



T-1(3mm) Solid State LED Lamps

LTL-1CHA/1CHAE	Amber
LTL-1CHE/1CHEE	High Efficiency Red
LTL-1CHG/1CHGE	Green
LTL-1CHP/1CHPE	Bright Red
LTL-1CHR/1CHRE	Red
LTL-1CHY/1CHYE	Yellow

Features

- Low power consumption.
- High efficiency.
- Versatile mounting on P.C. Board or panel.
- I.C. compatible/low current requirements.
- 3.1mm diameter package.

Description

The Amber source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Amber Light Emitting Diode.

The High Efficiency Red source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.

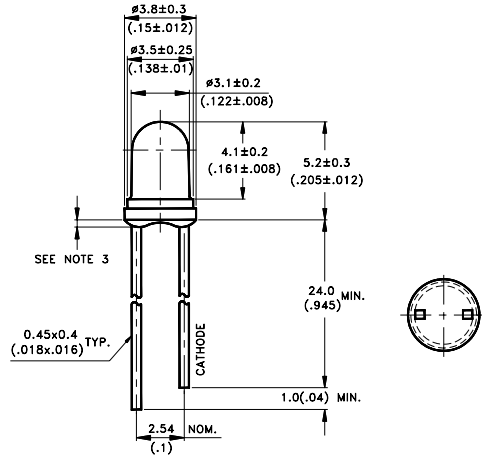
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Light Emitting Diode.

The Red source color devices are made with Gallium Arsenide Phosphide on Gallium Arsenide Red Light Emitting Diode.

The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Package Dimensions



Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is $\pm 0.25\text{mm}$ (.010") unless otherwise noted.
3. Protruded resin under flange is 1.5mm (.059") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

Devices

Part No. LTL-	Lens	Source Color
1CHA	Amber Diffused	Amber
1CHAE	Amber Transparent	
1CHE	Red Diffused	Hi. Eff. Red
1CHEE	Red Transparent	
1CHG	Green Diffused	Green
1CHGE	Green Transparent	
1CHP	Red Diffused	Bright Red
1CHPE	Red Transparent	
1CHR	Red Diffused	Red
1CHRE	Red Transparent	
1CHY	Yellow Diffused	Yellow
1CHYE	Yellow Transparent	

Absolute Maximum Ratings at Ta=25°C

Parameter	Amber	Hi. Eff. Red	Green	Bright Red	Red	Yellow	Unit
Power Dissipation	60	100	100	40	80	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	80	120	120	60	200	80	mA
Continuous Forward Current	20	30	30	15	40	20	mA
Derating Linear From 50°C	0.25	0.4	0.4	0.2	0.5	0.25	mA/°C
Reverse Voltage	5	5	5	5	5	5	V
Operating Temperature Range	-55°C to +100°C						
Storage Temperature Range	-55°C to +100°C						
Lead Soldering Temperature [1.6mm (.063 in.) from body]	260°C for 5 Seconds						

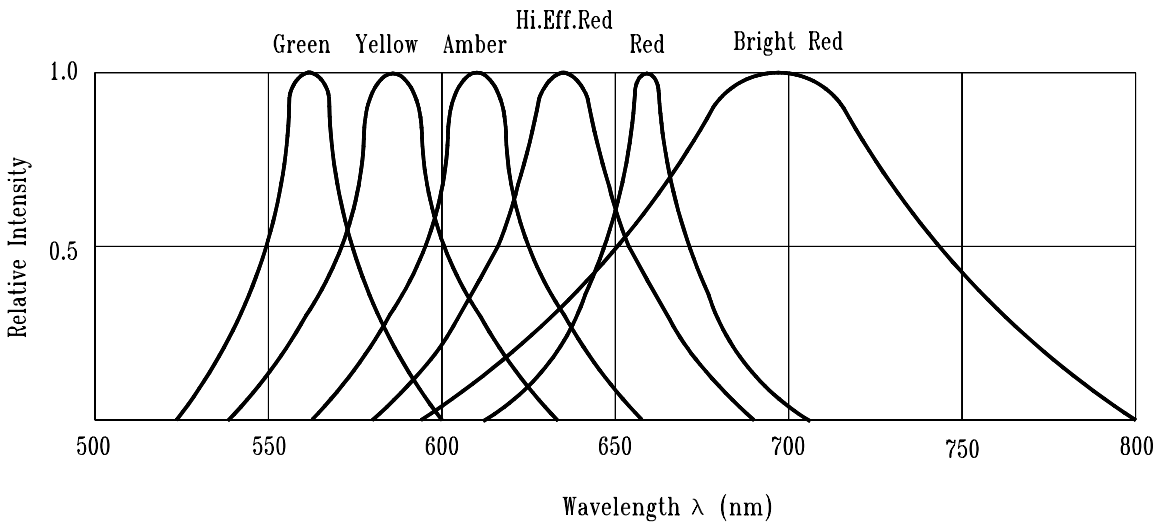


Fig.1 Relative Intensity vs. Wavelength

Electrical/Optical Characteristics at Ta=25°C

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit.	Test Condition.
Luminous Intensity	I _v	1CHA	3.7	12.6		mcd	I _F =10 mA Note 1,4
		1CHE	2.5	8.7			
		1CHG	3.7	12.6			
		1CHP	1.3	4.4			
		1CHR	0.4	1.1			
		1CHY	2.5	8.7			
Viewing Angle	2 θ _{1/2}	1CHx		60		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λ _P	1CHA		610		nm	Measurement @Peak (Fig.1)
		1CHE		635			
		1CHG		565			
		1CHP		697			
		1CHR		655			
		1CHY		585			
Dominant Wavelength	λ _d	1CHA		602		nm	Note 3
		1CHE		623			
		1CHG		569			
		1CHP		657			
		1CHR		651			
		1CHY		588			
Spectral Line Half Width	Δλ	1CHA		35		nm	
		1CHE		40			
		1CHG		30			
		1CHP		90			
		1CHR		24			
		1CHY		35			
Forward Voltage	V _F	1CHA		2.1	2.6	V	I _F =20mA
		1CHE		2.0	2.6		
		1CHG		2.1	2.6		
		1CHP		2.1	2.6		
		1CHR		1.7	2.0		
		1CHY		2.1	2.6		
Reverse Current	I _R	1CHx			100	μA	V _R =5V
Capacitance	C	1CHA		15		pF	V _F =0, f=1MHz
		1CHE		20			
		1CHG		35			
		1CHP		55			
		1CHR		30			
		1CHY		15			

- Notes:1.Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2.θ_{1/2} is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3.The dominant wavelength, λ_d is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
4.I_v needs ± 15% additionalary for guaranteed limits.

Electrical/Optical Characteristics at Ta=25°C

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit.	Test Condition.
Luminous Intensity	I _v	1CHAE	8.7	29		mcd	I _F =10 mA Note 1,4
		1CHEE	5.6	19			
		1CHGE	12.6	40			
		1CHPE	2.5	8.7			
		1CHRE	1.1	3.7			
		1CHYE	12.6	40			
Viewing Angle	2 θ ^{1/2}	1CHxE		45		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λ _P	1CHAE		610		nm	Measurement @Peak (Fig.1)
		1CHEE		635			
		1CHGE		565			
		1CHPE		697			
		1CHRE		655			
		1CHYE		585			
Dominant Wavelength	λ _d	1CHAE		602		nm	Note 3
		1CHEE		623			
		1CHGE		569			
		1CHPE		657			
		1CHRE		651			
		1CHYE		588			
Spectral Line Half Width	Δλ	1CHAE		35		nm	
		1CHEE		40			
		1CHGE		30			
		1CHPE		90			
		1CHRE		24			
		1CHYE		35			
Forward Voltage	V _F	1CHAE		2.1	2.6	V	I _F =20mA
		1CHEE		2.0	2.6		
		1CHGE		2.1	2.6		
		1CHPE		2.1	2.6		
		1CHRE		1.7	2.0		
		1CHYE		2.1	2.6		
Reverse Current	I _R	1CHxE			100	μA	V _R =5V
Capacitance	C	1CHAE		15		pF	V _F =0 , f=1MHz
		1CHEE		20			
		1CHGE		35			
		1CHPE		55			
		1CHRE		30			
		1CHYE		15			

- Notes:1.Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2.θ^{1/2} is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3.The dominant wavelength, λ_d is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
4.I_v needs ± 15% additionalary for guaranteed limits.

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

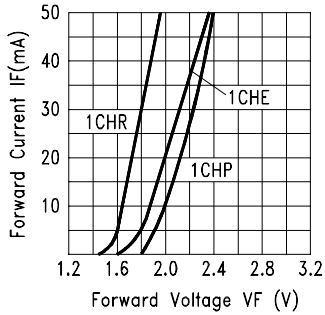


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

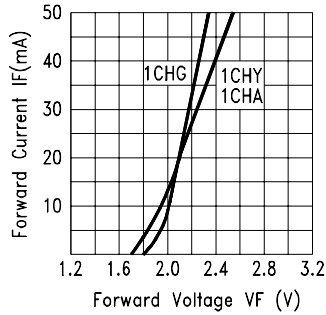


Fig.19 FORWARD CURRENT VS. FORWARD VOLTAGE

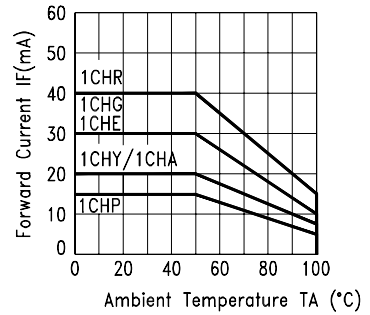


Fig.20 FORWARD CURRENT DERATING CURVE

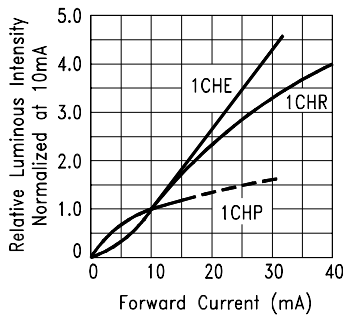


Fig.21 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

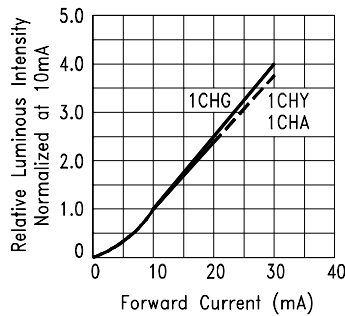


Fig.22 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

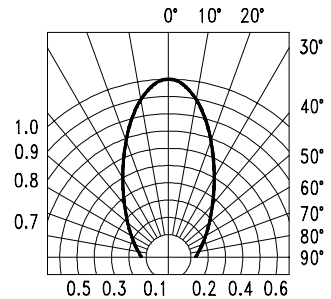


Fig.23 SPATIAL DISTRIBUTION

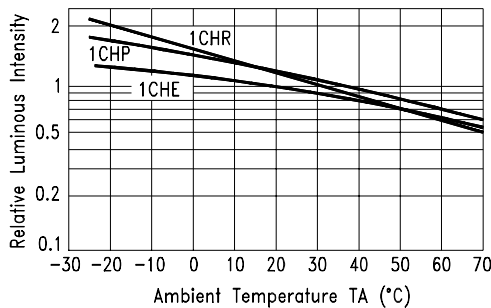


Fig.24 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

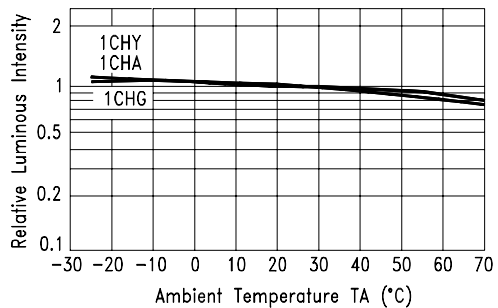


Fig.25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

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

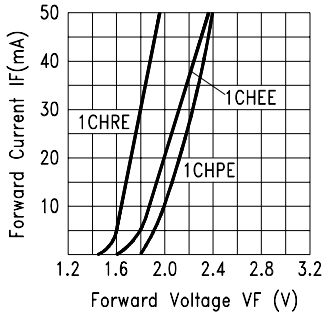


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

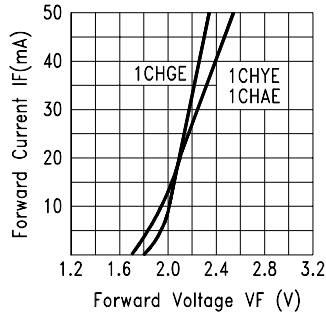


Fig.19 FORWARD CURRENT VS. FORWARD VOLTAGE

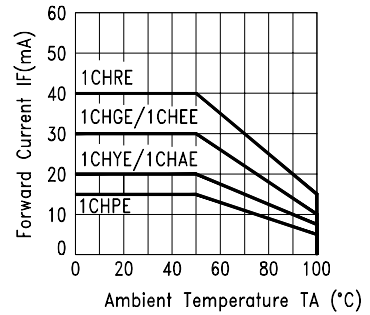


Fig.20 FORWARD CURRENT DERATING CURVE

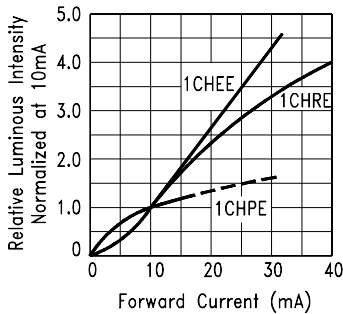


Fig.21 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

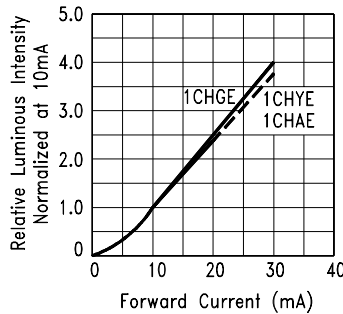


Fig.22 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

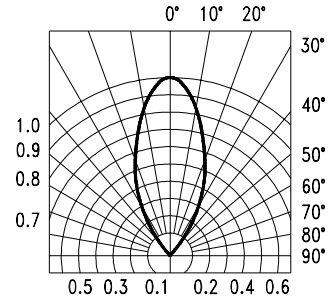


Fig.23 SPATIAL DISTRIBUTION

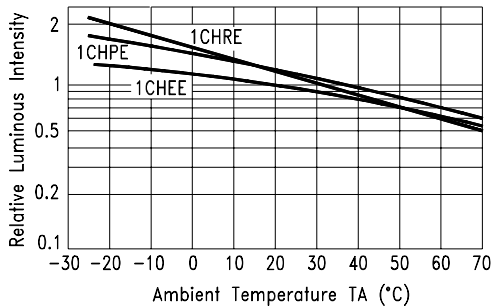


Fig.24 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

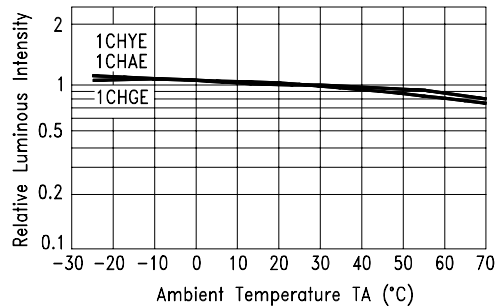


Fig.25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE