S           | 224       | 250       |              |      |      |
|              |        |         |              |        |         | BZ           | 2 400     | 2 800     | 4S           | 250       | 280       |              |      |      |
| CW           | 2 800  | 4 500   | CA           | 2 800  | 3 550   | CX           | 2 800     | 3 300     | 1T           | 280       | 315       |              |      |      |
|              |        |         | CB           | 3 550  | 4 500   | CY           | 3 300     | 3 900     | 2T           | 315       | 355       |              |      |      |
|              |        |         |              |        |         | CZ           | 3 900     | 4 500     | 3T           | 355       | 400       |              |      |      |
| DW           | 4 500  | 7 100   | DA           | 4 500  | 5 600   | DX           | 4 500     | 5 200     | 4T           | 400       | 450       |              |      |      |
|              |        |         | DB           | 5 600  | 7 100   | DY           | 5 200     | 6 100     | 1U           | 450       | 500       |              |      |      |
|              |        |         |              |        |         | DZ           | 6 100     | 7 100     | 2U           | 500       | 560       |              |      |      |
| E            | 5 600  | 8 400   | EA           | 5 600  | 6 300   | EX           | 5 600     | 6 100     | 3U           | 560       | 630       |              |      |      |
|              |        |         | EB           | 6 300  | 8 400   | EY           | 6 100     | 7 100     | 4U           | 630       | 710       |              |      |      |
|              |        |         |              |        |         | 1V           | 710       | 800       |              |           |           |              |      |      |
| F            | 6 300  | 9 000   | FA           | 6 300  | 7 100   | FX           | 6 300     | 7 100     | 2V           | 800       | 900       |              |      |      |
|              |        |         | FB           | 7 100  | 9 000   | FY           | 7 100     | 8 400     | 3V           | 900       | 1 000     |              |      |      |
|              |        |         |              |        |         | 1W           | 1 000     | 1 120     |              |           |           |              |      |      |
| G            | 7 100  | 10 000  | GA           | 7 100  | 8 400   | GX           | 7 100     | 8 400     | 2W           | 1 120     | 1 250     |              |      |      |
|              |        |         | GB           | 8 400  | 10 000  | GY           | 8 400     | 9 000     | 3W           | 1 250     | 1 400     |              |      |      |
|              |        |         |              |        |         | 1X           | 1 400     | 1 590     |              |           |           |              |      |      |
| H            | 8 400  | 11 200  | HA           | 8 400  | 9 000   | HX           | 8 400     | 9 000     | 2X           | 1 590     | 1 800     |              |      |      |
|              |        |         | HB           | 9 000  | 11 200  | HY           | 9 000     | 10 000    | 3X           | 1 800     | 2 010     |              |      |      |
|              |        |         |              |        |         | 1Y           | 2 010     | 2 240     |              |           |           |              |      |      |
| I            | 9 000  | 12 500  | IA           | 9 000  | 10 000  | IX           | 9 000     | 10 000    | 2Y           | 2 240     | 2 500     |              |      |      |
|              |        |         | IB           | 10 000 | 12 500  | IY           | 10 000    | 11 200    | 3Y           | 2 500     | 2 800     |              |      |      |
|              |        |         |              |        |         | 1Z           | 2 800     | 3 150     |              |           |           |              |      |      |
| J            | 10 000 | 15 000  | JA           | 10 000 | 12 500  | JX           | 10 000    | 12 500    | 2Z           | 3 150     | 3 550     |              |      |      |
|              |        |         | JB           | 12 500 | 15 000  | JY           | 12 500    | 14 000    | 3Z           | 3 550     | 4 000     |              |      |      |
|              |        |         |              |        |         | 1AA          | 4 000     | 4 500     |              |           |           |              |      |      |
| K            | 11 200 | 18 000  | KA           | 11 200 | 14 000  | KX           | 11 200    | 14 000    | 2AA          | 4 500     | 5 000     |              |      |      |
|              |        |         | KB           | 14 000 | 18 000  | KY           | 14 000    | 15 900    | 3AA          | 5 000     | 5 600     |              |      |      |
|              |        |         |              |        |         | 1AB          | 5 600     | 6 300     |              |           |           |              |      |      |
| L            | 12 500 | 20 000  | LA           | 12 500 | 15 000  | LX           | 12 500    | 15 000    | 2AB          | 6 300     | 7 100     |              |      |      |
|              |        |         | LB           | 15 000 | 20 000  | LY           | 15 000    | 16 000    | 3AB          | 7 100     | 8 000     |              |      |      |
|              |        |         |              |        |         | 1AC          | 8 000     | 8 400     |              |           |           |              |      |      |
| M            | 14 000 | 22 000  | MA           | 14 000 | 16 000  | MX           | 14 000    | 16 000    | 2AC          | 8 400     | 9 000     |              |      |      |
|              |        |         | MB           | 16 000 | 22 000  | MY           | 16 000    | 17 000    | 3AC          | 9 000     | 9 500     |              |      |      |
|              |        |         |              |        |         | 1AD          | 9 500     | 10 000    |              |           |           |              |      |      |
| N            | 15 000 | 25 000  | NA           | 15 000 | 18 000  | NX           | 15 000    | 18 000    | 2AD          | 10 000    | 11 200    |              |      |      |
|              |        |         | NB           | 18 000 | 25 000  | NY           | 18 000    | 19 000    | 3AD          | 11 200    | 12 500    |              |      |      |
|              |        |         |              |        |         | 1AE          | 12 500    | 14 000    |              |           |           |              |      |      |
| O            | 16 000 | 28 000  | OA           | 16 000 | 20 000  | OX           | 16 000    | 20 000    | 2AE          | 14 000    | 15 900    |              |      |      |
|              |        |         | OB           | 20 000 | 28 000  | OY           | 20 000    | 22 000    | 3AE          | 15 900    | 18 000    |              |      |      |
|              |        |         |              |        |         | 1AF          | 18 000    | 20 000    |              |           |           |              |      |      |
| P            | 17 000 | 31 000  | PA           | 17 000 | 22 000  | PX           | 17 000    | 22 000    | 2AF          | 20 000    | 22 400    |              |      |      |
|              |        |         | PB           | 22 000 | 31 000  | PY           | 22 000    | 24 000    | 3AF          | 22 400    | 25 000    |              |      |      |
|              |        |         |              |        |         | 1AG          | 25 000    | 28 000    |              |           |           |              |      |      |
| Q            | 18 000 | 35 000  | QA           | 18 000 | 25 000  | QX           | 18 000    | 25 000    | 2AG          | 28 000    | 31 500    |              |      |      |
|              |        |         | QB           | 25 000 | 35 000  | QY           | 25 000    | 28 000    | 3AG          | 31 500    | 35 500    |              |      |      |
|              |        |         |              |        |         | 1AH          | 35 500    | 40 000    |              |           |           |              |      |      |
| R            | 19 000 | 40 000  | RA           | 19 000 | 28 000  | RX           | 19 000    | 28 000    | 2AH          | 40 000    | 45 000    |              |      |      |
|              |        |         | RB           | 28 000 | 40 000  | RY           | 28 000    | 32 000    | 3AH          | 45 000    | 50 000    |              |      |      |
|              |        |         |              |        |         | 1AI          | 50 000    | 56 000    |              |           |           |              |      |      |
| S            | 20 000 | 45 000  | SA           | 20 000 | 32 000  | SX           | 20 000    | 32 000    | 2AI          | 56 000    | 63 000    |              |      |      |
|              |        |         | SB           | 32 000 | 45 000  | SY           | 32 000    | 36 000    | 3AI          | 63 000    | 71 000    |              |      |      |
|              |        |         |              |        |         | 1AJ          | 71 000    | 80 000    |              |           |           |              |      |      |
| T            | 21 000 | 50 000  | TA           | 21 000 | 35 000  | TX           | 21 000    | 35 000    | 2AJ          | 80 000    | 90 000    |              |      |      |
|              |        |         | TB           | 35 000 | 50 000  | TY           | 35 000    | 40 000    | 3AJ          | 90 000    | 100 000   |              |      |      |
|              |        |         |              |        |         | 1AK          | 100 000   | 112 000   |              |           |           |              |      |      |
| U            | 22 000 | 56 000  | TA           | 22 000 | 35 500  | UX           | 22 000    | 35 500    | 2AK          | 112 000   | 125 000   |              |      |      |
|              |        |         | TB           | 35 500 | 56 000  | UY           | 35 500    | 40 000    | 3AK          | 125 000   | 140 000   |              |      |      |
|              |        |         |              |        |         | 1AL          | 140 000   | 159 000   |              |           |           |              |      |      |
| V            | 23 000 | 63 000  | VA           | 23 000 | 35 500  | VX           | 23 000    | 35 500    | 2AL          | 159 000   | 180 000   |              |      |      |
|              |        |         | VB           | 35 500 | 63 000  | VY           | 35 500    | 40 000    | 3AL          | 180 000   | 201 000   |              |      |      |
|              |        |         |              |        |         | 1AM          | 201 000   | 224 000   |              |           |           |              |      |      |
| W            | 24 000 | 71 000  | WA           | 24 000 | 35 500  | WX           | 24 000    | 35 500    | 2AM          | 224 000   | 250 000   |              |      |      |
|              |        |         | WB           | 35 500 | 71 000  | WY           | 35 500    | 40 000    | 3AM          | 250 000   | 280 000   |              |      |      |
|              |        |         |              |        |         | 1AN          | 280 000   | 315 000   |              |           |           |              |      |      |
| X            | 25 000 | 80 000  | XA           | 25 000 | 35 500  | XX           | 25 000    | 35 500    | 2AN          | 315 000   | 355 000   |              |      |      |
|              |        |         | XB           | 35 500 | 80 000  | XY           | 35 500    | 40 000    | 3AN          | 355 000   | 400 000   |              |      |      |
|              |        |         |              |        |         | 1AO          | 400 000   | 450 000   |              |           |           |              |      |      |
| Y            | 26 000 | 90 000  | YA           | 26 000 | 35 500  | YX           | 26 000    | 35 500    | 2AO          | 450 000   | 500 000   |              |      |      |
|              |        |         | YB           | 35 500 | 90 000  | YY           | 35 500    | 40 000    | 3AO          | 500 000   | 560 000   |              |      |      |
|              |        |         |              |        |         | 1AP          | 560 000   | 630 000   |              |           |           |              |      |      |
| Z            | 27 000 | 100 000 | ZA           | 27 000 | 35 500  | ZX           | 27 000    | 35 500    | 2AP          | 630 000   | 710 000   |              |      |      |
|              |        |         | ZB           | 35 500 | 100 000 | ZY           | 35 500    | 40 000    | 3AP          | 710 000   | 800 000   |              |      |      |
|              |        |         |              |        |         | 1AQ          | 800 000   | 900 000   |              |           |           |              |      |      |
| AA           | 28 000 | 112 000 | ZAA          | 28 000 | 35 500  | ZAX          | 28 000    | 35 500    | 2AQ          | 900 000   | 1 000 000 |              |      |      |
|              |        |         | ZAB          | 35 500 | 112 000 | ZAY          | 35 500    | 40 000    | 3AQ          | 1 000 000 | 1 120 000 |              |      |      |
|              |        |         |              |        |         | 1AR          | 1 120 000 | 1 250 000 |              |           |           |              |      |      |
| AB           | 29 000 | 125 000 | ZA           | 29 000 | 35 500  | ZAX          | 29 000    | 35 500    | 2AR          | 1 250 000 | 1 400 000 |              |      |      |
|              |        |         | ZAB          | 35 500 | 125 000 | ZAY          | 35 500    | 40 000    | 3AR          | 1 400 000 | 1 590 000 |              |      |      |
|              |        |         |              |        |         | 1AS          | 1 590 000 | 1 800 000 |              |           |           |              |      |      |
| AC           | 30 000 | 140 000 | ZAA          | 30 000 | 35 500  | ZAX          | 30 000    | 35 500    | 2AS          | 1 800 000 | 2 010 000 |              |      |      |
|              |        |         | ZAB          | 35 500 | 140 000 | ZAY          | 35 500    | 40 000    | 3AS          | 2 010 000 | 2 240 000 |              |      |      |
|              |        |         |              |        |         | 1AT          | 2 240 000 | 2 500 000 |              |           |           |              |      |      |
| AD           | 31 000 | 159 000 | ZAA          | 31 000 |         |              |           |           |              |           |           |              |      |      |

## Brightness Intensity Groups

| 1/1 Grouping (cont.) |           |            | 1/2 Grouping (cont.) |           |            | 1/3 Grouping (cont.) |           |            | 1/4 Grouping (cont.) |            |            | 1/6 Grouping (cont.) |            |            |
|----------------------|-----------|------------|----------------------|-----------|------------|----------------------|-----------|------------|----------------------|------------|------------|----------------------|------------|------------|
| Bin                  | min.      | max.       | Bin                  | min.      | max.       | Bin                  | min.      | max.       | Bin                  | min.       | max.       | Bin                  | min.       | max.       |
| EW                   | 7 100     | 11 200     | EA                   | 7 100     | 9 000      | EX                   | 7 100     | 8 200      | 5E                   | 7 100      | 8 000      | EP                   | 7 100      | 7 630      |
|                      |           |            | EB                   | 9 000     | 11 200     | EY                   | 8 200     | 9 700      | 6E                   | 8 000      | 9 000      | EQ                   | 7 630      | 8 200      |
|                      |           |            |                      |           |            | EZ                   | 9 700     | 11 200     | 7E                   | 9 000      | 10 000     | ER                   | 8 200      | 8 920      |
|                      |           |            |                      |           |            |                      |           |            | 8E                   | 10 000     | 11 200     | ES                   | 8 920      | 9 700      |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | ET                   | 9 700      | 10 420     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | EU                   | 10 420     | 11 200     |
| FW                   | 11 200    | 18 000     | FA                   | 11 200    | 14 000     | FX                   | 11 200    | 13 000     | 5F                   | 11 200     | 12 500     | FP                   | 11 200     | 12 100     |
|                      |           |            | FB                   | 14 000    | 18 000     | FY                   | 13 000    | 15 000     | 6F                   | 12 500     | 14 000     | FQ                   | 12 100     | 13 000     |
|                      |           |            |                      |           |            | FZ                   | 15 000    | 18 000     | 7F                   | 14 000     | 15 900     | FR                   | 13 000     | 14 000     |
|                      |           |            |                      |           |            |                      |           |            | 8F                   | 15 900     | 18 000     | FS                   | 14 000     | 15 000     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | FT                   | 15 000     | 16 400     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | FU                   | 16 400     | 18 000     |
| GW                   | 18 000    | 28 000     | GA                   | 18 000    | 22 400     | GX                   | 18 000    | 21 000     | 5G                   | 18 000     | 20 100     | GP                   | 18 000     | 19 400     |
|                      |           |            | GB                   | 22 400    | 28 000     | GY                   | 21 000    | 24 000     | 6G                   | 20 100     | 22 400     | GQ                   | 19 400     | 21 000     |
|                      |           |            |                      |           |            | GZ                   | 24 000    | 28 000     | 7G                   | 22 400     | 25 000     | GR                   | 21 000     | 22 400     |
|                      |           |            |                      |           |            |                      |           |            | 8G                   | 25 000     | 28 000     | GS                   | 22 400     | 24 000     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | GT                   | 24 000     | 25 900     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | GU                   | 25 900     | 28 000     |
| HW                   | 28 000    | 45 000     | HA                   | 28 000    | 35 500     | HX                   | 28 000    | 33 000     | 5H                   | 28 000     | 31 500     | HP                   | 28 000     | 30 400     |
|                      |           |            | HB                   | 35 500    | 45 000     | HY                   | 33 000    | 39 000     | 6H                   | 31 500     | 35 500     | HQ                   | 30 400     | 33 000     |
|                      |           |            |                      |           |            | HZ                   | 39 000    | 45 000     | 7H                   | 35 500     | 40 000     | HR                   | 33 000     | 35 900     |
|                      |           |            |                      |           |            |                      |           |            | 8H                   | 40 000     | 45 000     | HS                   | 35 900     | 39 000     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | HT                   | 39 000     | 41 900     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | HU                   | 41 900     | 45 000     |
| JW                   | 45 000    | 71 000     | JA                   | 45 000    | 56 000     | JX                   | 45 000    | 52 000     | 5J                   | 45 000     | 50 000     | JP                   | 45 000     | 48 400     |
|                      |           |            | JB                   | 56 000    | 71 000     | JY                   | 52 000    | 61 000     | 6J                   | 50 000     | 56 000     | JQ                   | 48 400     | 52 000     |
|                      |           |            |                      |           |            | JZ                   | 61 000    | 71 000     | 7J                   | 56 000     | 63 000     | JR                   | 52 000     | 56 300     |
|                      |           |            |                      |           |            |                      |           |            | 8J                   | 63 000     | 71 000     | JS                   | 56 300     | 61 000     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | JT                   | 61 000     | 65 800     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | JU                   | 65 800     | 71 000     |
| KW                   | 71 000    | 112 000    | KA                   | 71 000    | 90 000     | KX                   | 71 000    | 82 000     | 5K                   | 71 000     | 80 000     | KP                   | 71 000     | 76 300     |
|                      |           |            | KB                   | 90 000    | 112 000    | KY                   | 82 000    | 97 000     | 6K                   | 80 000     | 90 000     | KQ                   | 76 300     | 82 000     |
|                      |           |            |                      |           |            | KZ                   | 97 000    | 112 000    | 7K                   | 90 000     | 100 000    | KR                   | 82 000     | 89 200     |
|                      |           |            |                      |           |            |                      |           |            | 8K                   | 100 000    | 112 000    | KS                   | 89 200     | 97 000     |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | KT                   | 97 000     | 104 200    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | KU                   | 104 200    | 112 000    |
| LW                   | 112 000   | 180 000    | LA                   | 112 000   | 140 000    | LX                   | 112 000   | 130 000    | 5L                   | 112 000    | 125 000    | LP                   | 112 000    | 121 000    |
|                      |           |            | LB                   | 140 000   | 180 000    | LY                   | 130 000   | 150 000    | 6L                   | 125 000    | 140 000    | LQ                   | 121 000    | 130 000    |
|                      |           |            |                      |           |            | LZ                   | 150 000   | 180 000    | 7L                   | 140 000    | 159 000    | LR                   | 130 000    | 140 000    |
|                      |           |            |                      |           |            |                      |           |            | 8L                   | 159 000    | 180 000    | LS                   | 140 000    | 150 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | LT                   | 150 000    | 164 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | LU                   | 164 000    | 180 000    |
| MW                   | 180 000   | 280 000    | MA                   | 180 000   | 224 000    | MX                   | 180 000   | 210 000    | 5M                   | 180 000    | 201 000    | MP                   | 180 000    | 194 000    |
|                      |           |            | MB                   | 224 000   | 280 000    | MY                   | 210 000   | 240 000    | 6M                   | 201 000    | 224 000    | MQ                   | 194 000    | 210 000    |
|                      |           |            |                      |           |            | MZ                   | 240 000   | 280 000    | 7M                   | 224 000    | 250 000    | MR                   | 210 000    | 224 000    |
|                      |           |            |                      |           |            |                      |           |            | 8M                   | 250 000    | 280 000    | MS                   | 224 000    | 240 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | MT                   | 240 000    | 259 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | MU                   | 259 000    | 280 000    |
| NW                   | 280 000   | 450 000    | NA                   | 280 000   | 355 000    | NX                   | 280 000   | 330 000    | 5N                   | 280 000    | 315 000    | NP                   | 280 000    | 304 000    |
|                      |           |            | NB                   | 355 000   | 450 000    | NY                   | 330 000   | 390 000    | 6N                   | 315 000    | 355 000    | NQ                   | 304 000    | 330 000    |
|                      |           |            |                      |           |            | NZ                   | 390 000   | 450 000    | 7N                   | 355 000    | 400 000    | NR                   | 330 000    | 359 000    |
|                      |           |            |                      |           |            |                      |           |            | 8N                   | 400 000    | 450 000    | NS                   | 359 000    | 390 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | NT                   | 390 000    | 419 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | NU                   | 419 000    | 450 000    |
| PW                   | 450 000   | 710 000    | PA                   | 450 000   | 560 000    | PX                   | 450 000   | 520 000    | 5P                   | 450 000    | 500 000    | PP                   | 450 000    | 484 000    |
|                      |           |            | PB                   | 560 000   | 710 000    | PY                   | 520 000   | 610 000    | 6P                   | 500 000    | 560 000    | PQ                   | 484 000    | 520 000    |
|                      |           |            |                      |           |            | PZ                   | 610 000   | 710 000    | 7P                   | 560 000    | 630 000    | PR                   | 520 000    | 563 000    |
|                      |           |            |                      |           |            |                      |           |            | 8P                   | 630 000    | 710 000    | PS                   | 563 000    | 610 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | PT                   | 610 000    | 658 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | PU                   | 658 000    | 710 000    |
| QW                   | 710 000   | 1 120 000  | QA                   | 710 000   | 900 000    | QX                   | 710 000   | 820 000    | 5Q                   | 710 000    | 800 000    | QP                   | 710 000    | 763 000    |
|                      |           |            | QB                   | 900 000   | 1 120 000  | QY                   | 820 000   | 970 000    | 6Q                   | 800 000    | 900 000    | QQ                   | 763 000    | 820 000    |
|                      |           |            |                      |           |            | QZ                   | 970 000   | 1 120 000  | 7Q                   | 900 000    | 1 000 000  | QR                   | 820 000    | 892 000    |
|                      |           |            |                      |           |            |                      |           |            | 8Q                   | 1 000 000  | 1 120 000  | QS                   | 892 000    | 970 000    |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | QT                   | 970 000    | 1 042 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | QU                   | 1 042 000  | 1 120 000  |
| RW                   | 1 120 000 | 1 800 000  | RA                   | 1 120 000 | 1 400 000  | RX                   | 1 120 000 | 1 300 000  | 5R                   | 1 120 000  | 1 250 000  | RP                   | 1 120 000  | 1 210 000  |
|                      |           |            | RB                   | 1 400 000 | 1 800 000  | RY                   | 1 300 000 | 1 500 000  | 6R                   | 1 250 000  | 1 400 000  | RQ                   | 1 210 000  | 1 300 000  |
|                      |           |            |                      |           |            | RZ                   | 1 500 000 | 1 800 000  | 7R                   | 1 400 000  | 1 590 000  | RR                   | 1 300 000  | 1 400 000  |
|                      |           |            |                      |           |            |                      |           |            | 8R                   | 1 590 000  | 1 800 000  | RS                   | 1 400 000  | 1 500 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | RT                   | 1 500 000  | 1 640 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | RU                   | 1 640 000  | 1 800 000  |
| SW                   | 1 800 000 | 2 800 000  | SA                   | 1 800 000 | 2 240 000  | SX                   | 1 800 000 | 2 100 000  | 5S                   | 1 800 000  | 2 010 000  | SP                   | 1 800 000  | 1 940 000  |
|                      |           |            | SB                   | 2 240 000 | 2 800 000  | SY                   | 2 100 000 | 2 400 000  | 6S                   | 2 010 000  | 2 240 000  | SQ                   | 1 940 000  | 2 100 000  |
|                      |           |            |                      |           |            | SZ                   | 2 400 000 | 2 800 000  | 7S                   | 2 240 000  | 2 500 000  | SR                   | 2 100 000  | 2 240 000  |
|                      |           |            |                      |           |            |                      |           |            | 8S                   | 2 500 000  | 2 800 000  | SS                   | 2 240 000  | 2 400 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | ST                   | 2 400 000  | 2 590 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | SU                   | 2 590 000  | 2 800 000  |
| TW                   | 2 800 000 | 4 500 000  | TA                   | 2 800 000 | 3 550 000  | TX                   | 2 800 000 | 3 300 000  | 5T                   | 2 800 000  | 3 150 000  | TP                   | 2 800 000  | 3 040 000  |
|                      |           |            | TB                   | 3 550 000 | 4 500 000  | TY                   | 3 300 000 | 3 900 000  | 6T                   | 3 150 000  | 3 550 000  | TQ                   | 3 040 000  | 3 300 000  |
|                      |           |            |                      |           |            | TZ                   | 3 900 000 | 4 500 000  | 7T                   | 3 550 000  | 4 000 000  | TR                   | 3 300 000  | 3 590 000  |
|                      |           |            |                      |           |            |                      |           |            | 8T                   | 4 000 000  | 4 500 000  | TS                   | 3 590 000  | 3 900 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | TT                   | 3 900 000  | 4 190 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | TU                   | 4 190 000  | 4 500 000  |
| UW                   | 4 500 000 | 7 100 000  | UA                   | 4 500 000 | 5 600 000  | UX                   | 4 500 000 | 5 200 000  | 5U                   | 4 500 000  | 5 000 000  | UP                   | 4 500 000  | 4 840 000  |
|                      |           |            | UB                   | 5 600 000 | 7 100 000  | UY                   | 5 200 000 | 6 100 000  | 6U                   | 5 000 000  | 5 600 000  | UQ                   | 4 840 000  | 5 200 000  |
|                      |           |            |                      |           |            | UZ                   | 6 100 000 | 7 100 000  | 7U                   | 5 600 000  | 6 300 000  | UR                   | 5 200 000  | 5 630 000  |
|                      |           |            |                      |           |            |                      |           |            | 8U                   | 6 300 000  | 7 100 000  | US                   | 5 630 000  | 6 100 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | UT                   | 6 100 000  | 6 580 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | UU                   | 6 580 000  | 7 100 000  |
| VW                   | 7 100 000 | 11 200 000 | VA                   | 7 100 000 | 9 000 000  | VX                   | 7 100 000 | 8 200 000  | 5V                   | 7 100 000  | 8 000 000  | VP                   | 7 100 000  | 7 630 000  |
|                      |           |            | VB                   | 9 000 000 | 11 200 000 | VY                   | 8 200 000 | 9 700 000  | 6V                   | 8 000 000  | 9 000 000  | VQ                   | 7 630 000  | 8 200 000  |
|                      |           |            |                      |           |            | VZ                   | 9 700 000 | 11 200 000 | 7V                   | 9 000 000  | 10 000 000 | VR                   | 8 200 000  | 8 920 000  |
|                      |           |            |                      |           |            |                      |           |            | 8V                   | 10 000 000 | 11 200 000 | VS                   | 8 920 000  | 9 700 000  |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | VT                   | 9 700 000  | 10 420 000 |
|                      |           |            |                      |           |            |                      |           |            |                      |            |            | VU                   | 10 420 000 | 11 200 000 |