



## 1309 Low Current LED in Ø 3 mm Tinted Diffused Package



19220

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: low current
- Angle of half intensity:  $\pm 25^\circ$

### FEATURES

- Low power consumption
- High brightness
- CMOS/MOS compatible
- Specified at  $I_F = 2 \text{ mA}$
- Luminous intensity categorized
- Yellow and green color categorized
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Low power DC circuits

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.		
TLLR4400	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4400-AS12Z	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4400-BT12Z	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4400-MS12Z	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-AS12	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-AS12Z	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-BT12	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-BT21Z	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-MS21Z	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-MS21	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLY4400	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4400-AS12	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4400-BT12Z	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4400-MS12	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-AS12	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-AS12Z	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-MS12	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLG4400	Green	0.63	1.2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4400-AS12	Green	0.63	1.2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-AS12	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-AS12Z	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-BT12	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-BT21Z	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**TLLG440., TLLR440., TLLY440.**

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	6	V
DC forward current		$I_F$	7	mA
Surge forward current	$t_p \leq 10\ \mu\text{s}$	$I_{FSM}$	0.15	A
Power dissipation	$T_{amb} \leq 84\text{ }^{\circ}\text{C}$	$P_V$	20	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
Operating temperature range		$T_{amb}$	-40 to +100	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	$t \leq 5\ \text{s}$ , 2 mm from body	$T_{sd}$	260	$^{\circ}\text{C}$
Thermal resistance junction/ambient		$R_{thJA}$	800	K/W

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**TLLR440., RED**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 2\ \text{mA}$	TLLR4400	$I_V$	0.63	1.2	-	mcd
		TLLR4401	$I_V$	1	2	-	mcd
Dominant wavelength	$I_F = 2\ \text{mA}$		$\lambda_d$	612	-	625	nm
Peak wavelength	$I_F = 2\ \text{mA}$		$\lambda_p$	-	635	-	nm
Angle of half intensity	$I_F = 2\ \text{mA}$		$\phi$	-	$\pm 25$	-	deg
Forward voltage	$I_F = 2\ \text{mA}$		$V_F$	-	1.9	2.4	V
Reverse voltage	$I_R = 10\ \mu\text{A}$		$V_R$	6	20	-	V
Junction capacitance	$V_R = 0\ \text{V}$ , $f = 1\ \text{MHz}$		$C_j$	-	50	-	pF

**Note**<sup>(1)</sup> In one packing unit  $I_{Vmin.}/I_{Vmax.} \leq 0.5$ **OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**TLLY440., YELLOW**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 2\ \text{mA}$	TLLY4400	$I_V$	0.63	1.2	-	mcd
		TLLY4401	$I_V$	1	2	-	mcd
Dominant wavelength	$I_F = 2\ \text{mA}$		$\lambda_d$	581	-	594	nm
Peak wavelength	$I_F = 2\ \text{mA}$		$\lambda_p$	-	585	-	nm
Angle of half intensity	$I_F = 2\ \text{mA}$		$\phi$	-	$\pm 25$	-	deg
Forward voltage	$I_F = 2\ \text{mA}$		$V_F$	-	2.4	2.9	V
Reverse voltage	$I_R = 10\ \mu\text{A}$		$V_R$	6	20	-	V
Junction capacitance	$V_R = 0\ \text{V}$ , $f = 1\ \text{MHz}$		$C_j$	-	50	-	pF

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



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>TLLG440., GREEN</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 2\text{ mA}$	TLLG4400	$I_V$	0.63	1.2	-	mcd
		TLLG4401	$I_V$	1	2	-	mcd
Dominant wavelength	$I_F = 2\text{ mA}$		$\lambda_d$	562	-	575	nm
Peak wavelength	$I_F = 2\text{ mA}$		$\lambda_p$	-	565	-	nm
Angle of half intensity	$I_F = 2\text{ mA}$		$\phi$	-	$\pm 25$	-	deg
Forward voltage	$I_F = 2\text{ mA}$		$V_F$	-	1.9	2.4	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	20	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	50	-	pF

**Note**

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

<b>LUMINOUS INTENSITY CLASSIFICATION</b>		
GROUP	LIGHT INTENSITY (mcd)	
STANDARD	MIN.	MAX.
K	0.63	1.25
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.

<b>COLOR CLASSIFICATION</b>				
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<sub>amb</sub> = 25 °C, unless otherwise specified)

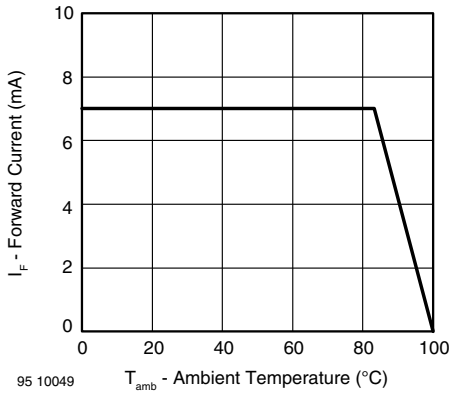


Fig. 1 - Forward Current vs. Ambient Temperature

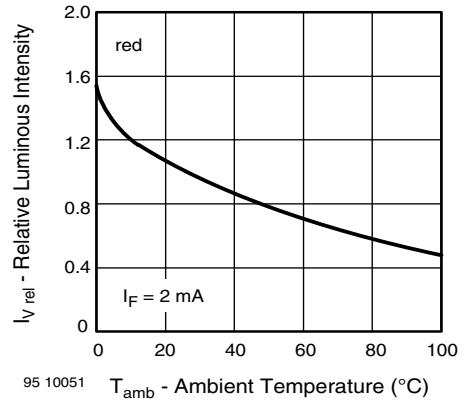


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

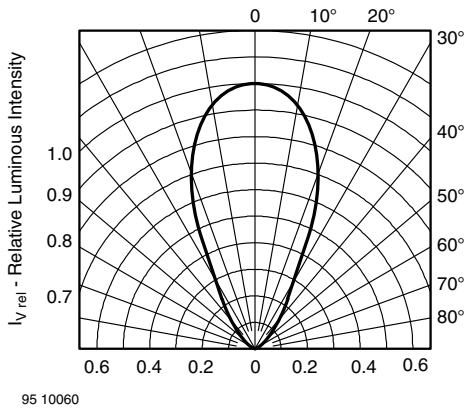


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

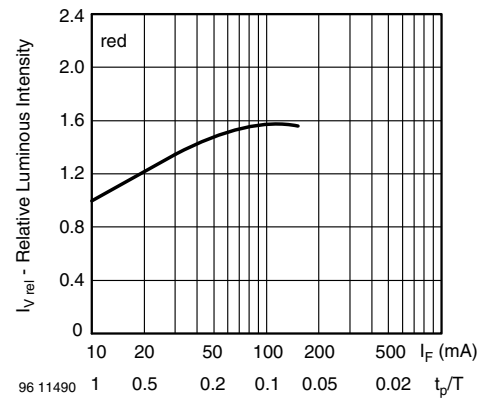


Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

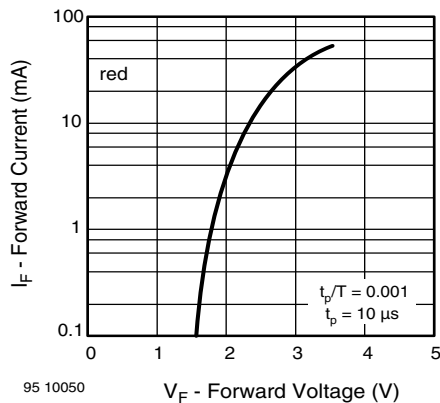


Fig. 3 - Forward Current vs. Forward Voltage

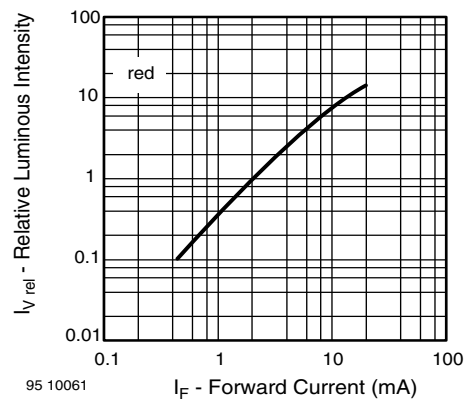


Fig. 6 - Relative Luminous Intensity vs. Forward Current

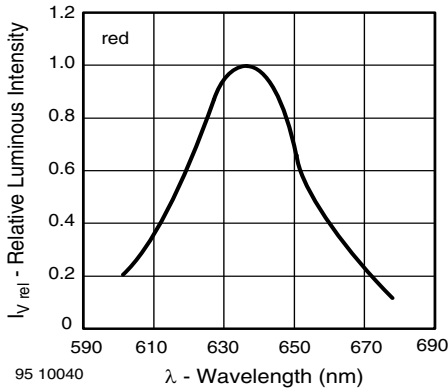


Fig. 7 - Relative Intensity vs. Wavelength

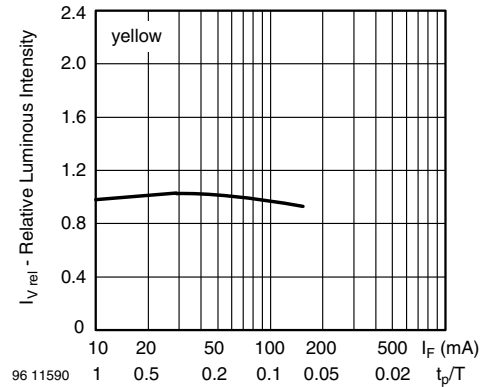


Fig. 10 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

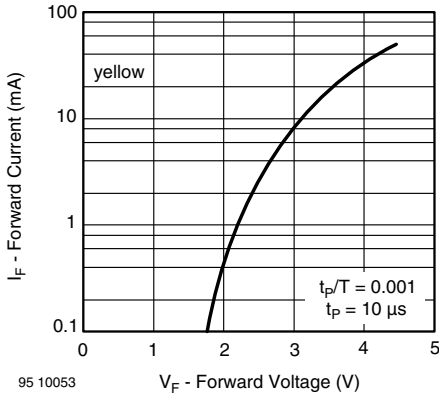


Fig. 8 - Forward Current vs. Forward Voltage

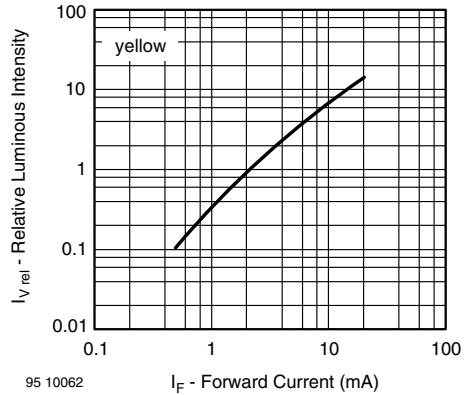


Fig. 11 - Relative Luminous Intensity vs. Forward Current

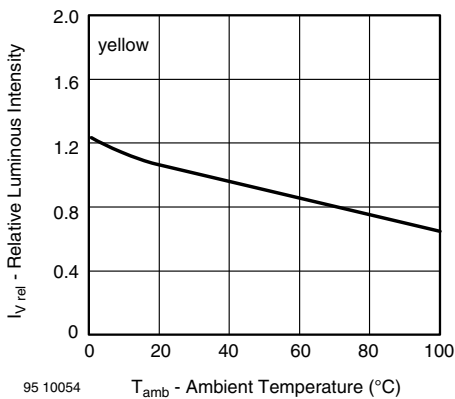


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

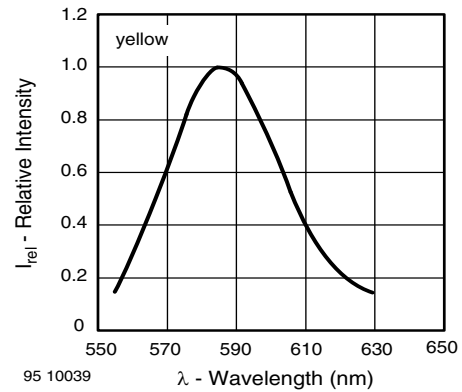


Fig. 12 - Relative Intensity vs. Wavelength

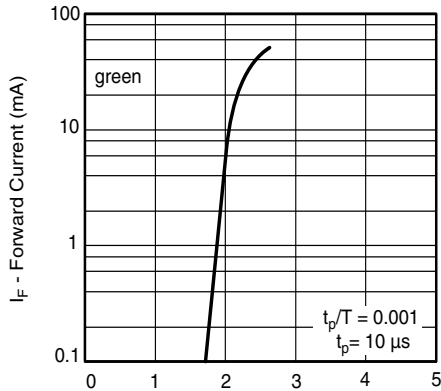


Fig. 13 - Forward Current vs. Forward Voltage

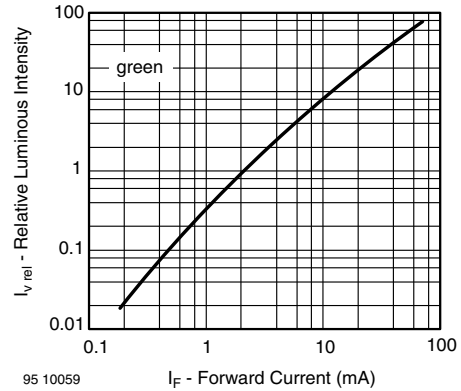


Fig. 16 - Relative Luminous Intensity vs. Forward Current

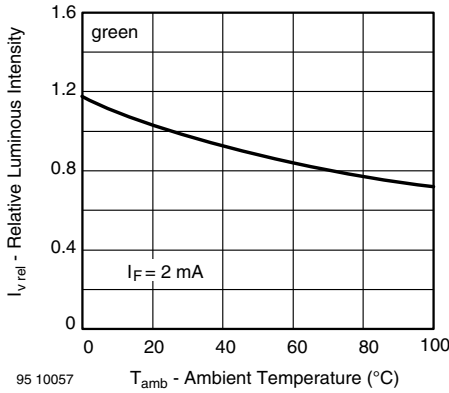


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature

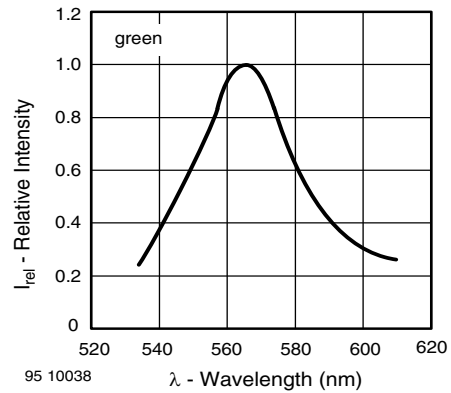


Fig. 17 - Relative Intensity vs. Wavelength

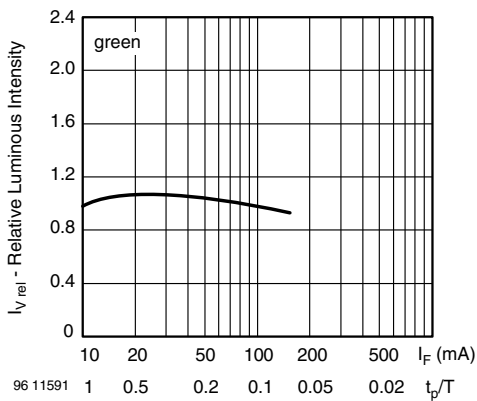
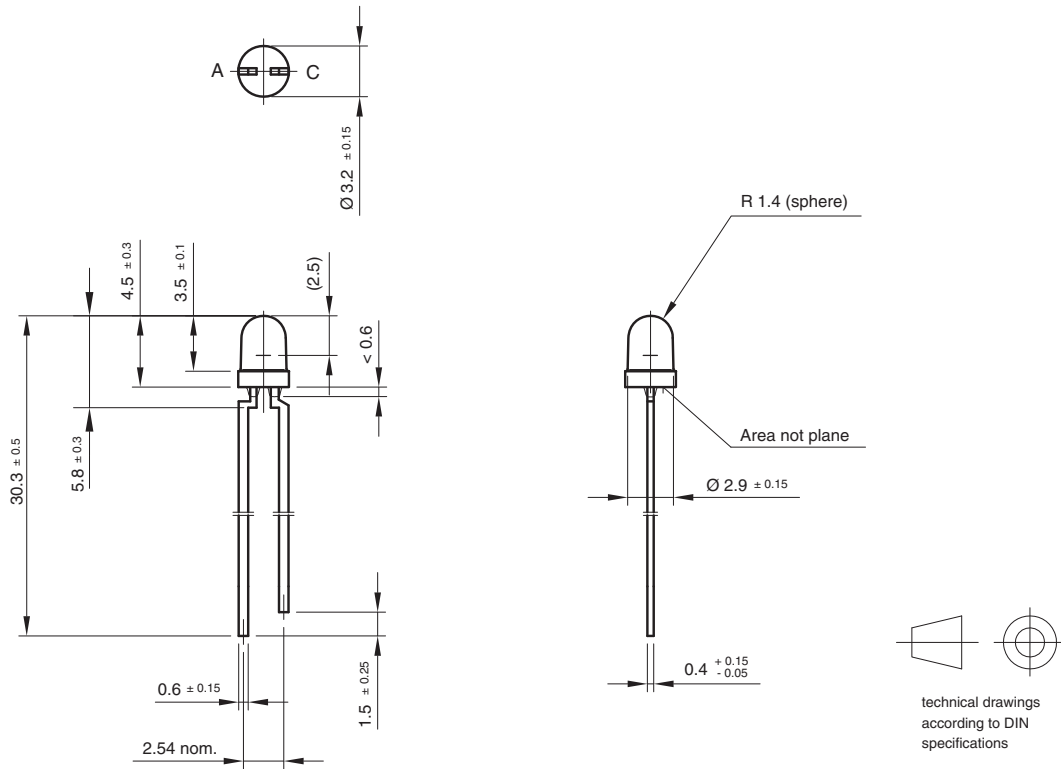


Fig. 15 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

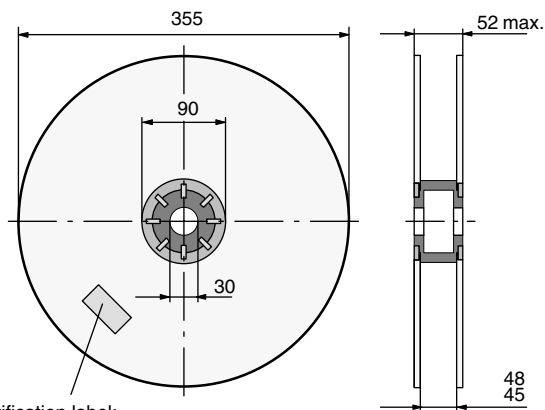


PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.544-5255.01-4  
Issue: 7; 25.09.08  
95 10913

REEL DIMENSIONS in millimeters



Identification label:  
Vishay/type/group/tape code/production code/quantity

948641

Fig. 18 - Reel

AS12 = cathode leaves tape first

AS21 = anode leaves tape first

TAPE

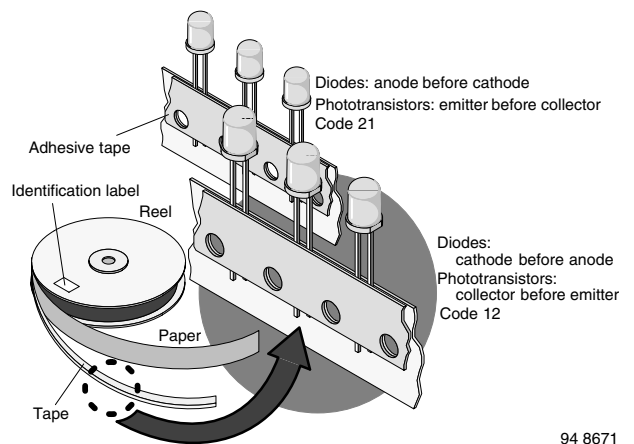


Fig. 19 - LED in Tape

94 8671

**AMMOPACK**

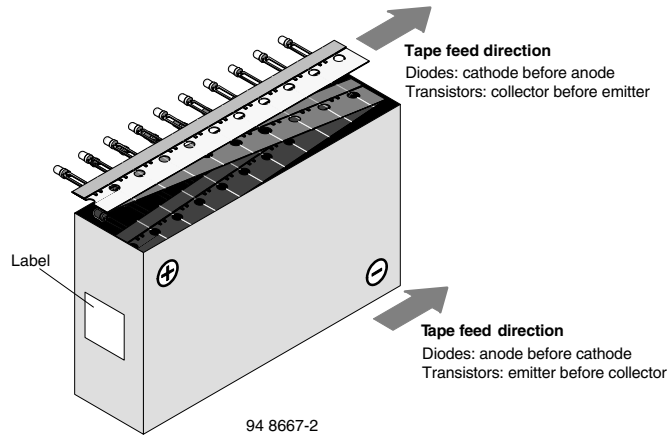
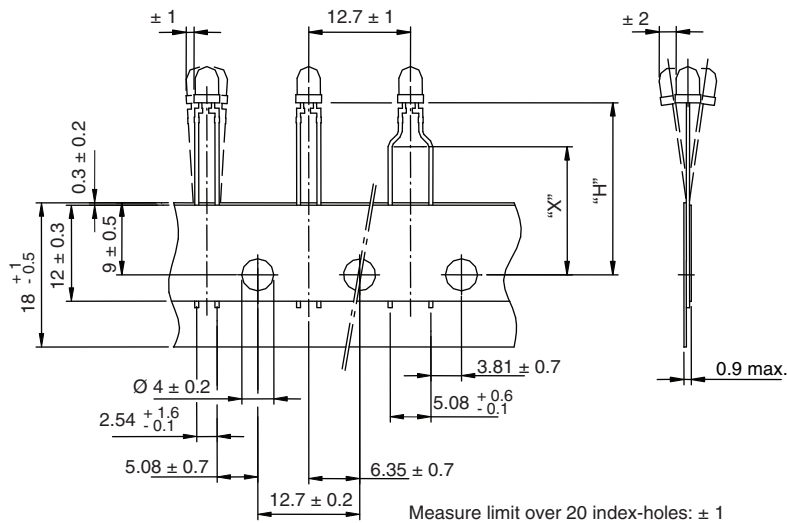


Fig. 20 - Tape Direction

**Note**

- The new nomenclature for ammpack is 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

21885

OPTION	DIMENSION "H" ± 0.5 mm	DIMENSION "X" ± 0.5 mm
AS	17.3	-
MS	25.5	-
BT	20.0	16.0





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