



2x5 RECTANGULAR BAR LED LAMPS

LTL-3201A / 23203A RED

LTL-3211A / 23213A BRIGHT RED

LTL-3221A / 23223A HIGH EFFICIENCY RED

LTL-3231A / 23233A GREEN

LTL-3251A / 23253A YELLOW

LTL-3271A / 23273A AMBER

LTL-3291A / 23293A ORANGE

FEATURES

- LOW POWER CONSUMPTION.
- MOST SUITABLE FOR USE LIKE LEVEL INDICATOR.
- EXCELLENT UNIFORMITY OF LIGHT EMISSION.
- LONG LIFE-SOLID STATE RELIABILITY.
- I.C. COMPATIBLE.

DESCRIPTION

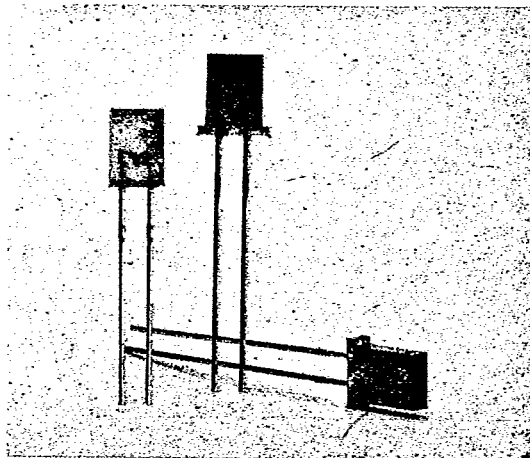
The Red source color devices are made with Gallium Arsenide Phosphide Red Light Emitting Diode.

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.

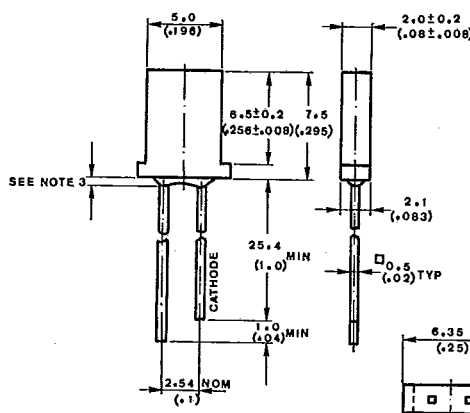
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

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



PACKAGE DIMENSIONS

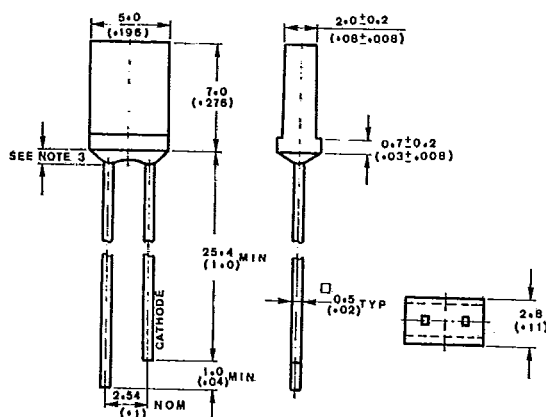
LTL-232x3A Series



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.

LTL-32x1A Series



DEVICES

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
3201A	Red	Diffused	Red
3211A	Red	Diffused	Bright Red
3221A	Red	Diffused	Hi.- Eff. Red
3231A	Green	Diffused	Green
3251A	Yellow	Diffused	Yellow
3271A	Amber	Diffused	Amber
3291A	Orange	Diffused	Orange

DEVICES

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
3201A	Red	Diffused	Red
3211A	Red	Diffused	Bright Red
3221A	Red	Diffused	Hi. Eff. Red
3231A	Green	Diffused	Green
3251A	Yellow	Diffused	Yellow
3271A	Amber	Diffused	Amber
3291A	Orange	Diffused	Orange

LED LAMPS

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

PARAMETER	RED	BRIGHT RED	GREEN	YELLOW AMBER	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 (0.063in) From Body]	260°C for 5 Seconds					

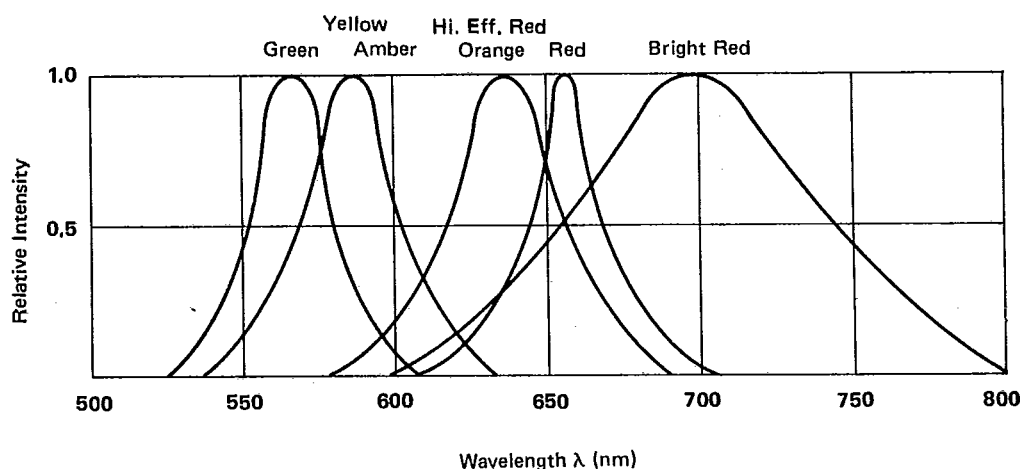


FIG 1 RELATIVE INTENSITY VS. WAVELENGTH

2-170

245

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	3201A 3211A 23203A 23213A	0.08 0.2 0.08 0.2	0.2 0.6 0.3 0.6		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	3201A 3211A 23203A 23213A		140 140 140 140		deg.	Note 2 (Fig. 21)
Peak Emission Wavelength	λ_{PEAK}	3201A 3211A 23203A 23213A		655 697 655 697		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	3201A 3211A 23203A 23213A		24 90 24 90		nm	
Forward Voltage	V_F	3201A 3211A 23203A 23213A		1.7 2.1 1.7 2.1	2.0 2.8 2.0 2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	3201A 3211A 23203A 23213A			100	μA	$V_R = 5\text{ V}$
Capacitance	C	3201A 3211A 23203A 23213A		30 55 30 55		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.

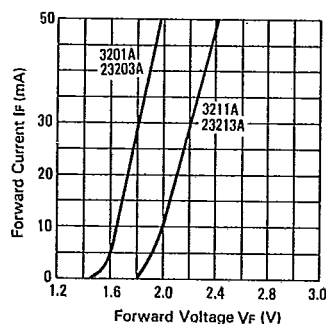


FIG. 2 FORWARD CURRENT VS. FORWARD VOLTAGE.

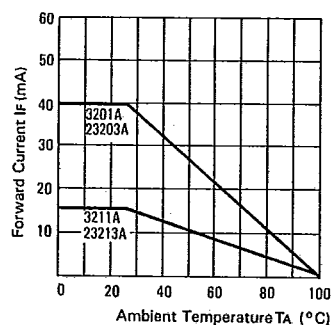


FIG. 3 FORWARD CURRENT DERATING CURVE

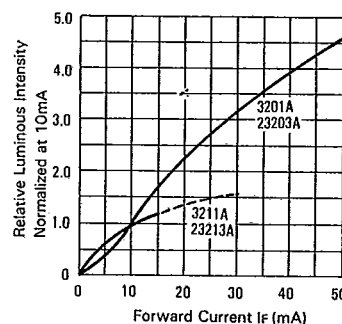


FIG. 4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT.

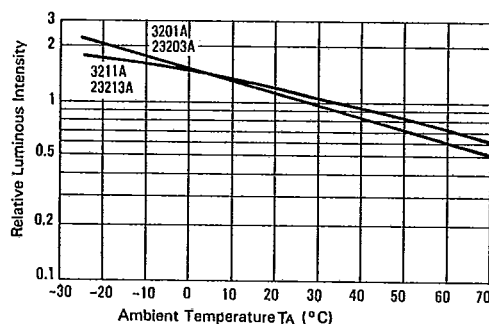


FIG. 5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

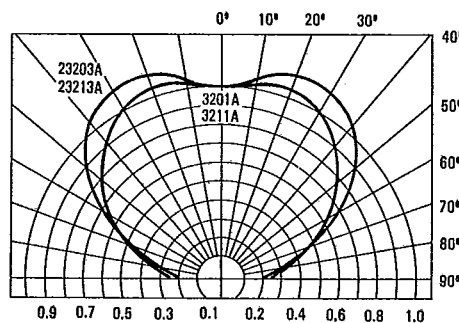


FIG. 6 SPATIAL DISTRIBUTION

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	3221A 23223A	0.6 0.7	1.7 2.5		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	3221A 23223A		140 140		deg.	Note 2 (Fig. 11)
Peak Emission Wavelength	λ_{PEAK}	3221A 23223A		635		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	3221A 23223A		40		nm	
Forward Voltage	V_F	3221A 23223A		2.0	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	3221A 23223A			100	μA	$V_R = 5\text{ V}$
Capacitance	C	3221A 23223A		20		PF	$V_F = 0$ $f = 1\text{ MHz}$

SMD LED LAMP

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.

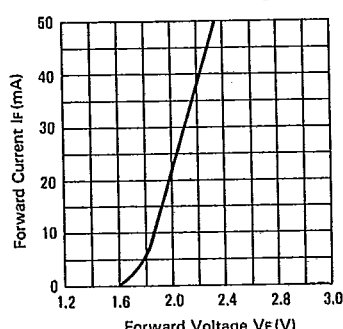


FIG. 7 FORWARD CURRENT VS. FORWARD VOLTAGE

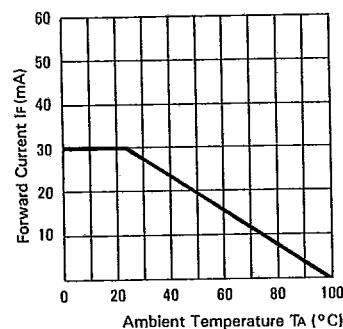


FIG. 8 FORWARD CURRENT DERATING CURVE

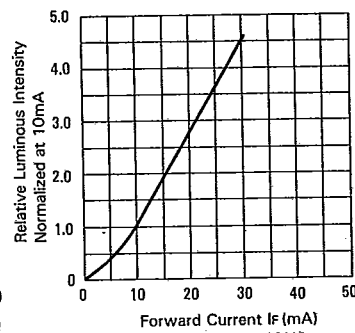


FIG. 9 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

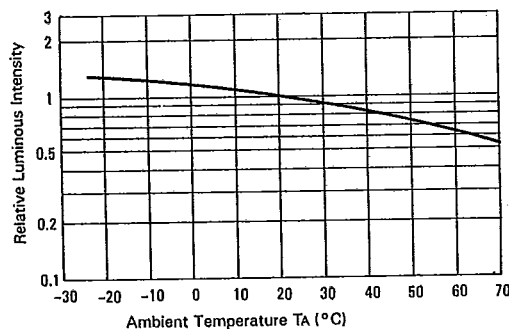


FIG. 10 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

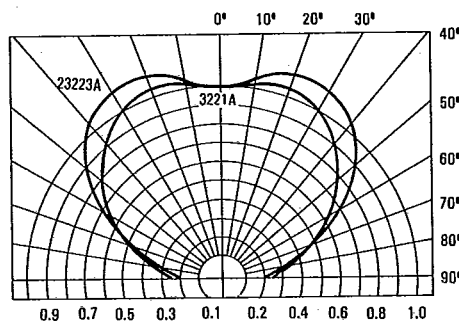


FIG. 11 SPATIAL DISTRIBUTION

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	3231A 3251A 23233A 23253A	1.1 1.1 1.1 1.1	3.8 3.8 3.8 3.8		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	3231A 3251A 23233A 23253A		140 140 140 140		deg.	Note 2 (Fig. 11)
Peak Emission Wavelength	λ_{PEAK}	3231A 3251A 23233A 23253A		565 565 565 565		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	3231A 3251A 23233A 23253A		30 35 30 35		nm	
Forward Voltage	V_F	3231A 3251A 23233A 23253A		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	3231A 3251A 23233A 23253A			100	μA	$V_R = 5\text{ V}$
Capacitance	C	3231A 3251A 23233A 23253A		35 15 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.

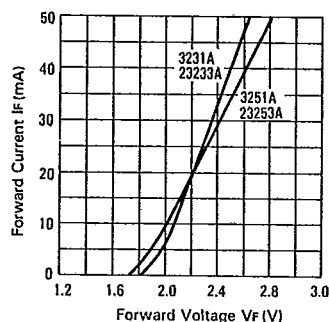


FIG. 12 FORWARD CURRENT VS. FORWARD VOLTAGE

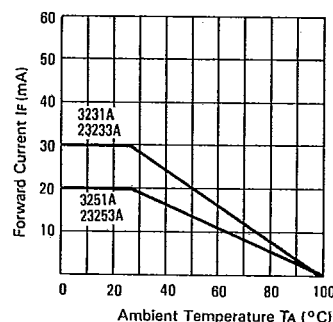


FIG. 13 FORWARD CURRENT DERATING CURVE

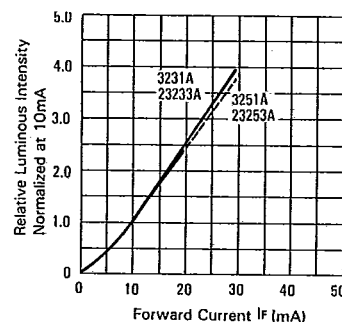


FIG. 14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

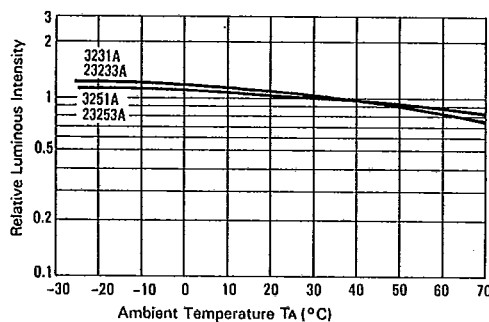


FIG. 15 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

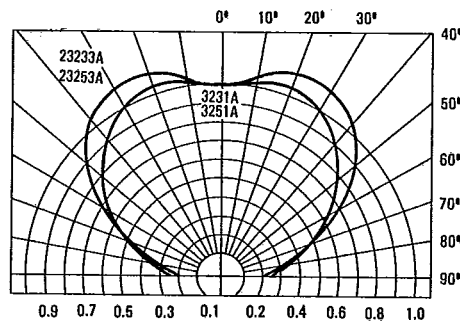


FIG. 16 SPATIAL DISTRIBUTION

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	3271A 3291A 23273A 23293A	1.1 0.6 1.1 0.7	3.8 1.7 3.8 2.5		md	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	3271A 3291A 23273A 23293A		140 140 140 140		deg.	Note 2 (Fig. 6)
Peak Emission Wavelength	λ_{PEAK}	3271A 3291A 23273A 23293A		600 630 600 630		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	3271A 3291A 23273A 23293A		35 40 35 40		nm	
Forward Voltage	V_F	3271A 3291A 23273A 23293A		2.1 2.0 2.1 2.0	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	3271A 3291A 23273A 23293A			100	μA	$V_R = 5\text{ V}$
Capacitance	C	3271A 3291A 23273A 23293A		15 20 15 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.

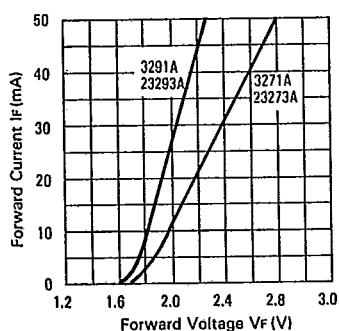


FIG. 17 FORWARD CURRENT VS. FORWARD VOLTAGE

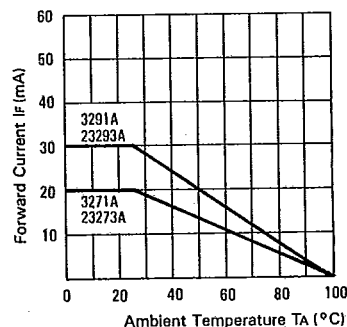


FIG. 18 FORWARD CURRENT DERATING CURVE

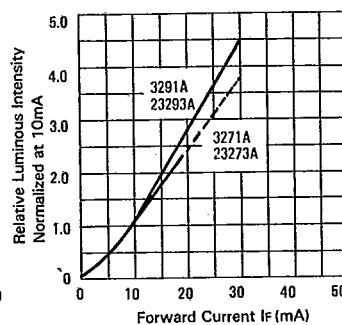


FIG. 19 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

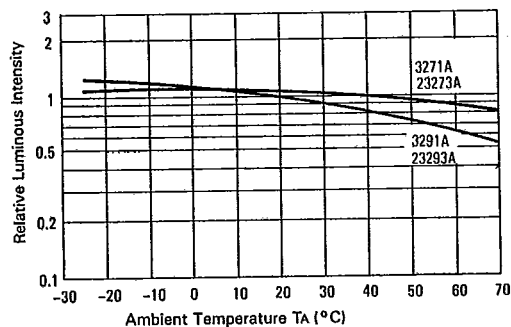


FIG. 20 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

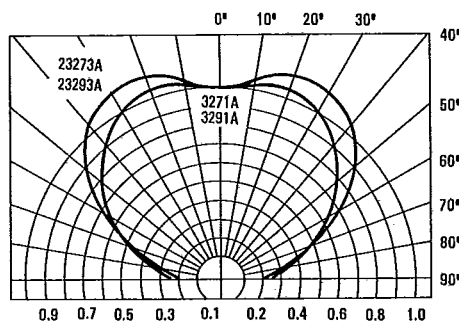


FIG. 21 SPATIAL DISTRIBUTION