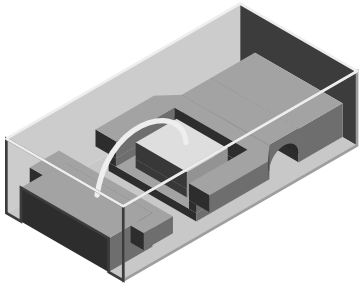
Low Current 0603 SMD LED



DESCRIPTION

The new 0603 LED series have been designed in the smallest SMD package. This innovative 0603 LED technology opens the way to

- Smaller products of higher performance
- More design in flexibility
- Enhanced applications

The 0603 LED is an obvious solution for small-scale, high power products that are expected to work reliability in an arduous environment.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD 0603
- Product series: low current
- Angle of half intensity: ± 80°

FEATURES

- Smallest SMD package 0603 with exceptional brightness 1.6 mm x 0.8 mm x 0.6 mm (L x W x H)
- High reliability lead frame based
- Temperature range -40 °C to +100 °C
- Footprint compatible to 0603 chipled
- Wavelength 633 nm (red), 606 nm (orange), 587 nm (yellow)
- AlInGaP technology
- Compatible to IR reflow soldering
- Viewing angle: Extremely wide 160°
- Grouping parameter: luminous intensity, wavelength
- Available in 8 mm tape
- Preconditioning according to JEDEC® level 2
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Backlight keypads
- Navigation systems
- Cellular phone displays
- Displays for industrial control systems
- Automotive features
- Miniaturized color effects
- Traffic displays

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.		
TLMS1000-GS15	Red	1.8	4	-	2	624	628	636	2	-	1.8	2.6	2	AlInGaP
TLMO1000-GS15	Soft orange	3.55	7.5	-	2	600	605	609	2	-	1.8	2.6	2	AlInGaP
TLMY1000-GS15	Yellow	3.55	7.5	-	2	580	588	595	2	-	1.8	2.6	2	AlInGaP

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified) **TLMS1000, TLMO1000, TLMY1000**				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage (1)		V_R	12	V
DC Forward current	$T_{amb} \leq 95$ °C	I_F	15	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	0.1	A
Power dissipation		P_V	40	mW
Junction temperature		T_j	120	°C
Operating temperature range		T_{amb}	-40 to +100	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	Acc. Vishay spec	T_{sd}	260	°C
Thermal resistance junction to ambient	Mounted on PC board (pad size > 5 mm^2)	R_{thJA}	500	K/W
ESD rating	HBM	V_{ESD}	2000	V

Note
(1) Driving the LED in reverse direction is suitable for short term application

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified) **TLMS1000, RED**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 2 mA	I_V	1.8	4	-	mcd
Dominant wavelength	I_F = 2 mA	λ_d	624	628	636	nm
Peak wavelength	I_F = 2 mA	λ_p	-	640	-	nm
Angle of half intensity	I_F = 2 mA	φ	-	± 80	-	°
Forward voltage	I_F = 2 mA	V_F	-	1.8	2.6	V
Reverse current	V_R = 6 V	I_R	-	-	10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified) **TLMO1000, SOFT ORANGE**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 2 mA	I_V	3.55	7.5	-	mcd
Dominant wavelength	I_F = 2 mA	λ_d	600	605	609	nm
Peak wavelength	I_F = 2 mA	λ_p	-	610	-	nm
Angle of half intensity	I_F = 2 mA	φ	-	± 80	-	°
Forward voltage	I_F = 2 mA	V_F	-	1.8	2.6	V
Reverse current	V_R = 6 V	I_R	-	-	10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified) **TLMY1000, YELLOW**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 2 mA	I_V	3.55	7.5	-	mcd
Dominant wavelength	I_F = 2 mA	λ_d	580	588	595	nm
Peak wavelength	I_F = 2 mA	λ_p	-	591	-	nm
Angle of half intensity	I_F = 2 mA	φ	-	± 80	-	°
Forward voltage	I_F = 2 mA	V_F	-	1.8	2.6	V
Reverse current	V_R = 6 V	I_R	-	-	10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

COLOR CLASSIFICATION

GROUP	DOMINANT WAVELENGTH (nm)			
	YELLOW		ORANGE	
	MIN.	MAX.	MIN.	MAX.
2	580	583	600	603
3	583	586	602	605
4	586	589	604	607
5	589	592	606	609
6	592	595		

Note

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm

LUMINOUS INTENSITY CLASSIFICATION

GROUP	LUMINOUS INTENSITY (mcd)	
	MIN.	MAX.
G1	1.80	2.24
G2	2.24	2.80
H1	2.80	3.55
H2	3.55	4.50
J1	4.50	5.60
J2	5.60	7.10
K1	7.10	9.00
K2	9.00	11.20
L1	11.20	14.00
L2	14.00	18.00

Note

- Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of ± 11 %.
  The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each reel (there will be no mixing of two groups on each reel).
  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 reel.
  In order to ensure availability, single wavelength groups will not be orderable.

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

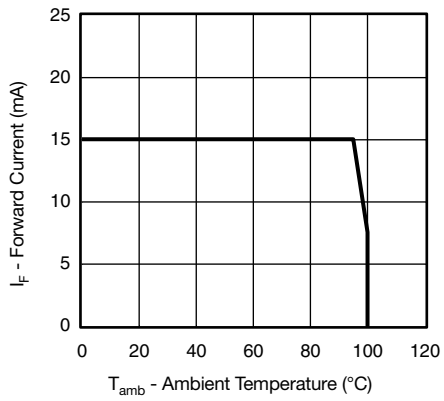


Fig. 1 - Forward Current vs. Ambient Temperature

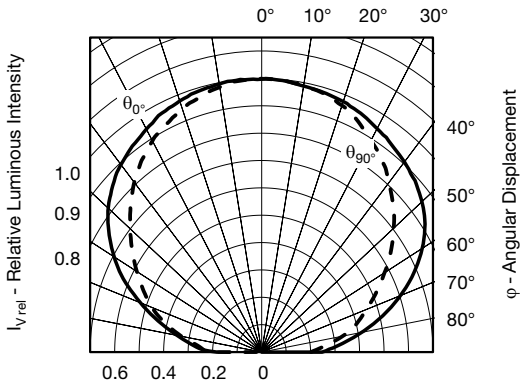


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

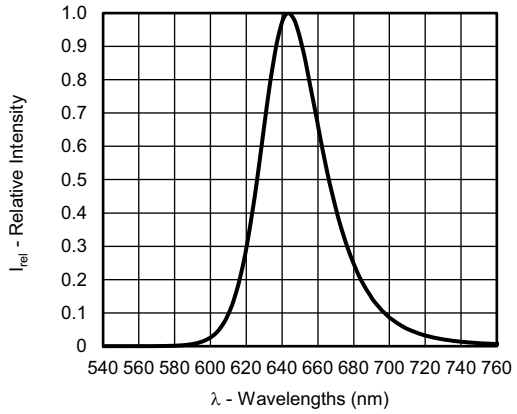


Fig. 3 - Relative Intensity vs. Angular Displacement

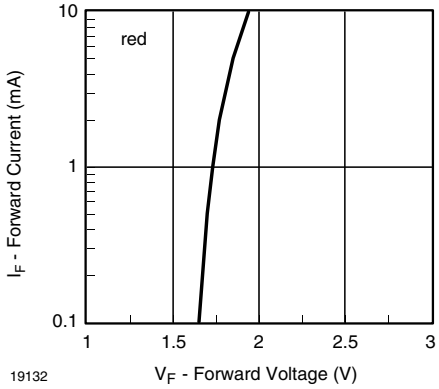


Fig. 6 - Forward Current vs. Forward Voltage

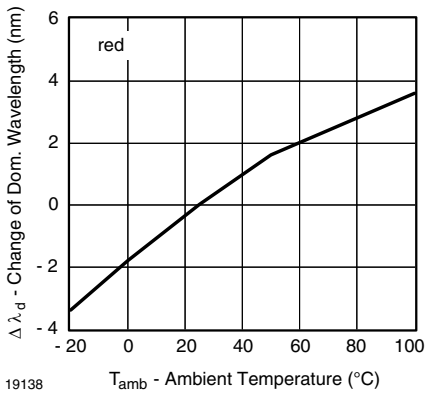


Fig. 4 - Change of Dominant Wavelength vs. Ambient Temperature

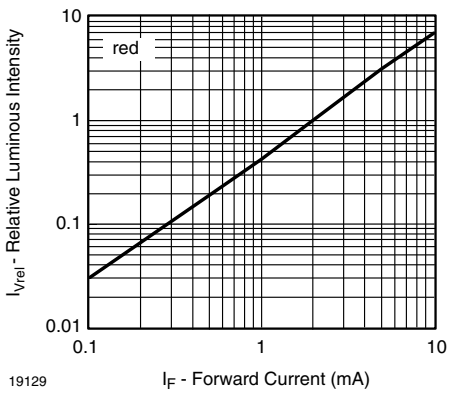


Fig. 7 - Relative Luminous Intensity vs. Forward Current

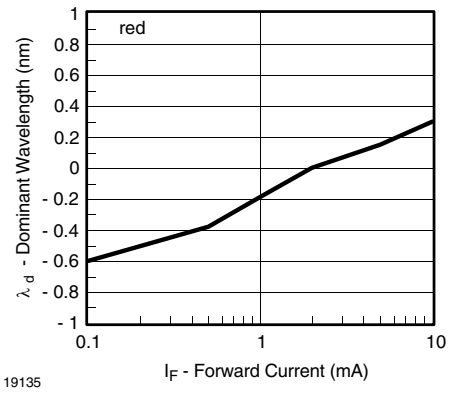


Fig. 5 - Dominant Wavelength vs. Forward Current

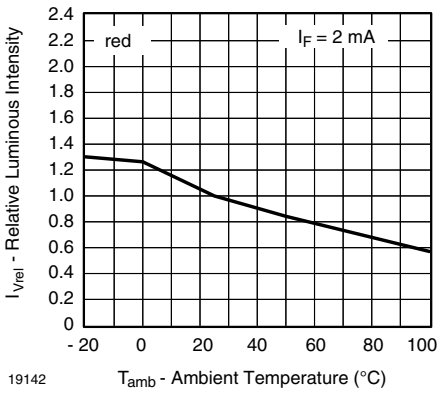


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

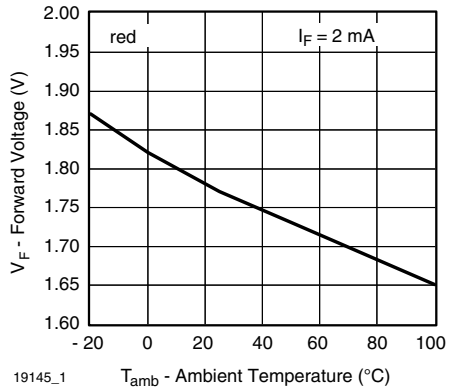


Fig. 9 - Forward Voltage vs. Ambient Temperature

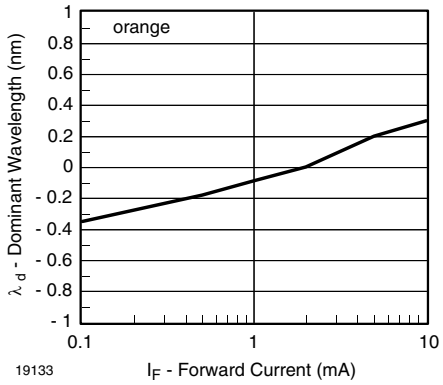


Fig. 12 - Dominant Wavelength vs. Forward Current

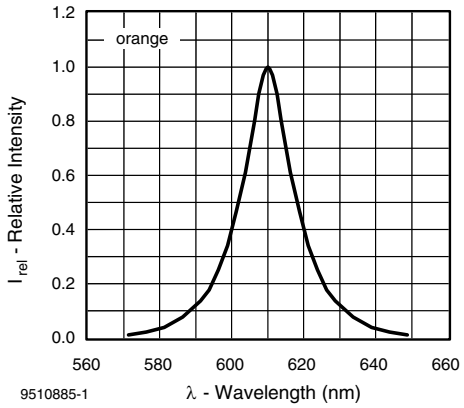


Fig. 10 - Relative Intensity vs. Wavelength

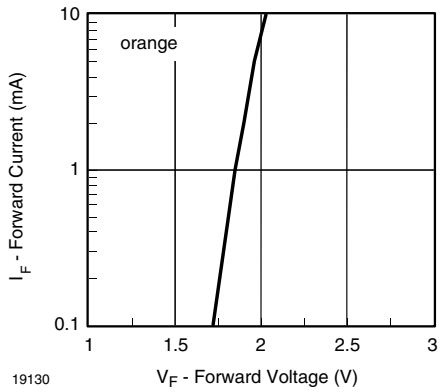


Fig. 13 - Forward Current vs. Forward Voltage

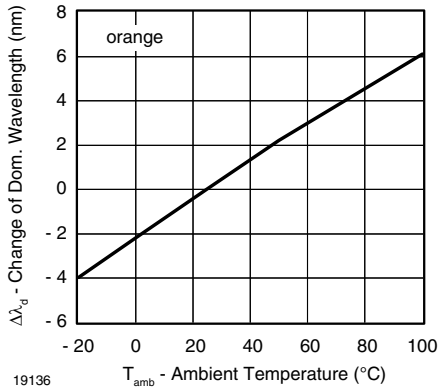


Fig. 11 - Change of Dominant Wavelength vs. Ambient Temperature

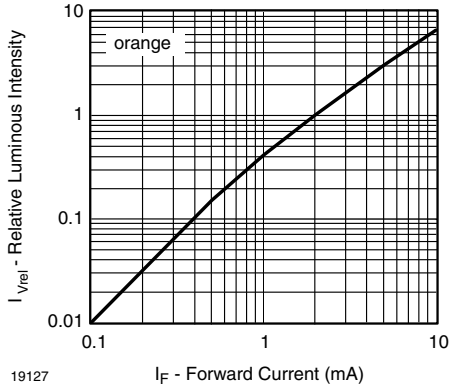


Fig. 14 - Relative Luminous Intensity vs. Forward Current

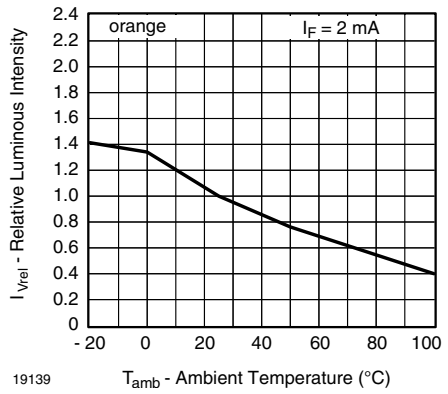


Fig. 15 - Relative Luminous Intensity vs. Ambient Temperature

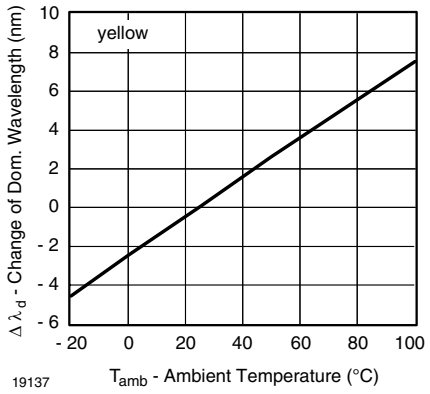


Fig. 18 - Change of Dominant Wavelength vs. Ambient Temperature

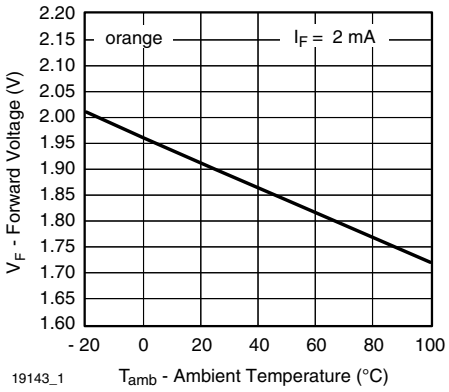


Fig. 16 - Forward Voltage vs. Ambient Temperature

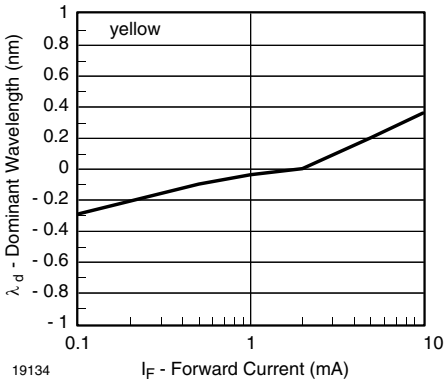


Fig. 19 - Dominant Wavelength vs. Forward Current

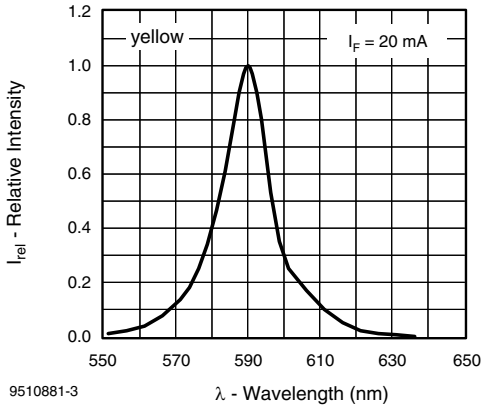


Fig. 17 - Relative Intensity vs. Wavelength

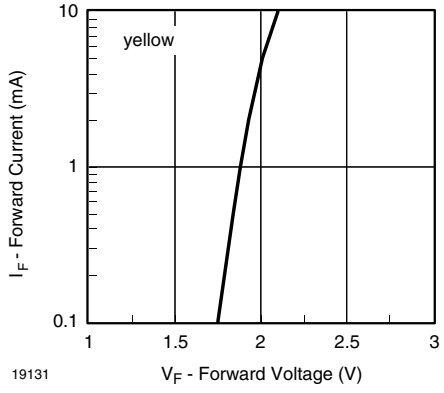


Fig. 20 - Forward Current vs. Forward Voltage

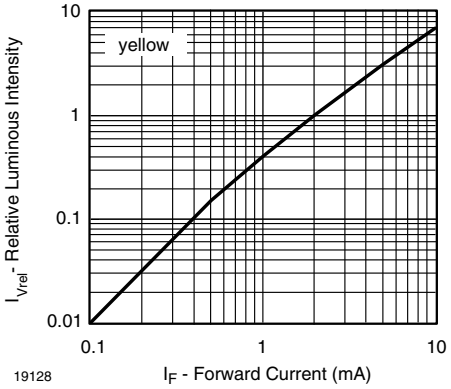


Fig. 21 - Relative Luminous Intensity vs. Forward Current

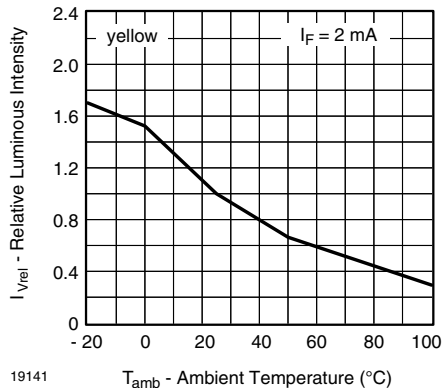


Fig. 22 - Relative Luminous Intensity vs. Ambient Temperature

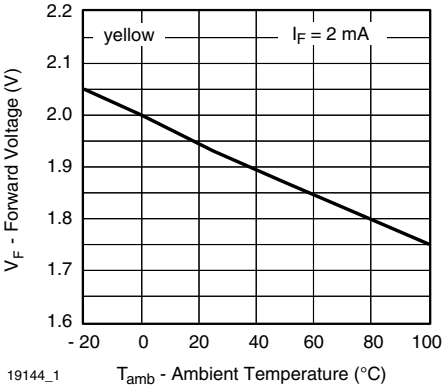
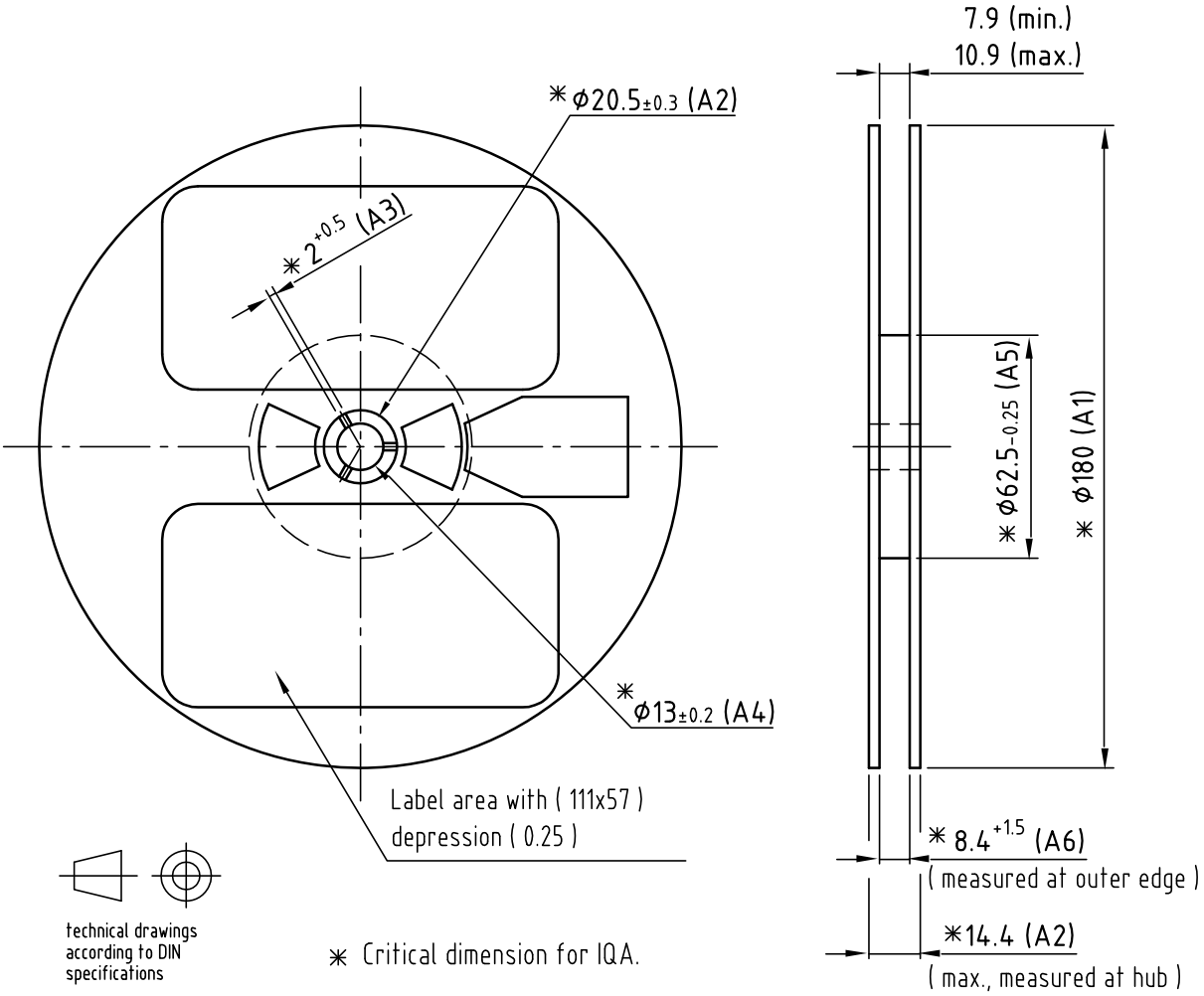


Fig. 23 - Forward Voltage vs. Ambient Temperature

REEL DIMENSIONS in millimeters



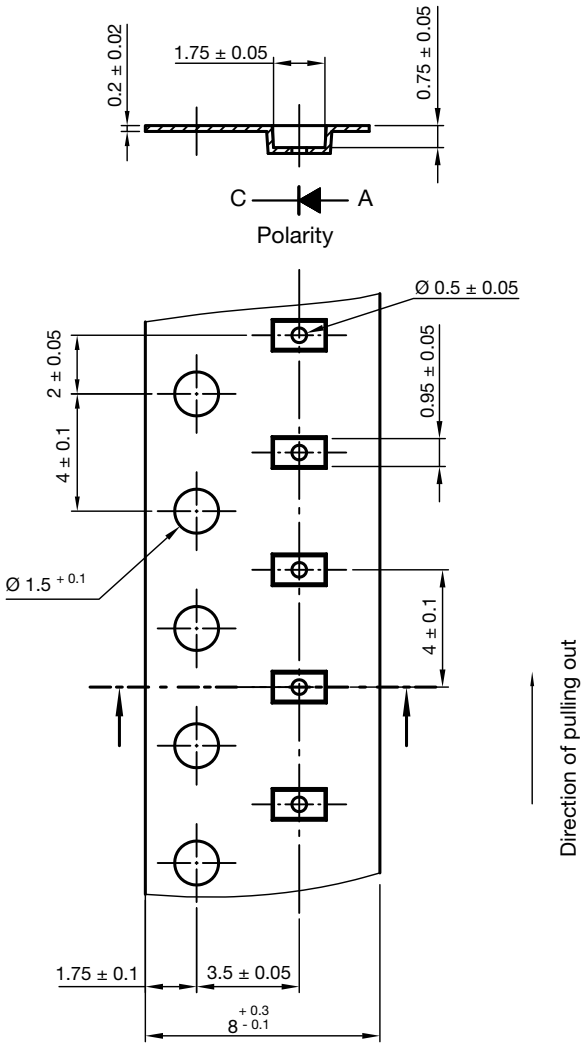
Drawing-No.: 9.800-5086.01-4
Issue: 1; 29.04.04

Not indicated tolerances ± 0.05

Material: black static dissipative

GS15: MOQ = 5000 pcs on one reel
(MOQ = minimum order quantity)

TAPE DIMENSIONS in millimeters

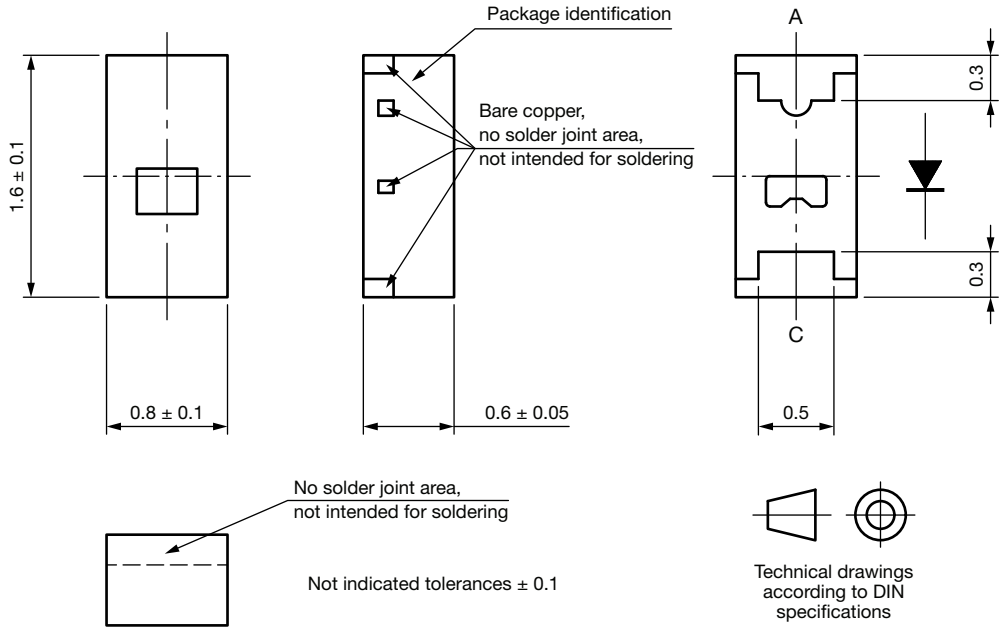


Technical drawings according to DIN specifications

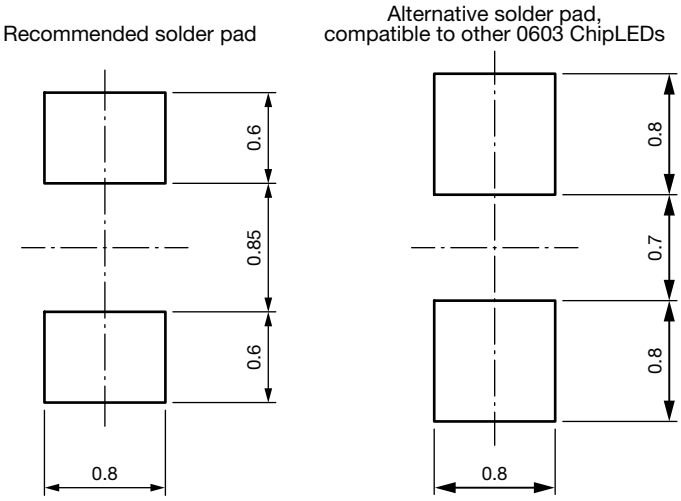
Not indicated tolerances ± 0.05
Material: Conductive black PC

Drawing-No.: 9.700-5290.01-4
Issue: 3; 24.09.13

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.541-5056.01-4
Issue: prelim. 4; 10.05.2023



Note
- Solder joints are only formed on the bottom of the component and solder filet will not be observable on the sides of the component

SOLDERING PROFILE

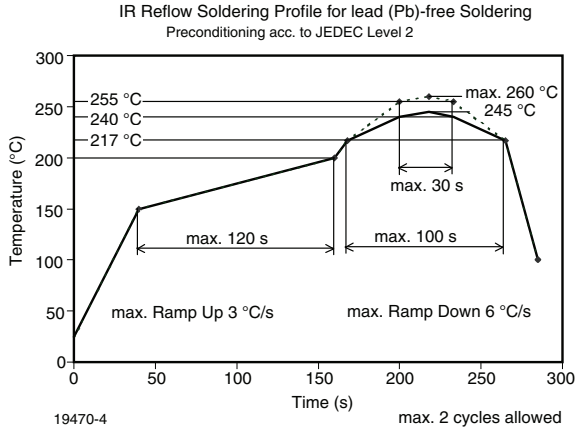
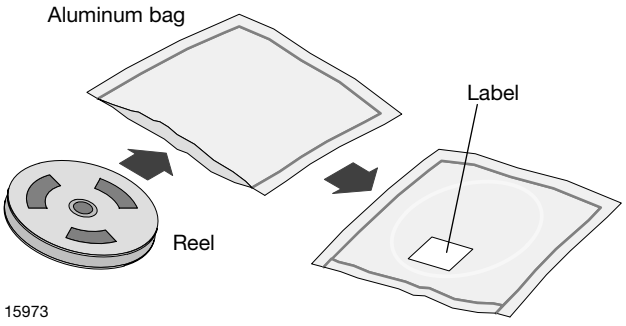


Fig. 24 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

DRY PACKING

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



FINAL PACKING

A cardboard outer box is used for shipping purposes.

RECOMMENDED METHOD OF STORAGE

Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

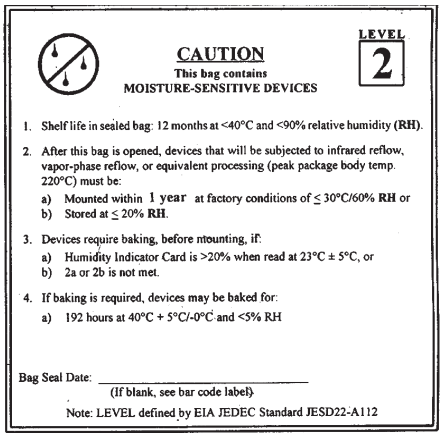
After more than 1 year under these conditions moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen) or

96 h at 60 °C + 5 °C and < 5 % RH for all device containers or 24 h at 100 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC standard JESD22-A112 level 2 label is included on all dry bags.



Example of JESD22-A112 level 2 label

ESD PRECAUTION

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electro-static sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABEL

The Vishay Semiconductors standard bar code labels are printed at final packing areas. The labels are on each packing unit and contain Vishay Semiconductors specific data.

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