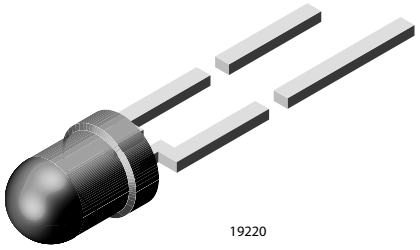
High Efficiency LED in Ø 3 mm Tinted Diffused Package



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.

FEATURES

- Standard Ø 3 mm (T-1) package
- Small mechanical tolerances
- Suitable for DC and high peak current
- Wide viewing angle
- Luminous intensity categorized
- Yellow and green color categorized
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

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: ± 30°

PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I_F (mA)	WAVELENGTH (nm)			at I_F (mA)	FORWARD VOLTAGE (V)			at I_F (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TLHR4400	Red	1.6	13	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4400-AS12	Red	1.6	13	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4400-AS21	Red	1.6	13	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4400-AS12Z	Red	1.6	13	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4400-MS12Z	Red	1.6	13	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4401	Red	2.5	14	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4401-AS12Z	Red	2.5	14	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHR4405	Red	6.3	15	-	10	612	-	625	10	-	2	3	20	GaAsP on GaP
TLHO4400	Soft orange	1.6	13	-	10	598	-	611	10	-	2.4	3	20	GaAsP on GaP
TLHY4400	Yellow	1.6	10	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4400-AS12Z	Yellow	1.6	10	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4400-MS12	Yellow	1.6	10	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4401	Yellow	2.5	10.5	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4405	Yellow	6.3	11	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4405-AS12	Yellow	6.3	11	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP
TLHY4405-MS12	Yellow	6.3	11	-	10	581	-	594	10	-	2.4	3	20	GaAsP on GaP

PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I_F (mA)	WAVELENGTH (nm)			at I_F (mA)	FORWARD VOLTAGE (V)			at I_F (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TLHG4400	Green	2.5	13	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4400-AS12	Green	2.5	13	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4400-AS12Z	Green	2.5	13	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4400-AS21	Green	2.5	13	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4400-MS12	Green	2.5	13	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4401	Green	4	14	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4401-AS12Z	Green	4	14	-	10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4405	Green	6.3	15		10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4405-AS12Z	Green	6.3	15		10	562	-	575	10	-	2.4	3	20	GaP on GaP
TLHG4405-MS12	Green	6.3	15		10	562	-	575	10	-	2.4	3	20	GaP on GaP

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)
TLHR440., TLHO440., TLHY440., TLHG440.

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	6	V
DC forward current		I_F	30	mA
Surge forward current	$t_p \leq 10$ µs	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 to ambient		R_{thJA}	400	K/W

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLHR440., RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity [1]	I_F = 10 mA	TLHR4400	I_V	1.6	13	-	mcd
		TLHR4401	I_V	2.5	14	-	mcd
		TLHR4405	I_V	6.3	15	-	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	-	°
Forward voltage	I_F = 20 mA		V_F	-	2	3	V
Reverse voltage	I_R = 10 µA		V_R	6	15	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz		C_j	-	50	-	pF

Note

[1] In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLHO440., SOFT ORANGE

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity (1)	I_F = 10 mA	TLHO4400	I_V	1.6	13	-	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	-	°
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 V, f = 1 MHz		C_j	-	15	-	pF

Note
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLHY440., YELLOW

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity (1)	I_F = 10 mA	TLHY4400	I_V	1.6	10	-	mcd
		TLHY4401	I_V	2.5	10.5	-	mcd
		TLHY4405	I_V	6.3	11	-	mcd
Dominant wavelength	I_F = 10 mA	TLHY4400	λ_d	581	-	594	nm
		TLHY4401	λ_d	581	-	594	nm
		TLHY4405	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	-	°
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 V, f = 1 MHz		C_j	-	50	-	pF

Note
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLHG440., GREEN

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity (1)	I_F = 10 mA	TLHG4400	I_V	2.5	13	-	mcd
		TLHG4401	I_V	4	14	-	mcd
		TLHG4405	I_V	6.3	15	-	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	-	°
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 V, f = 1 MHz		C_j	-	50	-	pF

Note
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

LUMINOUS INTENSITY CLASSIFICATION		
GROUP	LIGHT INTENSITY (mcd)	
STANDARD	MIN.	MAX.
L	1	2
M	1.6	3.2
N	2.5	5
P	4	8
Q	6.3	12.5
R	10	20
S	16	32
T	25	50
U	40	80

Note

- Luminous intensity is tested at a current pulse duration of 25 ms. The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each bag (there will be no mixing of two groups on each bag).
  In order to ensure availability, single brightness groups will not be orderable.
  In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped on any one bag.
  In order to ensure availability, single wavelength groups will not be orderable

COLOR CLASSIFICATION				
GROUP	DOM. WAVELENGTH (nm)			
	YELLOW		GREEN	
	MIN.	MAX.	MIN.	MAX.
0	-	-	-	-
1	581	584	-	-
2	583	586	-	-
3	585	588	562	565
4	587	590	564	567
5	589	592	566	569
6	591	594	568	571
7	-	-	570	573
8	-	-	572	575

Note

- Wavelengths are tested at a current pulse duration of 25 ms

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

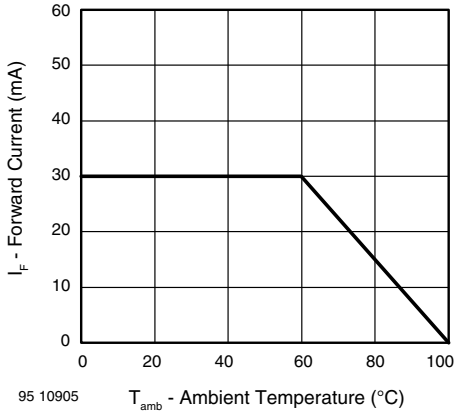


Fig. 1 - Forward Current vs. Ambient Temperature

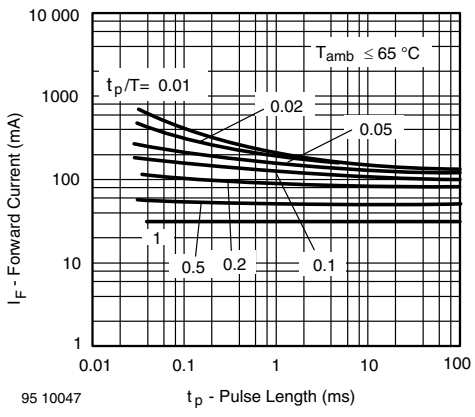


Fig. 2 - Forward Current vs. Pulse Length

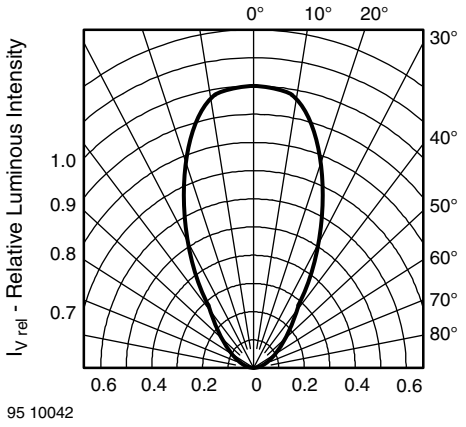


Fig. 3 - Relative Luminous Intensity vs. Angular Displacement

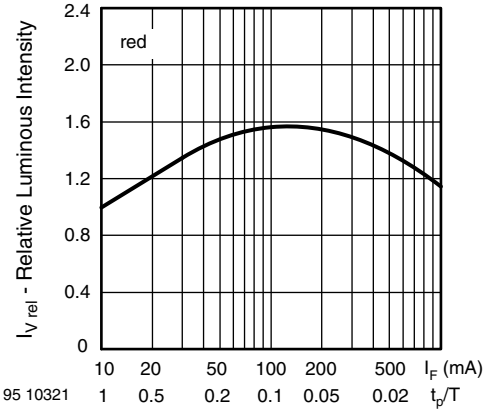


Fig. 6 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

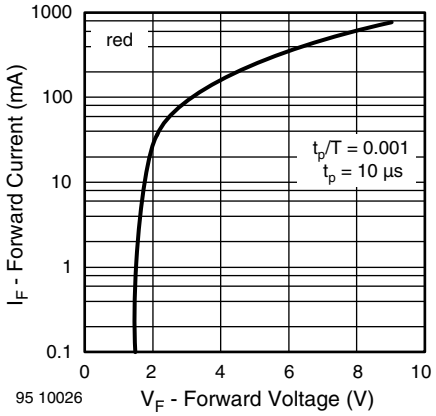


Fig. 4 - Forward Current vs. Forward Voltage

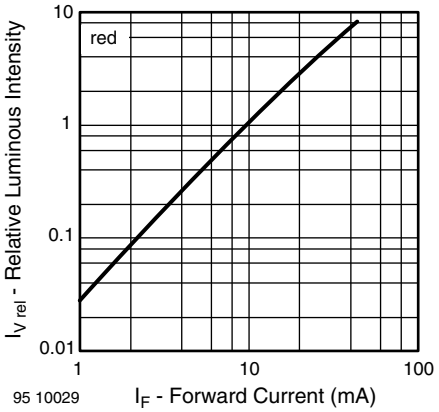


Fig. 7 - Relative Luminous Intensity vs. Forward Current

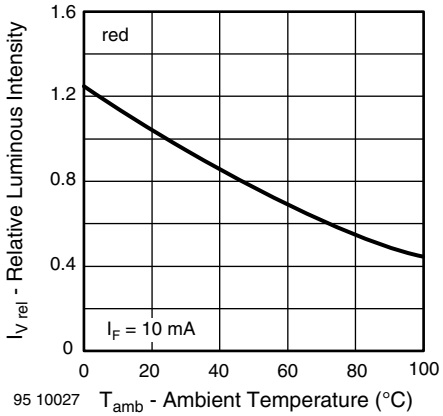


Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

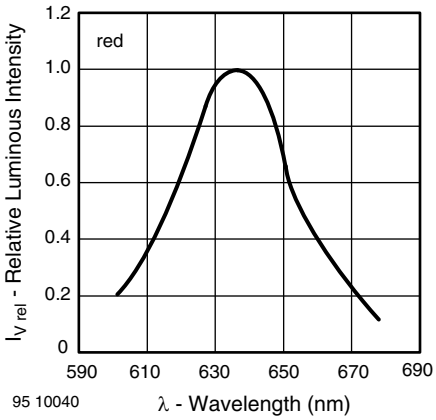


Fig. 8 - Relative Intensity vs. Wavelength

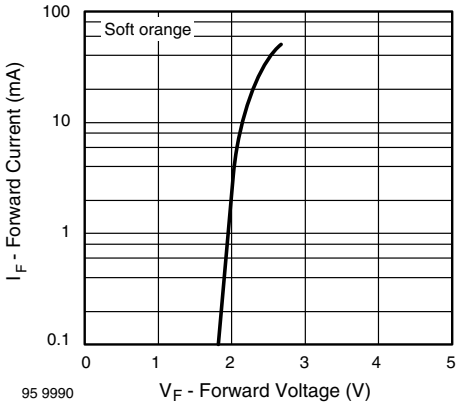


Fig. 9 - Forward Current vs. Forward Voltage

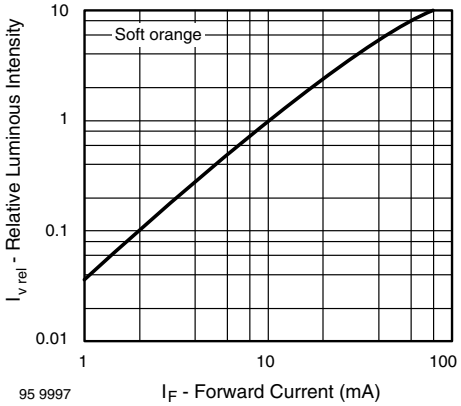


Fig. 12 - Relative Luminous Intensity vs. Forward Current

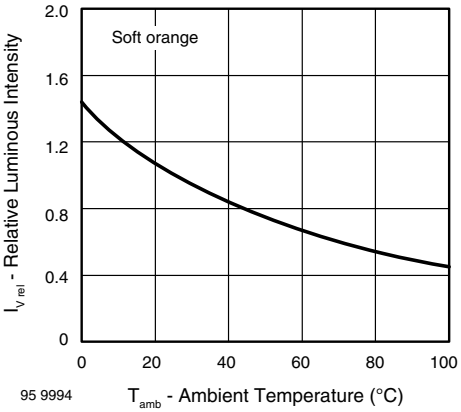


Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

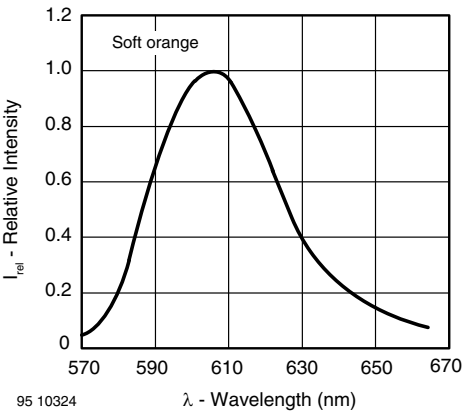


Fig. 13 - Relative Intensity vs. Wavelength

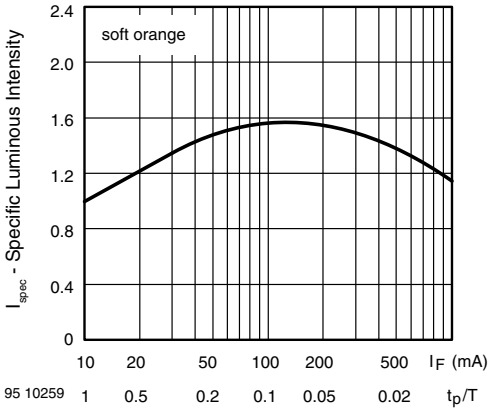


Fig. 11 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

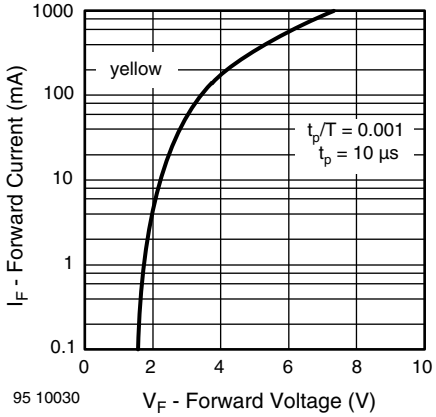


Fig. 14 - Forward Current vs. Forward Voltage

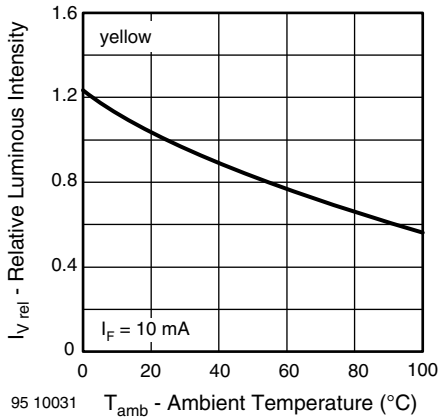


Fig. 15 - Relative Luminous Intensity vs. Ambient Temperature

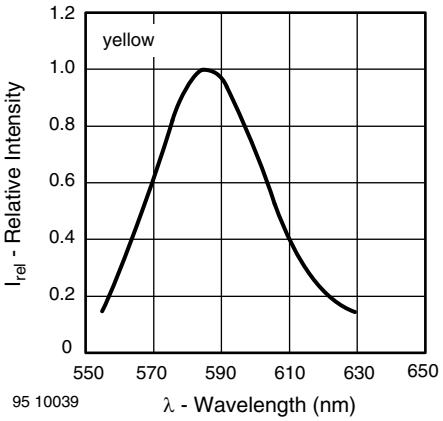


Fig. 18 - Relative Intensity vs. Wavelength

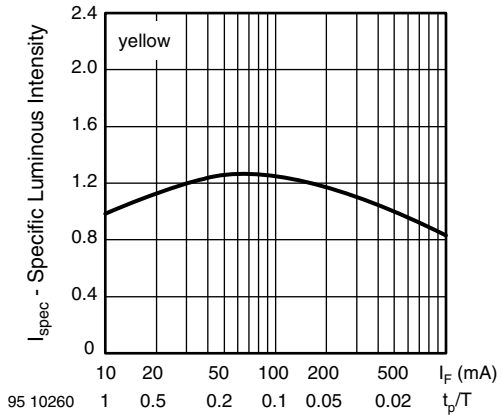


Fig. 16 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

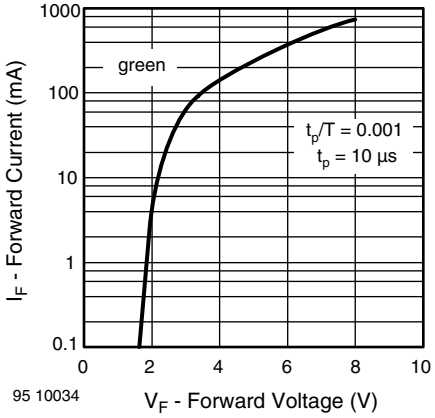


Fig. 19 - Forward Current vs. Forward Voltage

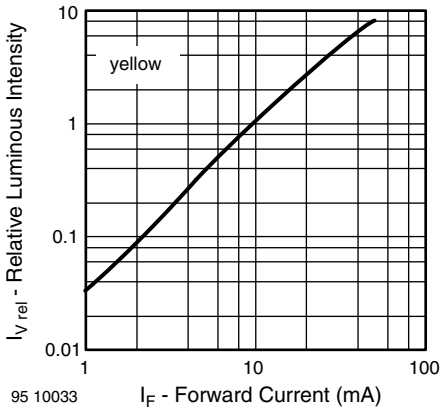


Fig. 17 - Relative Luminous Intensity vs. Forward Current

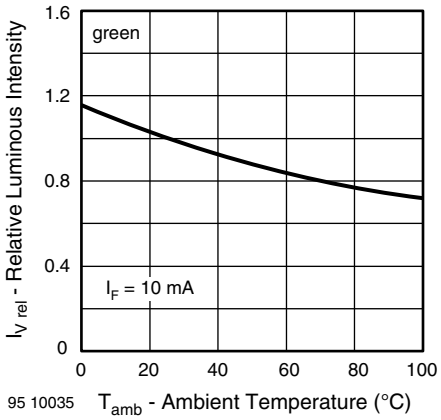


Fig. 20 - Relative Luminous Intensity vs. Ambient Temperature

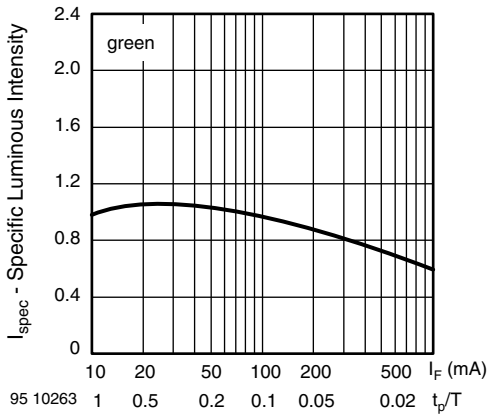


Fig. 21 - Specific Luminous Intensity vs. Forward Current

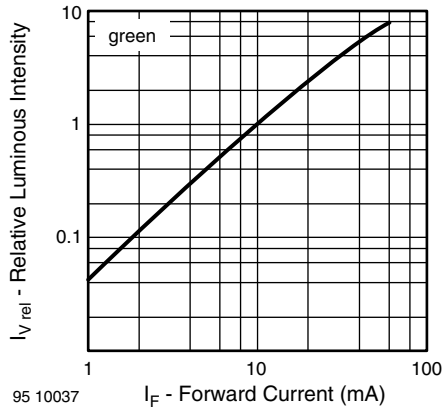


Fig. 22 - Relative Luminous Intensity vs. Forward Current

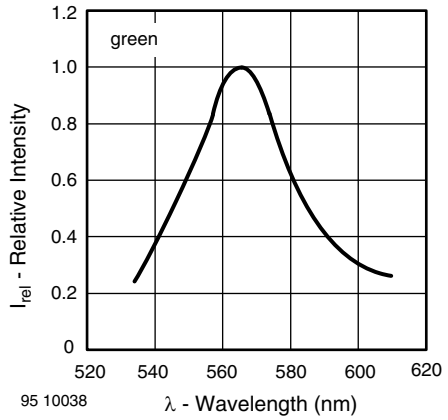
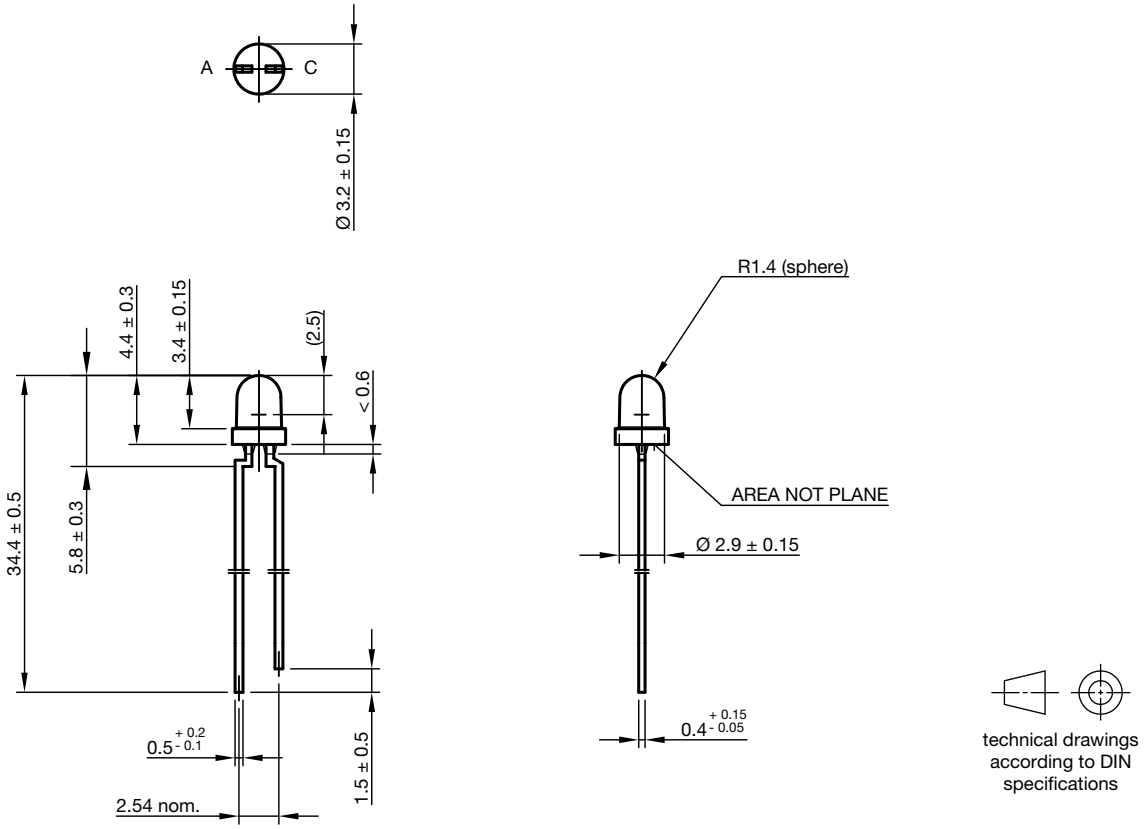


Fig. 23 - Relative Intensity vs. Wavelength

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.544-5255.01-4
Issue: 9; 28.07.14

REEL DIMENSIONS in millimeters

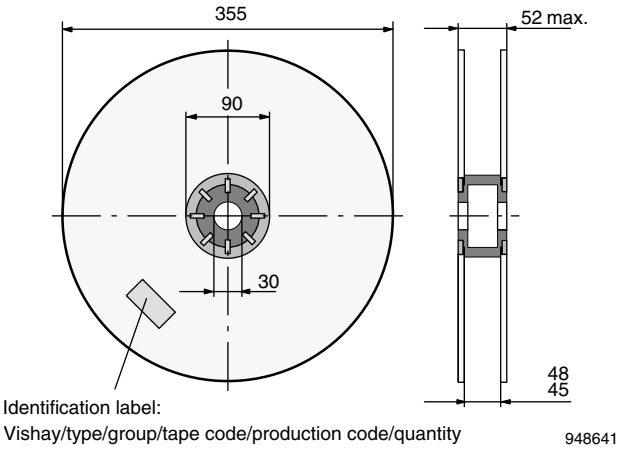


Fig. 24 - Reel

TAPE

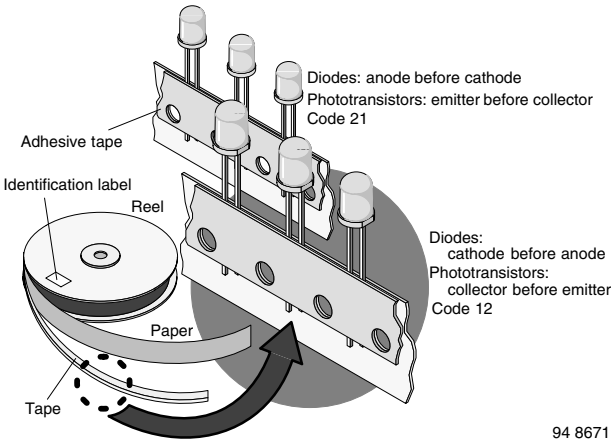


Fig. 25 - LED in Tape

AMMOPACK (ending: Z)

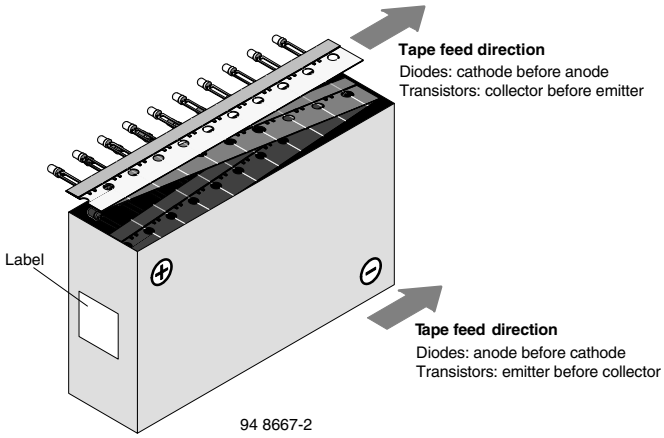
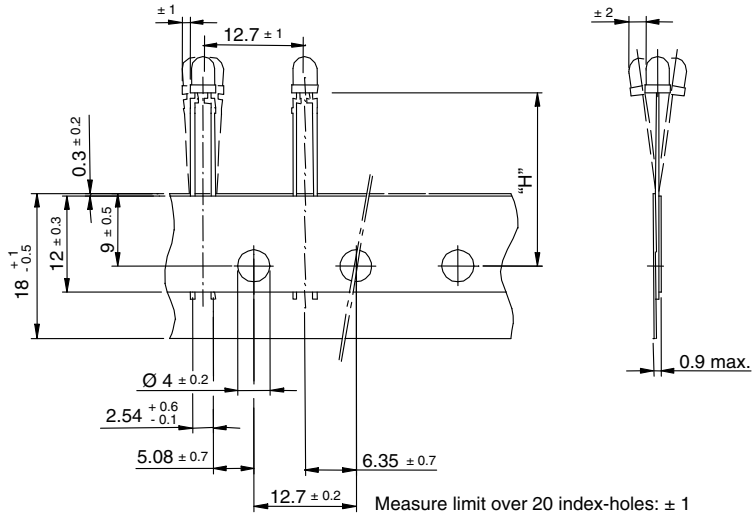


Fig. 26 - Tape Direction

Note

- The new nomenclature for ammopack is e.g. ASZ only, without suffix for the LED orientation. The carton box has to be turned to the desired position: “+” for anode first, or “-” for cathode first. AS12Z and AS21Z are still valid for already existing types, BUT NOT FOR NEW DESIGN

TAPE DIMENSIONS in millimeters



Quantity per:	Reel (Mat. - No. 1764)
	2000

94 8171

OPTION	DIMENSION “H” ± 0.5 mm	DIMENSION “X” ± 0.5 mm
AS	17.3	-
MS	25.5	-

Disclaimer

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