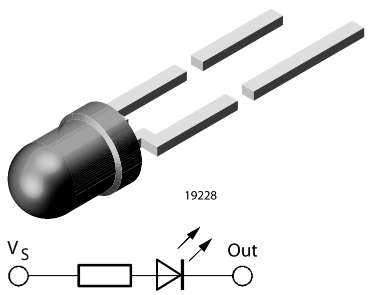
Resistor LED for 12 V Supply Voltage



FEATURES

- With current limiting resistor for 12 V
- Cost effective: save space and resistor cost
- Standard ∅ 3 mm (T-1) package
- Wide viewing angle
- Choice of five bright colors
- Luminous intensity categorized
- Yellow and green color categorized
- Luminous intensity and color are measured at 12 V
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

DESCRIPTION

These devices are developed for the automotive industry and other industries which use 12 V sources.

The TLR.440. series contains an integrated resistor for current limiting in series with the LED chip. This allows the lamp to be driven from a 12 V source without an external current limiter.

Available colors are red, soft orange, yellow, green and pure green. The luminous intensity of such an LED is measured at constant voltage of 12 V.

These tinted diffused lamps provide a wide off-axis viewing angle.

These LEDs are intended for space critical applications such as automobile instrument panels, switches and others which are driven from a 12 V source.

APPLICATIONS

- Status light in cars and other applications with a 12 V source
- OFF/ON indicator in cars and other applications with a 12 V source
- Background illumination for switches
- Off/On indicator in switches

PARTS TABLE

PART	COLOR, LUMINOUS INTENSITY	ANGLE OF HALF INTENSITY (± φ)	TECHNOLOGY
TLRP4400	Pure green, I_V > 0.63 mcd	30°	GaP on GaP
TLRP4401	Pure green, I_V > 1.6 mcd	30°	GaP on GaP
TLRP4406	Pure green, I_V = (1.6 to 5) mcd	30°	GaP on GaP
TLRH4400	Red, I_V > 1.6 mcd	30°	GaAsP on GaP
TLRO4400	Soft orange, I_V > 4 mcd	30°	GaAsP on GaP
TLRY4400	Yellow, I_V > 1.6 mcd	30°	GaAsP on GaP
TLRG4400	Green, I_V > 1.6 mcd	30°	GaP on GaP

ABSOLUTE MAXIMUM RATINGS[1], TLRH4400 , TLR04400 , TLRY4400 , TLRG4400 , TLRP4400				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage		V_R	6	V
Forward voltage	$T_{amb} \leq 65$ °C	V_F	16	V
Power dissipation		P_V	240	mW
Junction temperature		T_j	100	°C
Operating temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 55 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from body	T_{sd}	260	°C
Thermal resistance junction/ ambient		R_{thJA}	150	K/W

Note:
[1] T_{amb} = 25 °C unless otherwise specified

OPTICAL AND ELECTRICAL CHARACTERISTICS[1], TLRH4400, RED						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity [2]	V_S = 12 V	I_V	1.6	4		mcd
Dominant wavelength	V_S = 12 V	λ_d	612		625	nm
Peak wavelength	V_S = 12 V	λ_p		635		nm
Angle of half intensity	V_S = 12 V	φ		± 30		deg
Forward current	V_S = 12 V	I_F		10	12	mA
Breakdown voltage	I_R = 10 µA	V_{BR}	6	20		V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Note:
[1] T_{amb} = 25 °C unless otherwise specified
[2] in one Packing Unit $I_{Vmin}/I_{Vmax} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS[1], TLRO4400, SOFT ORANGE						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity [2]	V_S = 12 V	I_V	4	10		mcd
Dominant wavelength	V_S = 12 V	λ_d	598		611	nm
Peak wavelength	V_S = 12 V	λ_p		605		nm
Angle of half intensity	V_S = 12 V	φ		± 30		deg
Forward current	V_S = 12 V	I_F		10	12	mA
Breakdown voltage	I_R = 10 µA	V_{BR}	6	20		V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Note:
[1] T_{amb} = 25 °C unless otherwise specified
[2] in one Packing Unit $I_{Vmin}/I_{Vmax} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS[1], TLRY4400, YELLOW						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity [2]	V_S = 12 V	I_V	1.6	4		mcd
Dominant wavelength	V_S = 12 V	λ_d	581		594	nm
Peak wavelength	V_S = 12 V	λ_p		585		nm
Angle of half intensity	V_S = 12 V	φ		± 30		deg
Forward current	V_S = 12 V	I_F		10	12	mA
Breakdown voltage	I_R = 10 µA	V_{BR}	6	20		V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Note:
[1] T_{amb} = 25 °C unless otherwise specified
[2] in one Packing Unit $I_{Vmin}/I_{Vmax} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS[1], TLRG4400, GREEN						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity [2]	V_S = 12 V	I_V	1.6	4		mcd
Dominant wavelength	V_S = 12 V	λ_d	562		575	nm
Peak wavelength	V_S = 12 V	λ_p		565		nm
Angle of half intensity	V_S = 12 V	φ		± 30		deg
Forward current	V_S = 12 V	I_F		10	12	mA
Breakdown voltage	I_R = 10 µA	V_{BR}	6	20		V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Note:
[1] T_{amb} = 25 °C unless otherwise specified
[2] in one Packing Unit $I_{Vmin}/I_{Vmax} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS[1], TLRP4400, PURE GREEN							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Luminous intensity [2]	V_S = 12 V	TLRP4400	I_V	0.63	3		mcd
		TLRP4401	I_V	1.6	4		mcd
		TLRP4406	I_V	1.6		5	mcd
Dominant wavelength	V_S = 12 V		λ_d	555		565	nm
Peak wavelength	V_S = 12 V		λ_p		555		nm
Angle of half intensity	V_S = 12 V		φ		± 30		deg
Forward current	V_S = 12 V		I_F		10	12	mA
Breakdown voltage	I_R = 10 µA		V_{BR}	6	20		V
Junction capacitance	V_R = 0, f = 1 MHz		C_j		50		pF

Note:
[1] T_{amb} = 25 °C unless otherwise specified
[2] in one Packing Unit $I_{Vmin}/I_{Vmax} \leq 0.5$

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

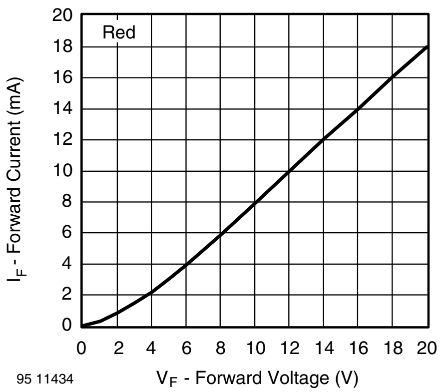


Figure 1. Forward Current vs. Forward Voltage

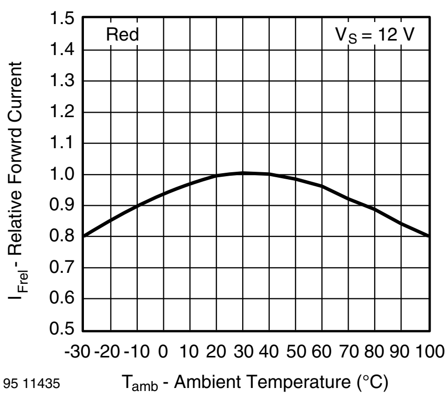


Figure 2. Relative Forward Current vs. Ambient Temperature

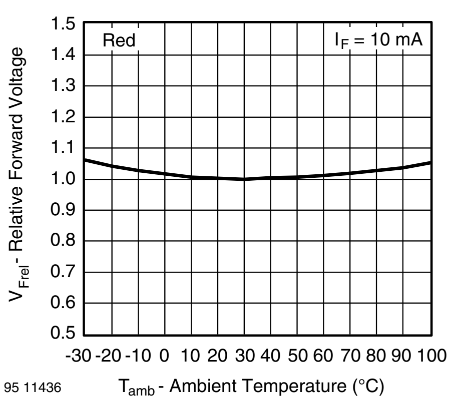


Figure 3. Relative Forward Voltage vs. Ambient Temperature

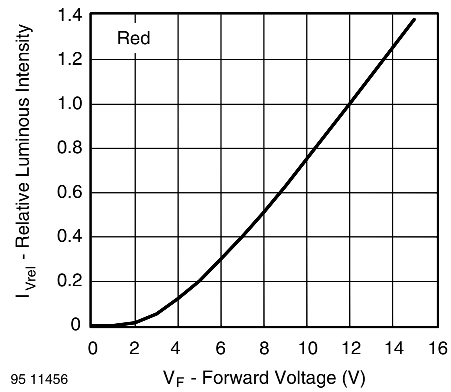


Figure 4. Relative Luminous Intensity vs. Forward Voltage

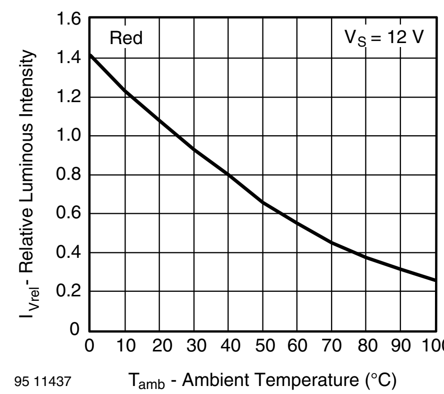


Figure 5. Rel. Luminous Intensity vs. Ambient Temperature

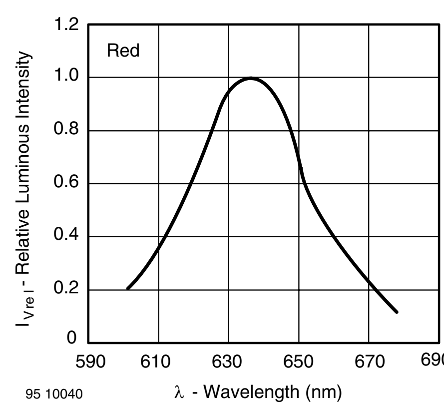


Figure 6. Relative Intensity vs. Wavelength

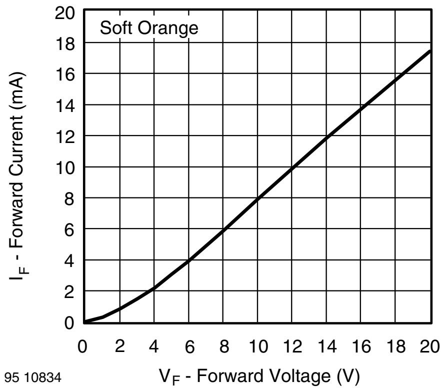


Figure 7. Forward Current vs. Forward Voltage

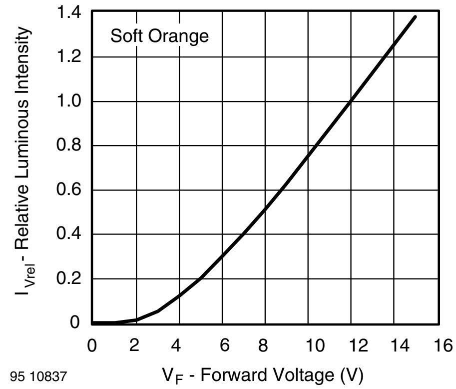


Figure 10. Relative Luminous Intensity vs. Forward Voltage

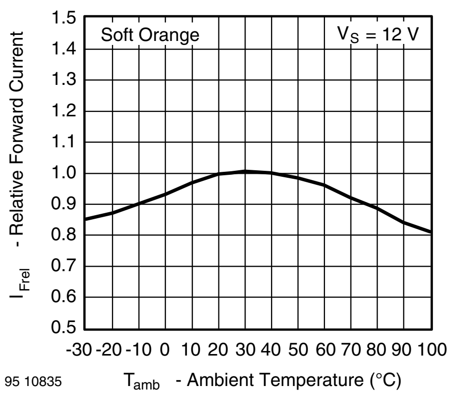


Figure 8. Relative Forward Current vs. Ambient Temperature

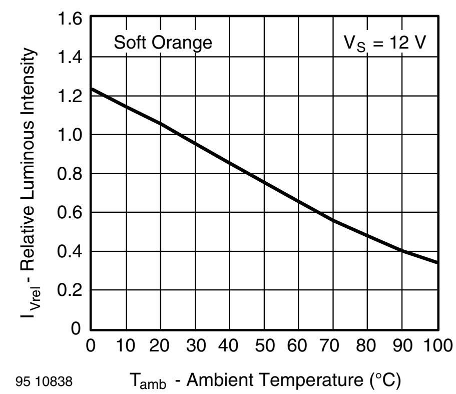


Figure 11. Rel. Luminous Intensity vs. Ambient Temperature

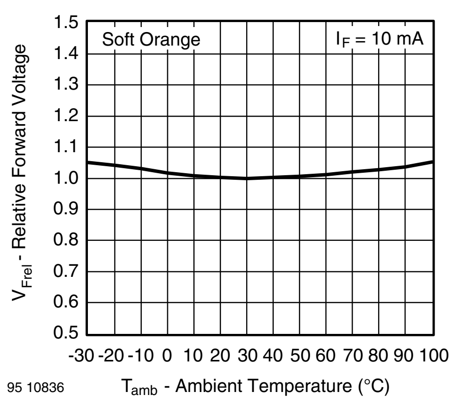


Figure 9. Relative Forward Voltage vs. Ambient Temperature

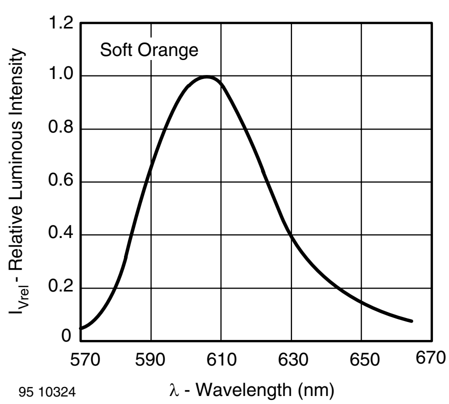


Figure 12. Relative Intensity vs. Wavelength

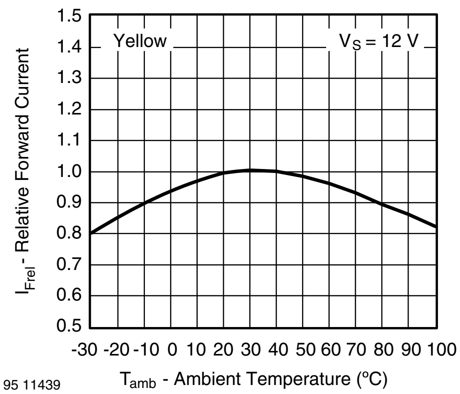


Figure 13. Relative Forward Current vs. Ambient Temperature

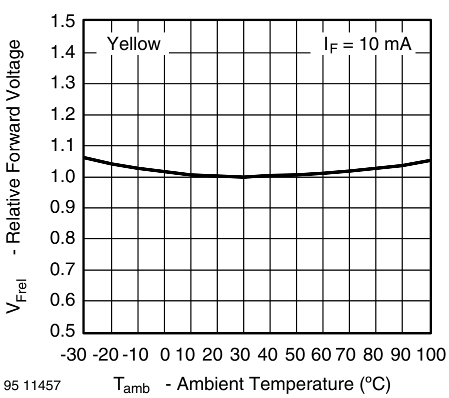


Figure 14. Relative Forward Voltage vs. Ambient Temperature

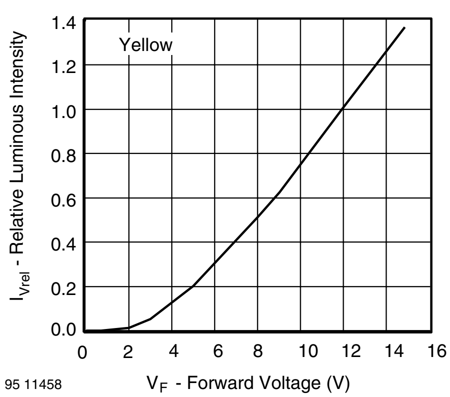


Figure 15. Relative Luminous Intensity vs. Forward Voltage

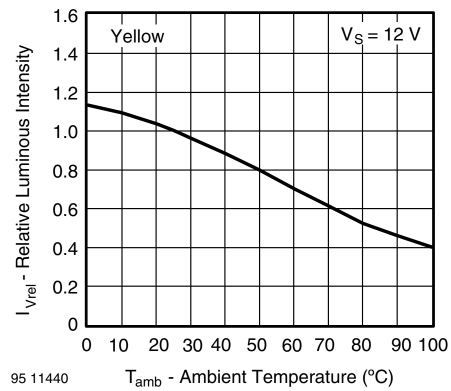


Figure 16. Rel. Luminous Intensity vs. Ambient Temperature

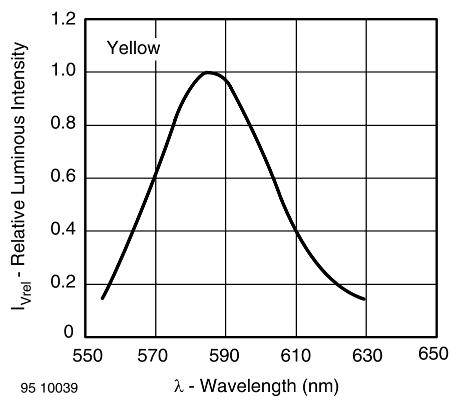


Figure 17. Relative Intensity vs. Wavelength

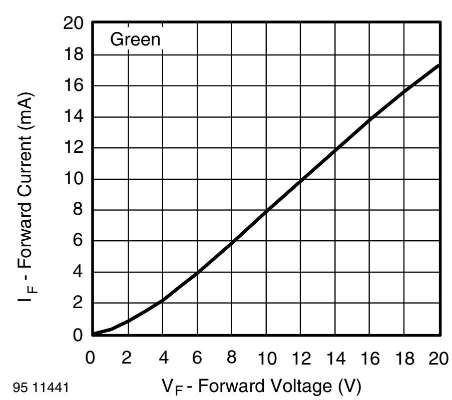


Figure 18. Forward Current vs. Forward Voltage

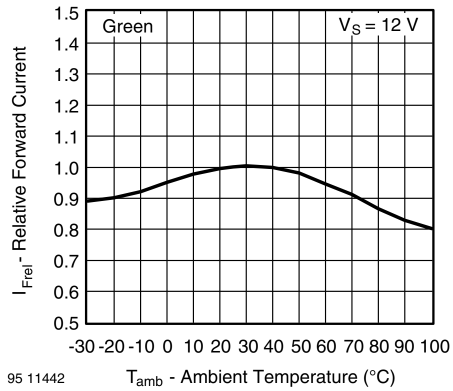


Figure 19. Relative Forward Current vs. Ambient Temperature

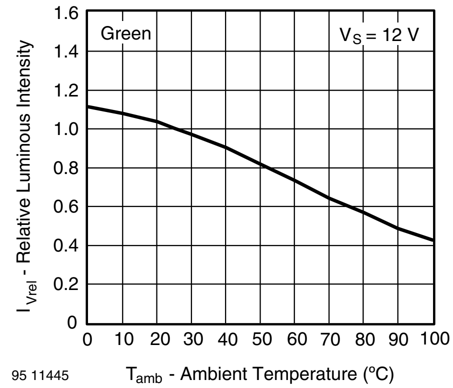


Figure 22. Rel. Luminous Intensity vs. Ambient Temperature

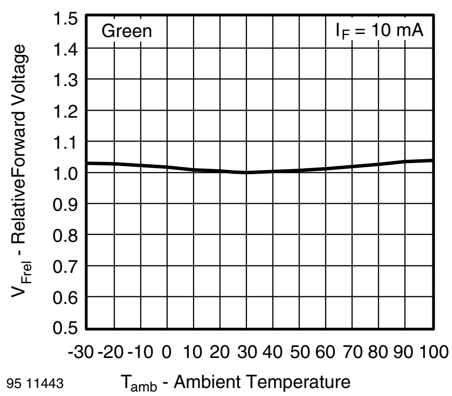


Figure 20. Relative Forward Voltage vs. Ambient Temperature

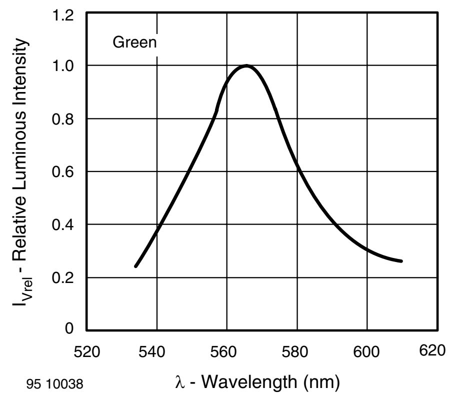


Figure 23. Relative Intensity vs. Wavelength

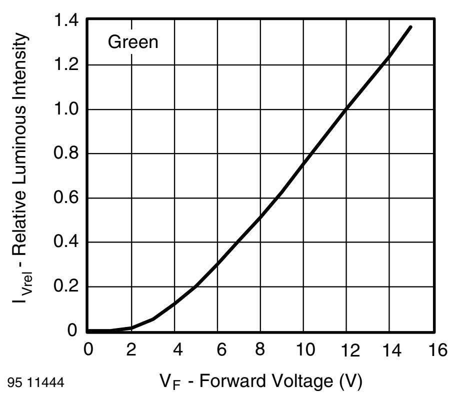


Figure 21. Relative Luminous Intensity vs. Forward Voltage

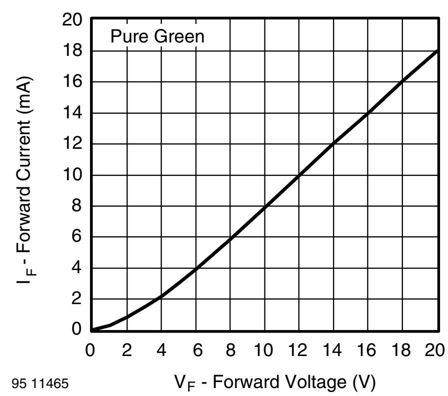


Figure 24. Forward Current vs. Forward Voltage

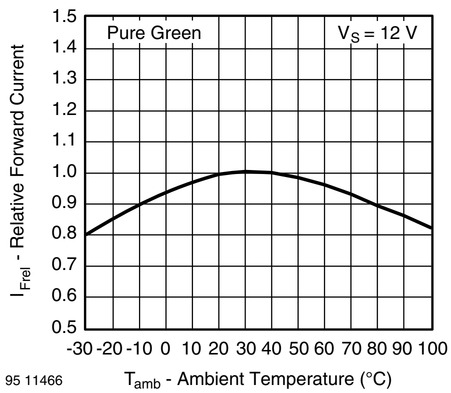


Figure 25. Relative Forward Current vs. Ambient Temperature

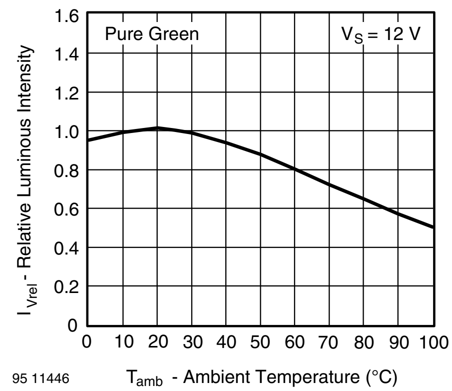


Figure 28. Rel. Luminous Intensity vs. Ambient Temperature

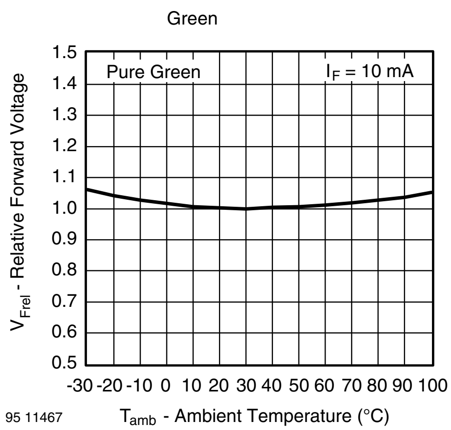


Figure 26. Relative Forward Voltage vs. Ambient Temperature

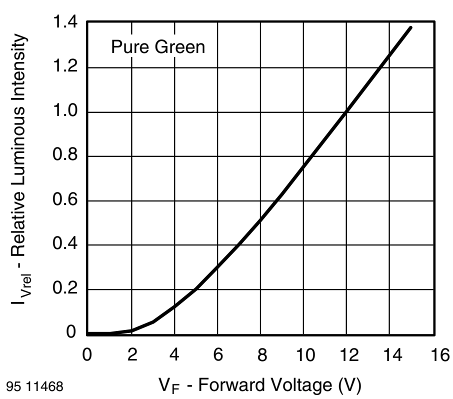
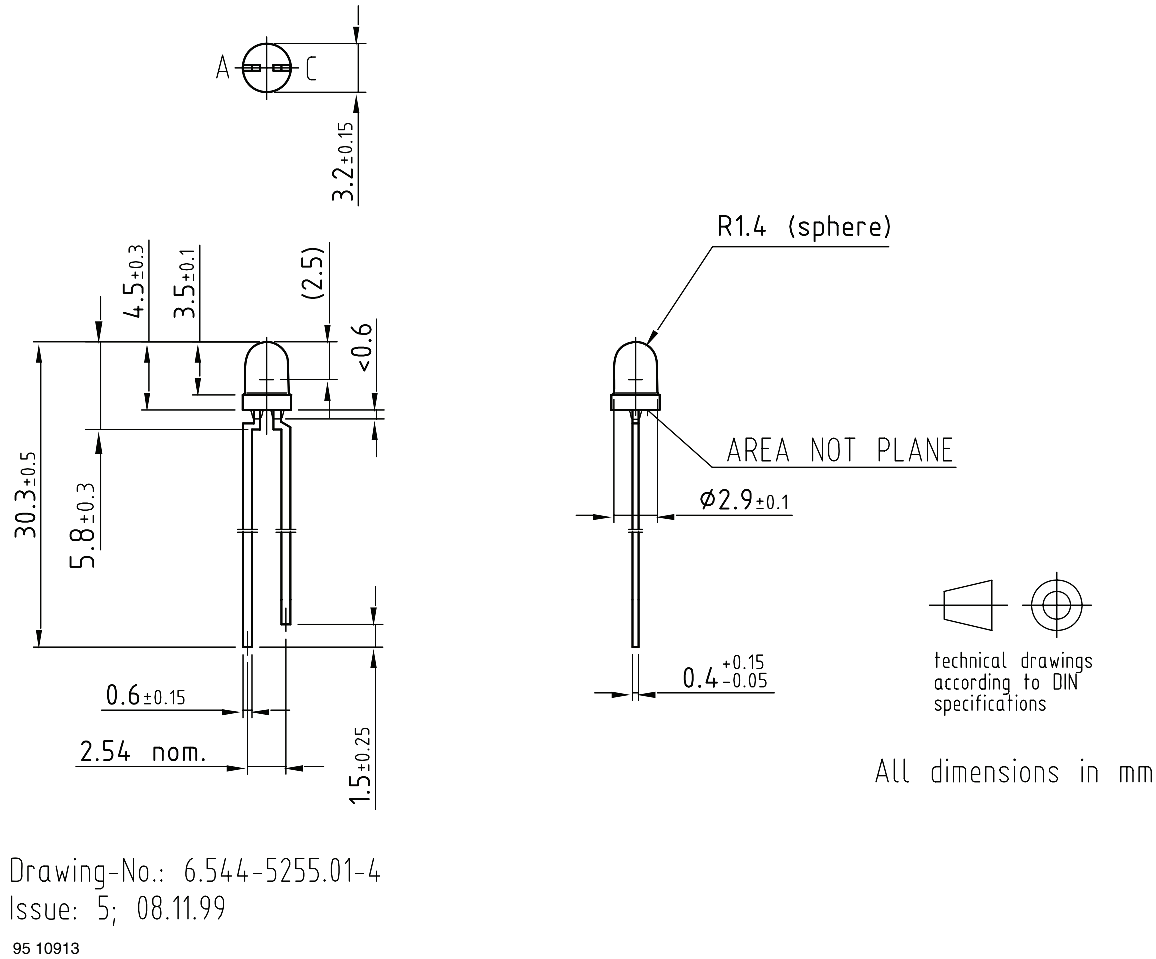


Figure 27. Relative Luminous Intensity vs. Forward Voltage

PACKAGE DIMENSIONS IN MM



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It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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