

# LITEON

## 0.52" Seven-Segment Numeric LED Display

LTS-540A

LTD-5200 Series

LTC-5300/5800

### Features

- 0.52 inch (13.2mm) digit height
- Continuous uniform segments.
- Choices of six bright colors-AlGaAs red/bright red/green/yellow/red orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- High brightness.
- Wide viewing angle.
- Solid state reliability.
- Categorized for luminous intensity.
- I.C. compatible.
- Easy mounting on P.C. board or socket.

DISPLAYS

### Description

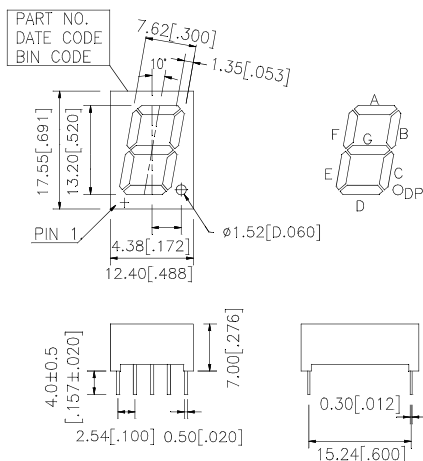
The LTS-540A, LTD-5000, LTC-5000 series are 0.52 inch (13.2mm) height 7-Segment displays. AlGaAs red Bright red, yellow and red orange displays have gray face and white segments. Green displays have gray face and green segments. High efficiency red displays have red face and red segments.

The AlGaAs red seven segment displs are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low current. Drive current as low as 1 mA per segment is available.

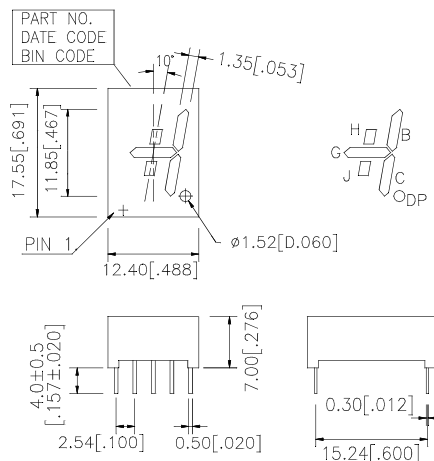
The AlGaAs red series devices utilize LED chips which are made from AlGaAs on a non-transparent GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The yellow and red orange series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

### Package Dimensions

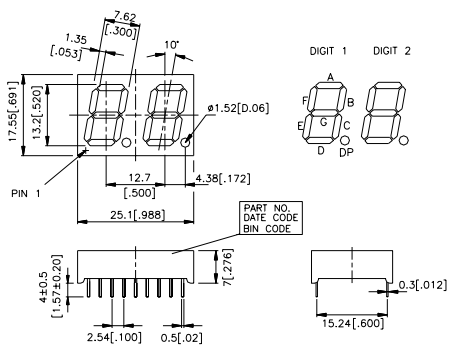
#### A.LTS-546A/547A



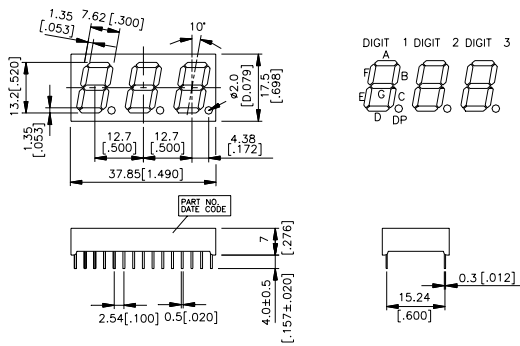
#### B.LTS-548A/549A



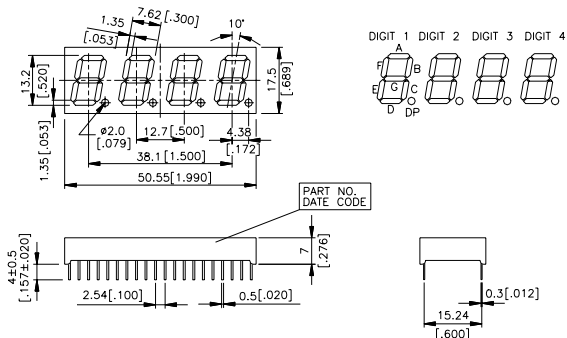
C.LTD-5250/5260



## D.LTC-5336/5836



C.LTC-5337/5837



Notes: All dimensions are in millimeters (inches).

Tolerance:  $\pm 0.25\text{mm}$  (0.01") unless otherwise noted.

## Devices

| Part No. LTS- |            |       |        |            |             | Description                         | Package Dimension | Internal Circuit Diagram |
|---------------|------------|-------|--------|------------|-------------|-------------------------------------|-------------------|--------------------------|
| AlGaAs Red    | Bright Red | Green | Yellow | Red Orange | Hi-Eff. Red |                                     |                   |                          |
| 546AWC        | 546AP      | 546AG | 546AY  | 546AE      | 546AHR      | Common Anode,<br>Rt. Hand Decimal   | A                 | A                        |
| 547AWC        | 547AP      | 547AG | 547AY  | 547AE      | 547AHR      | Common Cathode,<br>Rt. Hand Decimal | A                 | B                        |
| 548AWC        | 548AP      | 548AG | 548AY  | 548AE      | 548AHR      | Common Anode,<br>Rt. Hand Decimal   | B                 | C                        |
| 549AWC        | 549AP      | 549AG | 549AY  | 549AE      | 549AHR      | Common Cathode,<br>Rt. Hand Decimal | B                 | D                        |

| Part No. LTD- |            |       |        |            |             | Description                         | Package Dimension | Internal Circuit Diagram |
|---------------|------------|-------|--------|------------|-------------|-------------------------------------|-------------------|--------------------------|
| AlGaAs Red    | Bright Red | Green | Yellow | Red Orange | Hi-Eff. Red |                                     |                   |                          |
| 5250WC        | 5250P      | 5250G | 5250Y  | 5250E      | 5250HR      | Common Anode,<br>Rt. Hand Decimal   | C                 | E                        |
| 5260WC        | 5260P      | 5260G | 5260Y  | 5260E      | 5260HR      | Common Cathode,<br>Rt. Hand Decimal | C                 | F                        |

| Part No. LTC- |            |       |        |            |             | Description                      | Package Dimension | Internal Circuit Diagram |
|---------------|------------|-------|--------|------------|-------------|----------------------------------|-------------------|--------------------------|
| AlGaAs Red    | Bright Red | Green | Yellow | Red Orange | Hi-Eff. Red |                                  |                   |                          |
| 5336WC        | 5336P      | 5336G | 5336Y  | 5336E      | 5336HR      | Common Cathode, Rt. Hand Decimal | D                 | G                        |
| 5836WC        | 5836P      | 5836G | 5836Y  | 5836E      | 5836HR      | Common Anode, Rt. Hand Decimal   | D                 | H                        |
| 5337WC        | 5337P      | 5337G | 5337Y  | 5337E      | 5337HR      | Common Cathode, Rt. Hand Decimal | E                 | I                        |
| 5837WC        | 5837P      | 5837G | 5837Y  | 5837E      | 5837HR      | Common Anode, Rt. Hand Decimal   | E                 | J                        |

## Pin Connection

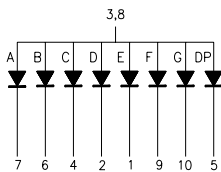
| Pin No. | Connection    |                 |               |                 |
|---------|---------------|-----------------|---------------|-----------------|
|         | A.LTS-546A    | B.LTS-547A      | C.LTS-548A    | D.LTS-549A      |
| 1.      | Cathode E     | Anode E         | Cathode J     | Anode J         |
| 2.      | Cathode D     | Anode D         | No Connection | No Connection   |
| 3.      | Common Anode* | Common Cathode* | Common Anode* | Common Cathode* |
| 4.      | Cathode C     | Anode C         | Cathode C     | Anode C         |
| 5.      | Cathode D.P.  | Anode D.P.      | Cathode D.P.  | Anode D.P.      |
| 6.      | Cathode B     | Anode B         | Cathode B     | Anode B         |
| 7.      | Cathode A     | Anode A         | No Connection | No Connection   |
| 8.      | Common Anode* | Common Cathode* | Common Anode* | Common Cathode* |
| 9.      | Cathode F     | Anode F         | Cathode H     | Anode H         |
| 10.     | Cathode G     | Anode G         | Cathode G     | Anode G         |

| Pin No. | Connection             |                          |
|---------|------------------------|--------------------------|
|         | E.LTD-5250             | F.LTD-5260               |
| 1.      | Cathode E (Digit 1)    | Anode E (Digit 1)        |
| 2.      | Cathode D (Digit 1)    | Anode D (Digit 1)        |
| 3.      | Cathode C (Digit 1)    | Anode C (Digit 1)        |
| 4.      | Cathode D.P. (Digit 1) | Anode D.P. (Digit 1)     |
| 5.      | Cathode E (Digit 2)    | Anode E (Digit 2)        |
| 6.      | Cathode D (Digit 2)    | Anode D (Digit 2)        |
| 7.      | Cathode G (Digit 2)    | Anode G (Digit 2)        |
| 8.      | Cathode C (Digit 2)    | Anode C (Digit 2)        |
| 9.      | Cathode D.P. (Digit 2) | Anode D.P. (Digit 2)     |
| 10.     | Cathode B (Digit 2)    | Anode B (Digit 2)        |
| 11.     | Cathode A (Digit 2)    | Anode A (Digit 2)        |
| 12.     | Cathode F (Digit 2)    | Anode F (Digit 2)        |
| 13.     | Common Anode (Digit 2) | Common Cathode (Digit 2) |
| 14.     | Common Anode (Digit 1) | Common Cathode (Digit 1) |
| 15.     | Cathode B (Digit 1)    | Anode B (Digit 1)        |
| 16.     | Cathode A (Digit 1)    | Anode A (Digit 1)        |
| 17.     | Cathode G (Digit 1)    | Anode G (Digit 1)        |
| 18.     | Cathode F (Digit 1)    | Anode F (Digit 1)        |

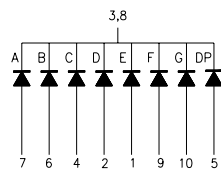
| Pin No. | Connection               |                        |                          |                        |
|---------|--------------------------|------------------------|--------------------------|------------------------|
|         | G.LTC-5336               | H.LTC-5836             | I.LTC-5337               | I.LTC-5837             |
| 1.      | Anode E (Digit 1)        | Cathode E (Digit 1)    | Anode E (Digit 1)        | Cathode E (Digit 1)    |
| 2.      | Anode D (Digit 1)        | Cathode D (Digit 1)    | Anode D (Digit 1)        | Cathode D (Digit 1)    |
| 3.      | Common Cathode (Digit 1) | Common Anode (Digit 1) | Common Cathode (Digit 1) | Common Anode (Digit 1) |
| 4.      | Anode C (Digit 1)        | Cathode C (Digit 1)    | Anode C (Digit 1)        | Cathode C (Digit 1)    |
| 5.      | Anode D.P.(Digit 1)      | Cathode D.P. (Digit 1) | Anode D.P.(Digit 1)      | Cathode D.P. (Digit 1) |
| 6.      | Anode E (Digit 2)        | Cathode E (Digit 2)    | Anode E (Digit 2)        | Cathode E (Digit 2)    |
| 7.      | Anode D (Digit 2)        | Cathode D (Digit 2)    | Anode D (Digit 2)        | Cathode D (Digit 2)    |
| 8.      | Common Cathode (Digit 2) | Common Anode (Digit 2) | Common Cathode (Digit 2) | Common Anode (Digit 2) |
| 9.      | Anode C (Digit 2)        | Cathode C (Digit 2)    | Anode C (Digit 2)        | Cathode C (Digit 2)    |
| 10.     | Anode D.P. (Digit 2)     | Cathode D.P. (Digit 2) | Anode D.P. (Digit 2)     | Cathode D.P. (Digit 2) |
| 11.     | Anode E (Digit 3)        | Cathode E (Digit 3)    | Anode E (Digit 3)        | Cathode E (Digit 3)    |
| 12.     | Anode D (Digit 3)        | Cathode D (Digit 3)    | Anode D (Digit 3)        | Cathode D (Digit 3)    |
| 13.     | Common Cathode (Digit 3) | Common Anode (Digit 3) | Common Cathode (Digit 3) | Common Anode (Digit 3) |
| 14.     | Anode C (Digit 3)        | Cathode C (Digit 3)    | Anode C (Digit 3)        | Cathode C (Digit 3)    |
| 15.     | Anode D.P. (Digit 3)     | Cathode D.P. (Digit 3) | Anode D.P. (Digit 3)     | Cathode D.P. (Digit 3) |
| 16.     | Anode B (Digit 3)        | Cathode B (Digit 3)    | Anode E (Digit 4)        | Cathode E (Digit 4)    |
| 17.     | Anode A (Digit 3)        | Cathode A (Digit 3)    | Anode D (Digit 4)        | Cathode D (Digit 4)    |
| 18.     | Common Cathode (Digit 3) | Common Anode (Digit 3) | Common Cathode (Digit 4) | Common Anode (Digit 4) |
| 19.     | Anode F (Digit 3)        | Cathode F (Digit 3)    | Anode C (Digit 4)        | Cathode C (Digit 4)    |
| 20.     | Anode G (Digit 3)        | Cathode G (Digit 3)    | Anode D.P.(Digit 4)      | Cathode D.P. (Digit 4) |
| 21.     | Anode B (Digit 2)        | Cathode B (Digit 2)    | Anode B (Digit 4)        | Cathode B (Digit 4)    |
| 22.     | Anode A (Digit 2)        | Cathode A (Digit 2)    | Anode A (Digit 4)        | Cathode A (Digit 4)    |
| 23.     | Common Cathode (Digit 2) | Common Anode (Digit 2) | Common Cathode (Digit 4) | Common Anode (Digit 4) |
| 24.     | Anode F (Digit 2)        | Cathode F (Digit 2)    | Anode F (Digit 4)        | Cathode F (Digit 4)    |
| 25.     | Anode G (Digit 2)        | Cathode G (Digit 2)    | Anode G (Digit 4)        | Cathode G (Digit 4)    |
| 26.     | Anode B (Digit 1)        | Cathode B (Digit 1)    | Anode B (Digit 3)        | Cathode B (Digit 3)    |
| 27.     | Anode A (Digit 1)        | Cathode A (Digit 1)    | Anode A (Digit 3)        | Cathode A (Digit 3)    |
| 28.     | Common Cathode (Digit 1) | Common Anode (Digit 1) | Common Cathode (Digit 3) | Common Anode (Digit 3) |
| 29.     | Anode F (Digit 1)        | Cathode F (Digit 1)    | Anode F (Digit 3)        | Cathode F (Digit 3)    |
| 30.     | Anode G (Digit 1)        | Cathode G (Digit 1)    | Anode G (Digit 3)        | Cathode G (Digit 3)    |
| 31.     | -                        | -                      | Anode B (Digit 2)        | Cathode B (Digit 2)    |
| 32.     | -                        | -                      | Anode A (Digit 2)        | Cathode A (Digit 2)    |
| 33.     | -                        | -                      | Common Cathode (Digit 2) | Common Anode (Digit 2) |
| 34.     | -                        | -                      | Anode F (Digit 2)        | Cathode F (Digit 2)    |
| 35.     | -                        | -                      | Anode G (Digit 2)        | Cathode G (Digit 2)    |
| 36.     | -                        | -                      | Anode B (Digit 1)        | Cathode B (Digit 1)    |
| 37.     | -                        | -                      | Anode A (Digit 1)        | Cathode A (Digit 1)    |
| 38.     | -                        | -                      | Common Cathode (Digit 1) | Common Anode (Digit 1) |
| 39.     | -                        | -                      | Anode F (Digit 1)        | Cathode F (Digit 1)    |
| 40.     | -                        | -                      | Anode G (Digit 1)        | Cathode G (Digit 1)    |

## Internal Circuit Diagrams

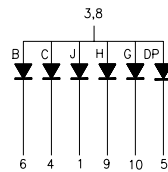
A.LTS-546A



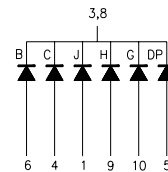
B.LTS-547A



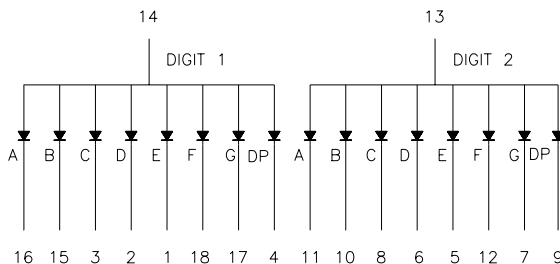
C.LTS-548A



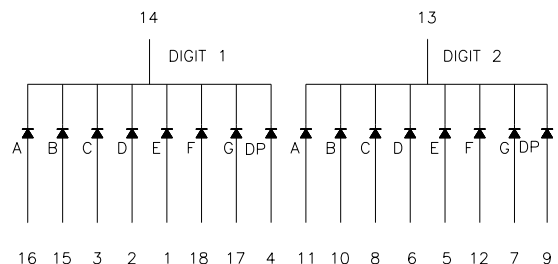
D.LTS-549A

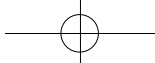


E.LTD-5250

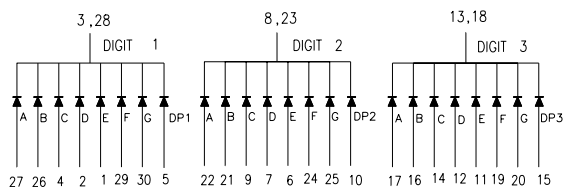


F.LTD-5260

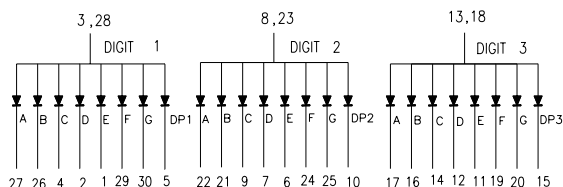




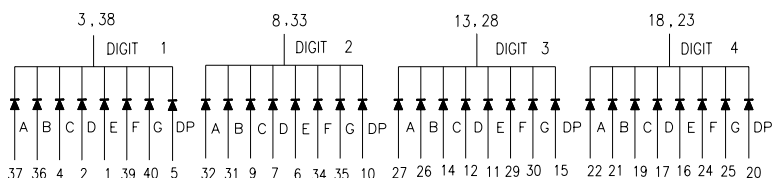
### G.LTC-5336



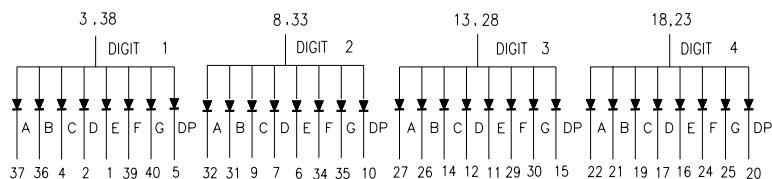
### H.LTC-5836



### I.LTC-5337



### J.LTC-5837



DISPLAYS

## Absolute Maximum Rating at Ta=25°C

| Parameter                                                                       | AlGaAs Red     | Bright Red | Green | Yellow | Red Orange | Hi-Eff. Red | Unit  |
|---------------------------------------------------------------------------------|----------------|------------|-------|--------|------------|-------------|-------|
| Power Dissipation Per Segment                                                   | 75             | 40         | 75    | 60     | 75         | 75          | mW    |
| Peak Forward Current Per Segment<br>(1/10 Duty Cycle, 0.1ms Pulse Width)        | 125            | 60         | 100   | 80     | 100        | 100         | mA    |
| Continuous Forward Current Per Segment<br>Derating Linear from 25°C Per Segment | 30             | 15         | 25    | 20     | 25         | 25          | mA    |
|                                                                                 | 0.4            | 0.2        | 0.33  | 0.27   | 0.33       | 0.33        | mA/°C |
| Reverse Voltage Per Segment                                                     | 5              | 5          | 5     | 5      | 5          | 5           | V     |
| Operating Temperature Range                                                     | -35°C to +85°C |            |       |        |            |             |       |
| Stroage Temperature Range                                                       | -35°C to +85°C |            |       |        |            |             |       |
| Solder Temperature 1/16 Inch Below Seating Plane for 3 Seconds at 260°C         |                |            |       |        |            |             |       |

## Electrical/Optical Characteristics at Ta=25°C

LTS-546AWC/547AWC/548AWC/549AWC

LTD-5250WC/5260WC

LTC-5336WC/5836WC/5337WC/5837WC

| Parameter                         | Symbol           | Min. | Typ. | Max. | Unit | Tset Condition       |
|-----------------------------------|------------------|------|------|------|------|----------------------|
| Average Luminous Intensity        | I <sub>v</sub>   | 320  | 700  |      | μ cd | I <sub>F</sub> =1mA  |
|                                   |                  |      | 3750 |      |      | I <sub>F</sub> =5mA  |
| Peak Emission Wavelength          | λ <sub>P</sub>   |      | 660  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width          | Δλ               |      | 35   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength               | λ <sub>d</sub>   |      | 638  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment      | V <sub>F</sub>   |      | 1.6  | 2.4  | V    | I <sub>F</sub> =1mA  |
|                                   |                  |      | 1.7  |      |      | I <sub>F</sub> =5mA  |
|                                   |                  |      | 1.8  |      |      | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment      | I <sub>R</sub>   |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio | I <sub>v-m</sub> |      |      | 2:1  |      | I <sub>F</sub> =1mA  |

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LTS-546AP/547AP/548AP/549AP/LTD-5250P/5260P/LTC-5336P/5836P/5337P/5837P

| Parameter                            | Symbol            | Min. | Typ. | Max. | Unit | Tset Condition       |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity           | I <sub>v</sub>    | 320  | 800  |      | μ cd | I <sub>F</sub> =10mA |
| Peak Emission Wavelength             | λ P               |      | 697  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width             | Δ λ               |      | 90   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength                  | λ d               |      | 657  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment or D.P. | V <sub>F</sub>    |      | 2.1  | 2.6  | V    | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment or D.P. | I <sub>R</sub>    |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio    | I <sub>v</sub> -m |      |      | 2:1  |      | I <sub>F</sub> =10mA |

LTS-546AG/547AG/548AG/549AG/LTD-5250G/5260G/LTC-5336G/5836G/5337G/5837G

| Parameter                            | Symbol            | Min. | Typ. | Max. | Unit | Tset Condition       |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity           | I <sub>v</sub>    | 800  | 2200 |      | μ cd | I <sub>F</sub> =10mA |
| Peak Emission Wavelength             | λ P               |      | 565  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width             | Δ λ               |      | 30   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength                  | λ d               |      | 569  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment or D.P. | V <sub>F</sub>    |      | 2.1  | 2.6  | V    | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment or D.P. | I <sub>R</sub>    |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio    | I <sub>v</sub> -m |      |      | 2:1  |      | I <sub>F</sub> =10mA |

LTS-546AY/547AY/548AY/549AY/LTD-5250Y/5260Y/LTC-5336Y/5836Y/5337Y/5837Y

| Parameter                            | Symbol            | Min. | Typ. | Max. | Unit | Tset Condition       |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity           | I <sub>v</sub>    | 800  | 2200 |      | μ cd | I <sub>F</sub> =10mA |
| Peak Emission Wavelength             | λ P               |      | 585  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width             | Δ λ               |      | 35   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength                  | λ d               |      | 588  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment or D.P. | V <sub>F</sub>    |      | 2.1  | 2.6  | V    | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment or D.P. | I <sub>R</sub>    |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio    | I <sub>v</sub> -m |      |      | 2:1  |      | I <sub>F</sub> =10mA |

LTS-546AE/547AE/548AE/549AE/LTD-5250E/5260E/LTC-5336E/5836E/5337E/5837E

| Parameter                            | Symbol            | Min. | Typ. | Max. | Unit | Tset Condition       |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity           | I <sub>v</sub>    | 800  | 2200 |      | μ cd | I <sub>F</sub> =10mA |
| Peak Emission Wavelength             | λ P               |      | 630  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width             | Δ λ               |      | 40   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength                  | λ d               |      | 621  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment or D.P. | V <sub>F</sub>    |      | 2.0  | 2.6  | V    | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment or D.P. | I <sub>R</sub>    |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio    | I <sub>v</sub> -m |      |      | 2:1  |      | I <sub>F</sub> =10mA |



| Parameter                            | Symbol            | Min. | Typ. | Max. | Unit | Tset Condition       |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity           | I <sub>v</sub>    | 800  | 2200 |      | μ cd | I <sub>F</sub> =10mA |
| Peak Emission Wavelength             | λ <sub>P</sub>    |      | 635  |      | nm   | I <sub>F</sub> =20mA |
| Spectral Line Half-Width             | Δ λ               |      | 40   |      | nm   | I <sub>F</sub> =20mA |
| Dominant Wavelength                  | λ <sub>d</sub>    |      | 623  |      | nm   | I <sub>F</sub> =20mA |
| Forward Voltage, Per Segment or D.P. | V <sub>F</sub>    |      | 2.0  | 2.6  | V    | I <sub>F</sub> =20mA |
| Reverse Current, Per Segment or D.P. | I <sub>R</sub>    |      |      | 100  | μ A  | V <sub>R</sub> =5V   |
| Luminous Intensity Matching Ratio    | I <sub>v</sub> -m |      |      | 2:1  |      | I <sub>F</sub> =10mA |

## DISPLAYS

A line graph showing the relative intensity (%) of six curves (G, Y, HR, E, C, P) as a function of wavelength (nm) from 500 to 800 nm. The y-axis ranges from 0 to 100% with major grid lines at 0, 50, and 100. The x-axis ranges from 500 to 800 nm with major grid lines every 50 nm. Curve G peaks at ~565 nm (100%). Curve Y peaks at ~585 nm (100%). Curve HR peaks at ~615 nm (100%). Curve E peaks at ~635 nm (100%). Curve C peaks at ~655 nm (100%). Curve P is broad, peaking at ~685 nm (100%). All curves intersect at approximately 650 nm and 50% intensity.

Fig1. RELATIVE INTENSITY VS. WAVELENGTH

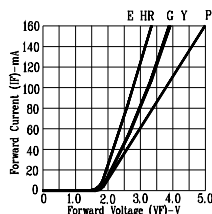
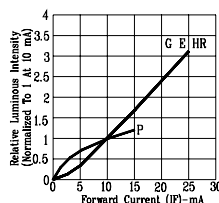


Fig2. FORWARD CURRENT VS FORWARD VOLTAGE



Forward Current (IF)-mA

Fig3. RELATIVE LUMINOUS INTENSITY  
VS. FORWARD CURRENT

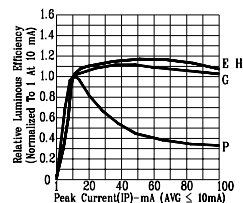


Fig4. RELATIVE LUMINOUS EFFICIENCY  
(LUMINOUS INTENSITY PER UNIT  
CURRENT) VS. PEAK CURRENT

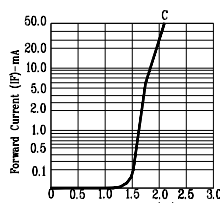


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

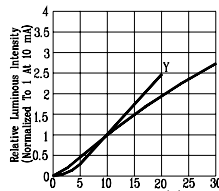


Fig6. RELATIVE LUMINOUS INTENSITY  
VS. FORWARD CURRENT

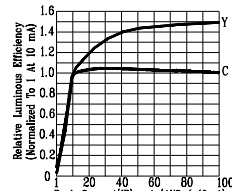


Fig7. RELATIVE LUMINOUS EFFICIENCY  
(LUMINOUS INTENSITY PER UNIT  
CURRENT) VS. PEAK CURRENT

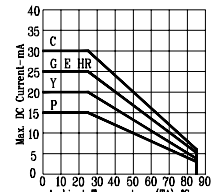


Fig8. MAX. ALLOWABLE DC CURRENT.  
VS. AMBIENT TEMPERATURE.

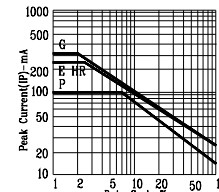


Fig9. MAX. PEAK CURRENT VS.  
DUTY CYCLE %  
(REFRESH RATE 1KHz)

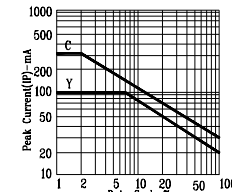


Fig10. MAX. PEAK CURRENT VS.  
DUTY CYCLE %  
(REFRESH RATE 1KHz)

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