



T-1 3/4 (5mm) SOLID STATE LAMPS

LTL-4203 RED LTL-4233/307G GREEN
 LTL-4213/307P BRIGHT RED LTL-4253/307Y YELLOW
 LTL-4223/307E HIGH EFFICIENCY RED LTL-4294/307EA ORANGE

LED LAMPS

FEATURES

- LOW POWER CONSUMPTION.
- HIGH EFFICIENCY.
- VERSATILE MOUNTING ON P.C. BOARD OR PANEL.
- I.C. COMPATIBLE/LOW CURRENT REQUIREMENTS.
- POPULAR T-1 3/4 DIAMETER, 1" LEAD LENGTH.
- RELIABLE AND RUGGED.
- LOW COST.

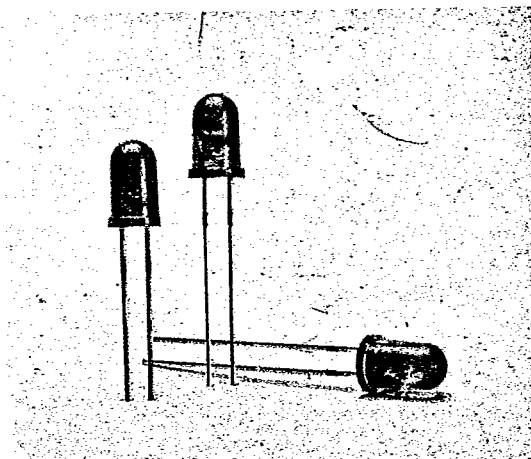
DESCRIPTION

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

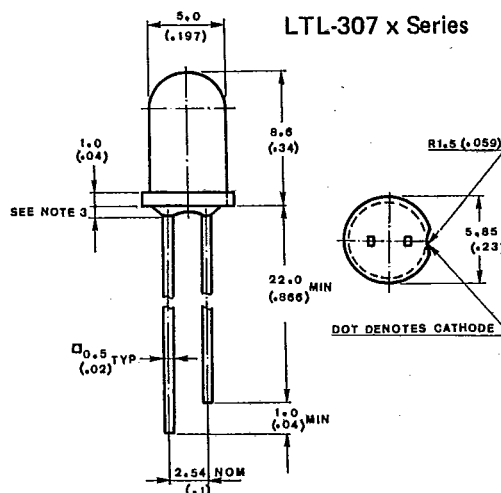
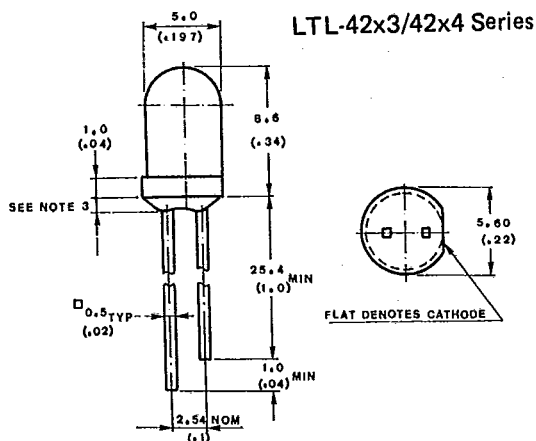
The Bright Red source color devices are made with Gallium Phosphide on Gallium Phosphide Red Light Emitting Diode.

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



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.

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DEVICES

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
4203 4204 4208	Red Red Water Clear	Diffused Transparent Non-Diffused	Red
4213 4214	Red	Diffused Transparent	Bright Red
4223 4224	Red	Diffused Transparent	Hi. Eff. Red
4233 4234	Green	Diffused Transparent	Green
4253 4254	Yellow	Diffused Transparent	Yellow
4293 4294	Orange	Diffused Transparent	Orange

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
307P 307PE	Red	Diffused Transparent	Bright Red
307E 307EE	Red	Diffused Transparent	Hi. Eff. Red
307G 307GE	Green	Diffused Transparent	Green
307Y	Yellow	Diffused	Yellow
307EA	Orange	Diffused	Orange

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 (0.063in) From Body]	260°C for 5 Seconds					

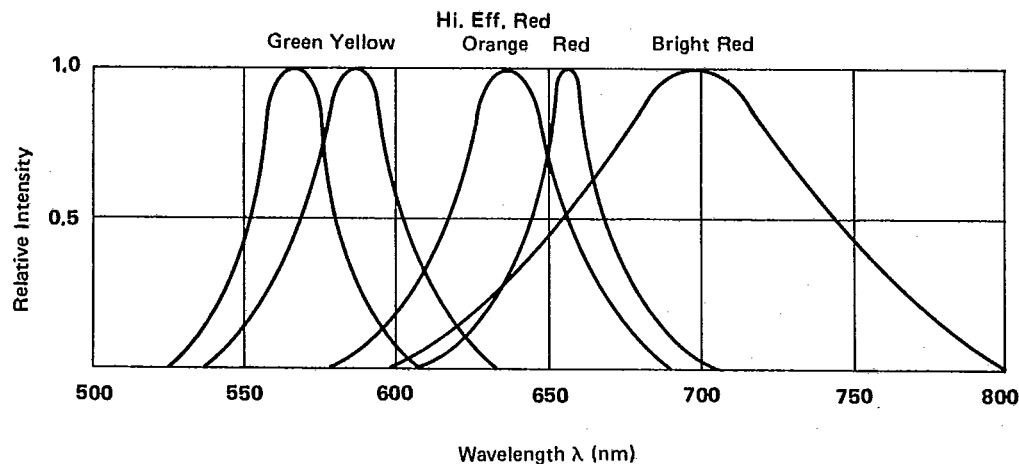


FIG. 1 RELATIVE INTENSITY VS. WAVELENGTH

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	4203 4204 4208	0.3 1.7 1.7	0.8 6.5 5.5		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	4203 4204 4208		36 16 16		deg.	Note 2 (Fig. 6)
Peak Emission Wavelength	λ_{PEAK}			655		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$			24		nm	
Forward Voltage	V_F			1.7	2.0	V	$I_F = 20\text{ mA}$
Reverse Current	I_R				100	μA	$V_R = 5\text{ V}$
Capacitance	C			30		PF	$V_F = 0$ $f = 1\text{ MHz}$

LED LAMPS

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.

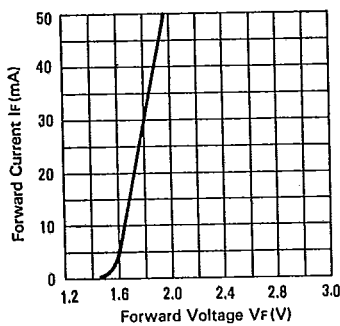


FIG. 2 FORWARD CURRENT VS. FORWARD VOLTAGE.

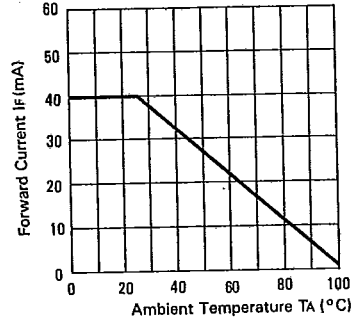


FIG. 3 FORWARD CURRENT DERATING CURVE.

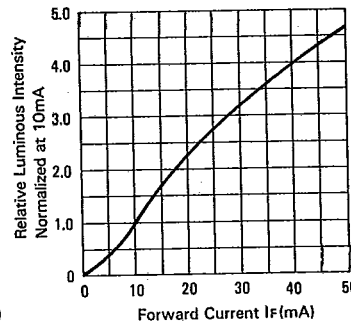


FIG. 4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT.

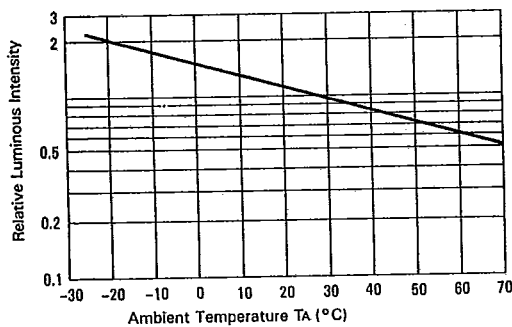


FIG. 5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

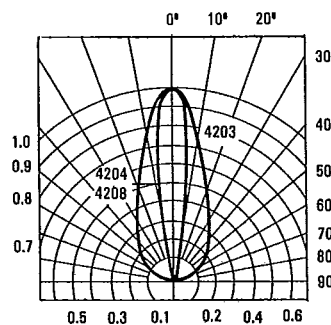


FIG. 6 SPATIAL DISTRIBUTION

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	4213 4214 4223 4224	1.1 2.5 2.5 10.0	3.8 8.7 8.7 40.0		md	$I_F = 10\text{mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	4213 4214 4223 4224		36 16 36 16		deg.	Note 2 (Fig. 11)
Peak Emission Wavelength	λ_{PEAK}	4213 4214 4223 4224		697 687 685 635		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	4213 4214 4223 4224		90 90 40 40		nm	
Forward Voltage	V_F	4213 4214 4223 4224		2.1 2.1 2.0 2.0	2.8	V	$I_F = 20\text{mA}$
Reverse Current	I_R	4213 4214 4223 4224			100	μA	$V_R = 5\text{V}$
Capacitance	C	4213 4214 4223 4224		55 55 20 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.

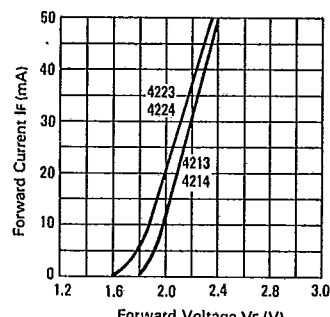


FIG. 7 FORWARD CURRENT VS. FORWARD VOLTAGE

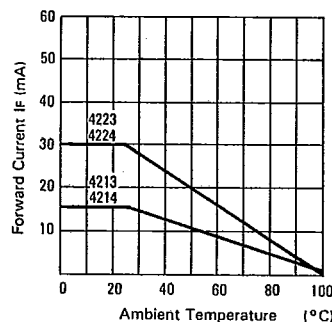


FIG. 8 FORWARD CURRENT DERATING CURVE

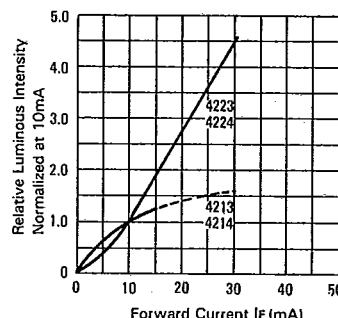


FIG. 9 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

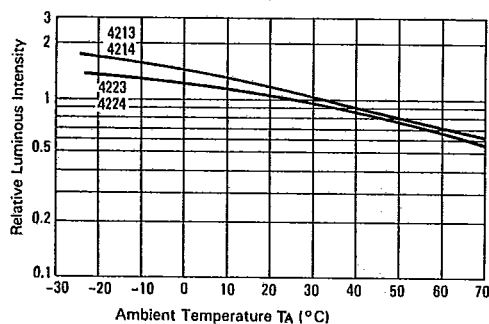


FIG. 10 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

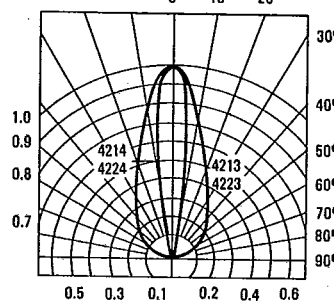


FIG. 11 SPATIAL DISTRIBUTION

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	4233 4234 4253 4254	2.5 10.0 2.5 10.0	8.7 40.0 8.7 40.0		mcd	$I_F = 10\text{mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	4223 4234 4253 4254		36 16 36 16		deg.	Note 2 (Fig. 16)
Peak Emission Wavelength	λ_{PEAK}	4233 4234 4253 4254		585 585 585 585		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	4233 4234 4253 4254		30 30 35 35		nm	
Forward Voltage	V_F	4233 4234 4253 4254		2.1	2.8	V	$I_F = 20\text{mA}$
Reverse Current	I_R	4233 4234 4253 4254			100	μA	$V_R = 5\text{V}$
Capacitance	C	4233 4234 4253 4254		35 35 15 15		PF	$V_F = 0$ $f = 1\text{MHz}$

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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.

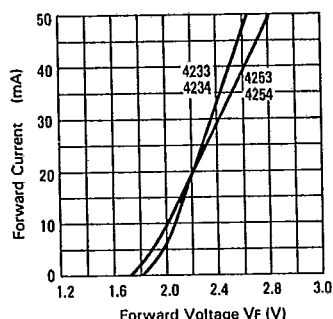


FIG. 12 FORWARD CURRENT VS. FORWARD VOLTAGE

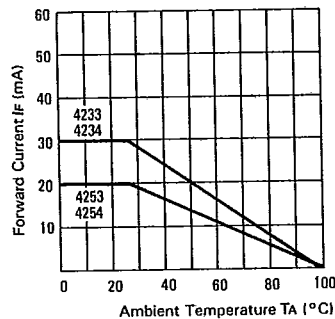


FIG. 13 FORWARD CURRENT DERATING CURVE

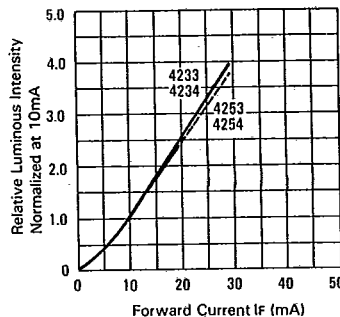


FIG. 14 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

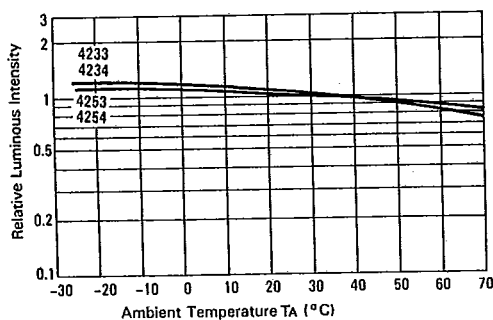


FIG. 15 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

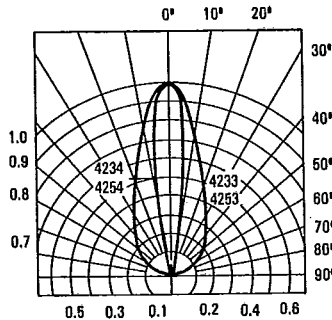


FIG. 16 SPATIAL DISTRIBUTION

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	4293 4294	2.5 10.0	8.7 40.0		md	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	4293 4294		36 16		deg.	Note 2 (Fig. 21)
Peak Emission Wavelength	λ_{PEAK}			635		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$			40		nm	
Forward Voltage	V_F			2.0	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R				100	μA	$V_R = 5\text{ V}$
Capacitance	C			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.

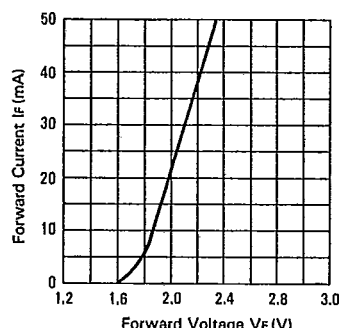


FIG. 17 FORWARD CURRENT VS. FORWARD VOLTAGE

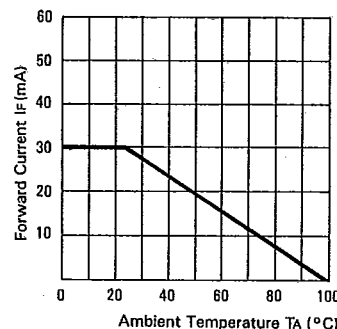


FIG. 18 FORWARD CURRENT DERATING CURVE

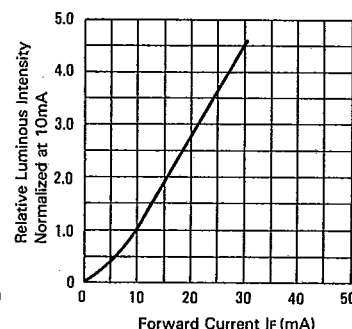


FIG. 19 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

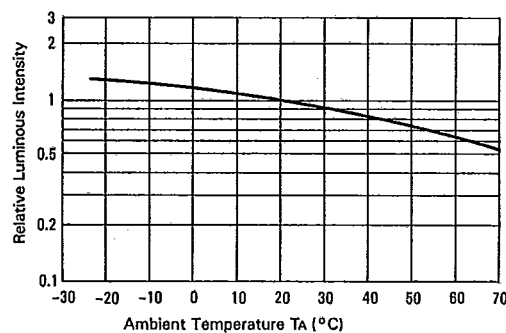


FIG. 20 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

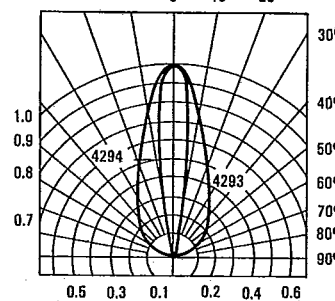


FIG. 21 SPATIAL DISTRIBUTION

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	307P 307PE 307E 307EE	1.1 2.5 5.6 9.0	5.6 9.0 19.0 30.3		mcd	$I_F = 10\text{mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	307P 307PE 307E 307EE		50 40 50 40		deg.	Note 2 (Fig. 26)
Peak Emission Wavelength	λ_{PEAK}	307P 307PE 307E 307EE		697 697 635 635		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	307P 307PE 307E 307EE		90 90 40 40		nm	
Forward Voltage	V_F	307P 307PE 307E 307EE		2.1 2.1 2.0 2.0	2.8	V	$I_F = 20\text{mA}$
Reverse Current	I_R	307P 307PE 307E 307EE			100	μA	$V_R = 5\text{V}$
Capacitance	C	307P 307PE 307E 307EE		55 55 20 20		PF	$V_F = 0$ $f = 1\text{MHz}$

LED LAMPS

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.

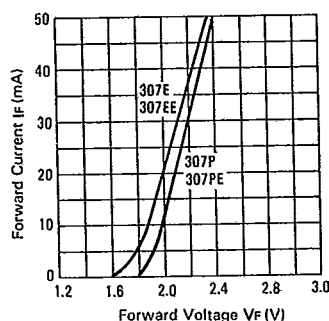


FIG. 22 FORWARD CURRENT VS. FORWARD VOLTAGE

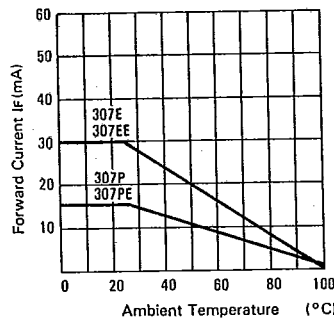


FIG. 23 FORWARD CURRENT DERATING CURVE

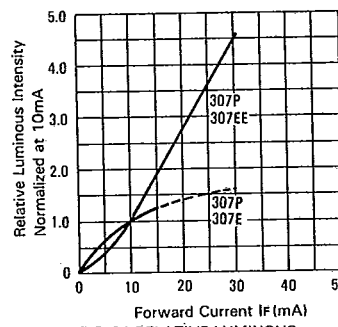


FIG. 24 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

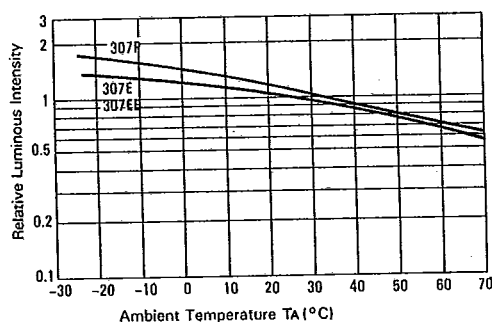


FIG. 25 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

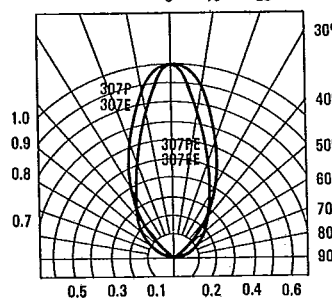


FIG. 26 SPATIAL DISTRIBUTION

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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	307G 307GE 307Y	4.0 8.7 4.0	12.6 29.0 12.6		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	307G 307GE 307Y		50 40 50		deg.	Note 2 (Fig. 31)
Peak Emission Wavelength	λ_{PEAK}	307G 307GE 307Y		565 565 585		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$	307G 307GE 307Y		30 30 35		nm	
Forward Voltage	V_F	307G 307GE 307Y		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R	307G 307GE 307Y			100	μA	$V_R = 5\text{ V}$
Capacitance	C	307G 307GE 307Y		35 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.

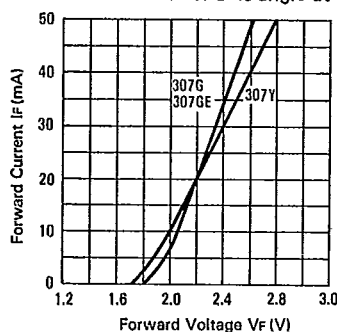


FIG. 27 FORWARD CURRENT VS. FORWARD VOLTAGE

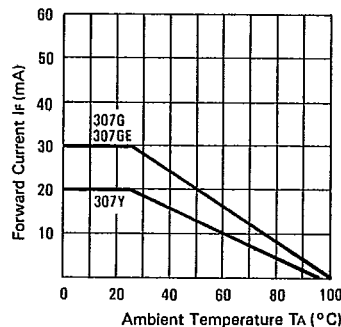


FIG. 28 FORWARD CURRENT DERATING CURVE

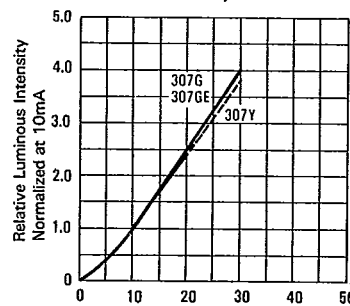


FIG. 29 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

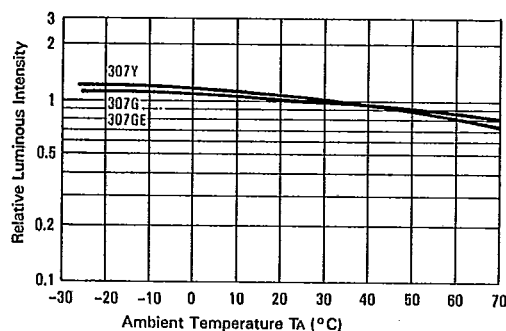


FIG. 30 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

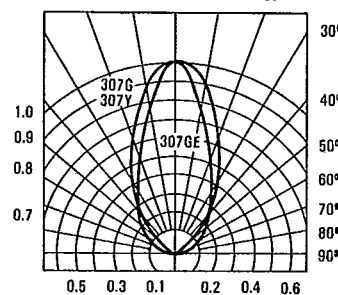


FIG. 31 SPATIAL DISTRIBUTION

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	307EA	5.6	19.0		mcd	$I_F = 10\text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	307EA		50		deg.	Note 2 (Fig. 36)
Peak Emission Wavelength	λ_{PEAK}			630		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$			40		nm	
Forward Voltage	V_F			2.0	2.8	V	$I_F = 20\text{ mA}$
Reverse Current	I_R				100	μA	$V_R = 5\text{ V}$
Capacitance	C			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.

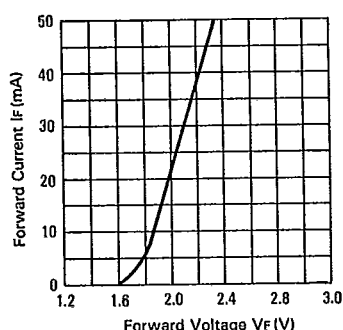


FIG. 2 FORWARD CURRENT VS. FORWARD VOLTAGE

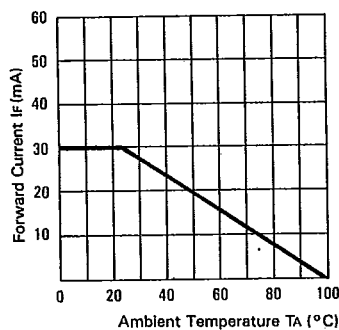


FIG. 3 FORWARD CURRENT DERATING CURVE

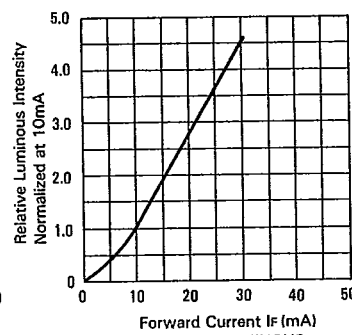


FIG. 4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

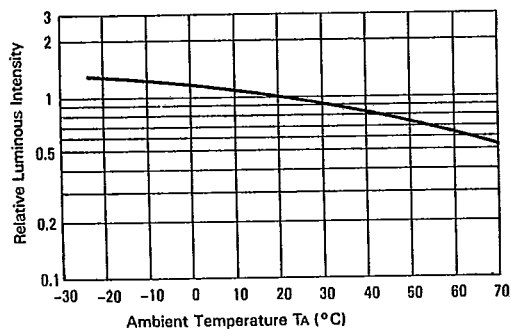


FIG. 5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

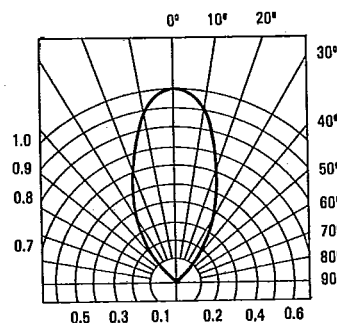


FIG. 6 SPATIAL DISTRIBUTION