

0.3" Single Digit Numeric LED Displays

LTS-310A Series

Features

- 0.3 inch (7.62mm) digit height.
- Choices of six bright colors-AlGaAs red/bright red/ green/yellow/red orange/high efficiency red.
- Low power requirement.
- Excellent characters appearance.
- Categorized for luminous intensity.
- I.C. compatible.
- Easy mounting on P.C. board or socket.

Descriptions

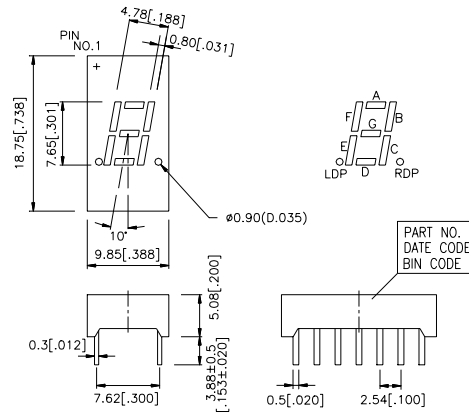
The LTS-310A series are 0.3 inch (7.62mm) height single digit displays. AlGaAs red displays has gray face and white segments. Bright red displays has black face and red segments. Green and yellow displays have gray face and white segments. Red orange displays have orange face and orange segments. The High efficiency red displays have red face and red segments.

The AlGaAs red seven segment displays are designed for applications requiring low power consumption. They are tested and selected for the 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 device 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, red orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate.

Package Dimensions

A.LTS-312A/313A/315A

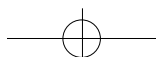


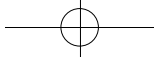
Notes: All dimensions are in millimeters (inches).

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

Devices

| Part No. | | | | | | Description | Package Dimension | Internal Circuit Diagram |
|------------|------------|-------|--------|------------|-------------|--|-------------------|--------------------------|
| AlGaAs Red | Bright Red | Green | Yellow | Red Orange | Hi.-Eff Red | | | |
| 312AWC | 312AP | 312AG | 312AY | 312AE | 312AHR | Common Anode, Rt. and Lt. Hand Decimal | A | B |
| 313AWC | 313AP | 313AG | 313AY | 313AE | 313AHR | Common Cathode, Rt. Hand Decimal | A | C |
| 315AWC | 315AP | 315AG | 315AY | 315AE | 315AHR | Common Cathode, Rt. Hand Decimal | A | D |





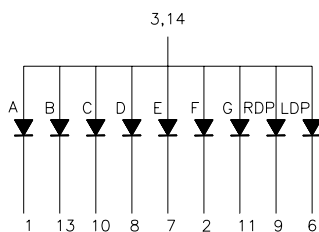
Pin Connection

| Pin No. | Connection | | |
|---------|-----------------|-------------------|-------------------|
| | A.LTS-312A | B.LTS-313A | C.LTS-315A |
| 1. | Cathode A | Common Cathode *2 | Anode F |
| 2. | Cathode F | Anode F | Anode G |
| 3. | Common Anode *1 | Anode G | No Pin |
| 4. | No Pin | Anode E | Common Cathode *3 |
| 5. | No Pin | Anode D | No Pin |
| 6. | Cathode L.D.P. | Common Cathode *2 | Anode E |
| 7. | Cathode E | Anode D.P. | Anode D |
| 8. | Cathode D | Anode C | Anode C |
| 9. | Cathode R.D.P. | Anode B | Anode D.P. |
| 10. | Cathode C | Anode A | No Pin |
| 11. | Cathode G | - | No Pin |
| 12. | No Pin | - | Common Cathode *3 |
| 13. | Cathode B | - | Anode B |
| 14. | Common Anode *1 | - | Anode A |

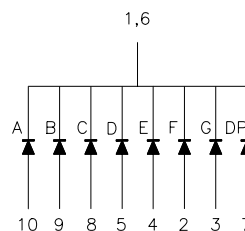
Notes: 1.Pin 3 & 14 are internally connected. 3.Pin 4 & 12 are internally connected.
 2.Pin 1 & 6 are internally connected. 4.Pin 1 & 3 are internally connected.

Internal Circuit Diagrams

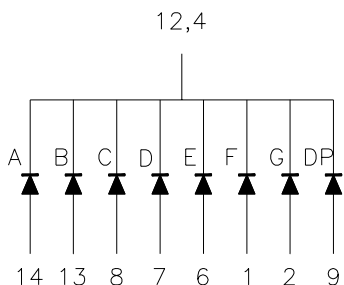
A.LTS-312A



B.LTS-313A

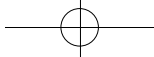


C.LTS-315A



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 (1/10 Duty Cycle, 0.1ms Pulse Width) | 125 | 60 | 100 | 80 | 100 | 100 | mA |
| Continuous Forward Current Per Segment | 30 | 15 | 25 | 20 | 25 | 25 | mA |
| Derating Linear from 25°C Per Segment | 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 | | | | | | |
| Storage 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-312AWC/313AWC/315AWC

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity | I _v | 200 | 600 | | μ cd | I _F =1mA |
| | | | 3100 | | | I _F =5mA |
| Peak Emission Wavelength | λ _P | | 660 | | nm | I _F =20mA |
| Spectral Line Half-Width | Δλ | | 35 | | nm | I _F =20mA |
| Dominant Wavelength | λ _d | | 638 | | nm | I _F =20mA |
| Forward Voltage, Per Segment or D.P. | V _F | | 1.6 | 2.4 | V | I _F =1mA |
| | | | 1.7 | | | I _F =5mA |
| | | | 1.8 | | | I _F =20mA |
| Reverse Current, Per Segment or D.P. | I _R | | | 100 | μ A | V _R =5V |
| Luminous Intensity Matching Ratio | I _v -m | | | 2.1 | | I _F =1mA |

LTS-312AP/313AP/315AP

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity | I _v | 340 | 750 | | μ cd | I _F =10mA |
| Peak Emission Wavelength | λ _P | | 697 | | nm | I _F =20mA |
| Spectral Line Half-Width | Δλ | | 90 | | nm | I _F =20mA |
| Dominant Wavelength | λ _d | | 657 | | nm | I _F =20mA |
| Forward Voltage, Per Segment or D.P. | V _F | | 2.1 | 2.6 | V | I _F =20mA |
| Reverse Current, Per Segment or D.P. | I _R | | | 100 | μ A | V _R =5V |
| Luminous Intensity Matching Ratio | I _v -m | | | 2:1 | | I _F =10mA |

LTS-312AG/313AG/315AG

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity | I _v | 870 | 2000 | | μ cd | I _F =10mA |
| Peak Emission Wavelength | λ _P | | 565 | | nm | I _F =20mA |
| Spectral Line Half-Width | Δλ | | 30 | | nm | I _F =20mA |
| Dominant Wavelength | λ _d | | 569 | | nm | I _F =20mA |
| Forward Voltage, Per Segment or D.P. | V _F | | 2.1 | 2.6 | V | I _F =20mA |
| Reverse Current, Per Segment | I _R | | | 100 | μ A | V _R =5V |
| Luminous Intensity Matching Ratio | I _v -m | | | 2:1 | | I _F =10mA |

LTS-312AY/313AY/315AY

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity | I _v | 870 | 2000 | | μ cd | I _F =10mA |
| Peak Emission Wavelength | λ _P | | 585 | | nm | I _F =20mA |
| Spectral Line Half-Width | Δλ | | 35 | | nm | I _F =20mA |
| Dominant Wavelength | λ _d | | 588 | | nm | I _F =20mA |
| Forward Voltage, Per Segment or D.P. | V _F | | 2.1 | 2.6 | V | I _F =20mA |
| Reverse Current, Per Segment or D.P. | I _R | | | 100 | μ A | V _R =5V |
| Luminous Intensity Matching Ratio | I _v -m | | | 2:1 | | I _F =10mA |

LTS-312AE/313AE/315AE

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-------------------|------|------|------|------|----------------------|
| Average Luminous Intensity | I _v | 870 | 2000 | | μ cd | I _F =10mA |
| Peak Emission Wavelength | λ _P | | 630 | | nm | I _F =20mA |
| Spectral Line Half-Width | Δλ | | 40 | | nm | I _F =20mA |
| Dominant Wavelength | λ _d | | 621 | | nm | I _F =20mA |
| Forward Voltage, Per Segment or D.P. | V _F | | 2.0 | 2.6 | V | I _F =20mA |
| Reverse Current, Per Segment or D.P. | I _R | | | 100 | μ A | V _R =5V |
| Luminous Intensity Matching Ratio | I _v -m | | | 2:1 | | I _F =10mA |

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LTS-312AHR/313AHR/315AHR

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Tset Condition |
|--------------------------------------|-----------------|------|------|------|------------------|-------------------|
| Average Luminous Intensity | I_v | 870 | 2000 | | $\mu\text{L cd}$ | $I_F=10\text{mA}$ |
| Peak Emission Wavelength | λ_P | | 635 | | nm | $I_F=20\text{mA}$ |
| Spectral Line Half-Width | $\Delta\lambda$ | | 40 | | nm | $I_F=20\text{mA}$ |
| Dominant Wavelength | λ_d | | 623 | | nm | $I_F=20\text{mA}$ |
| Forward Voltage, Per Segment or D.P. | V_F | | 2.0 | 2.6 | V | $I_F=20\text{mA}$ |
| Reverse Current, Per Segment or D.P. | I_R | | | 100 | μA | $V_R=5\text{V}$ |
| Luminous Intensity Matching Ratio | $I_v\text{-m}$ | | | 2:1 | | $I_F=10\text{mA}$ |

Note : Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.

**Typical Electrical/Optical Characteristic Curves
(25°C Ambient Temperature Unless Otherwise Noted)**

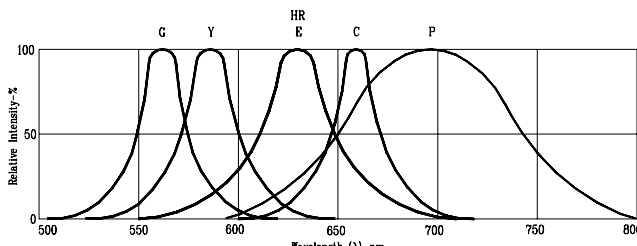


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

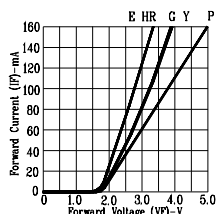


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

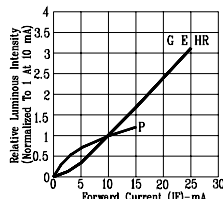


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

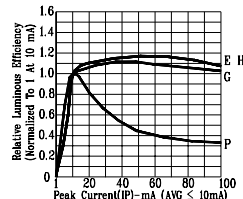


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

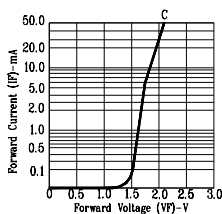


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

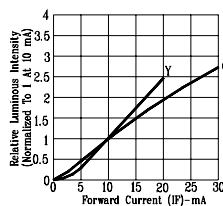


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

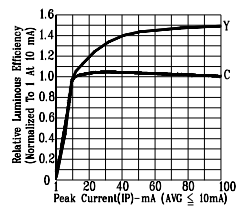


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

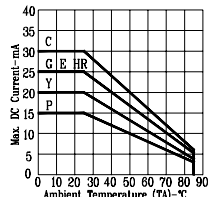


Fig8. MAX ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

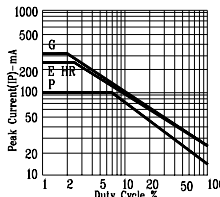


Fig9. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

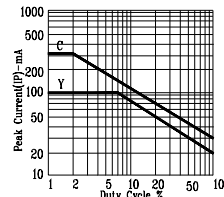


Fig10. MAX. PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

NOTE: G=GREEN Y=YELLOW HR=Hi-Eff. RED E=RED ORANGE C=AlGaAs RED P=BRIGHT RED (REFRESH RATE 1KHz)

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