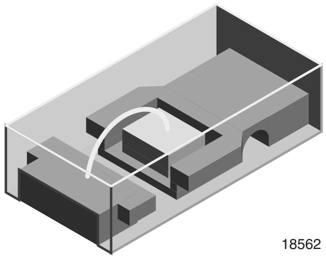
Standard 0603 SMD LED



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: standard
- 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 570 nm (green), 561 nm (pure green), 589 nm (yellow), 606 nm (orange), 633 nm (red)
- AllnGaP and GaN technology
- Viewing angle: extremely wide 160°
- Grouping parameter: luminous intensity, wavelength
- Available in 8 mm tape
- Compatible to IR reflow soldering
- 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.		
TLMS1100-GS08 (1)	Red	32	63	-	20	627	633	639	20	1.8	2.1	2.4	20	AllnGaP
TLMS1100-GS15	Red	32	63	-	20	627	633	639	20	1.8	2.1	2.4	20	AllnGaP
TLMS1101-GS08 (1)	Red	50	-	125	20	627	633	639	20	1.8	2.1	2.4	20	AllnGaP
TLMS1101-GS15	Red	50	-	125	20	627	633	639	20	1.8	2.1	2.4	20	AllnGaP
TLMO1100-GS08 (1)	Orange	50	80	-	20	600	606	609	20	1.8	2.1	2.4	20	AllnGaP
TLMO1100-GS15	Orange	50	80	-	20	600	606	609	20	1.8	2.1	2.4	20	AllnGaP
TLMY1100-GS08 (1)	Yellow	50	80	-	20	580	589	595	20	1.8	2.1	2.4	20	AllnGaP
TLMY1100-GS015	Yellow	50	80	-	20	580	589	595	20	1.8	2.1	2.4	20	AllnGaP
TLMG1100-GS08 (1)	Green	12.5	35	-	20	564	570	575	20	1.8	2.1	2.4	20	AllnGaP
TLMG1100-GS15	Green	12.5	35	-	20	564	570	575	20	1.8	2.1	2.4	20	AllnGaP
TLMP1100-GS08 (1)	Pure green	6.3	15	-	20	551	561	566	20	1.8	2.1	2.4	20	AllnGaP
TLMP1100-GS15	Pure green	6.3	15	-	20	551	561	566	20	1.8	2.1	2.4	20	AllnGaP

Note

- Will be changed from GS08 (3000 pcs per reel) to GS15 (5000 pcs per reel)

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified) **TLMS110., TLMO1100, TLMY1100, TLMG1100, TLMP1100**				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage [(1)]		V_R	12	V
DC forward current	T_{amb} ≤ 75 °C	I_F	30	mA
Surge forward current	t_p ≤ 10 μs	I_{FSM}	0.5	A
Power dissipation		P_V	90	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	According to Vischay specification	T_{sd}	+260	°C
Thermal resistance junction to ambient	Mounted on PC board (pad size > 5 mm^2)	R_{thJA}	480	K/W

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) **TLMS110., RED**							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 20 mA	TLMS1100	I_V	32	63	-	mcd
		TLMS1101		50	-	125	
Dominant wavelength	I_F = 20 mA		λ_d	627	633	639	nm
Peak wavelength	I_F = 20 mA		λ_p	-	645	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 80	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2.1	2.4	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) **TLMO1100, ORANGE**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 20 mA	I_V	50	80	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	600	606	609	nm
Peak wavelength	I_F = 20 mA	λ_p	-	610	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	°
Forward voltage	I_F = 20 mA	V_F	1.8	2.1	2.4	V
Reverse current	V_R = 6 V		I_R	-	-	10
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified) **TLMY1100, YELLOW**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 20 mA	I_V	50	80	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	580	589	595	nm
Peak wavelength	I_F = 20 mA	λ_p	-	591	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	°
Forward voltage	I_F = 20 mA	V_F	1.8	2.1	2.4	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) **TLMG1100, GREEN**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 20 mA	I_V	12.5	35	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	564	570	575	nm
Peak wavelength	I_F = 20 mA	λ_p	-	572	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	°
Forward voltage	I_F = 20 mA	V_F	1.8	2.1	2.4	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) **TLMP1100, PURE GREEN**						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 20 mA	I_V	6.3	15	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	551	561	566	nm
Peak wavelength	I_F = 20 mA	λ_p	-	562	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	°
Forward voltage	I_F = 20 mA	V_F	1.8	2.1	2.4	V
Reverse current	V_R = 6 V	I_R	-	-	10	μA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

LUMINOUS INTENSITY/FLUX CLASSIFICATION		
GROUP	**LUMINOUS INTENSITY I_V (mcd)**	
	MIN.	**MAX.**
Pa	4	6.3
Pb	5	8
Qa	6.3	10
Qb	8	12.5
Ra	10	16
Rb	12.5	20
Sa	16	25
Sb	20	32
Ta	25	40
Tb	32	50
Ua	40	63
Ub	50	80
Va	63	100
Vb	80	125
Wa	100	160
Wb	125	200

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 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

COLOR CLASSIFICATION

GROUP	DOM. WAVELENGTH (nm)							
	PURE GREEN		GREEN		YELLOW		ORANGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	551	554	564	566	-	-	-	-
2	554	557	566	569	580	583	600	603
3	557	560	569	572	583	586	603	606
4	560	563	572	575	586	589	606	609
5	563	566	-	-	589	592	609	612
6	-	-	-	-	592	595	-	-

Note

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

GROUP NAME ON LABEL

LUMINOUS INTENSITY GROUP	HALFGROUP	WAVELENGTH
Q	b	4

Note

- One packing unit/tape contains only one classification group of luminous intensity, color and forward voltage.
  Only one single classification groups is not available.
  The given groups are not order codes, customer specific group combinations require marketing agreement.
  No color subgrouping for super red

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

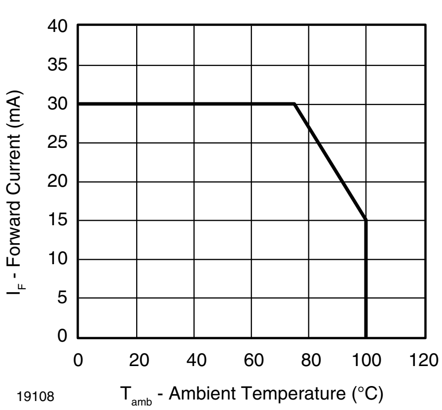


Fig. 1 - Forward Current vs. Ambient Temperature

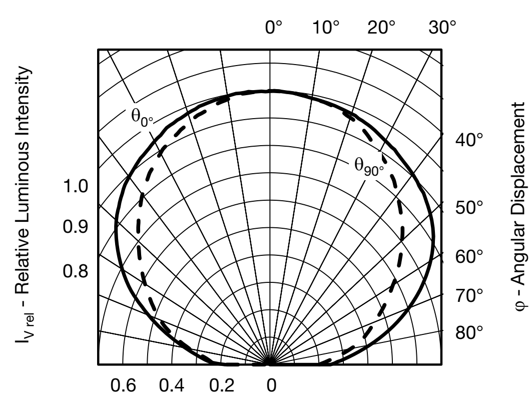


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

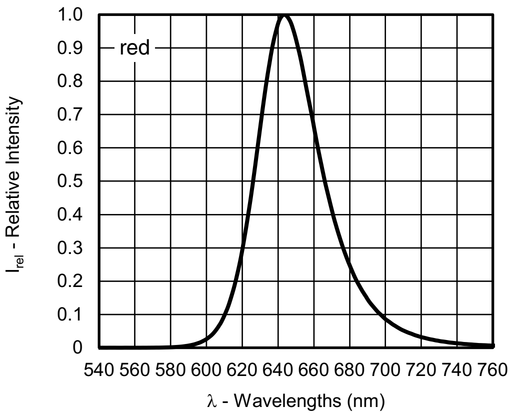


Fig. 3 - Relative Intensity vs. Wavelength

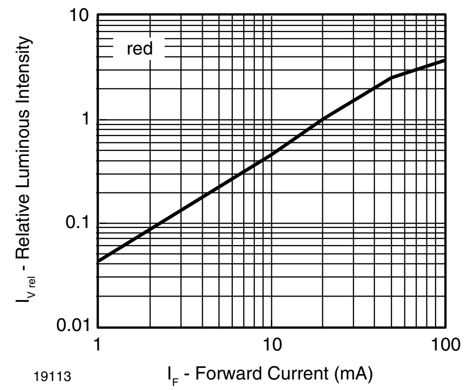


Fig. 6 - Relative Luminous Intensity vs. Forward Current

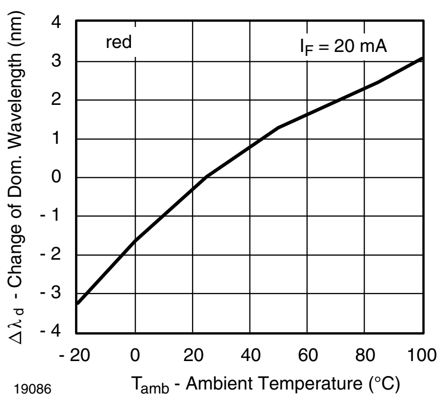


Fig. 4 - Change of Dominant Wavelength vs. Ambient Temperature

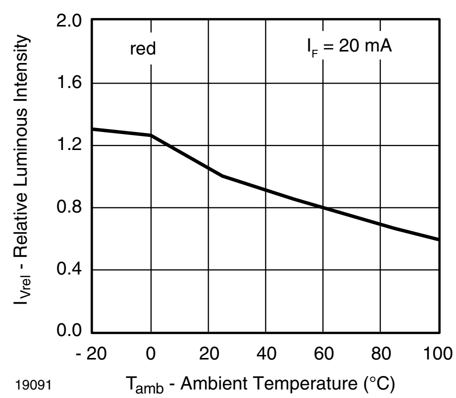


Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

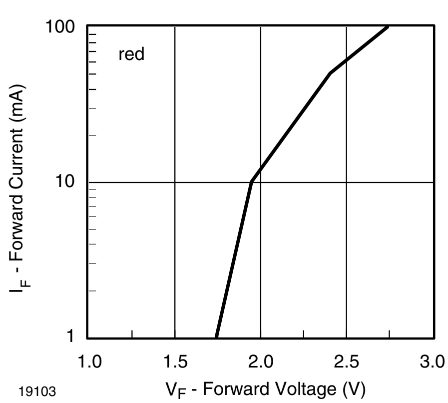


Fig. 5 - Forward Current vs. Forward Voltage

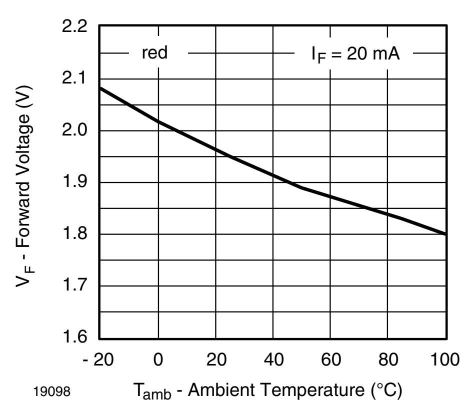


Fig. 8 - Forward Voltage vs. Ambient Temperature

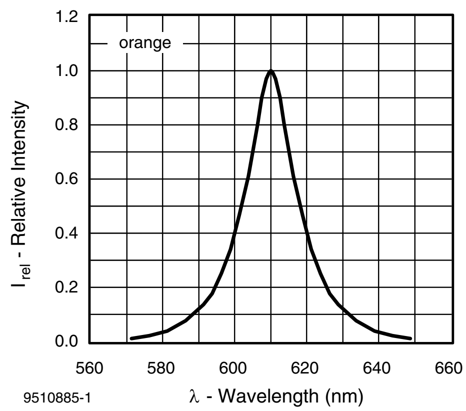


Fig. 9 - Relative Intensity vs. Wavelength

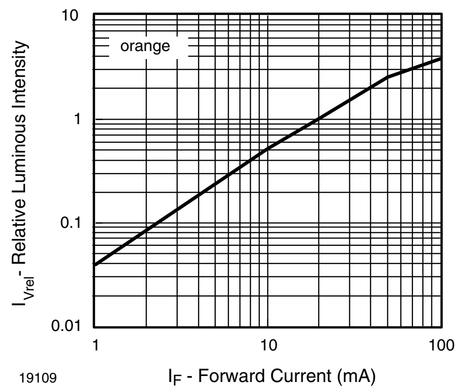


Fig. 12 - Relative Luminous Intensity vs. Forward Current

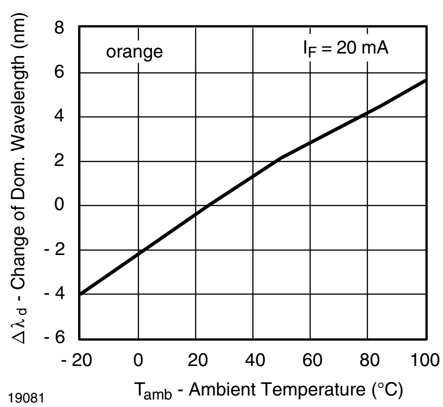


Fig. 10 - Change of Dominant Wavelength vs. Ambient Temperature

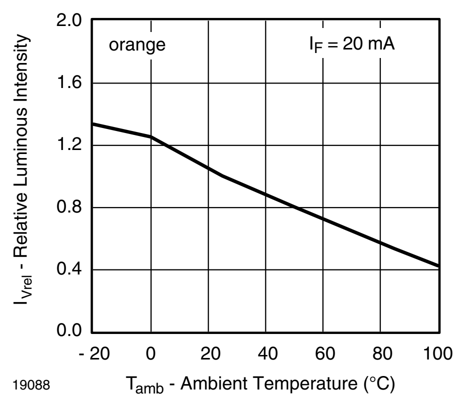


Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

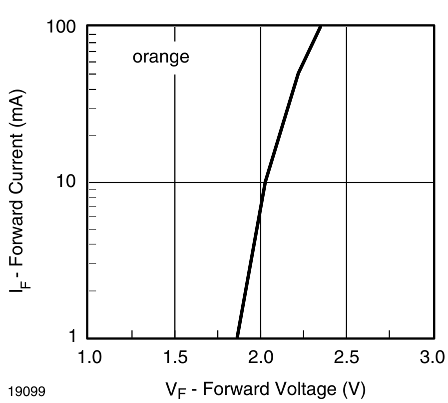


Fig. 11 - Forward Current vs. Forward Voltage

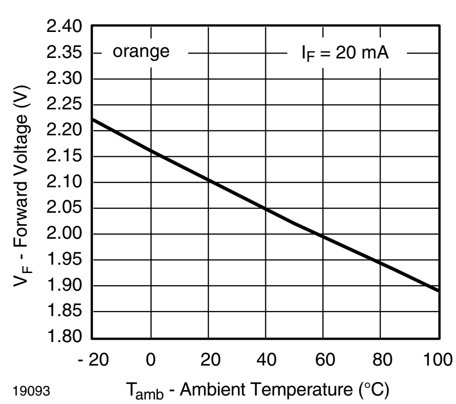


Fig. 14 - Forward Voltage vs. Ambient Temperature

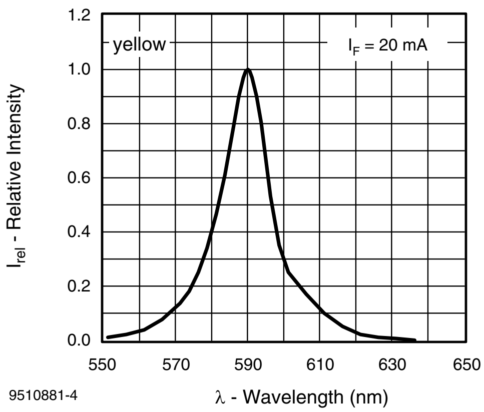


Fig. 15 - Relative Intensity vs. Wavelength

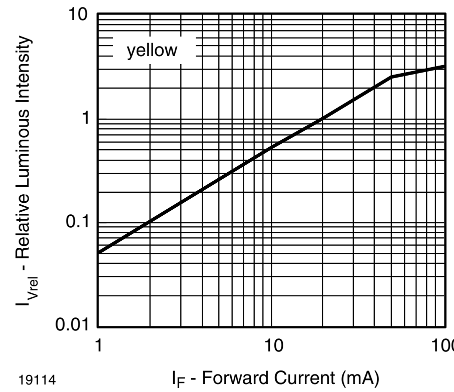


Fig. 18 - Relative Luminous Intensity vs. Forward Current

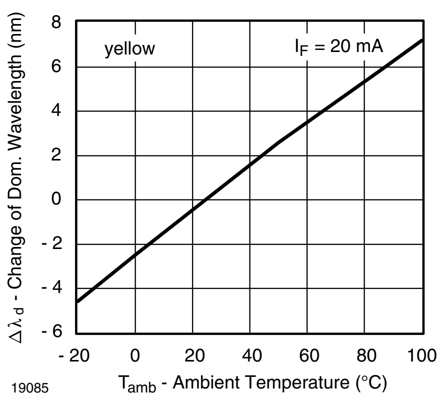


Fig. 16 - Change of Dominant Wavelength vs. Ambient Temperature

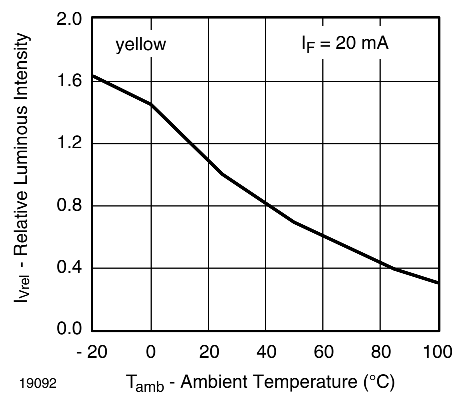


Fig. 19 - Relative Luminous Intensity vs. Ambient Temperature

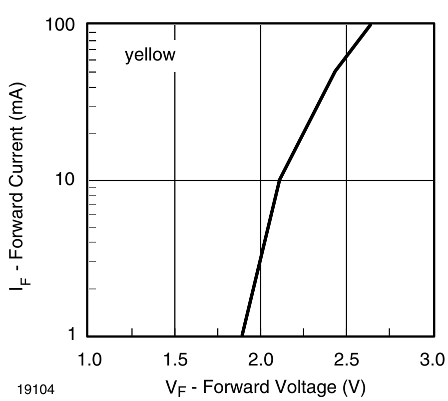


Fig. 17 - Forward Current vs. Forward Voltage

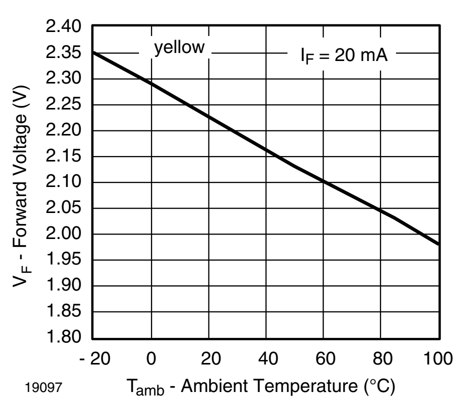


Fig. 20 - Forward Voltage vs. Ambient Temperature

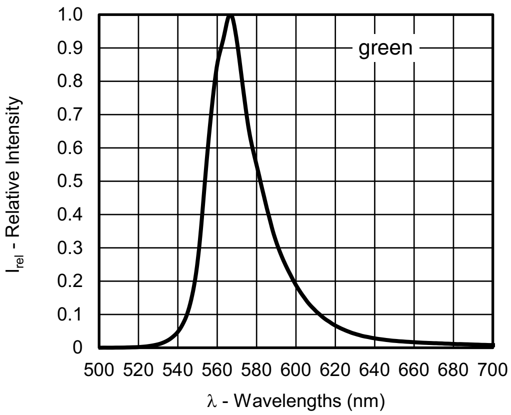


Fig. 21 - Relative Intensity vs. Wavelength

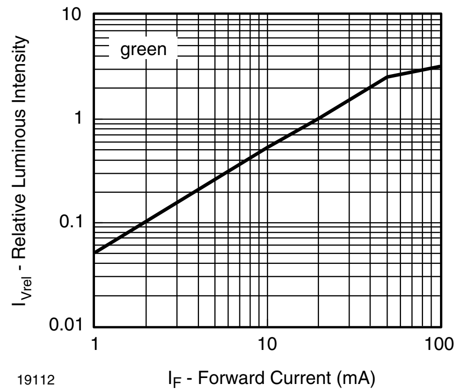


Fig. 24 - Relative Luminous Intensity vs. Forward Current

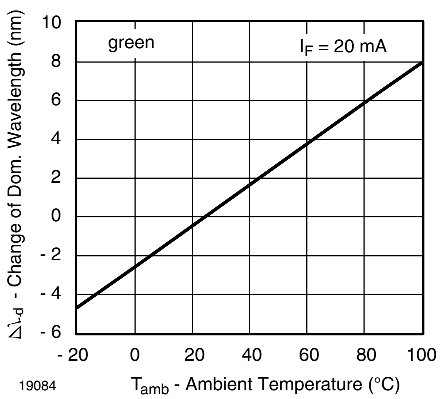


Fig. 22 - Change of Dominant Wavelength vs. Ambient Temperature

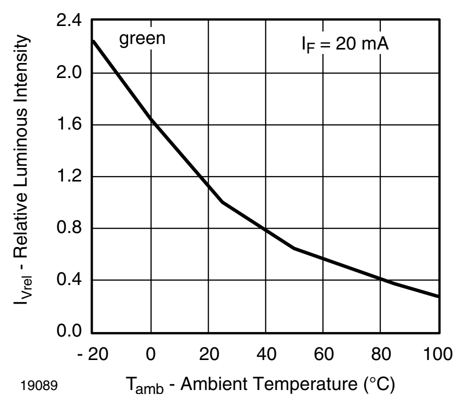


Fig. 25 - Relative Luminous Intensity vs. Ambient Temperature

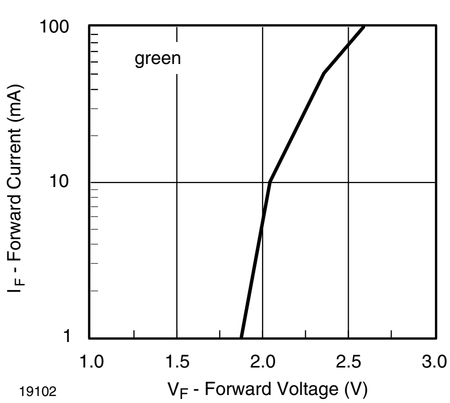


Fig. 23 - Forward Current vs. Forward Voltage

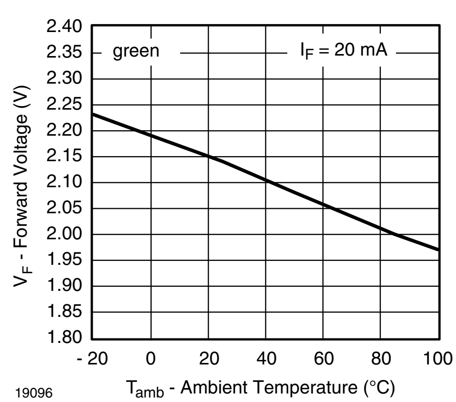


Fig. 26 - Forward Voltage vs. Ambient Temperature

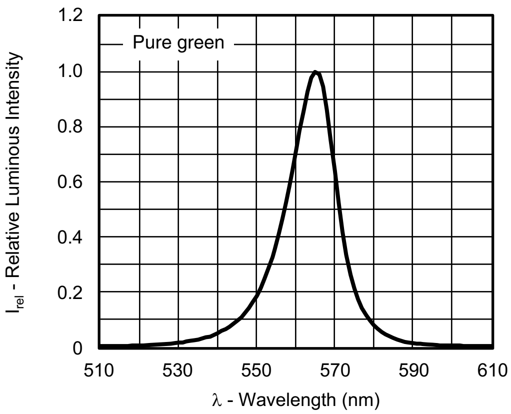


Fig. 27 - Relative Intensity vs. Wavelength

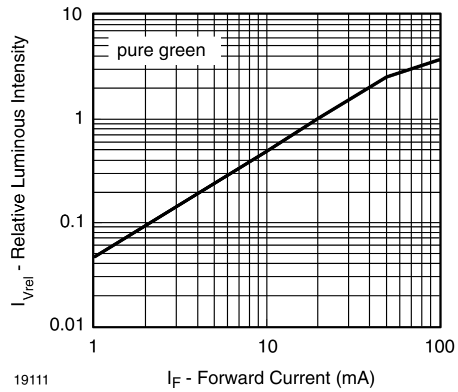


Fig. 30 - Relative Luminous Intensity vs. Forward Current

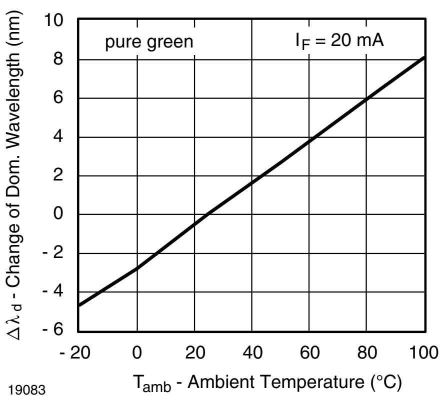


Fig. 28 - Change of Dominant Wavelength vs. Ambient Temperature

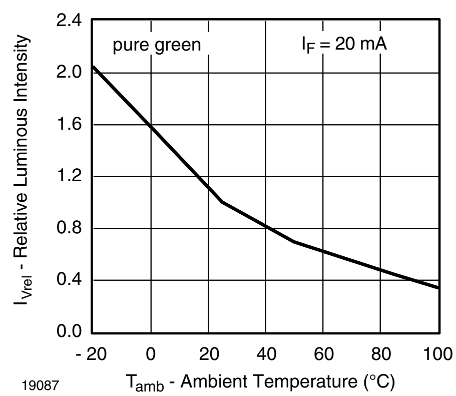


Fig. 31 - Relative Luminous Intensity vs. Ambient Temperature

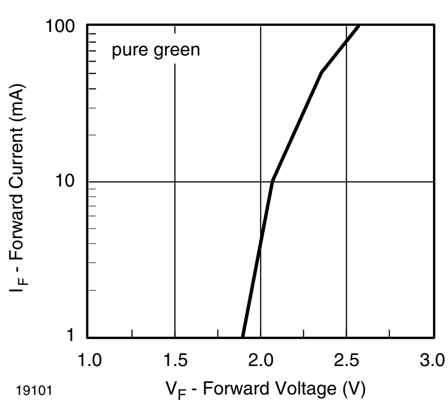


Fig. 29 - Forward Current vs. Forward Voltage

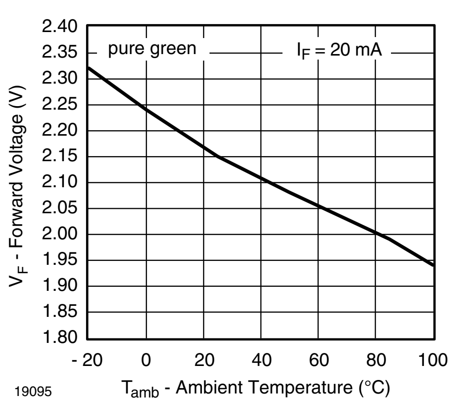
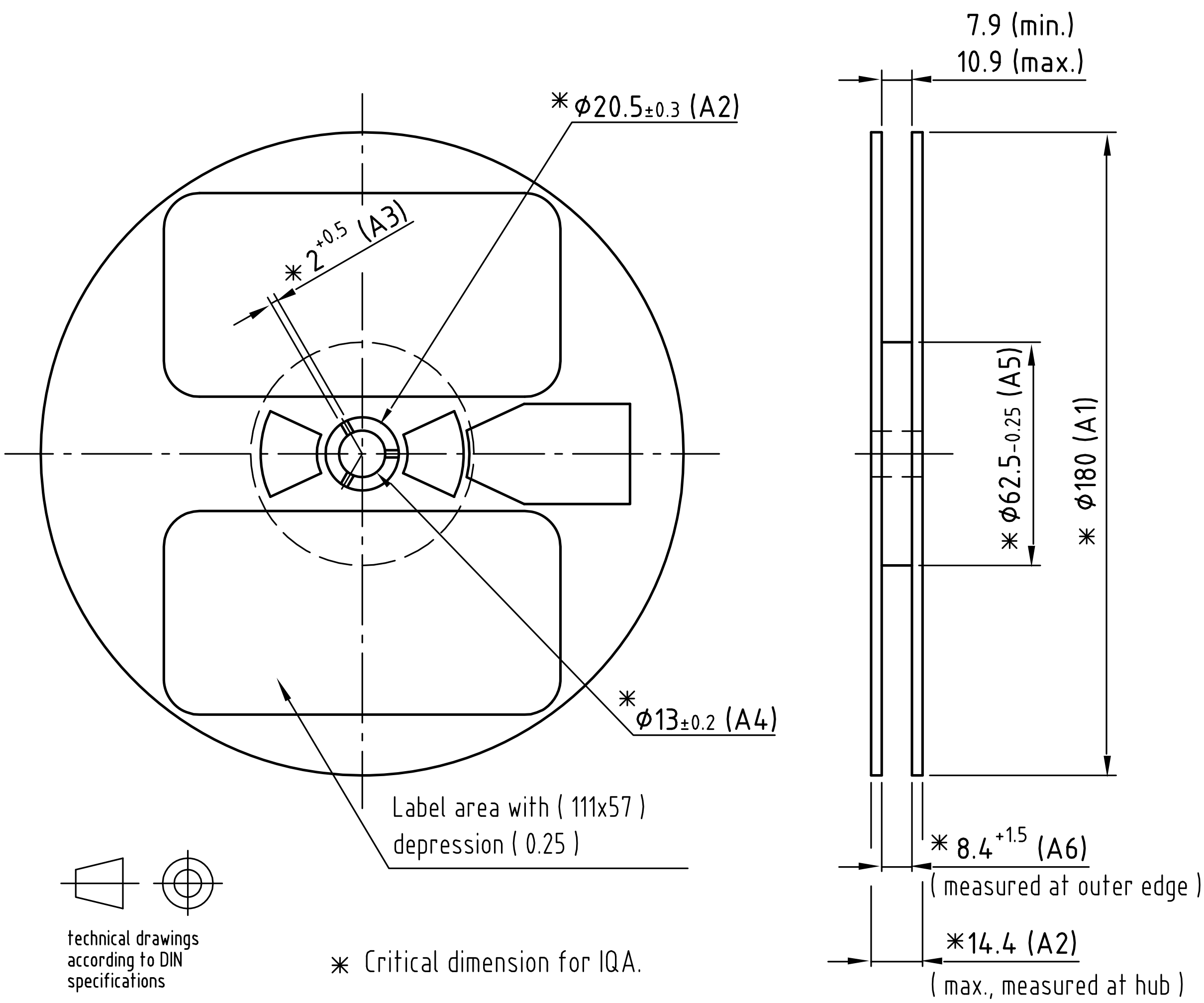


Fig. 32 - Forward Voltage vs. Ambient Temperature

REEL DIMENSIONS in millimeters



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

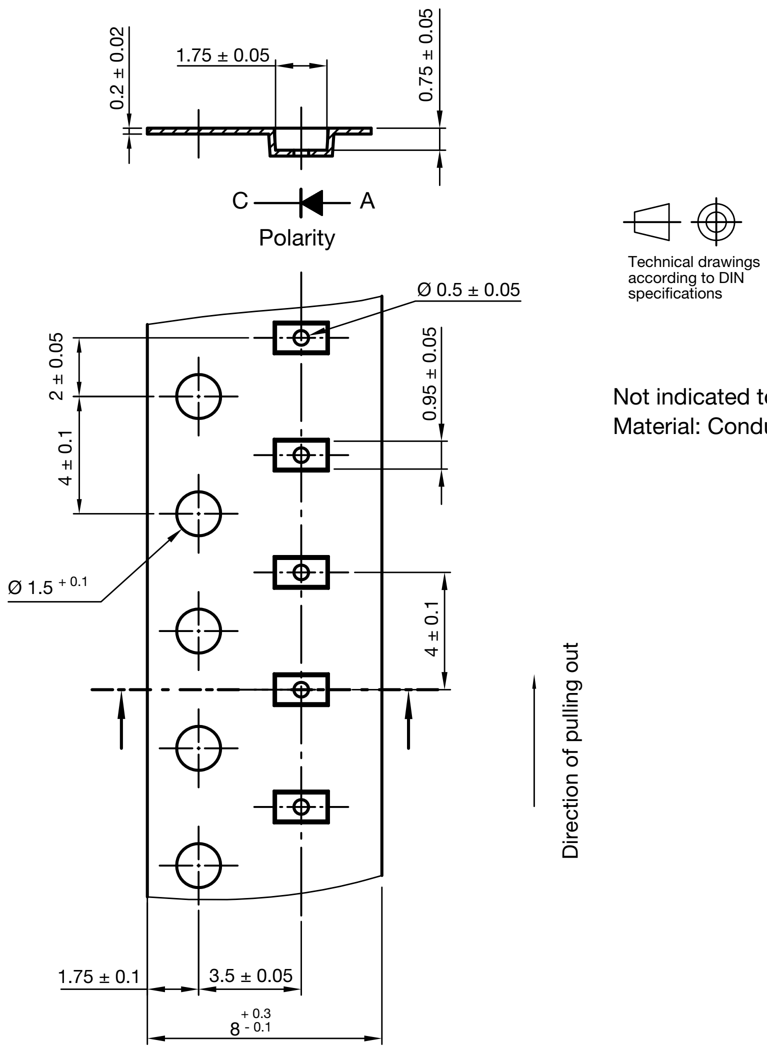
19043

Not indicated tolerances ± 0.05

Material: black static dissipative

GS08: MOQ = 3000 pcs on one reel
GS15: MOQ = 5000 pcs on one reel
(MOQ = minimum order quantity)

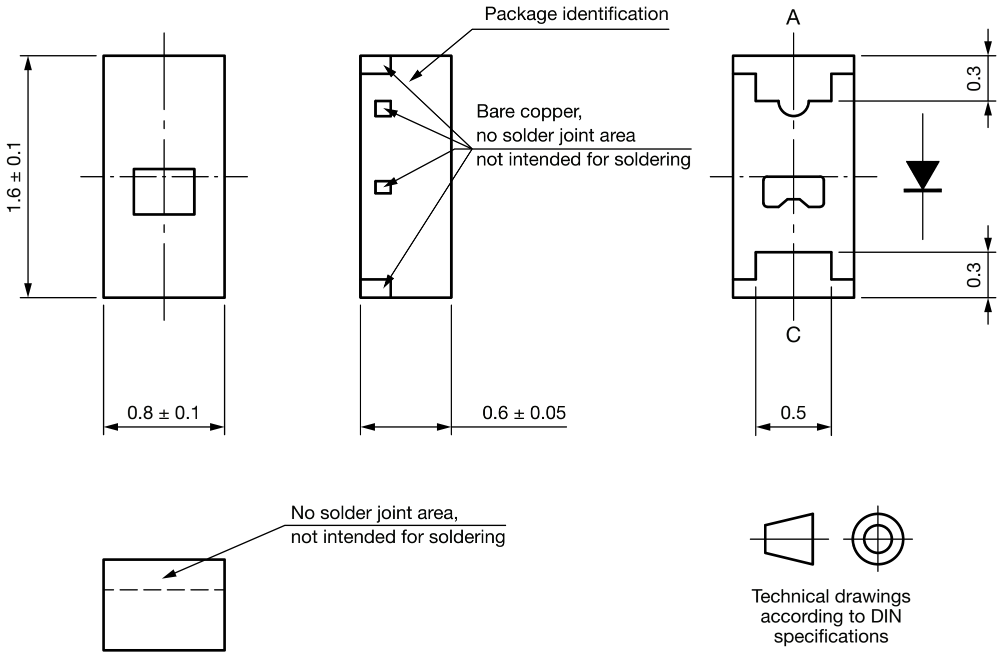
TAPE DIMENSIONS in millimeters



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: 3; 20.01.2022

Not indicated tolerances ± 0.1

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

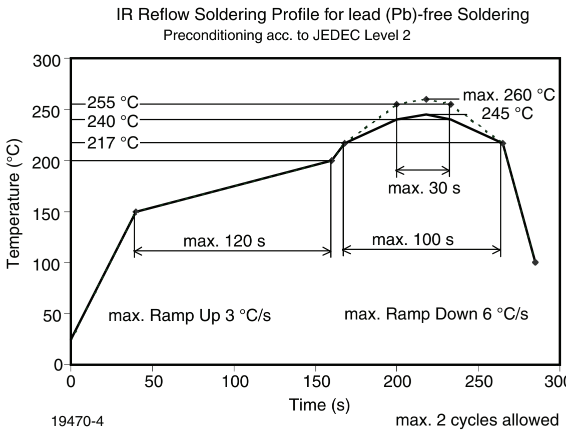
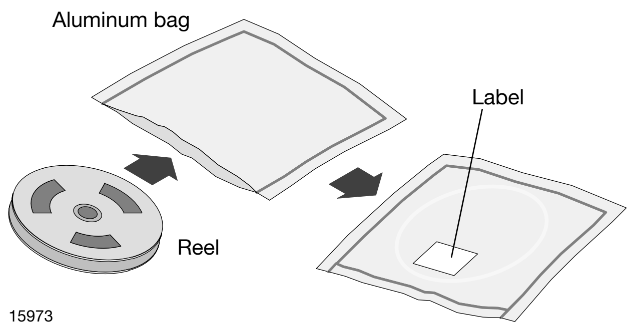


Fig. 33 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

DRY PACKING

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



FINAL PACKING

The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

HANDLING REMARK

Since a ChipLED is very tiny and light, it can become more vulnerable to sticking on the cover tape during the assembly process. Therefore it is highly recommended to consider precautionary actions addressing the triboelectric effect as described in the application note: “How to Avoid ChipLEDs Sticking to Cover Tape During Automated Tape-and-Reel Assembly” (www.vishay.com/doc?84998).

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:

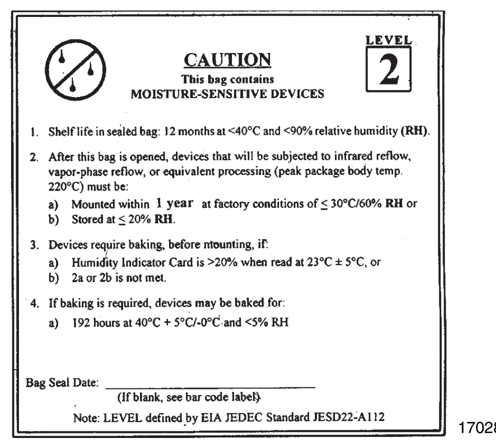
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.


CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL
2

1. Shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH).
2. After this bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing (peak package body temp. 220°C) must be:
   a) Mounted within 1 year at factory conditions of ≤ 30°C/60% RH or
   b) Stored at ≤ 20% RH.
3. Devices require baking, before mounting, if:
   a) Humidity Indicator Card is >20% when read at 23°C ± 5°C, or
   b) 2a or 2b is not met.
4. If baking is required, devices may be baked for:
   a) 192 hours at 40°C + 5°C/-0°C and <5% RH

Bag Seal Date: ____________________
(If blank, see bar code label)
Note: LEVEL defined by EIA JEDEC Standard JESD22-A112

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. Electrostatic sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS

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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