



T-1(3mm) Solid State LED Lamps

LTL-4201N/4206N Red

LTL-4211N/4212N Bright Red

LTL-4221N/4222N High Efficiency Red

LTL-4231N/4232N/4236N Green

LTL-4251N/4252N/4256N Yellow

LTL-4291N/4292N/4296N Red Orange

Features

- High intensity.
- Popular T-1 diameter package.
- Selected minimum intensities.
- Wide viewing angle.
- General purpose leads.
- Reliable and rugged.

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

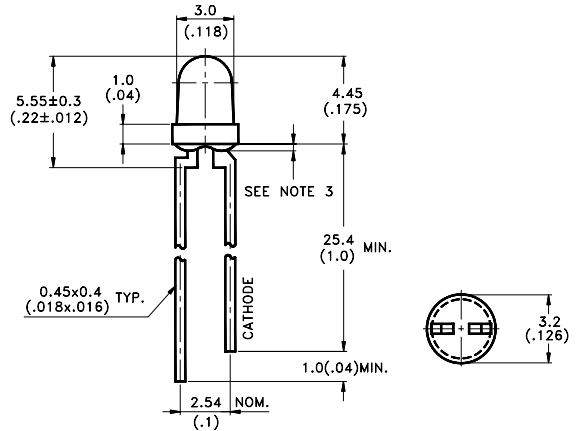
The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

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

Devices

Part No. LTL-	Lens	Source Color
4201N	Red Diffused	Red
4206N	Water Clear	
4211N	Red Diffused	Bright Red
4212N	Red Transparent	
4221N	Red Diffused	Hi. Eff. Red
4222N	Red Transparent	
4231N	Green Diffused	Green
4232N	Green Transparent	
4236N	Water Clear	
4251N	Yellow Diffused	Yellow
4252N	Yellow Transparent	
4256N	Water Clear	
4291N	Orange Diffused	Red Orange
4292N	Orange Transparent	
4296N	Water Clear	

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.

Absolute Maximum Ratings at Ta=25°C

Parameter	Red	Bright Red	Green	Yellow	Hi. Eff. Red 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 (.063 in.) from body]	260°C for 5 Seconds					

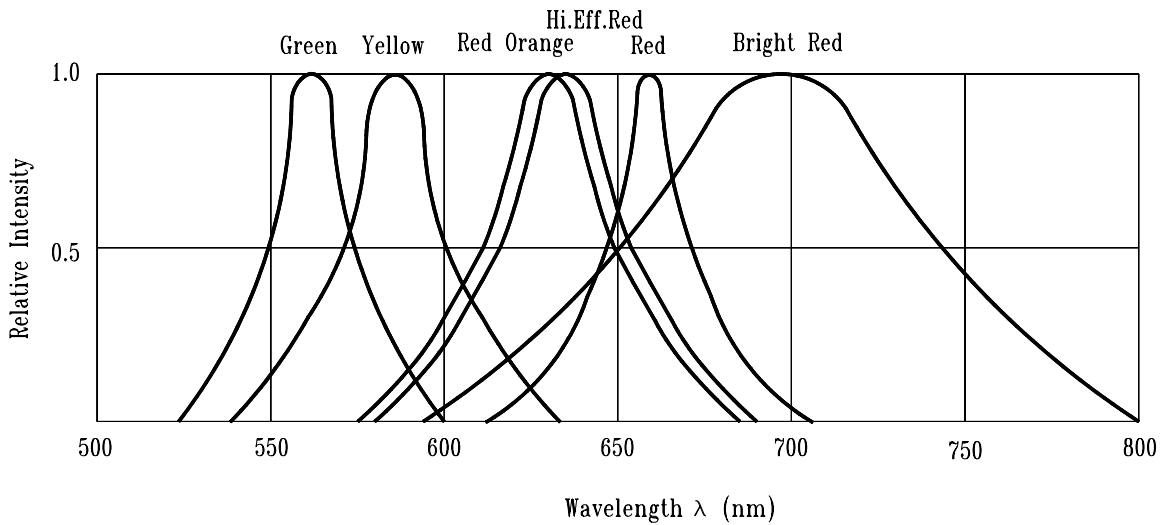


Fig.1 Relative Intensity vs. Wavelength

Electrical/Optical Characteristics at Ta=25°C

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit.	Test Condition.
Luminous Intensity	I _v	4201N	0.4	1.1		mcd	I _F =10 mA Note 1,4
		4211N	1.3	4.4			
		4221N	2.5	8.7			
		4231N	3.7	12.6			
		4251N	1.7	5.6			
		4291N	2.5	8.7			
Viewing Angle	2 θ ^{1/2}	42x1N		60		deg	Note 2 (Fig.7)
Peak Emission Wavelength	λ _P	4201N		655		nm	Measurement @Peak (Fig.1)
		4211N		697			
		4221N		635			
		4231N		565			
		4251N		585			
		4291N		630			
Dominant Wavelength	λ _d	4201N		651		nm	Note 3
		4211N		657			
		4221N		623			
		4231N		569			
		4251N		588			
		4291N		621			
Spectral Line Half Width	Δλ	4201N		24		nm	
		4211N		90			
		4221N		40			
		4231N		30			
		4251N		35			
		4291N		40			
Forward Voltage	V _F	4201N		1.7	2.0	V	I _F =20mA
		4211N		2.1	2.6		
		4221N		2.0	2.6		
		4231N		2.1	2.6		
		4251N		2.1	2.6		
		4291N		2.0	2.6		
Reverse Current	I _R	42x1N			100	μA	V _R =5V
Capacitance	C	4201N		30		pF	V _F =0, f=1MHz
		4211N		55			
		4221N		20			
		4231N		35			
		4251N		15			
		4291N		20			

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.

Electrical/Optical Characteristics at Ta=25°C

Parameter	Symbol	Part No. LTL-	Min.	Typ.	Max.	Unit.	Test Condition.
Luminous Intensity	Iv	4206N	1.1	3.7		mcd	If=10 mA Note 1,4
		4212N	1.7	5.6			
		4222N	8.7	29			
		4232N	12.6	40			
		4236N	19	60			
		4252N	5.6	19			
		4256N	12.6	40			
		4292N	5.6	19			
4296N	19	60					
Viewing Angle	2 $\theta_{1/2}$	42x2N		45		deg	Note 2 (Fig.15)
Peak Emission Wavelength	λ_P	4206N		655		nm	Measurement @Peak (Fig.1)
		4212N		697			
		4222N		635			
		4232N		565			
		4236N		565			
		4252N		585			
		4256N		585			
		4292N		630			
4296N		630					
Dominant Wavelength	λ_d	4206N		651		nm	Note 3
		4212N		657			
		4222N		623			
		4232N		569			
		4236N		569			
		4252N		588			
		4256N		588			
		4292N		621			
4296N		621					
Spectral Line Half Width	$\Delta\lambda$	4206N		24		nm	
		4212N		90			
		4222N		40			
		4232N		30			
		4236N		30			
		4252N		35			
		4256N		35			
		4292N		40			
4296N		40					
Forward Voltage	VF	4206N		1.7	2.0	V	If=20mA
		4212N		2.1	2.6		
		4222N		2.0	2.6		
		4232N		2.1	2.6		
		4236N		2.1	2.6		
		4252N		2.1	2.6		
		4256N		2.1	2.6		
		4292N		2.0	2.6		
4296N		2.0	2.6				
Reverse Current	IR	42x2N			100	μ A	VR=5V
Capacitance	C	4206N		30		pF	VF=0 , f=1MHz
		4212N		55			
		4222N		20			
		4232N		35			
		4236N		35			
		4252N		15			
		4256N		15			
		4292N		20			
4296N		20					

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

4.Iv needs $\pm 15\%$ additionaly for guaranteed limits.

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

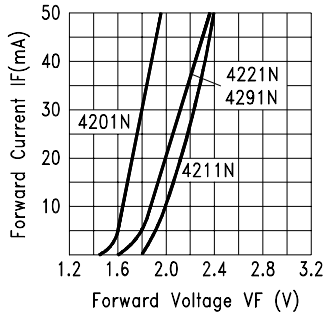


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

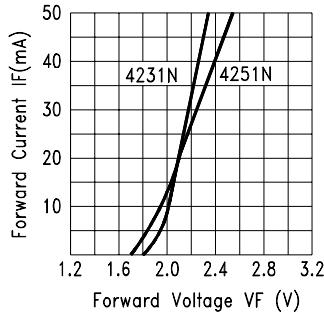


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

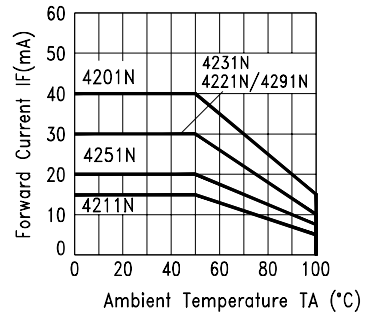


Fig.4 FORWARD CURRENT DERATING CURVE

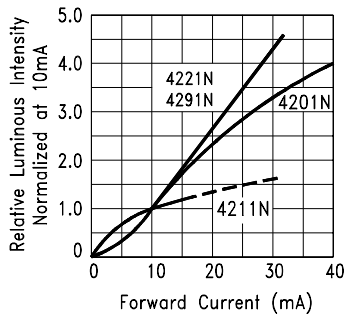


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

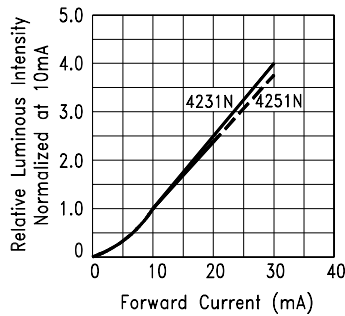


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

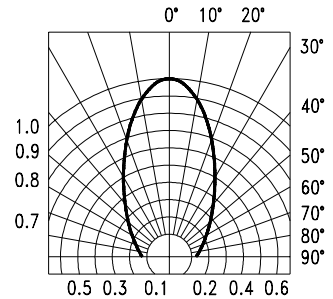


Fig.7 SPATIAL DISTRIBUTION

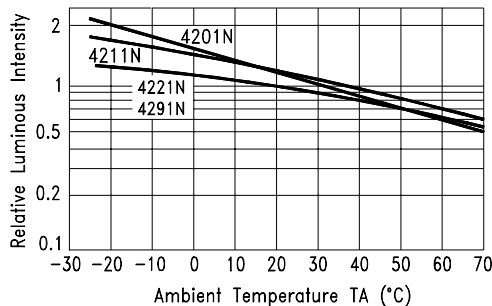


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

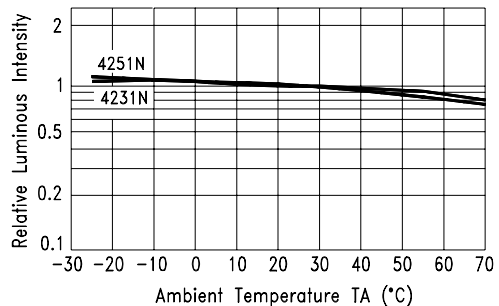


Fig.9 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

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

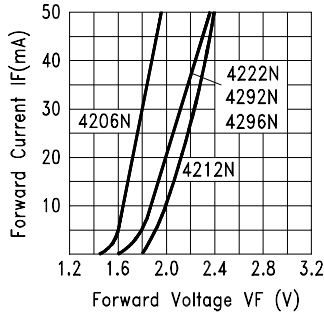


Fig.2 FORWARD CURRENT VS. FORWARD VOLTAGE

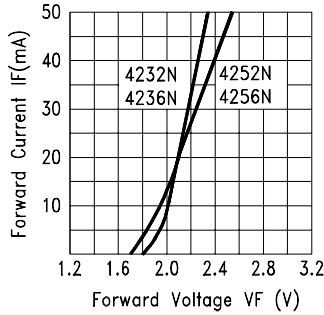


Fig.3 FORWARD CURRENT VS. FORWARD VOLTAGE

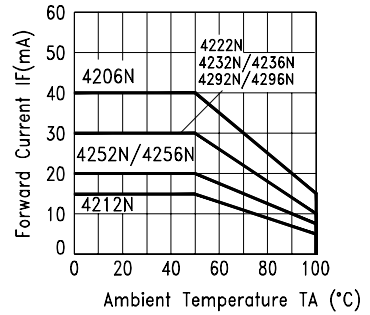


Fig.4 FORWARD CURRENT DERATING CURVE

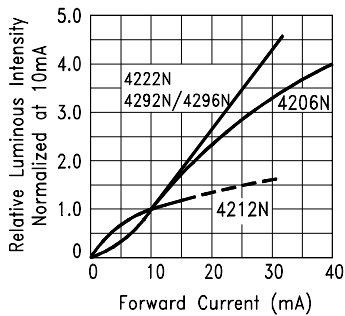


Fig.5 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

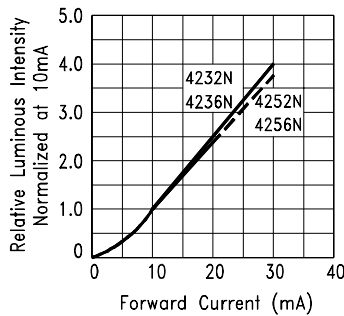


Fig.6 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

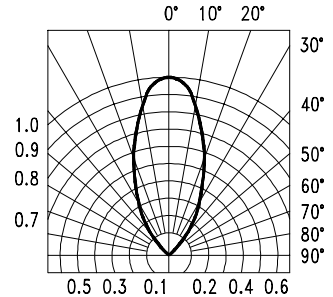


Fig.7 SPATIAL DISTRIBUTION

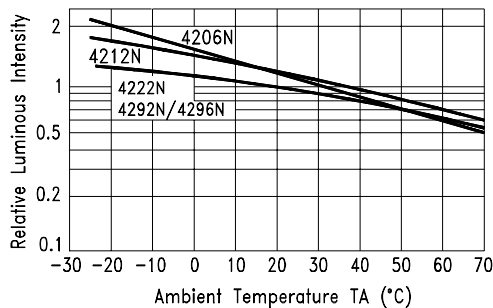


Fig.8 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

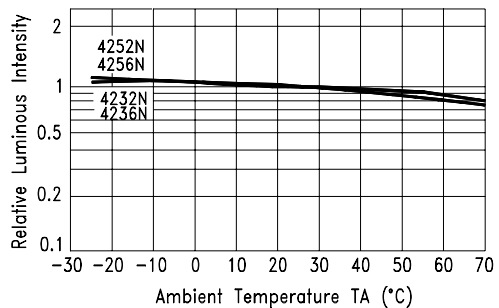


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