



T-1(3mm) SOLID STATE LAMPS

LTL-209 RED

LTL-239 GREEN

LTL-219 BRIGHT RED

LTL-259 YELLOW

LTL-229 HIGH EFFICIENCY RED

LTL-299 ORANGE

T-41-21

FEATURES

- LOW POWER CONSUMPTION.
- HIGH EFFICIENCY.
- I.C. COMPATIBLE/LOW CURRENT REQUIREMENTS.
- 1.27mm (0.5") LEAD SPACING.
- T-1 DIAMETER.
- DIFFUSED LENS.
- WIDE VIEWING ANGLE.
- LOW COST.

DESCRIPTION

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

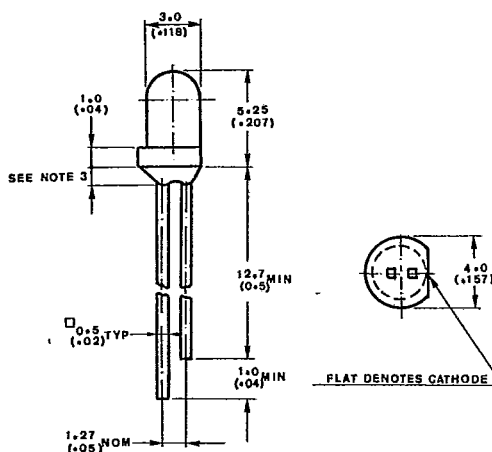
The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.

The High Efficiency Red and Orange 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.

PACKAGE DIMENSIONS



DEVICES

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
209	Red	Diffused	Red
219	Red	Diffused	Bright Red
229	Red	Diffused	Hi. Eff. Red
239	Green	Diffused	Green
259	Yellow	Diffused	Yellow
299	Orange	Diffused	Orange

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.

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

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 25°C	0.5	0.2	0.4	0.25	0.4	mA/ $^\circ\text{C}$
Reverse Voltage	5	5	5	5	5	V
Operating Temperature Range	-55°C to $+100^\circ\text{C}$					
Storage Temperature Range	-55°C to $+100^\circ\text{C}$					
Lead Soldering Temperature [1.6mm (0.063 in) From Body]	260°C for 5 Seconds					

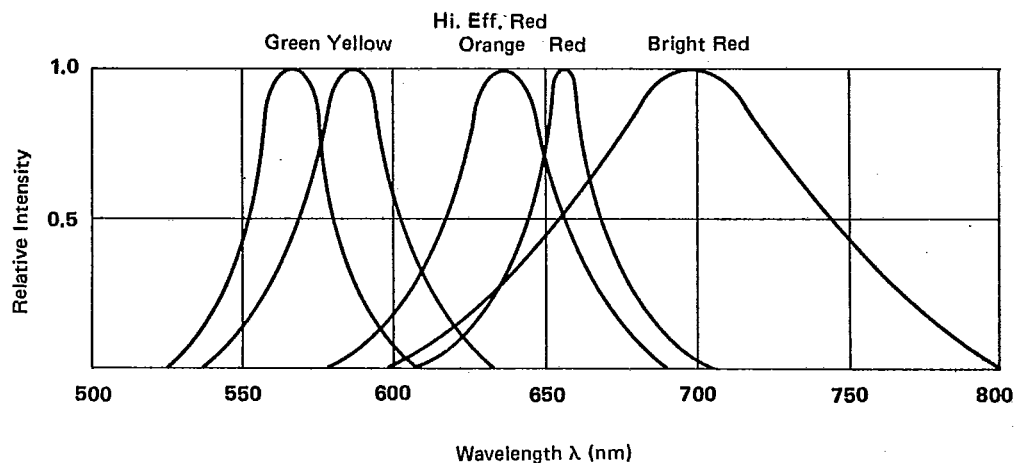


FIG. 1 RELATIVE INTENSITY VS. WAVELENGTH



ELECTRICAL/OPTICAL CHARACTERISTICS AND CURVES AT TA = 25°C

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	Iv	209 219 229	0.3 0.4 0.8	0.8 1.1 3.8		mcd	IF = 10 mA Note 1
Viewing Angle	2θ½	209 219 229		72		deg.	Note 2 (Fig. 6)
Peak Emission Wavelength	λPEAK	209 219 229		655 697 635		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	Δλ	209 219 229		24 90 40		nm	
Forward Voltage	VF	209 219 229		1.7 2.1 2.0	2.0 2.8 2.8	V	IF = 20 mA
Reverse Current	IR	209 219 229			100	μA	VR = 5 V
Capacitance	C	209 219 229		30 55 20		PF	VF = 0 f = 1MHZ

NOTES: 1. Luminous Intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.
2. θ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

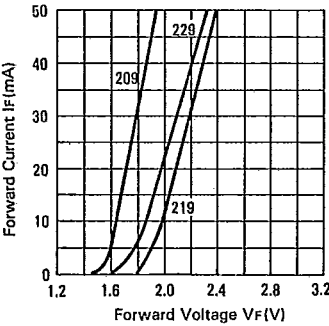


FIG. 2 FORWARD CURRENT VS. FORWARD VOLTAGE

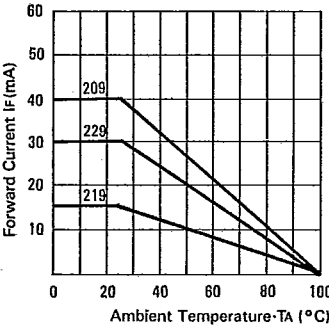


FIG. 3 FORWARD CURRENT DERATING CURVE

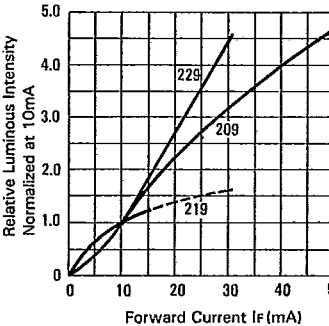


FIG. 4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT.

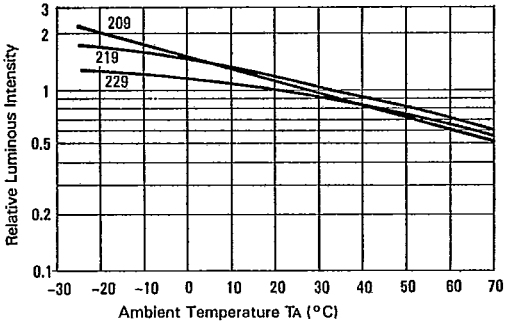


FIG. 5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

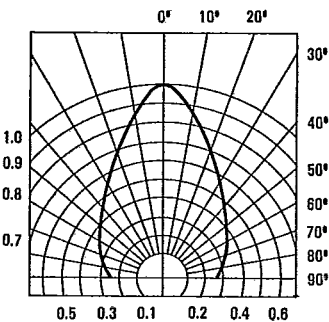


FIG. 6 SPATIAL DISTRIBUTION

T-41-21

ELECTRICAL/OPTICAL CHARACTERISTICS AND CURVES AT $T_A = 25^\circ\text{C}$

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	I_v	239 259	0.8 0.8	3.8 3.8		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	239 259		72		deg.	Note 2 (Fig. 11)
Peak Emission Wavelength	λ_{PEAK}	239 259		565 585		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	239 259		30 35		nm	
Forward Voltage	V_F	239 259		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	239 259			100	μA	$V_R = 5\text{ V}$
Capacitance	C	239 259		35 15		PF	$V_F = 0$ $f = 1\text{ MHz}$

NOTES: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.

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

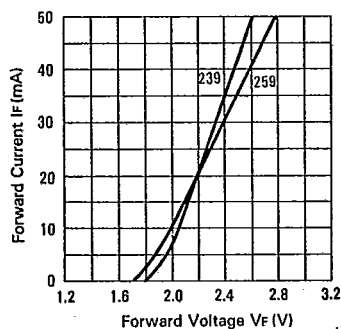


FIG. 7 FORWARD CURRENT VS. FORWARD VOLTAGE

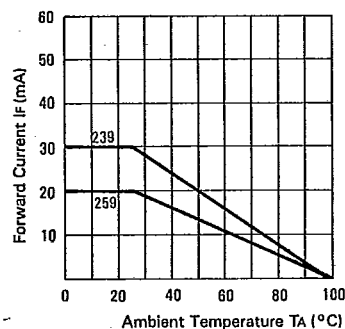


FIG. 8 FORWARD CURRENT DERATING CURVE

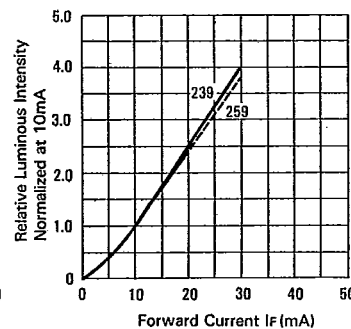


FIG. 9 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

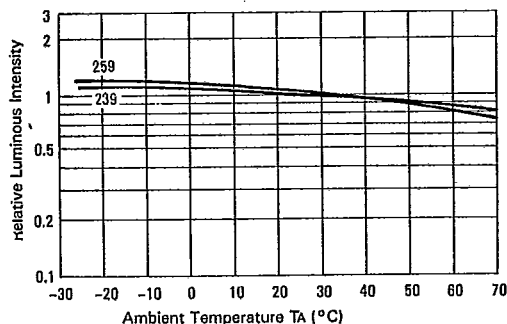


FIG. 10 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

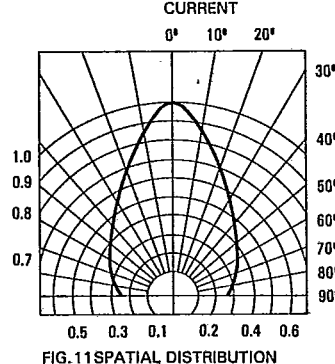


FIG. 11 SPATIAL DISTRIBUTION



2-126

405

ELECTRICAL/OPTICAL CHARACTERISTICS AND CURVES AT $T_A = 25^\circ\text{C}$

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	I_v	299	0.8	3.5		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	299		72		deg.	Note 2 (Fig. 16)
Peak Emission Wavelength	λ_{PEAK}	299		630		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	299		40		nm	
Forward Voltage	V_F	299		2.0	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	299			100	μA	$V_R = 5\text{ V}$
Capacitance	C	299		20		PF	$V_F = 0$ $f = 1\text{ MHz}$

NOTES: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.

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

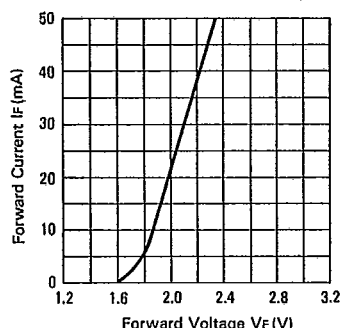


FIG.12 FORWARD CURRENT VS. FORWARD VOLTAGE

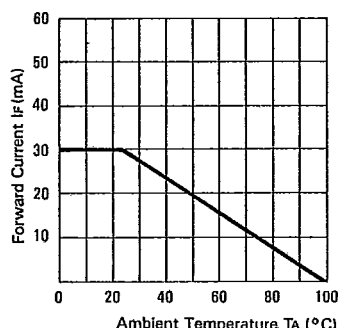


FIG.13 FORWARD CURRENT DERATING CURVE

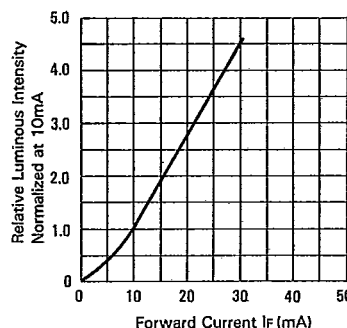


FIG.14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

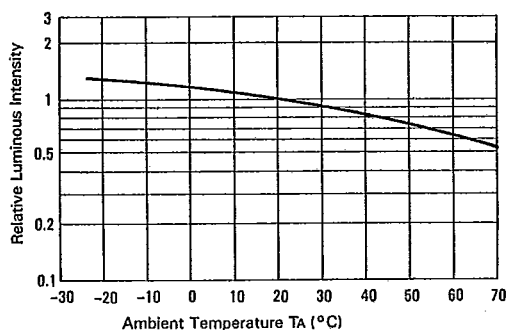


FIG.15 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

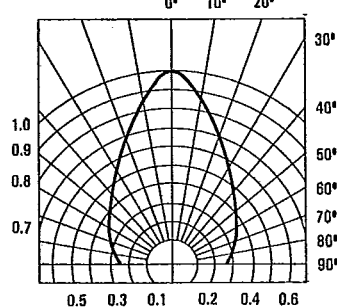


FIG.16 SPATIAL DISTRIBUTION