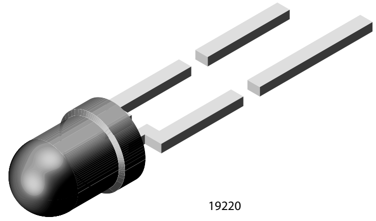
High Efficiency LED in ∅ 3 mm Tinted Diffused Package



FEATURES

- Standard T-1 package
- Small mechanical tolerances
- Suitable for DC and high peak current
- Wide viewing angle
- Luminous intensity categorized
- Yellow and green color categorized
- Lead (Pb)-free device

Pb-free

e3

DESCRIPTION

The TLH.44.. series was developed for standard applications like general indicating and lighting purposes.

It is housed in a 3 mm tinted diffused plastic package. The wide viewing angle of these devices provides a high on-off contrast.

Several selection types with different luminous intensities are offered. All LEDs are categorized in luminous intensity groups. The green and yellow LEDs are categorized additionally in wavelength groups.

That allows users to assemble LEDs with uniform appearance.

APPLICATIONS

- Status lights
- OFF/ON indicator
- Background illumination
- Readout lights
- Maintenance lights
- Legend light

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: standard
- Angle of half intensity: ± 40°

PARTS TABLE

PART	COLOR, LUMINOUS INTENSITY	TECHNOLOGY
TLHR4400	Red, I_V > 1.6 mcd	GaAsP on GaP
TLHR4401	Red, I_V > 2.5 mcd	GaAsP on GaP
TLHR4405	Red, I_V > 6.3 mcd	GaAsP on GaP
TLHO4400	Soft orange, I_V > 1.6 mcd	GaAsP on GaP
TLHY4400	Yellow, I_V > 1.6 mcd	GaAsP on GaP
TLHY4401	Yellow, I_V > 2.5 mcd	GaAsP on GaP
TLHY4405	Yellow, I_V > 6.3 mcd	GaAsP on GaP
TLHG4400	Green, I_V > 2.5 mcd	GaP on GaP
TLHG4401	Green, I_V > 4 mcd	GaP on GaP
TLHG4405	Green, I_V > 6.3 mcd	GaP on GaP
TLHP4400	Pure green, I_V > 0.63 mcd	GaP on GaP
TLHP4401	Pure green, I_V > 1 mcd	GaP on GaP
TLHP4405	Pure green, I_V > 1.6 mcd	GaP on GaP

ABSOLUTE MAXIMUM RATINGS[1] TLHR44.. , TLHO44.. , TLHY44.. , TLHG44.. , TLHP44.. ,				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	6	V
DC Forward current		I_F	30	mA
Surge forward current	$t_p \leq 10\ \mu s$	I_{FSM}	1	A
Power dissipation	$T_{amb} \leq 60$ °C	P_V	100	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}	400	K/W

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

OPTICAL AND ELECTRICAL CHARACTERISTICS[1] TLHR44., RED							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity [2]	I_F = 10 mA	TLHR4400	I_V	1.6	3		mcd
		TLHR4401	I_V	2.5	5		mcd
		TLHR4405	I_V	6.3	10		mcd
Dominant wavelength	I_F = 10 mA		λ_d	612		625	nm
Peak wavelength	I_F = 10 mA		λ_p		635		nm
Angle of half intensity	I_F = 10 mA		φ		± 30		deg
Forward voltage	I_F = 20 mA		V_F		2	3	V
Reverse voltage	$I_R = 10\ \mu A$		V_R	6	15		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] TLHO44., SOFT ORANGE							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity [2]	I_F = 10 mA	TLHO4400	I_V	1.6	4		mcd
Dominant wavelength	I_F = 10 mA		λ_d	598		611	nm
Peak wavelength	I_F = 10 mA		λ_p		605		nm
Angle of half intensity	I_F = 10 mA		φ		± 30		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse voltage	$I_R = 10\ \mu A$		V_R	6	15		V
Junction capacitance	V_R = 0, f = 1 MHz		C_j		15		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] TLHY44., YELLOW							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity [2]	I_F = 10 mA	TLHY4400	I_V	1.6	3		mcd
		TLHY4401	I_V	2.5	5		mcd
		TLHY4405	I_V	6.3	10		mcd
Dominant wavelength	I_F = 10 mA		λ_d	581		594	nm
Peak wavelength	I_F = 10 mA		λ_p		585		nm
Angle of half intensity	I_F = 10 mA		φ		± 30		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse voltage	I_R = 10 µA		V_R	6	15		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] TLHG44., GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity [2]	I_F = 10 mA	TLHG4400	I_V	2.5	4		mcd
		TLHG4401	I_V	4	6		mcd
		TLHG4405	I_V	6.3	12		mcd
Dominant wavelength	I_F = 10 mA		λ_d	562		575	nm
Peak wavelength	I_F = 10 mA		λ_p		565		nm
Angle of half intensity	I_F = 10 mA		φ		± 30		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse voltage	I_R = 10 µA		V_R	6	15		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] TLHP44., PURE GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity [2]	I_F = 10 mA	TLHP4400	I_V	0.63	2		mcd
		TLHP4401	I_V	1	3		mcd
		TLHP4405	I_V	1.6	3.5		mcd
Dominant wavelength	I_F = 10 mA		λ_d	555		565	nm
Peak wavelength	I_F = 10 mA		λ_p		555		nm
Angle of half intensity	I_F = 10 mA		φ		± 30		deg
Forward voltage	I_F = 20 mA		V_F		2.4	3	V
Reverse voltage	I_R = 10 µA		V_R	6	15		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

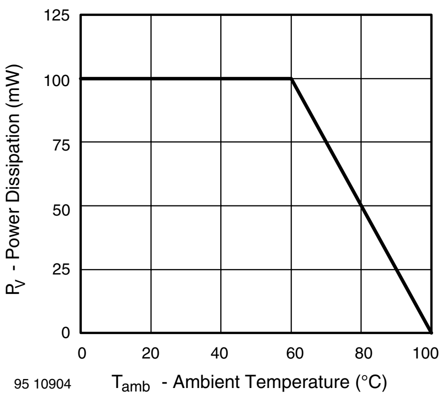


Figure 1. Power Dissipation vs. Ambient Temperature

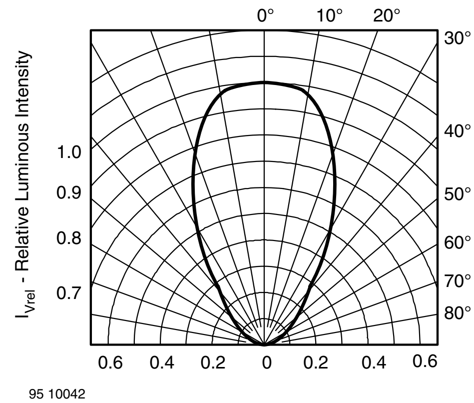


Figure 4. Rel. Luminous Intensity vs. Angular Displacement

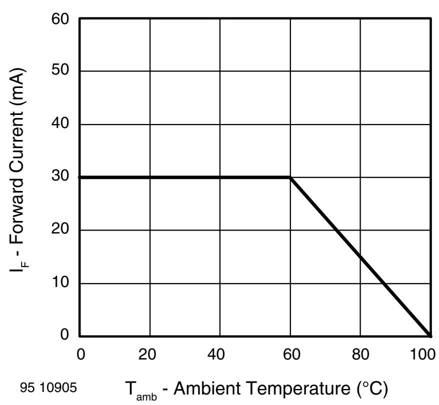


Figure 2. Forward Current vs. Ambient Temperature for InGaN

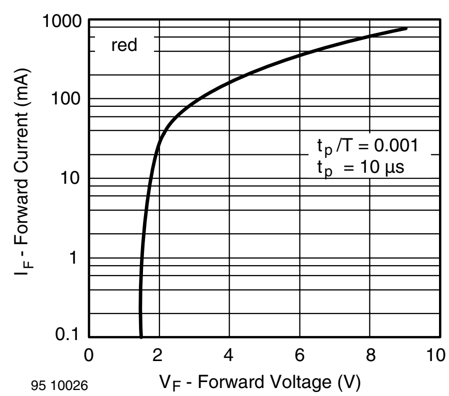


Figure 5. Forward Current vs. Forward Voltage

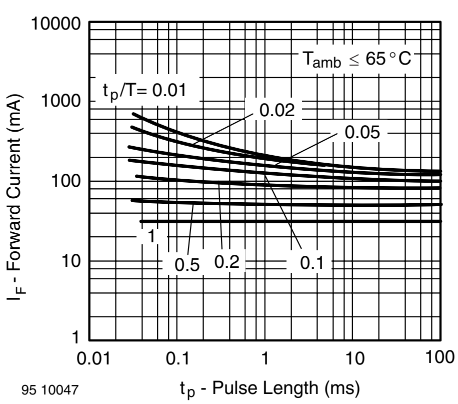


Figure 3. Forward Current vs. Pulse Length

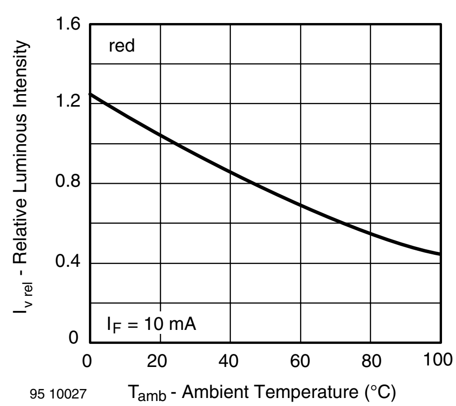


Figure 6. Rel. Luminous Intensity vs. Ambient Temperature

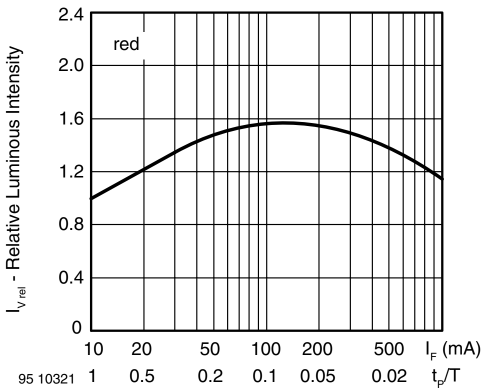


Figure 7. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

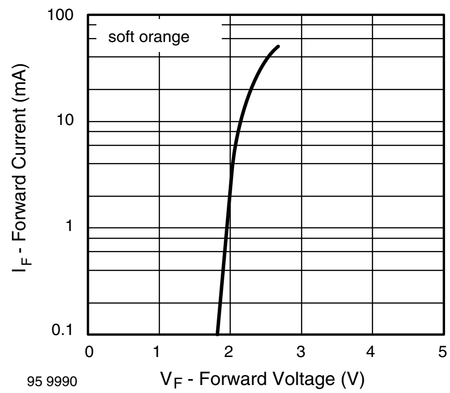


Figure 10. Forward Current vs. Forward Voltage

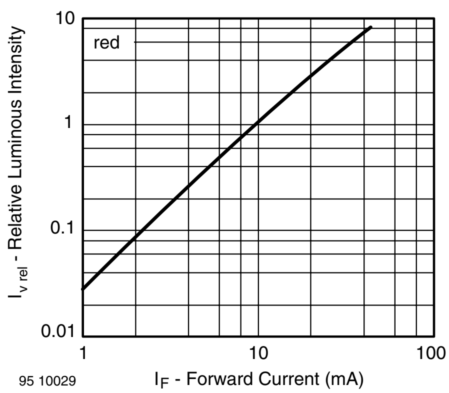


Figure 8. Relative Luminous Intensity vs. Forward Current

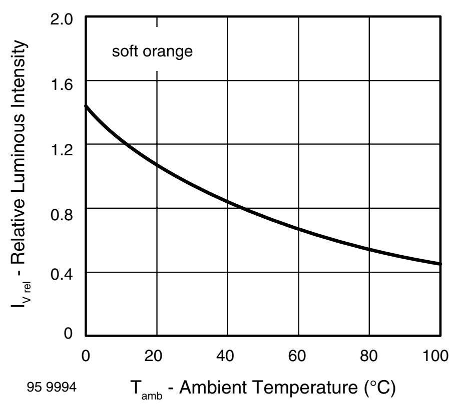


Figure 11. Rel. Luminous Intensity vs. Ambient Temperature

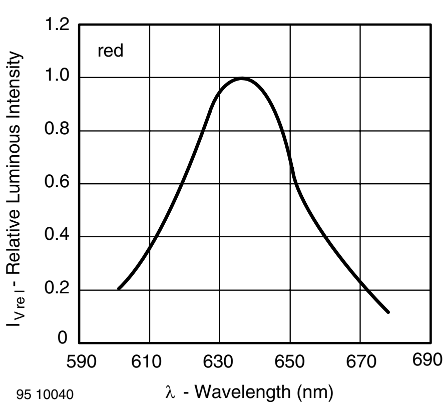


Figure 9. Relative Intensity vs. Wavelength

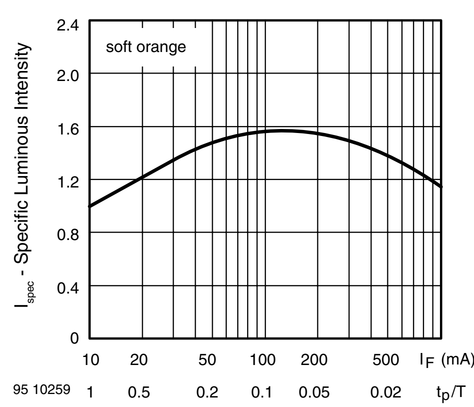


Figure 12. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

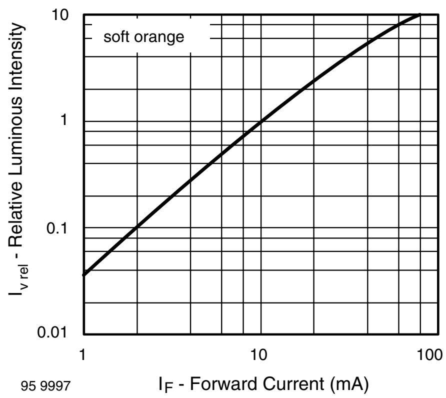


Figure 13. Relative Luminous Intensity vs. Forward Current

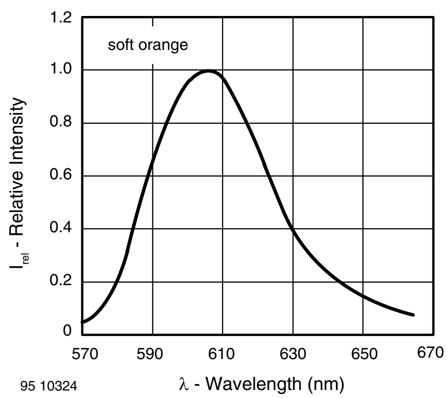


Figure 14. Relative Intensity vs. Wavelength

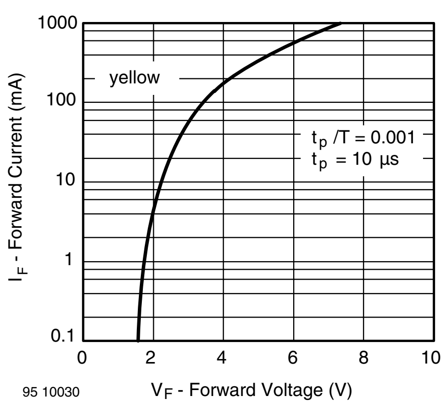


Figure 15. Forward Current vs. Forward Voltage

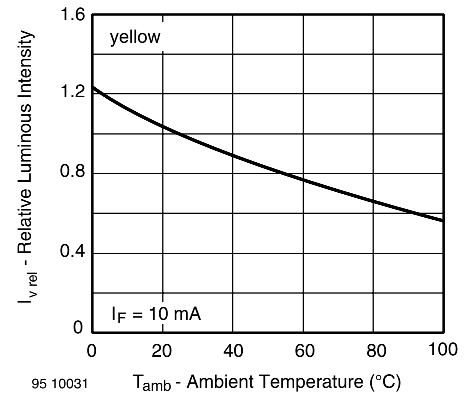


Figure 16. Rel. Luminous Intensity vs. Ambient Temperature

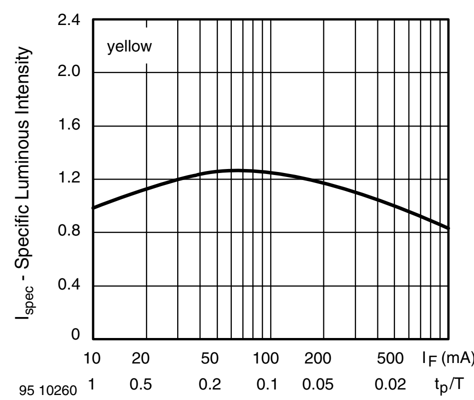


Figure 17. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

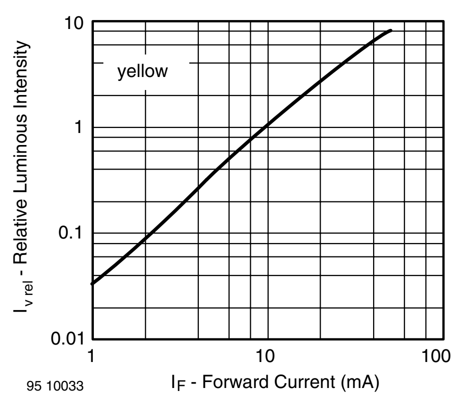


Figure 18. Relative Luminous Intensity vs. Forward Current

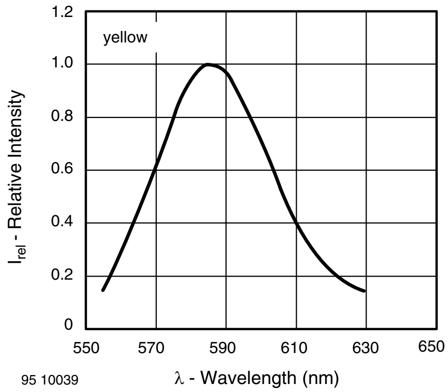


Figure 19. Relative Intensity vs. Wavelength

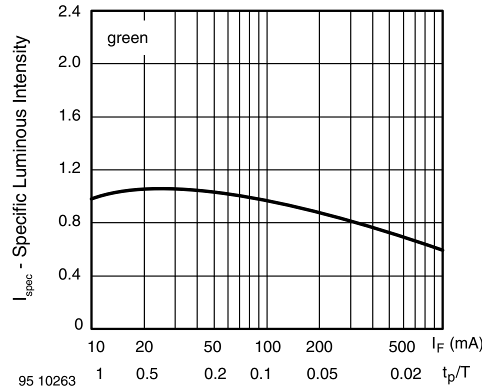


Figure 22. Specific Luminous Intensity vs. Forward Current

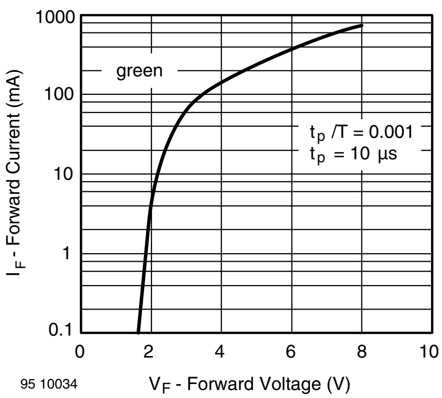


Figure 20. Forward Current vs. Forward Voltage

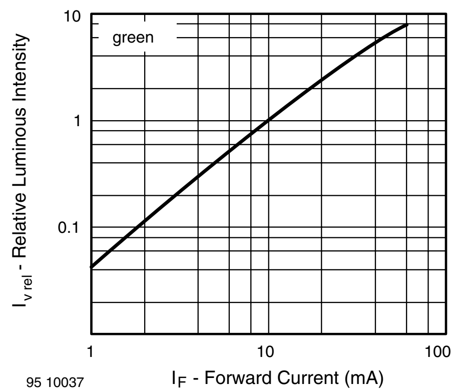


Figure 23. Relative Luminous Intensity vs. Forward Current

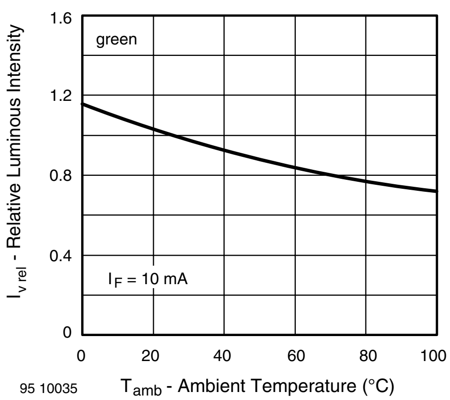


Figure 21. Rel. Luminous Intensity vs. Ambient Temperature

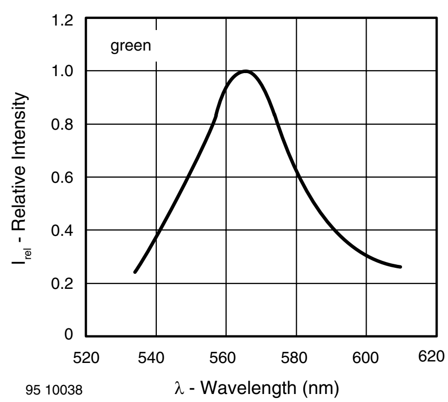


Figure 24. Relative Intensity vs. Wavelength

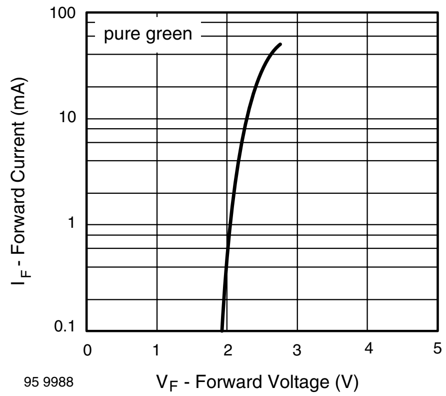


Figure 25. Forward Current vs. Forward Voltage

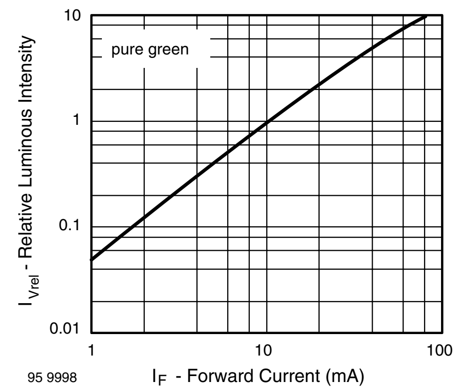


Figure 28. Relative Luminous Intensity vs. Forward Current

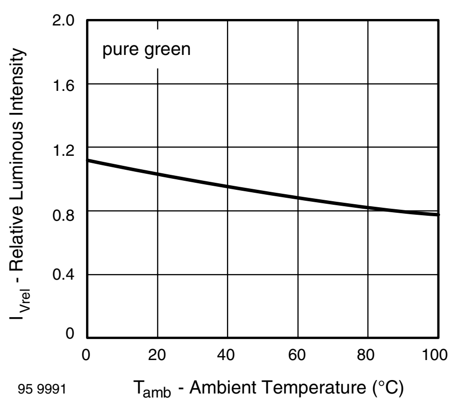


Figure 26. Rel. Luminous Intensity vs. Ambient Temperature

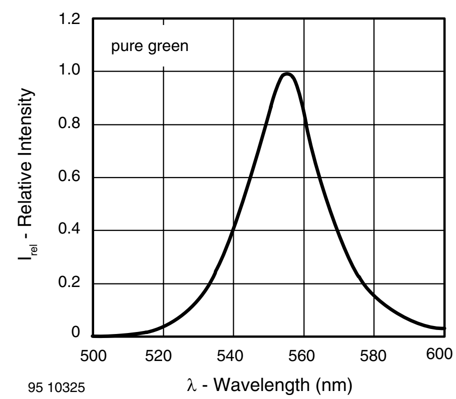


Figure 29. Relative Intensity vs. Wavelength

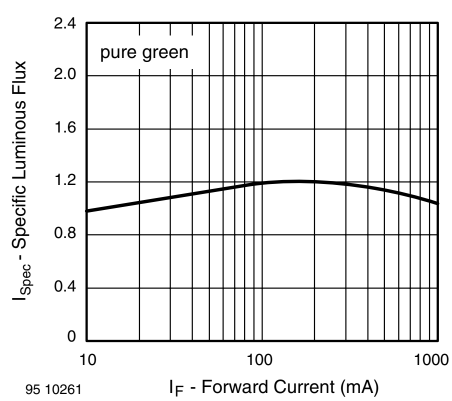
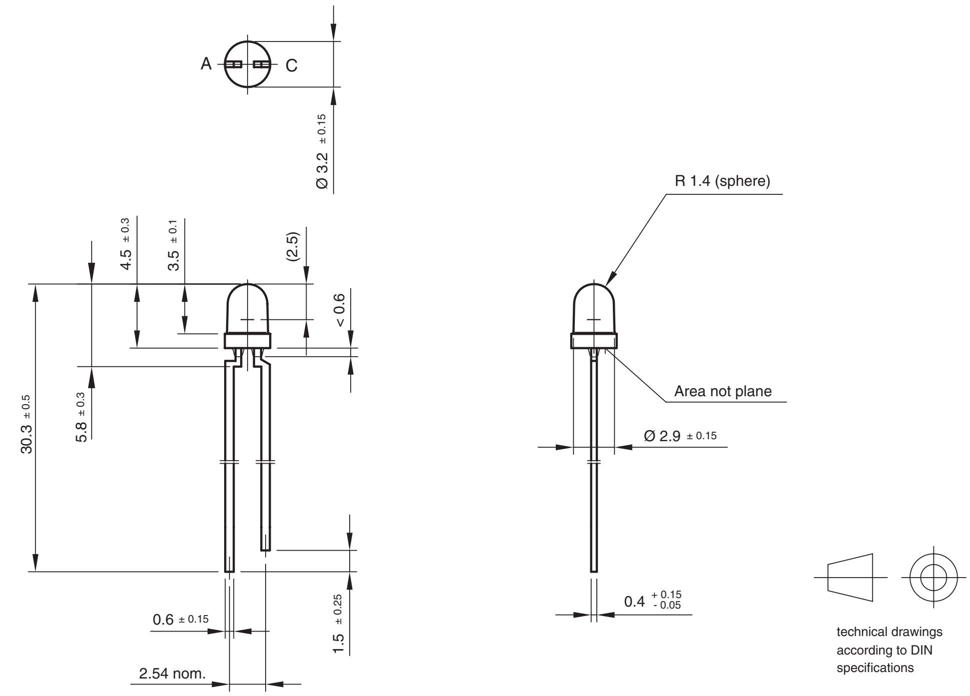


Figure 27. Specific Luminous Intensity vs. Forward Current

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.544-5255.01-4
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95 10913

Ozone Depleting Substances Policy Statement

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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