

## CST-90 LEDs



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### Introduction:

This document describes the binning and labeling nomenclature for CST-90 Big Chip LED™ product as well as the orderable bin kits for each part.

With each build of parts, there is a distribution of performance in both flux and wave length or chromaticity. In order to guarantee specific performance for customers, each device is measured and subsequently grouped into flux and wavelength or chromaticity bins. Each individual package or reel of parts contains only one combination of flux and wavelength or chromaticity bin. Furthermore, bins are combined into orderable bin kits comprising of a selection of flux and wavelength or chromaticity bins to ease the ordering process.

### Table of Products

| Products    | Ordering Part Number  | Description                                                                                                                           |
|-------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| CST-90-W65S | CST-90-W65S-C12-xx123 | White Big Chip LED™ CST-90 consisting of a 9 mm <sup>2</sup> LED, connector, mounted on a copper-core PCB                             |
| CST-90-W57S | CST-90-W57S-C12-xx123 |                                                                                                                                       |
| CST-90-WDLS | CST-90-WDLS-C12-xx123 |                                                                                                                                       |
| CST-90-W45S | CST-90-W45S-C12-xx123 |                                                                                                                                       |
| CST-90-WCLS | CST-90-WCLS-C12-xx123 |                                                                                                                                       |
| CST-90-W40S | CST-90-W40S-C12-xx123 |                                                                                                                                       |
| CST-90-W30M | CST-90-W30M-C12-xx123 |                                                                                                                                       |
| CST-90-WWRM | CST-90-WWRM-C12-xx123 |                                                                                                                                       |
| CST-90-W65S | CST-90-W65S-C13-xx123 | White Big Chip LED™ CST-90 consisting of a 9 mm <sup>2</sup> LED, connector, mounted on a copper-core PCB with an on board thermistor |
| CST-90-W57S | CST-90-W57S-C13-xx123 |                                                                                                                                       |
| CST-90-WDLS | CST-90-WDLS-C13-xx123 |                                                                                                                                       |
| CST-90-W45S | CST-90-W45S-C13-xx123 |                                                                                                                                       |
| CST-90-WCLS | CST-90-WCLS-C13-xx123 |                                                                                                                                       |
| CST-90-W40S | CST-90-W40S-C13-xx123 |                                                                                                                                       |
| CST-90-W30M | CST-90-W30M-C13-xx123 |                                                                                                                                       |
| CST-90-WWRM | CST-90-WWRM-C13-xx123 |                                                                                                                                       |

## CST-90 Shipping and Labeling Nomenclature

All CST-90 products are packaged and labeled with their respective bin as outlined in the following pages. Each package or reel will only contain one bin. The part number designation is as follows:

**A B C    —    1 2 3    —    D 4 5 E    —    F 6 7    —    G H    —    I 8**

| Product Family | Chip Area | Color | Package Configuration | Flux Bin | Chromaticity Bin |
|----------------|-----------|-------|-----------------------|----------|------------------|
|----------------|-----------|-------|-----------------------|----------|------------------|

|                  |                                                                                                                                                                                                                                                    |  |  |  |  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Product Family   | A - Package type: "C" denotes chip-on board<br>B - Lens type: "S" denotes dome<br>C - Chip quantity: "T" denotes single chip                                                                                                                       |  |  |  |  |
| Chip Area        | 1 2 3 - Total LED chip area (mm <sup>2</sup> ) x 10: "90" denotes 9mm <sup>2</sup>                                                                                                                                                                 |  |  |  |  |
| Color            | D - Color: "W" denotes white<br>4 5 - Color temperature: "65" denotes 6500K, "DL" denotes daylight white (6500K through 5700K) etc.<br>E - Color rendering: "S" (standard) denotes a typical CRI of 70, "M" (moderate) denotes a typical CRI of 83 |  |  |  |  |
| Package Config.  | F 6 7 - Package configuration (for internal use)                                                                                                                                                                                                   |  |  |  |  |
| Flux Bin         | G H - Flux bin                                                                                                                                                                                                                                     |  |  |  |  |
| Chromaticity Bin | I 8 - Chromaticity bin                                                                                                                                                                                                                             |  |  |  |  |

### Example:

The part number CST-90-W65S-C12-WN-G4 refers to a 6500K standard CRI white, CST-90 emitter, with a flux range from 850 to 1,000 lumens and a chromaticity value within the box defined by the four points (0.313, 0.338), (0.321, 0.348), (0.322, 0.336), (0.312, 0.328).

## CST-90 Bin Kit Ordering Nomenclature

All CST-90 White products are sold in sets of flux and chromaticity bins called bin kits. Each bin kit specifies a minimum flux bin and a specific selection of chromaticity bins. The ordering part number designation is as follows:

**A B C**    —    **1 2 3**    —    **D 4 5 E**    —    **F 6 7**    —    **G H 8 9 0**

| Product Family | Chip Area | Color | Package Configuration | Bin Kit Code |
|----------------|-----------|-------|-----------------------|--------------|
|----------------|-----------|-------|-----------------------|--------------|

|                 |                                                                                                                                                                                                                                                    |  |  |  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Product Family  | A - Package type: "C" denotes chip-on board<br>B - Lens type: "S" denotes dome<br>C - Chip quantity: "T" denotes single chip                                                                                                                       |  |  |  |
| Chip Area       | 1 2 3 - Total LED chip area (mm <sup>2</sup> ) x 10: "90" denotes 9mm <sup>2</sup>                                                                                                                                                                 |  |  |  |
| Color           | D - Color: "W" denotes white<br>4 5 - Color temperature: "65" denotes 6500K, "DL" denotes daylight white (6500K through 5700K) etc.<br>E - Color rendering: "S" (standard) denotes a typical CRI of 70, "M" (moderate) denotes a typical CRI of 83 |  |  |  |
| Package Config. | F 6 7 - Package configuration (for internal use)                                                                                                                                                                                                   |  |  |  |
| Bin Kit Code    | G H - Flux bin<br>8 9 0 - Chromaticity bin kit code                                                                                                                                                                                                |  |  |  |

### Example:

The ordering part number CST-90-W65S-C12-GN101 refers to a 6500K standard CRI white, CST-90 emitter, with a minimum flux value of 850 lumens and falling in the F4, F3, G4, G3, EF, and DG chromaticity bins.

## CST-90 White Binning Structure

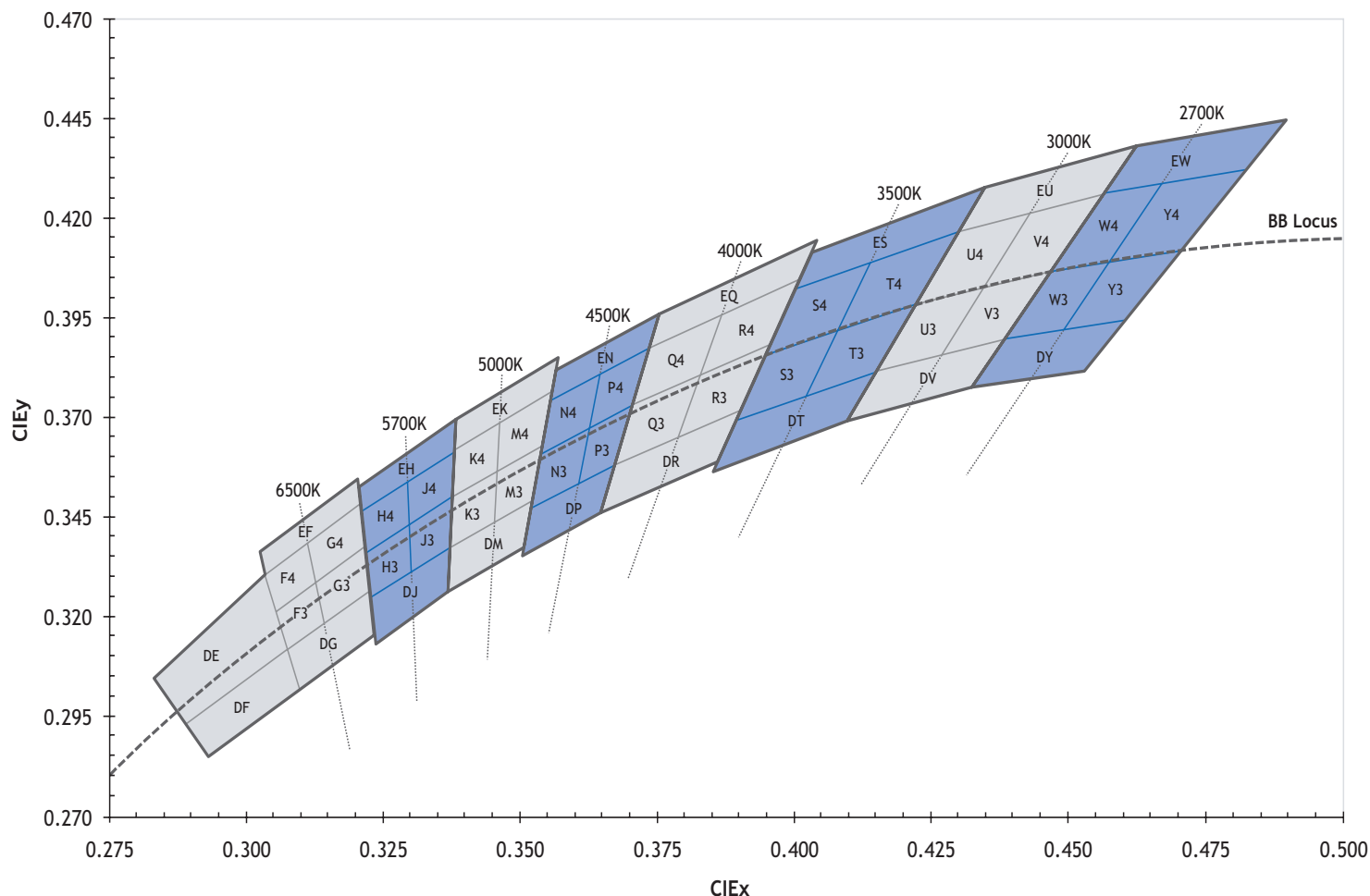
CST-90 LEDs are tested for luminous flux and chromaticity at a drive current of 3.15 A (350 mA/mm<sup>2</sup>) and placed into one of the following luminous flux (FF) and chromaticity (WW) bins:

| Flux Bin (FF) | Minumum Flux (lm) @ 3.15A | Maximum Flux (lm) @ 3.15A |
|---------------|---------------------------|---------------------------|
| K             | 500                       | 600                       |
| L             | 600                       | 700                       |
| M             | 700                       | 850                       |
| N             | 850                       | 1,000                     |

\*Note: Luminus maintains a +/- 6% tolerance on flux measurements.

## Chromaticity Bins

Luminus' Standard Chromaticity Bins: 1931 CIE Curve



The following tables describe the four chromaticity points that bound each chromaticity bin. Chromaticity bins are grouped together based on the color temperature.

| 6500K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| DG                      | 0.307            | 0.311            |
|                         | 0.322            | 0.326            |
|                         | 0.323            | 0.316            |
|                         | 0.309            | 0.302            |
| F3*                     | 0.305            | 0.321            |
|                         | 0.313            | 0.329            |
|                         | 0.315            | 0.319            |
|                         | 0.307            | 0.311            |
| F4*                     | 0.303            | 0.330            |
|                         | 0.312            | 0.339            |
|                         | 0.313            | 0.329            |
|                         | 0.305            | 0.321            |
| G3*                     | 0.313            | 0.329            |
|                         | 0.321            | 0.337            |
|                         | 0.322            | 0.326            |
|                         | 0.315            | 0.319            |
| G4*                     | 0.312            | 0.339            |
|                         | 0.321            | 0.348            |
|                         | 0.321            | 0.337            |
|                         | 0.313            | 0.329            |
| EF                      | 0.302            | 0.335            |
|                         | 0.320            | 0.354            |
|                         | 0.321            | 0.348            |
|                         | 0.303            | 0.330            |
| DE                      | 0.283            | 0.304            |
|                         | 0.303            | 0.330            |
|                         | 0.307            | 0.311            |
|                         | 0.289            | 0.293            |
| DF                      | 0.289            | 0.293            |
|                         | 0.307            | 0.311            |
|                         | 0.309            | 0.302            |
|                         | 0.293            | 0.285            |

| 5700K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| DJ                      | 0.322            | 0.324            |
|                         | 0.337            | 0.337            |
|                         | 0.336            | 0.326            |
|                         | 0.323            | 0.314            |
| H3*                     | 0.321            | 0.335            |
|                         | 0.329            | 0.342            |
|                         | 0.329            | 0.331            |
|                         | 0.322            | 0.324            |
| H4*                     | 0.321            | 0.346            |
|                         | 0.329            | 0.354            |
|                         | 0.329            | 0.342            |
|                         | 0.321            | 0.335            |
| J3*                     | 0.329            | 0.342            |
|                         | 0.337            | 0.349            |
|                         | 0.337            | 0.337            |
|                         | 0.330            | 0.331            |
| J4*                     | 0.329            | 0.354            |
|                         | 0.338            | 0.362            |
|                         | 0.337            | 0.349            |
|                         | 0.329            | 0.342            |
| EH                      | 0.320            | 0.352            |
|                         | 0.338            | 0.368            |
|                         | 0.338            | 0.362            |
|                         | 0.321            | 0.346            |

\*Sub-bins within ANSI defined quadrangles per ANSI C78.377-2008

| 5000K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| EK                      | 0.338            | 0.368            |
|                         | 0.356            | 0.384            |
|                         | 0.355            | 0.376            |
|                         | 0.338            | 0.362            |
| K3*                     | 0.337            | 0.349            |
|                         | 0.345            | 0.355            |
|                         | 0.345            | 0.343            |
|                         | 0.337            | 0.337            |
| K4*                     | 0.338            | 0.362            |
|                         | 0.347            | 0.369            |
|                         | 0.345            | 0.355            |
|                         | 0.337            | 0.349            |
| M3*                     | 0.345            | 0.355            |
|                         | 0.353            | 0.349            |
|                         | 0.352            | 0.372            |
|                         | 0.344            | 0.343            |
| M4*                     | 0.346            | 0.369            |
|                         | 0.355            | 0.376            |
|                         | 0.353            | 0.362            |
|                         | 0.345            | 0.355            |
| DM                      | 0.337            | 0.337            |
|                         | 0.352            | 0.349            |
|                         | 0.350            | 0.337            |
|                         | 0.336            | 0.326            |

| 4500K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| EN                      | 0.356            | 0.384            |
|                         | 0.376            | 0.396            |
|                         | 0.374            | 0.387            |
|                         | 0.355            | 0.374            |
| N3*                     | 0.353            | 0.360            |
|                         | 0.361            | 0.366            |
|                         | 0.359            | 0.352            |
|                         | 0.351            | 0.347            |
| N4*                     | 0.355            | 0.374            |
|                         | 0.364            | 0.381            |
|                         | 0.361            | 0.366            |
|                         | 0.353            | 0.360            |
| P3*                     | 0.361            | 0.366            |
|                         | 0.370            | 0.373            |
|                         | 0.367            | 0.358            |
|                         | 0.359            | 0.352            |
| P4*                     | 0.364            | 0.381            |
|                         | 0.374            | 0.387            |
|                         | 0.370            | 0.373            |
|                         | 0.361            | 0.366            |
| DP                      | 0.351            | 0.347            |
|                         | 0.367            | 0.358            |
|                         | 0.364            | 0.346            |
|                         | 0.350            | 0.335            |

\*Sub-bins within ANSI defined quadrangles per ANSI C78.377-2008

| 4000K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| EQ                      | 0.376            | 0.396            |
|                         | 0.404            | 0.414            |
|                         | 0.401            | 0.404            |
|                         | 0.374            | 0.387            |
| Q3*                     | 0.370            | 0.373            |
|                         | 0.382            | 0.380            |
|                         | 0.378            | 0.365            |
|                         | 0.367            | 0.358            |
| Q4*                     | 0.374            | 0.387            |
|                         | 0.387            | 0.396            |
|                         | 0.382            | 0.380            |
|                         | 0.370            | 0.373            |
| R3*                     | 0.382            | 0.380            |
|                         | 0.395            | 0.388            |
|                         | 0.390            | 0.372            |
|                         | 0.378            | 0.365            |
| R4*                     | 0.387            | 0.396            |
|                         | 0.401            | 0.404            |
|                         | 0.395            | 0.388            |
|                         | 0.382            | 0.380            |
| DR                      | 0.367            | 0.358            |
|                         | 0.390            | 0.372            |
|                         | 0.386            | 0.359            |
|                         | 0.364            | 0.346            |

| 3500K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| ES                      | 0.403            | 0.411            |
|                         | 0.435            | 0.427            |
|                         | 0.430            | 0.417            |
|                         | 0.400            | 0.402            |
| S3*                     | 0.394            | 0.385            |
|                         | 0.407            | 0.392            |
|                         | 0.402            | 0.375            |
|                         | 0.389            | 0.369            |
| S4*                     | 0.400            | 0.402            |
|                         | 0.415            | 0.409            |
|                         | 0.407            | 0.392            |
|                         | 0.394            | 0.385            |
| T3*                     | 0.407            | 0.392            |
|                         | 0.422            | 0.399            |
|                         | 0.415            | 0.381            |
|                         | 0.402            | 0.375            |
| T4*                     | 0.415            | 0.409            |
|                         | 0.430            | 0.417            |
|                         | 0.422            | 0.399            |
|                         | 0.407            | 0.392            |
| DT                      | 0.389            | 0.369            |
|                         | 0.415            | 0.381            |
|                         | 0.409            | 0.369            |
|                         | 0.385            | 0.357            |

\*Sub-bins within ANSI defined quadrangles per ANSI C78.377-2008

| 3000K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| EU                      | 0.435            | 0.427            |
|                         | 0.462            | 0.437            |
|                         | 0.456            | 0.426            |
|                         | 0.430            | 0.417            |
| U3*                     | 0.422            | 0.399            |
|                         | 0.434            | 0.403            |
|                         | 0.426            | 0.385            |
|                         | 0.415            | 0.381            |
| U4*                     | 0.430            | 0.417            |
|                         | 0.443            | 0.421            |
|                         | 0.434            | 0.403            |
|                         | 0.422            | 0.399            |
| V3*                     | 0.434            | 0.403            |
|                         | 0.447            | 0.408            |
|                         | 0.437            | 0.389            |
|                         | 0.426            | 0.385            |
| V4*                     | 0.443            | 0.421            |
|                         | 0.456            | 0.426            |
|                         | 0.447            | 0.408            |
|                         | 0.434            | 0.403            |
| DV                      | 0.415            | 0.381            |
|                         | 0.437            | 0.389            |
|                         | 0.431            | 0.377            |
|                         | 0.409            | 0.369            |

| 2700K Chromaticity Bins |                  |                  |
|-------------------------|------------------|------------------|
| Bin Code (WW)           | CIE <sub>x</sub> | CIE <sub>y</sub> |
| EW                      | 0.462            | 0.437            |
|                         | 0.488            | 0.444            |
|                         | 0.481            | 0.432            |
|                         | 0.456            | 0.426            |
| W3*                     | 0.447            | 0.408            |
|                         | 0.458            | 0.410            |
|                         | 0.448            | 0.392            |
|                         | 0.437            | 0.389            |
| W4*                     | 0.456            | 0.426            |
|                         | 0.469            | 0.429            |
|                         | 0.458            | 0.410            |
|                         | 0.447            | 0.408            |
| Y3*                     | 0.458            | 0.410            |
|                         | 0.70             | 0.413            |
|                         | 0.459            | 0.394            |
|                         | 0.448            | 0.392            |
| Y4*                     | 0.469            | 0.429            |
|                         | 0.481            | 0.432            |
|                         | 0.470            | 0.413            |
|                         | 0.458            | 0.410            |
| DY                      | 0.437            | 0.389            |
|                         | 0.459            | 0.394            |
|                         | 0.452            | 0.382            |
|                         | 0.431            | 0.377            |

\*Sub-bins within ANSI defined quadrangles per ANSI C78.377-2008

## CST-90 Bin Kit Order Codes

The following tables describe the bin kit ordering codes for the CST-90 and the flux and chromaticity bins included in the bin kit. Each kit specifies a minimum flux and the listed chromaticity bins. A maximum flux is not specified. Within each kit, Luminus may ship any part meeting or exceeding the minimum flux specification. Shipments will always meet the listed chromaticity bins. For information on ordering bin kits not listed below, please contact Luminus or an official distributor.

### CST-90-C12 and CST-90-C13 Bin Kit Order Codes

| Color                                                    | Luminous Flux     |           | Chromaticity Bins                                        | Kit Number |
|----------------------------------------------------------|-------------------|-----------|----------------------------------------------------------|------------|
|                                                          | Bin Kit Flux Code | Min. Flux |                                                          |            |
| White<br>W65S<br>6500K, Standard CRI (typ. 70)           | M                 | 700       | F4, F3, G4, G3, EF, DG, DE, DF                           | GM100      |
|                                                          |                   |           | F4, F3, G4, G3, EF, DG                                   | GM101      |
|                                                          |                   |           | F4, F3, G4, G3                                           | GM102      |
|                                                          | N                 | 850       | F4, F3, G4, G3, EF, DG, DE, DF                           | GN100      |
|                                                          |                   |           | F4, F3, G4, G3, EF, DG                                   | GN101      |
|                                                          |                   |           | F4, F3, G4, G3                                           | GN102      |
| White<br>WDLS<br>6500K & 5700K<br>Standard CRI (typ. 70) | M                 | 700       | F4, F3, G4, G3, EF, DG, DE, DF<br>H4, H3, J4, J3, EH, DJ | GM150      |
|                                                          | N                 | 850       | F4, F3, G4, G3, EF, DG, DE, DF<br>H4, H3, J4, J3, EH, DJ | GN150      |
| White<br>W57S<br>5700K, Standard CRI (typ. 70)           | M                 | 700       | H4, H3, J4, J3, EH, DJ                                   | GM200      |
|                                                          |                   |           | H4, H3, J4, J3                                           | GM201      |
|                                                          | N                 | 850       | H4, H3, J4, J3, EH, DJ                                   | GN200      |
|                                                          |                   |           | H4, H3, J4, J3                                           | GN201      |
| White<br>W45S<br>4500K, Standard CRI (typ. 70)           | M                 | 700       | N4, N3, P4, P3, EN, DP                                   | GM400      |
|                                                          |                   |           | N4, N3, P4, P3                                           | GM401      |
|                                                          | N                 | 850       | N4, N3, P4, P3, EN, DP                                   | GN400      |
|                                                          |                   |           | N4, N3, P4, P3                                           | GN401      |
| White<br>WCLS<br>4500K & 4000K<br>Standard CRI (typ. 70) | M                 | 700       | N3, N4, P3, P4, DP, EN<br>Q3, Q4, R3, R4, DR, EQ         | GM450      |
|                                                          | N                 | 850       | N3, N4, P3, P4, DP, EN<br>Q3, Q4, R3, R4, DR, EQ         | GN450      |
| White<br>W40S<br>4000K, Standard CRI (typ. 70)           | M                 | 700       | Q4, Q3, R4, R3, EQ, DR                                   | GM500      |
|                                                          |                   |           | Q4, Q3, R4, R3                                           | GM501      |
|                                                          | N                 | 850       | Q4, Q3, R4, R3, EQ, DR                                   | GN500      |
|                                                          |                   |           | Q4, Q3, R4, R3                                           | GN501      |

|                                                          |   |     |                                                  |       |
|----------------------------------------------------------|---|-----|--------------------------------------------------|-------|
| White<br>W30M<br>3000K, Moderate CRI (typ. 83)           | K | 500 | U4, U3, V4, V3, EU, DV                           | GK700 |
|                                                          |   |     | U4, U3, V4, V3                                   | GK701 |
|                                                          | L | 600 | U4, U3, V4, V3, EU, DV                           | GL700 |
|                                                          |   |     | U4, U3, V4, V3                                   | GL701 |
| White<br>WWRM<br>3000K & 2700K<br>Moderate CRI (typ. 83) | K | 500 | U3, U4, V3, V4, DV, EU<br>W3, W4, Y3, Y4, DY, EW | GK750 |
|                                                          | L | 600 | U3, U4, V3, V4, DV, EU<br>W3, W4, Y3, Y4, DY, EW | GL750 |

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