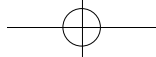


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# 0.3" Single Digit Numeric LED Displays

## 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

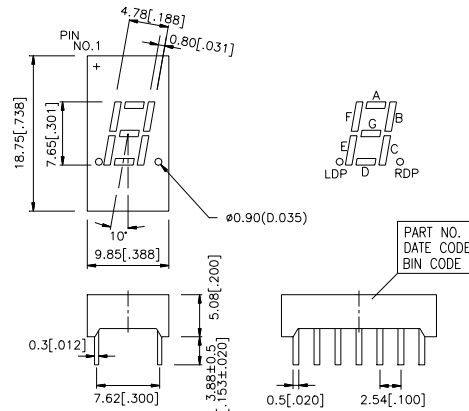
The LTS-310A series are 0.3 inch (7.62mm) height single digit displays. AlGaAs red displays has gray face and white segments. Bright red displays has black face and red segments. Green and yellow displays have gray face and white segments. Red orange displays have orange face and orange segments. The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

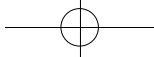


Notes: All dimensions are in millimeters (inches).

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



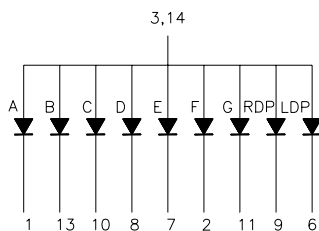
## Pin Connection

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

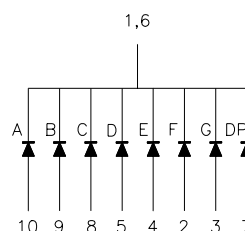
Notes: 1.Pin 3 & 14 are internally connected. 3.Pin 4 & 12 are internally connected.  
 2.Pin 1 & 6 are internally connected. 4.Pin 1 & 3 are internally connected.

## Internal Circuit Diagrams

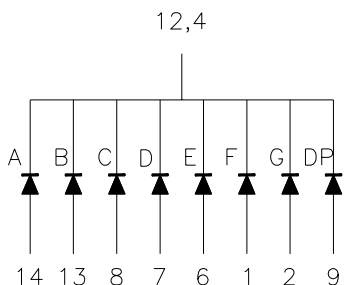
A.LTS-312A



B.LTS-313A

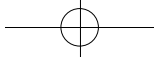


C.LTS-315A



## 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 <sub>v</sub>	200	600		μ cd	I <sub>F</sub> =1mA
			3100			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 or D.P.	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 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> =1mA

LTS-312AP/313AP/315AP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Tset Condition
Average Luminous Intensity	I <sub>v</sub>	340	750		μ cd	I <sub>F</sub> =10mA
Peak Emission Wavelength	λ <sub>P</sub>		697		nm	I <sub>F</sub> =20mA
Spectral Line Half-Width	Δλ		90		nm	I <sub>F</sub> =20mA
Dominant Wavelength	λ <sub>d</sub>		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-312AG/313AG/315AG

Parameter	Symbol	Min.	Typ.	Max.	Unit	Tset Condition
Average Luminous Intensity	I <sub>v</sub>	870	2000		μ cd	I <sub>F</sub> =10mA
Peak Emission Wavelength	λ <sub>P</sub>		565		nm	I <sub>F</sub> =20mA
Spectral Line Half-Width	Δλ		30		nm	I <sub>F</sub> =20mA
Dominant Wavelength	λ <sub>d</sub>		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	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

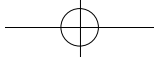
LTS-312AY/313AY/315AY

Parameter	Symbol	Min.	Typ.	Max.	Unit	Tset Condition
Average Luminous Intensity	I <sub>v</sub>	870	2000		μ cd	I <sub>F</sub> =10mA
Peak Emission Wavelength	λ <sub>P</sub>		585		nm	I <sub>F</sub> =20mA
Spectral Line Half-Width	Δλ		35		nm	I <sub>F</sub> =20mA
Dominant Wavelength	λ <sub>d</sub>		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-312AE/313AE/315AE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Tset Condition
Average Luminous Intensity	I <sub>v</sub>	870	2000		μ cd	I <sub>F</sub> =10mA
Peak Emission Wavelength	λ <sub>P</sub>		630		nm	I <sub>F</sub> =20mA
Spectral Line Half-Width	Δλ		40		nm	I <sub>F</sub> =20mA
Dominant Wavelength	λ <sub>d</sub>		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

9-122



LTS-312AHR/313AHR/315AHR

Parameter	Symbol	Min.	Typ.	Max.	Unit	Tset Condition
Average Luminous Intensity	I <sub>v</sub>	870	2000		μL cd	I <sub>F</sub> =10mA
Peak Emission Wavelength	λ <sub>P</sub>		635		nm	I <sub>F</sub> =20mA
Spectral Line Half-Width	Δλ		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	μA	V <sub>R</sub> =5V
Luminous Intensity Matching Ratio	I <sub>v</sub> -m			2:1		I <sub>F</sub> =10mA

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)**

**DISPLAYS**

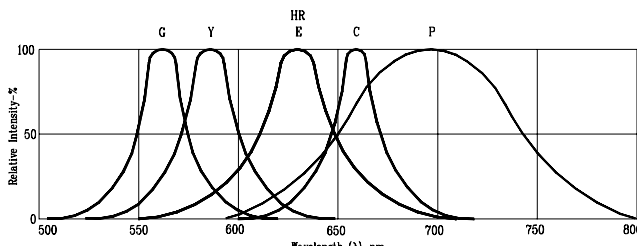


Fig1. RELATIVE INTENSITY VS. WAVELENGTH

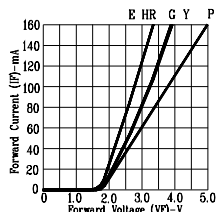


Fig2. FORWARD CURRENT VS. FORWARD VOLTAGE

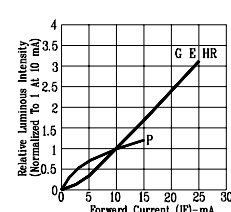


Fig3. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

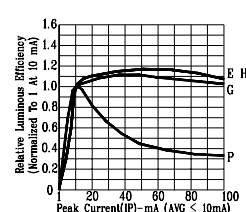


Fig4. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

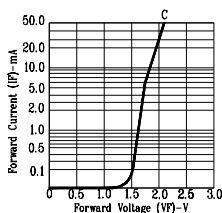


Fig5. FORWARD CURRENT VS. FORWARD VOLTAGE

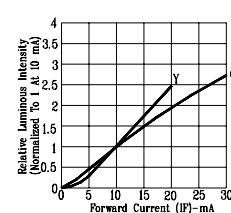


Fig6. RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

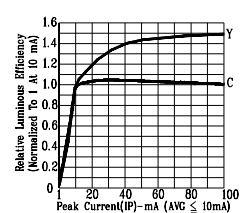


Fig7. RELATIVE LUMINOUS EFFICIENCY (LUMINOUS INTENSITY PER UNIT CURRENT) VS. PEAK CURRENT

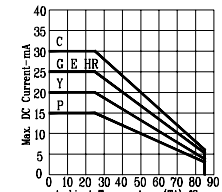


Fig8. MAX ALLOWABLE DC CURRENT VS. AMBIENT TEMPERATURE.

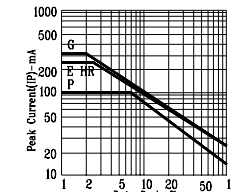


Fig9. MAX PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

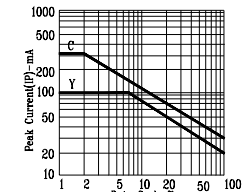


Fig10. MAX PEAK CURRENT VS. DUTY CYCLE % (REFRESH RATE 1KHz)

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