



T-1 (3 mm) Solid State LED Lamps

- LTL-1KHAE Amber
- LTL-1KHGE Green
- LTL-1KHEE Hi.Eff.Red
- LTL-1KHYE Yellow
- LTL-1KHPK Bright Red
- LTL-1KHKK Pure Green

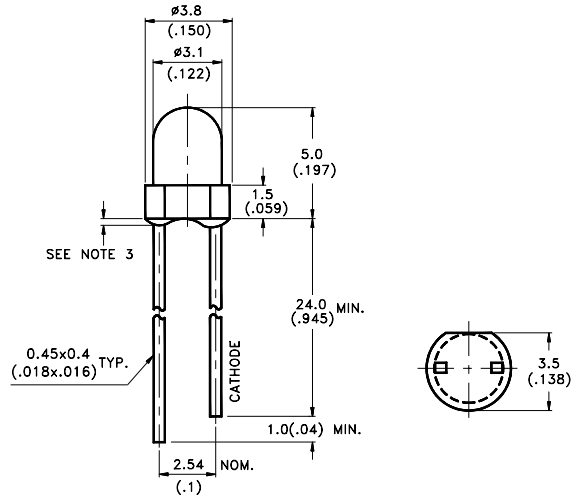
Features

- 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 LED is utilizing GaAsP on GaP.
 The Green and Pure Green LED are utilizing GaP on GaP.
 The Hi-Efficiency Red LED is utilizing GaAsP on GaP.
 The Yellow LED is utilizing GaAsP on GaP.
 The Bright Red LED is utilizing GaAsP on GaP.

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
1KHAE	Amber Transparent	Amber
1KHGE	Green Transparent	Green
1KHEE	Red Transparent	Hi. Eff. Red
1KHYE	Yellow Transparent	Yellow
1KHPK	Water Clear	Bright Red
1KHKK	Water Clear	Pure Green

Absolute Maximum Ratings at Ta=25°C

Parameter	Hi. Eff. Red	Green	Yellow	Amber	Bright Red	Pure Green	Unit
Power Dissipation	100	100	60	60	40	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	80	80	60	120	mA
Continuous Forward Current	30	30	20	20	15	30	mA
Derating Linear From 50°C	0.5	0.4	0.25	0.25	0.2	0.4	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						

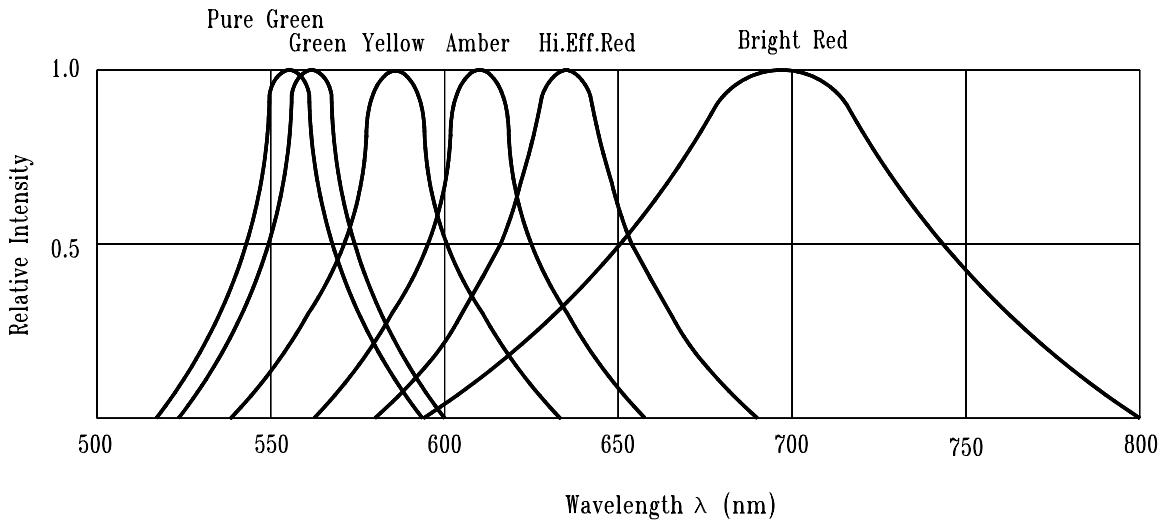


Fig.1 Relative Intensity vs. Wavelength

Electrical/Optical Characteristics at Ta=25°C

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit.	Test Condition.
Luminous Intensity	I _v	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK	3.7 8.7 3.7 3.7 0.7 1.1	12.6 29 12.6 12.6 2.5 3.7		mcd	I _F =10 mA Note 1,4
Viewing Angle	2 θ _{1/2}	1KHxx		75		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λ _P	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK		610 565 635 585 697 555		nm	Measurement @Peak (Fig.1)
Dominant Wavelength	λ _d	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK		602 569 623 588 657 569		nm	Note 3
Spectral Line Half Width	Δλ	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK		35 30 40 35 90 30		nm	
Forward Voltage	V _F	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK		2.1 2.1 2.0 2.1 2.1 2.1	2.6 2.6 2.6 2.6 2.6 2.6	V	I _F =20mA
Reverse Current	I _R	1KHxx			100	μA	V _R =5V
Capacitance	C	1KHAE 1KHGE 1KHEE 1KHYE 1KHPK 1KHKK		15 35 20 15 55 35		pF	V _F =0, f=1MHz

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% additionaly for guaranteed limits.

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

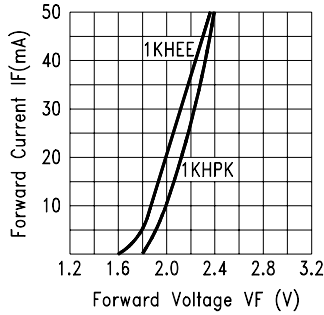


Fig.18 FORWARD CURRENT VS. FORWARD VOLTAGE

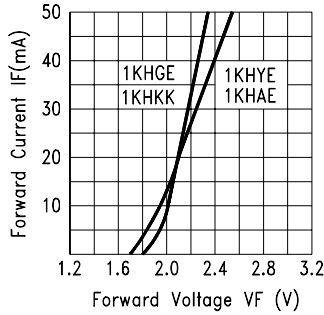


Fig.19 FORWARD CURRENT VS. FORWARD VOLTAGE

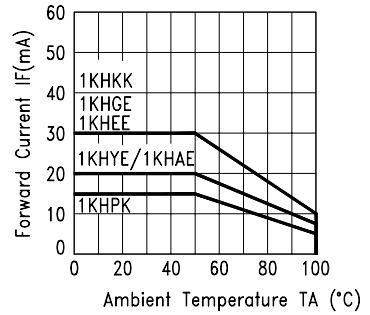


Fig.20 FORWARD CURRENT DERATING CURVE

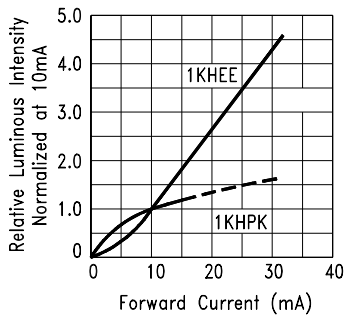


Fig.21 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

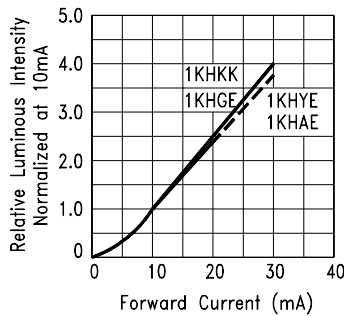


Fig.22 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

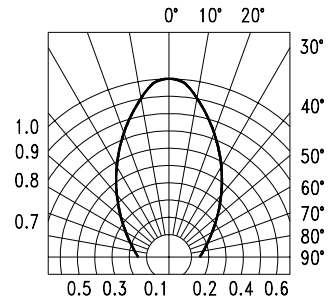


Fig.23 SPATIAL DISTRIBUTION

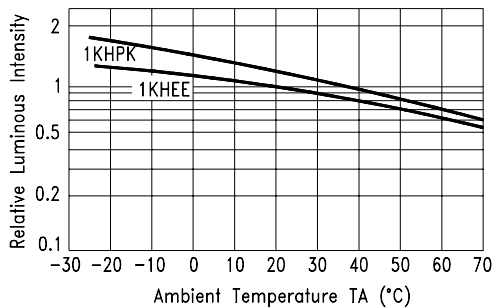


Fig.24 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

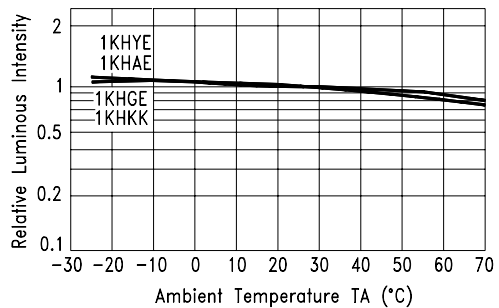


Fig.25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE