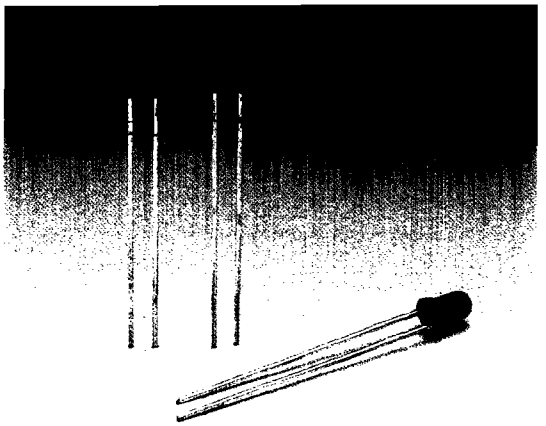
T-1(3mm) SOLID STATE LAMPS

LTL-16KR/16KRE RED **LTL-16KG/16KGE GREEN**
LTL-16KP/16KPE BRIGHT RED **LTL-16KY/16KYE YELLOW**
LTL-16KE/16KEE HIGH EFFICIENCY RED

FEATURES

- LOW POWER CONSUMPTION.
- HIGH EFFICIENCY.
- VERSATILE MOUNTING ON P.C. BOARD OR PANEL.
- CMOS/MOS AND TTL COMPATIBLE.
- LONG LIFE-SOLID STATE RELIABILITY.
- WIDE VIEWING.
- LOW COST.



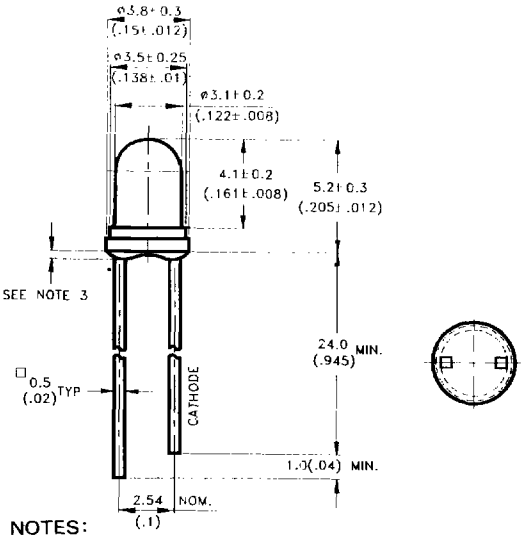
DESCRIPTION

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

DEVICES

PART NO. LTL–	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
16KR 16KRE	Red	Diffused Transparent	Red
16KP 16KPE	Red	Diffused Transparent	Bright Red
16KE 16KEE	Red	Diffused Transparent	Hi. Eff. Red
16KG 16KGE	Green	Diffused Transparent	Green
16KY 16KYE	Yellow	Diffused Transparent	Yellow

PACKAGE DIMENSIONS



NOTES:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (.010") unless otherwise noted.
3. Protruded resin under flange is 1.0mm (.04") max.
4. Lead spacing is measured where the leads emerge from the package.
5. Specifications are subject to change without notice.

ABSOLUTE MAXIMUM RATINGS AT $T_A = 25\,^{\circ}C$

PARAMETER	RED	BRIGHT RED	GREEN	YELLOW	HI. EFF. RED ORANGE	UNIT
Power Dissipation	80	40	100	60	100	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	200	60	120	80	120	mA
Continuous Forward Current	40	15	30	20	30	mA
Derating Linear From 50 °C	0.5	0.2	0.4	0.25	0.4	mA/ °C
Reverse Voltage	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 (0.063in) From Body]	260 °C for 5 Seconds					

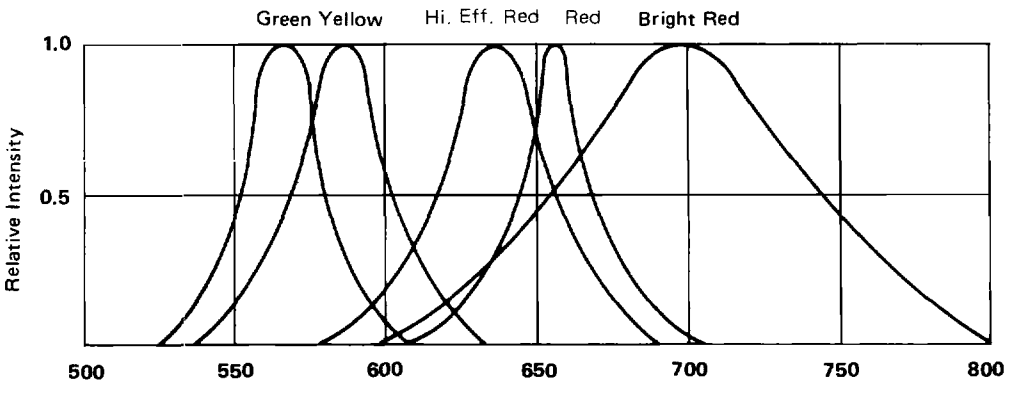


FIG. 1 RELATIVE INTENSITY VS. WAVELENGTH

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A=25 ℃

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	Iv	16KR 16KP 16KE 16KG 16KY	0.4 1.3 3.7 3.7 2.5	1.1 4.4 12.6 12.6 8.7		mcd	I_F =10 mA Note 1
Viewing Angle	2 θ 1/2	16KR 16KP 16KE 16KG 16KY		60		deg	Note 2 (FIG.7)
Peak Emission Wavelength	λ PEAK	16KR 16KP 16KE 16KG 16KY		655 697 635 565 585		nm	Measurement @ Peak (FIG.1)
Dominant Wavelength	λ d	16KR 16KP 16KE 16KG 16KY		651 657 621 569 588		nm	Note 3
Spectral Line Half Width	Δ λ	16KR 16KP 16KE 16KG 16KY		24 90 40 30 35		nm	
Forward Voltage	V_F	16KR 16KP 16KE 16KG 16KY		1.7 2.1 2.0 2.1 2.1	2.0 2.8 2.8 2.8 2.8	V	I_F =20 mA
Reverse Current	I_R	16KR 16KP 16KE 16KG 16KY			100	μ A	V_R =5V
Capacitance	C	16KR 16KP 16KE 16KG 16KY		30 55 20 35 15		PF	V_F =0 f=1MHZ

NOTE : 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3. The dominant wavelength, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A=25 ℃

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	Iv	16KRE 16KPE 16KEE 16KGE 16KYE	1.1 2.5 5.6 12.6 12.6	3.7 8.7 19 40 40		mcd	I_F =10 mA Note 1
Viewing Angle	2 θ 1/2	16KRE 16KPE 16KEE 16KGE 16KYE		45		deg	Note 2 (FIG.15)
Peak Emission Wavelength	λ PEAK	16KRE 16KPE 16KEE 16KGE 16KYE		655 697 635 565 585		nm	Measurement @ Peak (FIG.1)
Dominant Wavelength	λ d	16KRE 16KPE 16KEE 16KGE 16KYE		651 657 621 569 588		nm	Note 3
Spectral Line Half Width	Δ λ	16KRE 16KPE 16KEE 16KGE 16KYE		24 90 40 30 35		nm	
Forward Voltage	V_F	16KRE 16KPE 16KEE 16KGE 16KYE		1.7 2.1 2.0 2.1 2.1	2.0 2.8 2.8 2.8 2.8	V	I_F =20 mA
Reverse Current	I_R	16KRE 16KPE 16KEE 16KGE 16KYE			100	μ A	V_R =5V
Capacitance	C	16KRE 16KPE 16KEE 16KGE 16KYE		30 55 20 35 15		PF	V_F =0 f=1MHZ

NOTE : 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, λd is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES
(25 °C Ambient Temperature Unless Otherwise Noted)

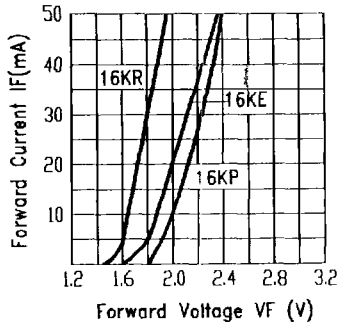


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

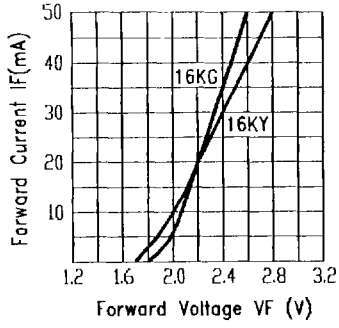


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

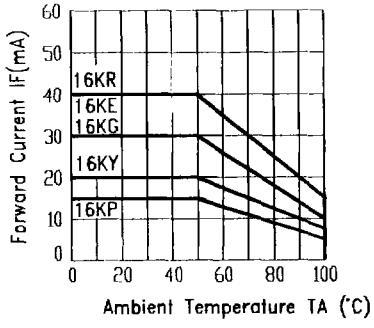


Fig.4 FORWARD CURRENT DERATING CURVE

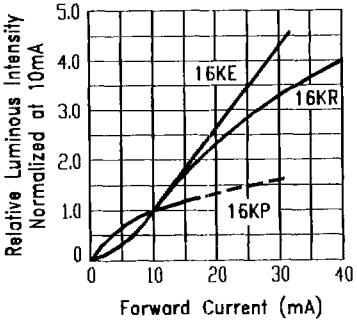


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

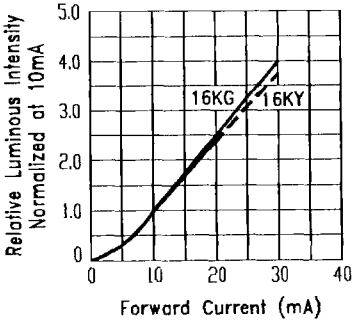


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

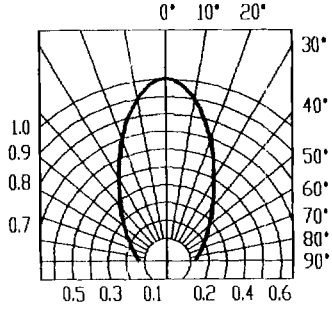


Fig.7 SPATIAL DISTRIBUTION

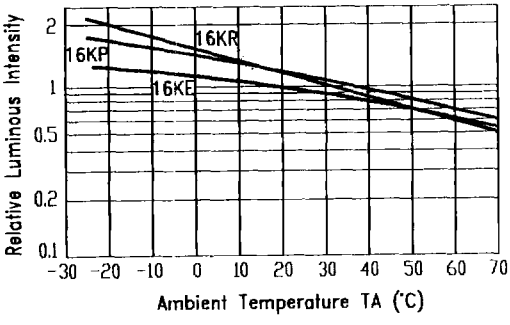


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

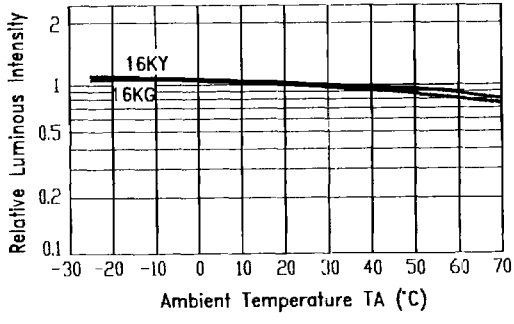


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES
(25 °C Ambient Temperature Unless Otherwise Noted)

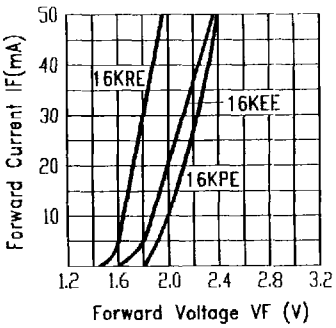


Fig.10 FORWARD CURRENT VS. FORWARD VOLTAGE

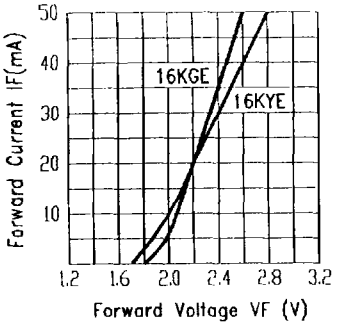


Fig.11 FORWARD CURRENT VS. FORWARD VOLTAGE

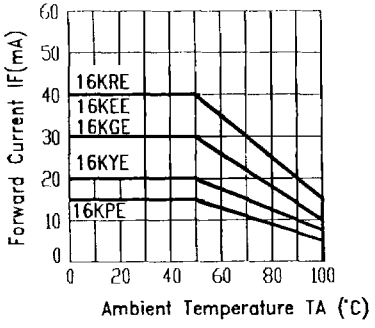


Fig.12 FORWARD CURRENT DERATING CURVE

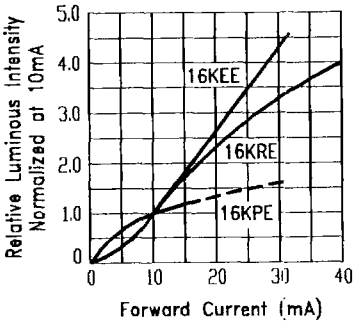


Fig.13 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

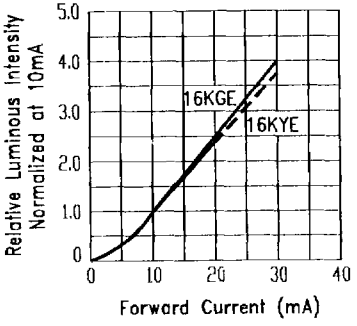


Fig.14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

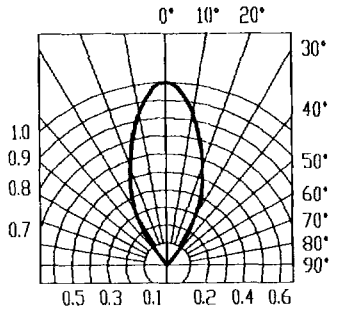


Fig.15 SPATIAL DISTRIBUTION

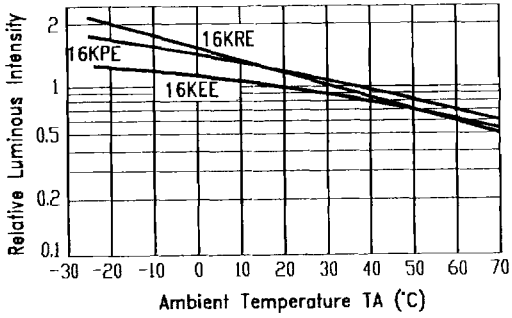


Fig.16 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

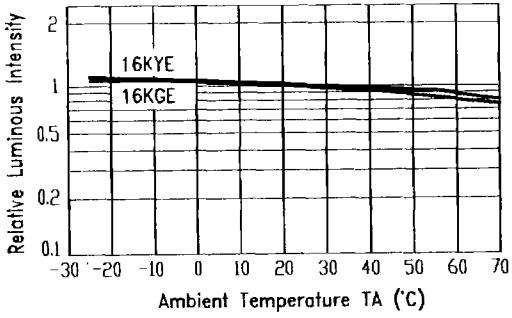


Fig.17 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

LED LAMPS