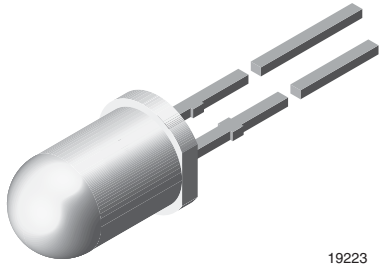




## Ultrabright LED, Ø 5 mm Untinted Non-Diffused Package



19223

### DESCRIPTION

The TLC.51.. series is a clear, non-diffused 5 mm LED for high end applications where supreme luminous intensity required.

These lamps with clear untinted plastic case utilize the highly developed ultrabright AlInGaP (AS).

The lens and the viewing angle is optimized to achieve best performance of light output and visibility.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 5 mm
- Product series: power
- Angle of half intensity:  $\pm 9^\circ$

### FEATURES

- Untinted non-diffused lens
- Utilizing ultrabright AlInGaP (AS)
- High luminous intensity
- High operating temperature:  $T_j$  (chip junction temperature) up to 125 °C for AlInGaP devices
- Luminous intensity and color categorized for each packing unit
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Interior and exterior lighting
- Outdoor LED panels
- Instrumentation and front panel indicators
- Central high mounted stop lights (CHMSL) for motor vehicles
- Replaces incandescent lamps
- Traffic signals
- Light guide design

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.		
TLCS5100	Super red	2400	7500	-	50	626	630	638	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCR5100	Red	4300	11 000	-	50	611	616	622	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCO5100	Soft orange	4300	12 000	-	50	600	605	611	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCY5100	Yellow	3200	7500	-	50	585	590	597	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCY5100-ASZ	Yellow	3200	7500	-	50	585	590	597	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCY5101-AS12Z	Yellow	5750	-	20 000	50	585	590	597	50	-	2.1	2.7	50	AllnGaP on GaAs
TLCYG5100	Yellow green	1350	3500	-	50	565	572	576	50	-	2.2	2.7	50	AllnGaP on GaAs
TLCPG5100	Pure green	430	1250	-	50	555	562	567	50	-	2.1	2.7	50	AllnGaP on GaAs

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified) TLCS510., TLCR510., TLCO510., TLCY510., TLCYG510., TLCPG510.				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>(1)</sup>		$V_R$	5	V
DC forward current	$T_{amb} \leq 85^\circ\text{C}$	$I_F$	50	mA
Surge forward current	$t_p \leq 10 \mu\text{s}$	$I_{FSM}$	1	A
Power dissipation		$P_V$	135	mW
Junction temperature		$T_j$	125	°C
Operating temperature range		$T_{amb}$	-40 to +100	°C
Storage temperature range		$T_{stg}$	-40 to +100	°C
Soldering temperature	$t \leq 5 \text{ s}$ , 2 mm from body	$T_{sd}$	260	°C
Thermal resistance junction/ambient		$R_{thJA}$	300	K/W

#### Note

<sup>(1)</sup> Driving the LED in reverse direction is suitable for a short term application



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>TLCS5100, SUPER RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 50\text{ mA}$	TLCS5100	$I_V$	2400	7500	-	mcd
Dominant wavelength	$I_F = 50\text{ mA}$		$\lambda_d$	626	630	638	nm
Peak wavelength	$I_F = 50\text{ mA}$		$\lambda_p$	-	641	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 50\text{ mA}$		$\Delta\lambda$	-	20	-	nm
Angle of half intensity	$I_F = 50\text{ mA}$		$\phi$	-	$\pm 9$	-	deg
Forward voltage	$I_F = 50\text{ mA}$		$V_F$	-	2.1	2.7	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	-	-	V
Temperature coefficient of $V_F$	$I_F = 50\text{ mA}$		$TC_{V_F}$	-	-2	-	mV/K
Temperature coefficient of $\lambda_d$	$I_F = 50\text{ mA}$		$TC_{\lambda_d}$	-	0.04	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>TLCR5100, RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 50\text{ mA}$	TLCR5100	$I_V$	4300	11 000	-	mcd
Dominant wavelength	$I_F = 50\text{ mA}$		$\lambda_d$	611	616	622	nm
Peak wavelength	$I_F = 50\text{ mA}$		$\lambda_p$	-	622	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 50\text{ mA}$		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	$I_F = 50\text{ mA}$		$\phi$	-	$\pm 9$	-	deg
Forward voltage	$I_F = 50\text{ mA}$		$V_F$	-	2.1	2.7	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	-	-	V
Temperature coefficient of $V_F$	$I_F = 50\text{ mA}$		$TC_{V_F}$	-	-3.5	-	mV/K
Temperature coefficient of $\lambda_d$	$I_F = 50\text{ mA}$		$TC_{\lambda_d}$	-	0.05	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>TLCO5100, SOFT ORANGE</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 50\text{ mA}$	TLCO5100	$I_V$	4300	12 000	-	mcd
Dominant wavelength	$I_F = 50\text{ mA}$		$\lambda_d$	600	605	611	nm
Peak wavelength	$I_F = 50\text{ mA}$		$\lambda_p$	-	611	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 50\text{ mA}$		$\Delta\lambda$	-	17	-	nm
Angle of half intensity	$I_F = 50\text{ mA}$		$\phi$	-	$\pm 9$	-	deg
Forward voltage	$I_F = 50\text{ mA}$		$V_F$	-	2.1	2.7	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	-	-	V
Temperature coefficient of $V_F$	$I_F = 50\text{ mA}$		$TC_{V_F}$	-	-2.5	-	mV/K
Temperature coefficient of $\lambda_d$	$I_F = 50\text{ mA}$		$TC_{\lambda_d}$	-	0.1	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$



OPTICAL AND ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
TLCY5100, TLCY5101, YELLOW							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	I <sub>F</sub> = 50 mA	TLCY5100	I <sub>V</sub>	3200	7500	-	mcd
		TLCY5101	I <sub>V</sub>	5750	-	20 000	mcd
Dominant wavelength	I <sub>F</sub> = 50 mA		λ <sub>d</sub>	585	590	597	nm
Peak wavelength	I <sub>F</sub> = 50 mA		λ <sub>p</sub>	-	593	-	nm
Spectral bandwidth at 50 % I <sub>rel max.</sub>	I <sub>F</sub> = 50 mA		Δλ	-	17	-	nm
Angle of half intensity	I <sub>F</sub> = 50 mA		φ	-	± 9	-	deg
Forward voltage	I <sub>F</sub> = 50 mA		V <sub>F</sub>	-	2.1	2.7	V
Reverse voltage	I <sub>R</sub> = 10 μA		V <sub>R</sub>	5	-	-	V
Temperature coefficient of V <sub>F</sub>	I <sub>F</sub> = 50 mA		TC <sub>V<sub>F</sub></sub>	-	-3.5	-	mV/K
Temperature coefficient of λ <sub>d</sub>	I <sub>F</sub> = 50 mA		TC <sub>λ<sub>d</sub></sub>	-	0.1	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit I<sub>Vmax.</sub>/I<sub>Vmin.</sub> ≤ 2.0

OPTICAL AND ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
TLCYG5100, YELLOW GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	I <sub>F</sub> = 50 mA	TLCYG5100	I <sub>V</sub>	1350	3500	-	mcd
Dominant wavelength	I <sub>F</sub> = 50 mA		λ <sub>d</sub>	565	572	576	nm
Peak wavelength	I <sub>F</sub> = 50 mA		λ <sub>p</sub>	-	574	-	nm
Spectral bandwidth at 50 % I <sub>rel max.</sub>	I <sub>F</sub> = 50 mA		Δλ	-	15	-	nm
Angle of half intensity	I <sub>F</sub> = 50 mA		φ	-	± 9	-	deg
Forward voltage	I <sub>F</sub> = 50 mA		V <sub>F</sub>	-	2.2	2.7	V
Reverse voltage	I <sub>R</sub> = 10 μA		V <sub>R</sub>	5	-	-	V
Temperature coefficient of V <sub>F</sub>	I <sub>F</sub> = 50 mA		TC <sub>V<sub>F</sub></sub>	-	-4.5	-	mV/K
Temperature coefficient of λ <sub>d</sub>	I <sub>F</sub> = 50 mA		TC <sub>λ<sub>d</sub></sub>	-	0.1	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit I<sub>Vmax.</sub>/I<sub>Vmin.</sub> ≤ 2.0

OPTICAL AND ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
TLCPG5100, PURE GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	I <sub>F</sub> = 50 mA	TLCPG5100	I <sub>V</sub>	430	1250	-	mcd
Dominant wavelength	I <sub>F</sub> = 50 mA		λ <sub>d</sub>	555	562	567	nm
Peak wavelength	I <sub>F</sub> = 50 mA		λ <sub>p</sub>	-	563	-	nm
Spectral bandwidth at 50 % I <sub>rel max.</sub>	I <sub>F</sub> = 50 mA		Δλ	-	20	-	nm
Angle of half intensity	I <sub>F</sub> = 50 mA		φ	-	± 9	-	deg
Forward voltage	I <sub>F</sub> = 50 mA		V <sub>F</sub>	-	2.1	2.7	V
Reverse voltage	I <sub>R</sub> = 10 μA		V <sub>R</sub>	5	-	-	V
Temperature coefficient of V <sub>F</sub>	I <sub>F</sub> = 50 mA		TC <sub>V<sub>F</sub></sub>	-	-3.5	-	mV/K
Temperature coefficient of λ <sub>d</sub>	I <sub>F</sub> = 50 mA		TC <sub>λ<sub>d</sub></sub>	-	0.1	-	nm/K

**Note**

<sup>(1)</sup> In one packing unit I<sub>Vmax.</sub>/I<sub>Vmin.</sub> ≤ 2.0



<b>LUMINOUS INTENSITY CLASSIFICATION</b>		
<b>GROUP</b>	<b>LUMINOUS INTENSITY (mcd)</b>	
	<b>MIN.</b>	<b>MAX.</b>
<b>STANDARD</b>		
BB	430	860
CC	575	1150
DD	750	1500
EE	1000	2000
FF	1350	2700
GG	1800	3600
HH	2400	4800
II	3200	6400
KK	4300	8600
LL	5750	11 500
MM	7500	15 000
NN	10 000	20 000
PP	13 500	27 000
QQ	18 000	36 000
RR	24 000	48 000
SS	32 000	64 000
TT	43 000	86 000
UU	57 500	115 000

**Note**

- Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ .  
 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 in any one bag.  
 In order to ensure availability, single wavelength groups will not be orderable.

<b>COLOR CLASSIFICATION</b>										
<b>GROUP</b>	<b>DOM. WAVELENGTH (nm)</b>									
	<b>RED</b>		<b>SOFT ORANGE</b>		<b>YELLOW</b>		<b>YELLOW GREEN</b>		<b>PURE GREEN</b>	
	<b>MIN.</b>	<b>MAX.</b>	<b>MIN.</b>	<b>MAX.</b>	<b>MIN.</b>	<b>MAX.</b>	<b>MIN.</b>	<b>MAX.</b>	<b>MIN.</b>	<b>MAX.</b>
0	-	-	-	-	585	588	-	-	555	559
1	611	618	-	-	587	591	-	-	558	561
2	614	622	600	603	589	594	-	-	560	563
3	-	-	602	605	592	597	-	-	562	565
4	-	-	604	607	-	-	-	-	564	567
5	-	-	606	609	-	-	565	570	-	-
6	-	-	608	611	-	-	567	572	-	-
7	-	-	-	-	-	-	569	574	-	-
8	-	-	-	-	-	-	571	576	-	-

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of  $\pm 1$  nm.

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

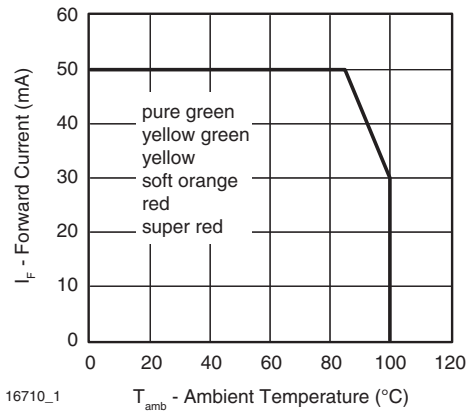


Fig. 1 - Forward Current vs. Ambient Temperature

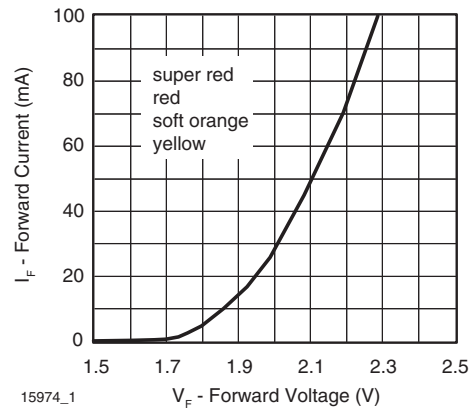


Fig. 4 - Forward Current vs. Forward Voltage

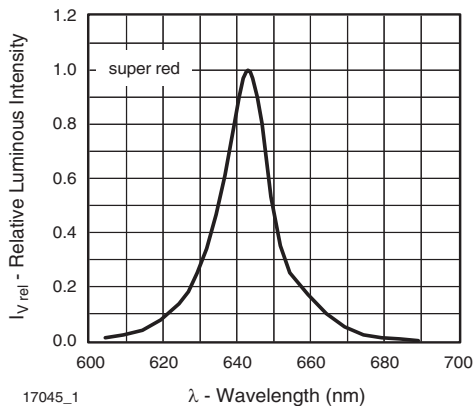


Fig. 2 - Relative Intensity vs. Wavelength

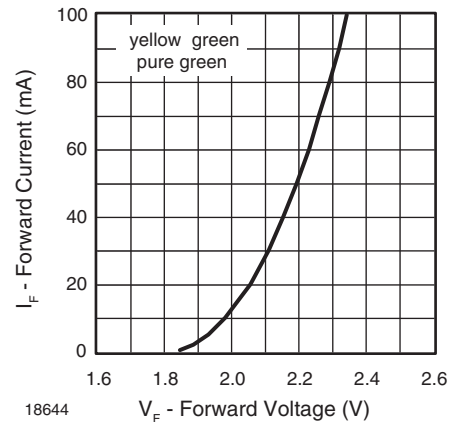


Fig. 5 - Forward Current vs. Forward Voltage

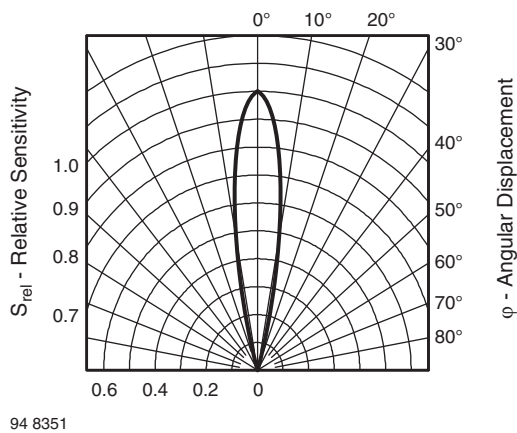


Fig. 3 - Relative Radiant Sensitivity vs. Angular Displacement

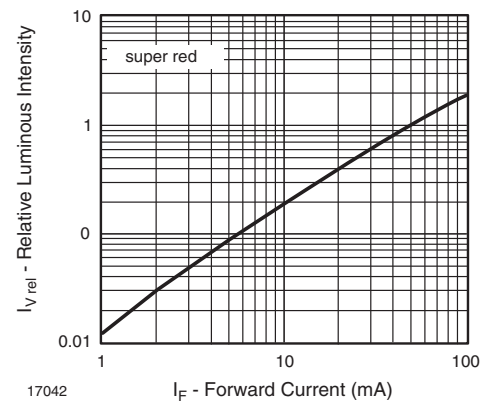


Fig. 6 - Relative Luminous Flux vs. Forward Current

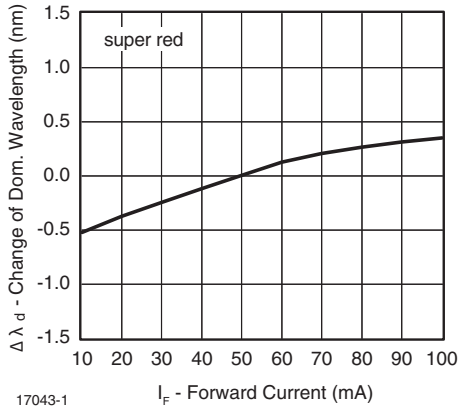


Fig. 7 - Change of Dominant Wavelength vs. Ambient Temperature

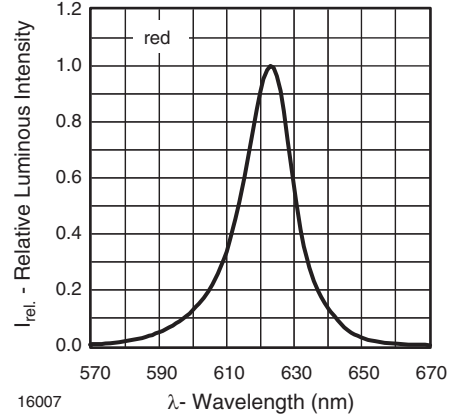


Fig. 10 - Relative Intensity vs. Wavelength

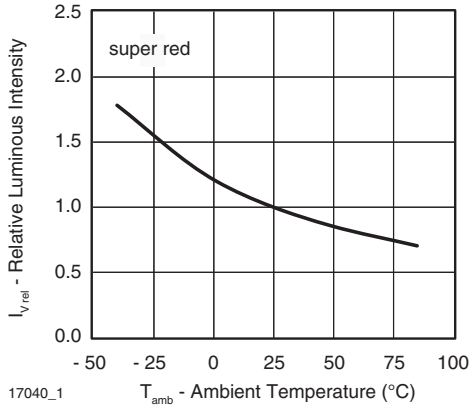


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

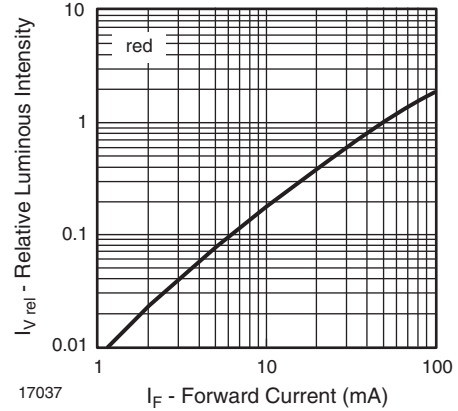


Fig. 11 - Relative Luminous Flux vs. Forward Current

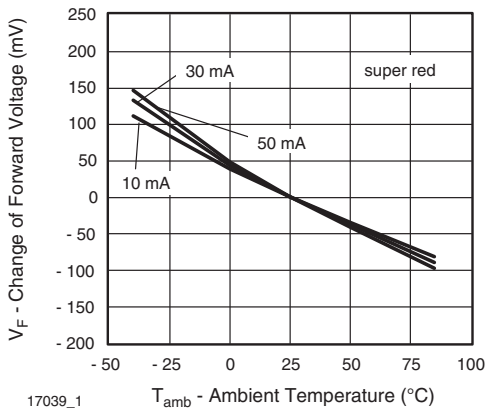


Fig. 9 - Change of Forward Voltage vs. Ambient Temperature

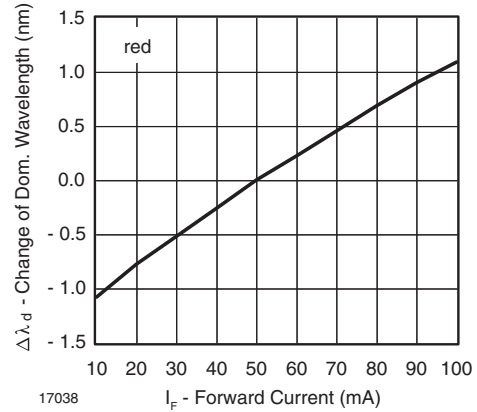


Fig. 12 - Changes of Dominant Wavelength vs. Forward Current

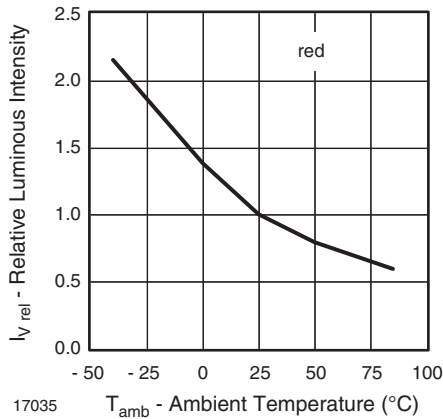


Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

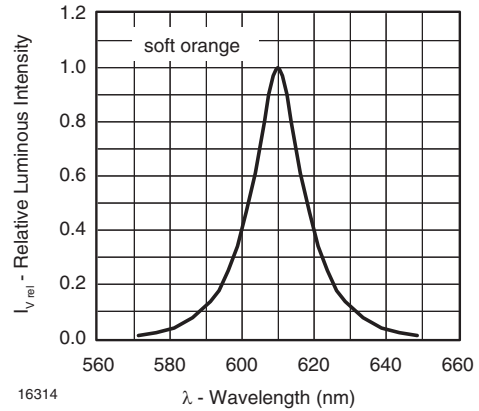


Fig. 16 - Relative Intensity vs. Wavelength

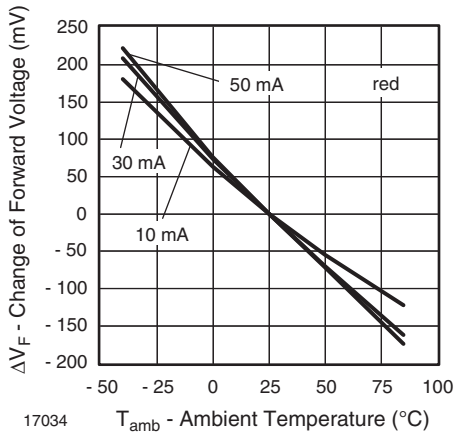


Fig. 14 - Change of Forward Voltage vs. Ambient Temperature

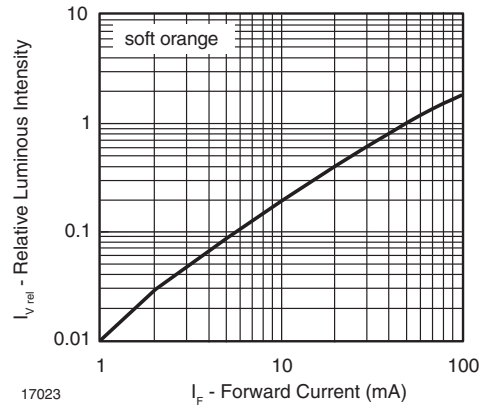


Fig. 17 - Relative Luminous Flux vs. Forward Current

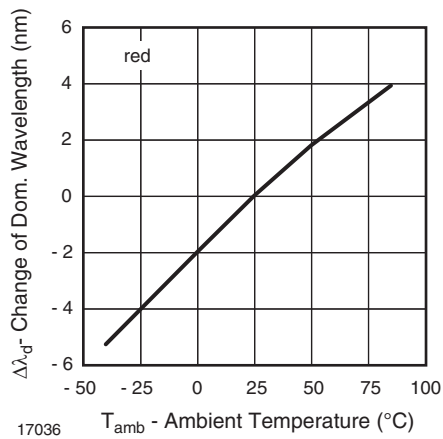


Fig. 15 - Change of Dominant Wavelength vs. Ambient Temperature

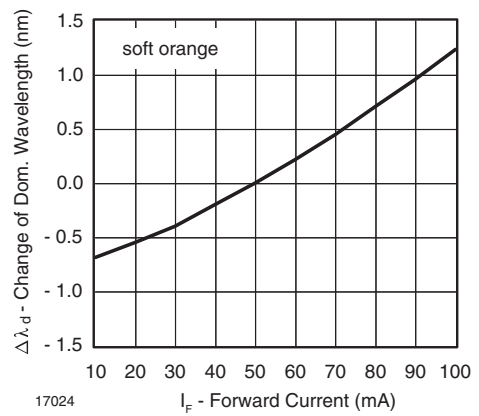


Fig. 18 - Change of Dominant Wavelength vs. Forward Current

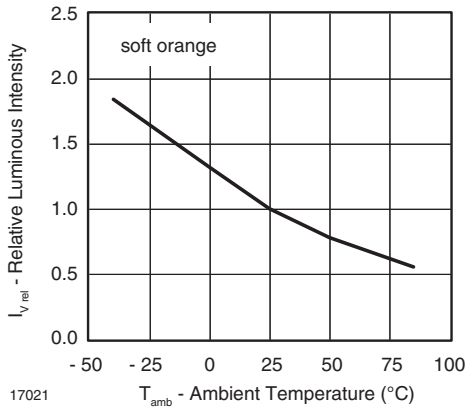


Fig. 19 - Relative Luminous Intensity vs. Ambient Temperature

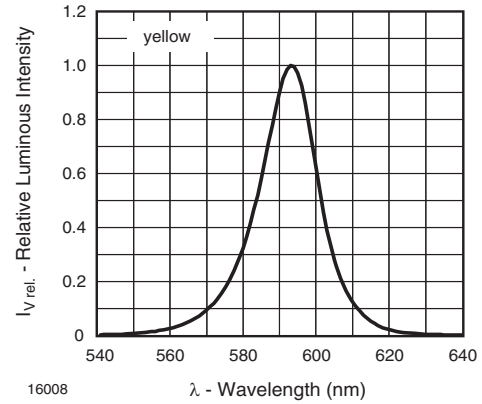


Fig. 22 - Relative Intensity vs. Wavelength

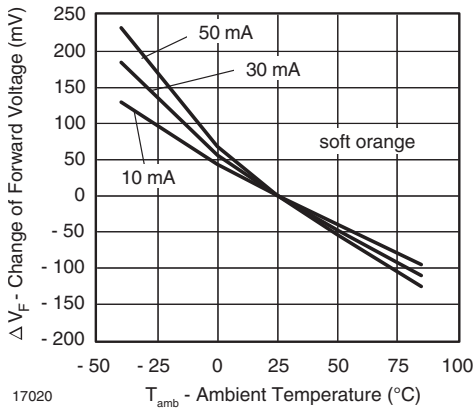


Fig. 20 - Change of Forward Voltage vs. Ambient Temperature

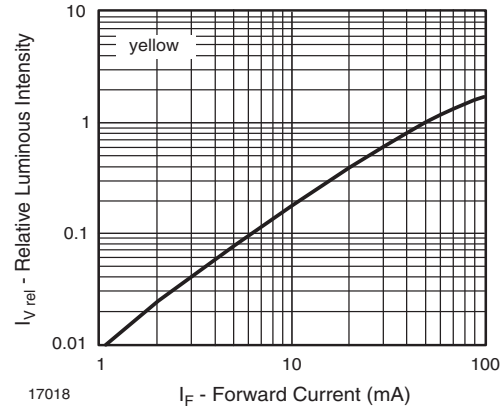


Fig. 23 - Relative Luminous Flux vs. Forward Current

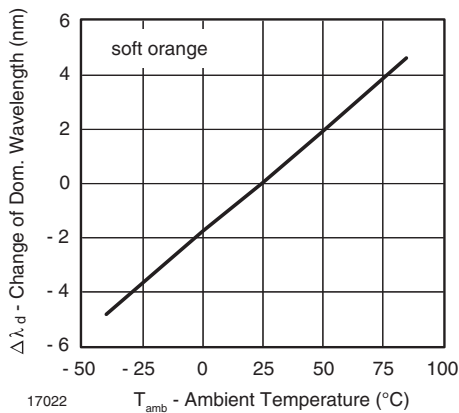


Fig. 21 - Change of Dominant Wavelength vs. Ambient Temperature

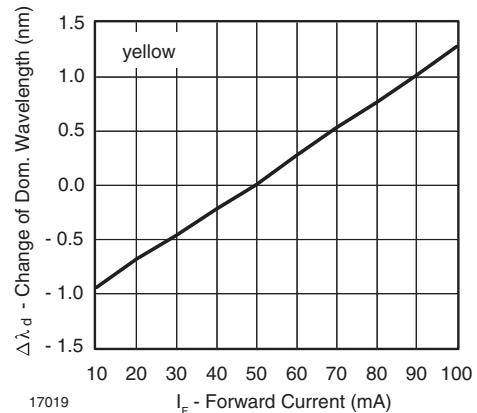


Fig. 24 - Change of Dominant Wavelength vs. Forward Current



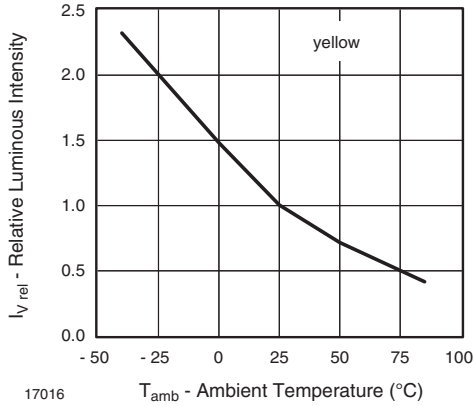


Fig. 25 - Relative Luminous Intensity vs. Ambient Temperature

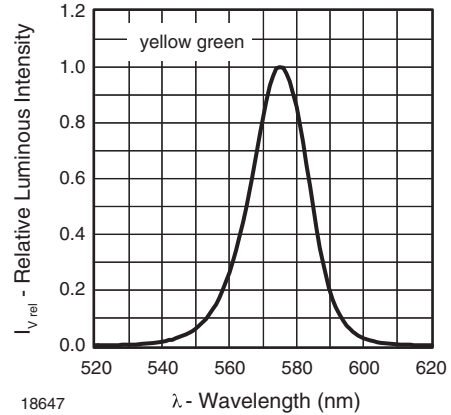


Fig. 28 - Relative Intensity vs. Wavelength

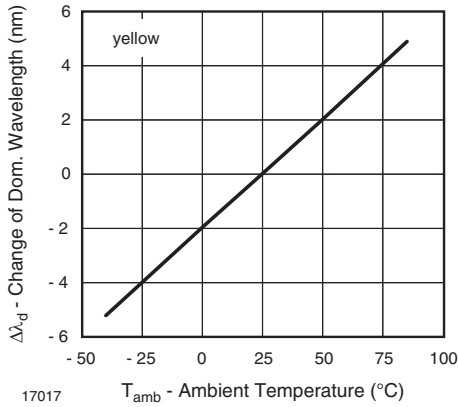


Fig. 26 - Change of Dominant Wavelength vs. Ambient Temperature

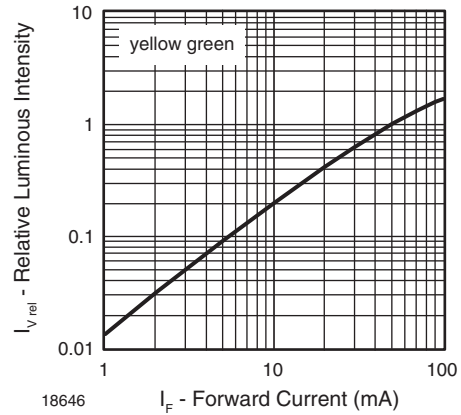


Fig. 29 - Relative Luminous Flux vs. Forward Current

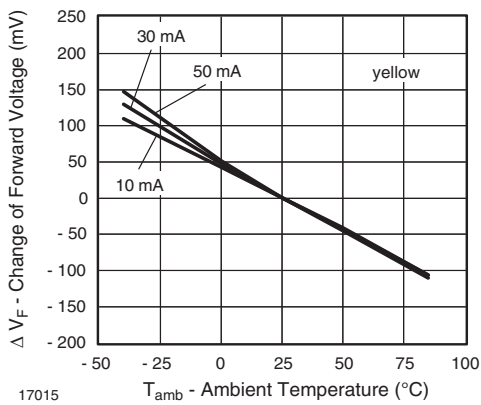


Fig. 27 - Change of Forward Voltage vs. Ambient Temperature

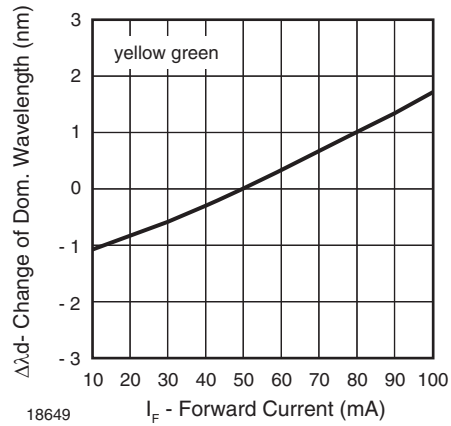


Fig. 30 - Change of Dominant Wavelength vs. Forward Current

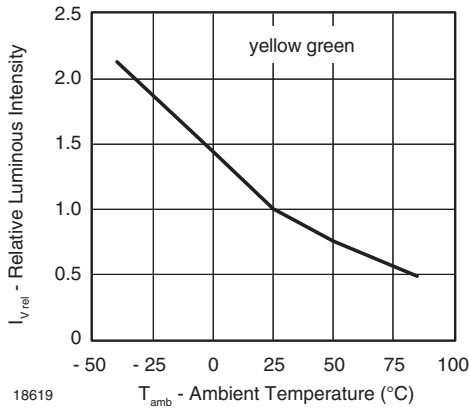


Fig. 31 - Relative Luminous Intensity vs. Ambient Temperature

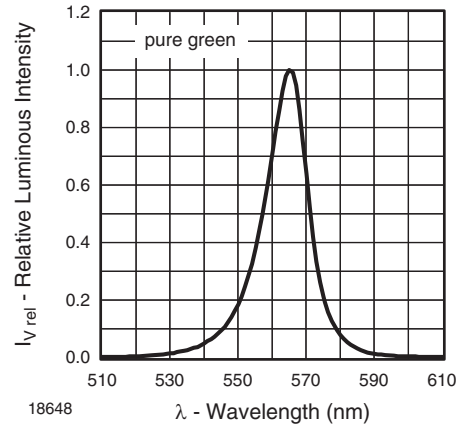


Fig. 34 - Relative Intensity vs. Wavelength

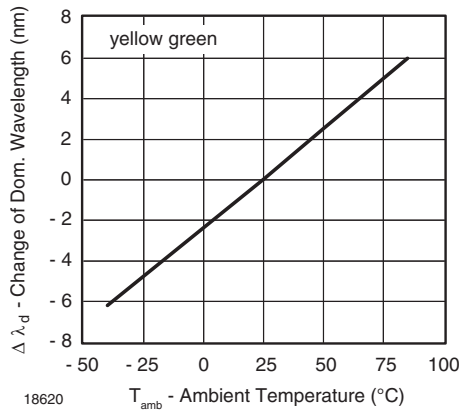


Fig. 32 - Change of Dominant Wavelength vs. Ambient Temperature

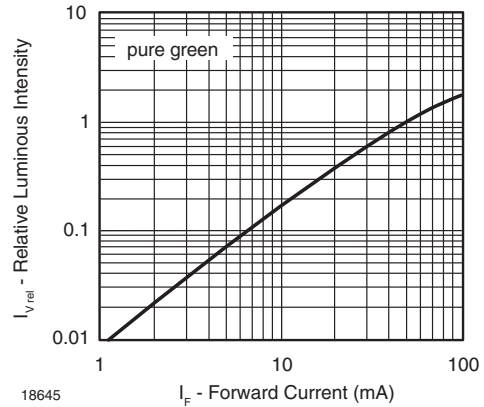


Fig. 35 - Relative Luminous Flux vs. Forward Current

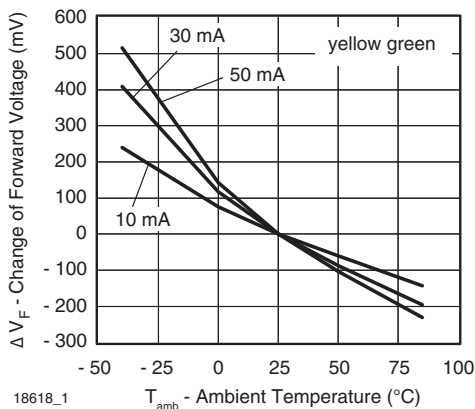


Fig. 33 - Change of Forward Voltage vs. Ambient Temperature

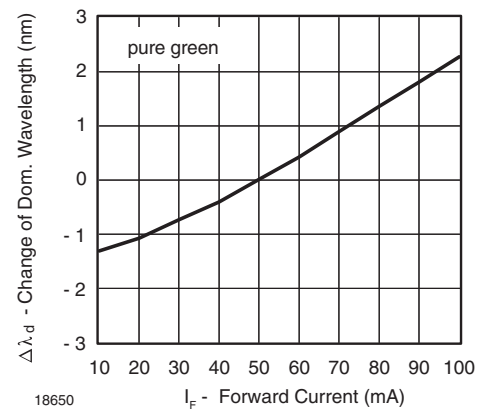


Fig. 36 - Change of Dominant Wavelength vs. Forward Current

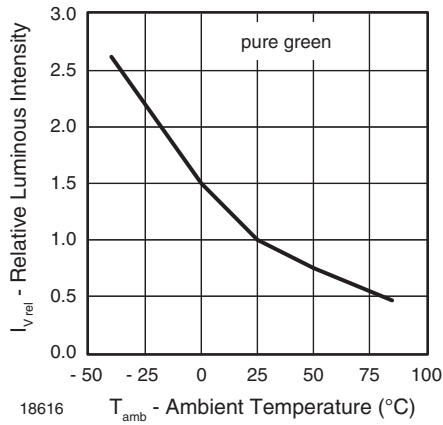


Fig. 37 - Relative Luminous Intensity vs. Ambient Temperature

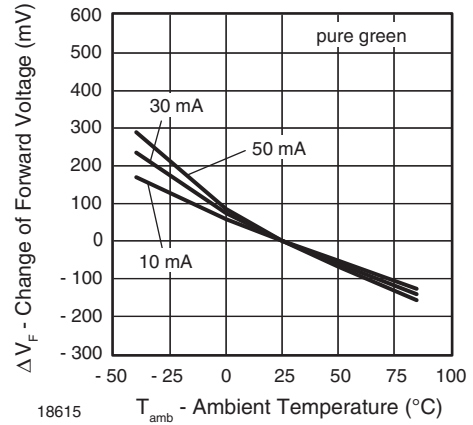


Fig. 39 - Change of Forward Voltage vs. Ambient Temperature

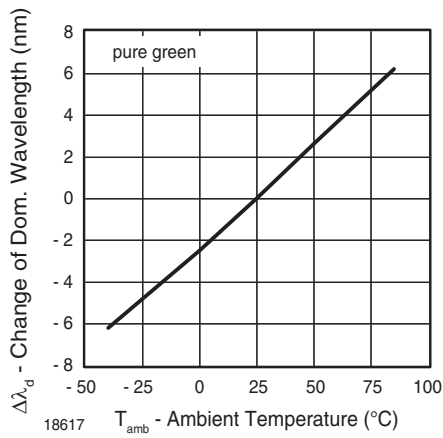
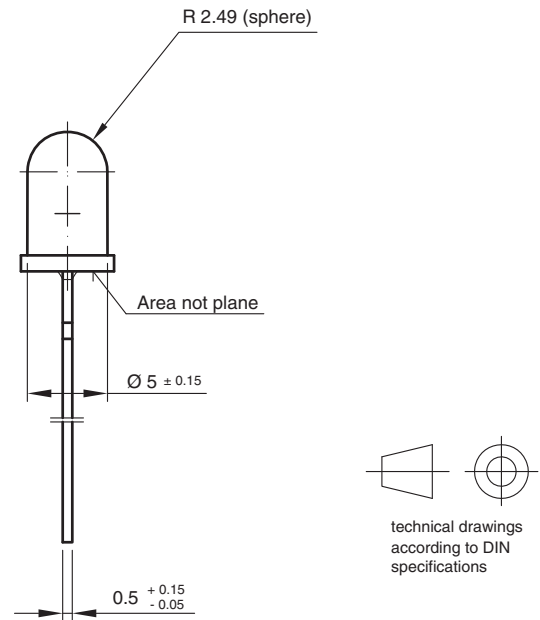
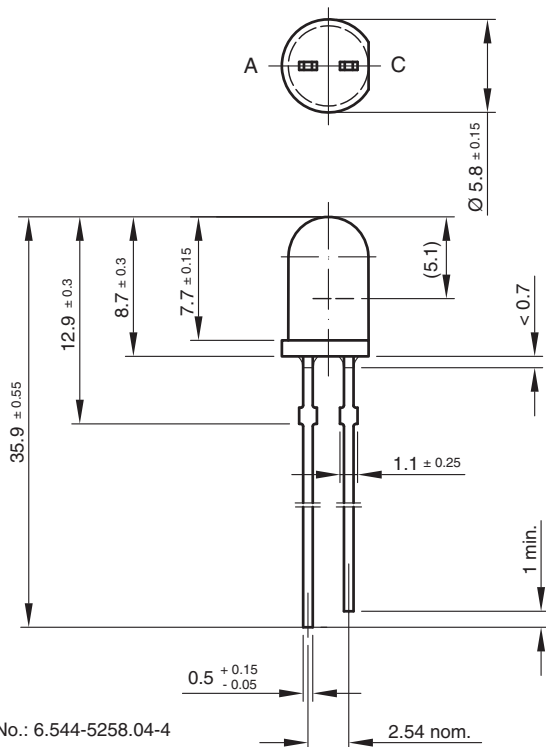


Fig. 38 - Change of Dominant Wavelength vs. Ambient Temperature



**PACKAGE DIMENSIONS** in millimeters



Drawing-No.: 6.544-5258.04-4  
Issue: 9; 23.07.10  
96 12121

**TAPE**

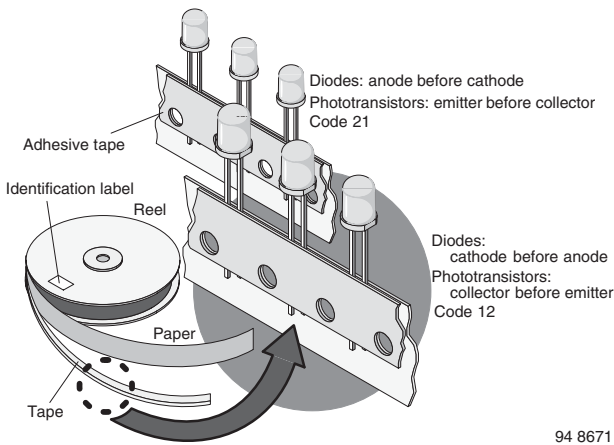


Fig. 40 - LED in Tape

94 8671

**AMMOPACK**

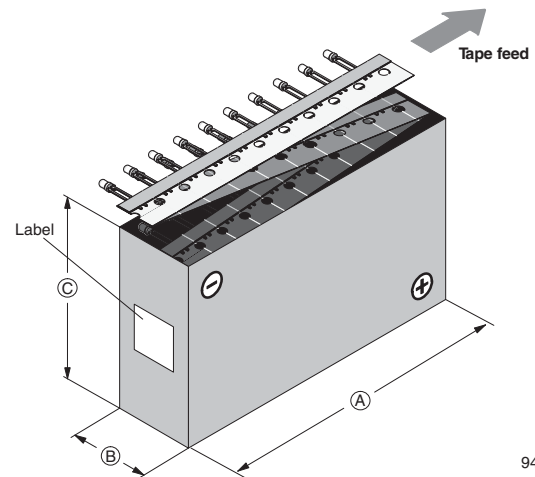


Fig. 41 - Tape Direction

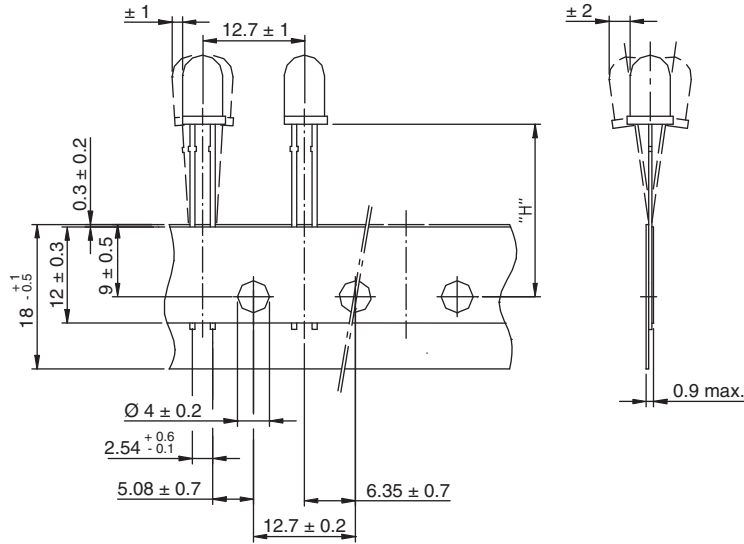
94 8667-1

**Note**

- The new nomenclature for ammpack 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



Measure limit over 20 index-holes: ± 1

Quantity per:	Reel (Mat.-no. 1764)
	1000

94 8172

Option	Dim. "H" ± 0.5 mm
AS	17.3



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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