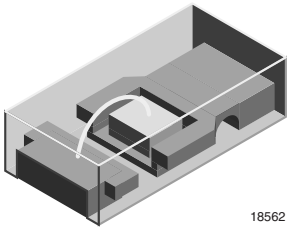
Low Current 0603 SMD LED



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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE2002/96/EC
- Preconditioning: acc. to JEDEC level 2
- AEC-Q101 qualified

AUTOMOTIVE GRADE

Pb-free

e4

RoHS COMPLIANT

GREEN (5-2008)**

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°

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
TLMS1000-GS08	Red, I_V = 4 mcd (typ.)
TLMO1000-GS08	Soft orange, I_V = 7.5 mcd (typ.)
TLMY1000-GS08	Yellow, I_V = 7.5 mcd (typ.)

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

ABSOLUTE MAXIMUM RATINGS [1] TLMS100., TLMO1000, TLMY1000				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage [2]		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/ ambient	mounted on PC board (pad size > 5 mm^2)	R_{thJA}	500	K/W

Note:
[1] T_{amb} = 25 °C, unless otherwise specified
[2] Driving the LED in reverse direction is suitable for short term application

OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLMS1000, RED							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity	I_F = 2 mA	TLMS1000	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		deg
Forward voltage	I_F = 2 mA		V_F		1.8	2.6	V
Reverse voltage	I_R = 10 µA		V_R	6			V
Junction capacitance	V_R = 0, f = 1 MHz		C_j		15		pF

Note:
[1] T_{amb} = 25 °C, unless otherwise specified

OPTICAL AND ELECTRICAL CHARACTERISTICS [1] 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		deg
Forward voltage	I_F = 2 mA	V_F		1.8	2.6	V
Reverse voltage	I_R = 10 µA	V_R	6			V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		15		pF

Note:
[1] T_{amb} = 25 °C, unless otherwise specified

OPTICAL AND ELECTRICAL CHARACTERISTICS [1] 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		deg
Forward voltage	I_F = 2 mA	V_F		1.8	2.6	V
Reverse voltage	I_R = 10 µA	V_R	6			V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		15		pF

Note:
[1] T_{amb} = 25 °C, unless otherwise specified

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

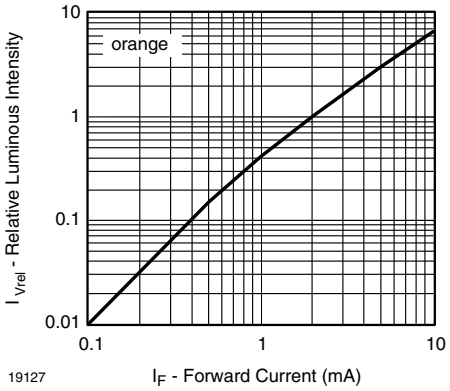


Figure 1. Relative Luminous Intensity vs. Forward Current

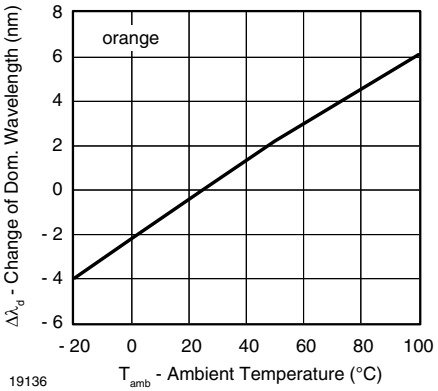


Figure 4. Change of Dominant Wavelength vs. Ambient Temperature

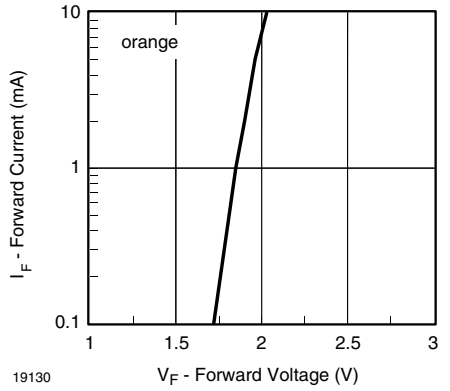


Figure 2. Forward Current vs. Forward Voltage

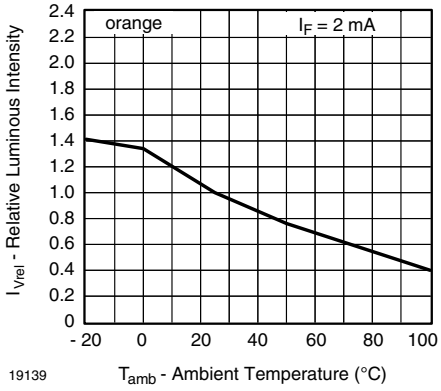


Figure 5. Relative Luminous Intensity vs. Amb. Temperature

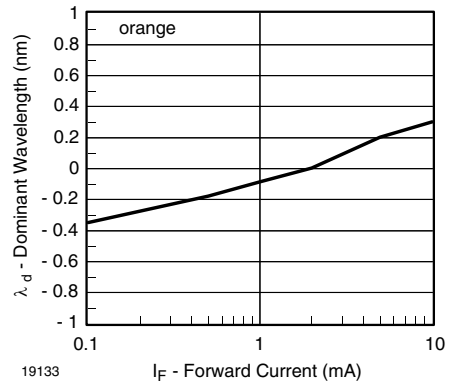


Figure 3. Dominant Wavelength vs. Forward Current

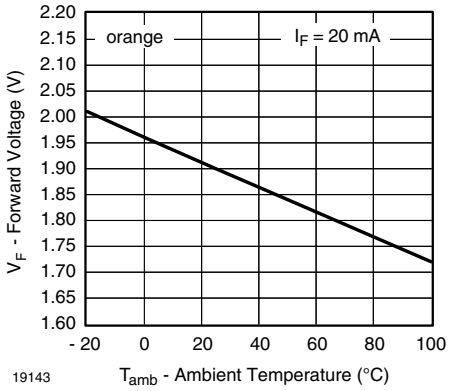


Figure 6. Forward Voltage vs. Ambient Temperature

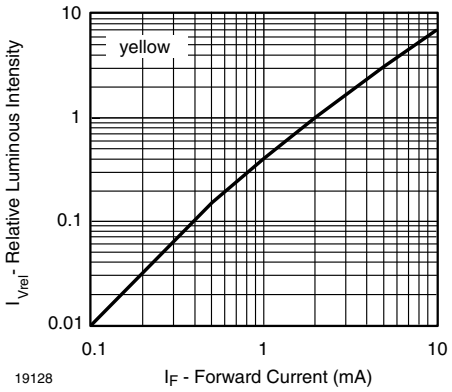


Figure 7. Relative Luminous Intensity vs. Forward Current

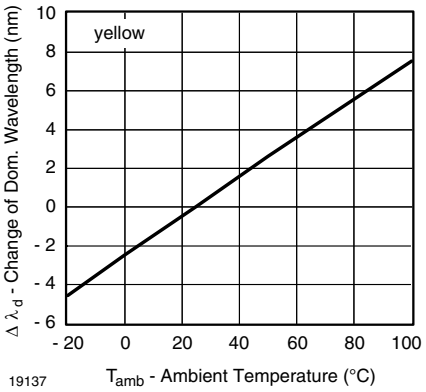


Figure 10. Change of Dominant Wavelength vs. Ambient Temperature

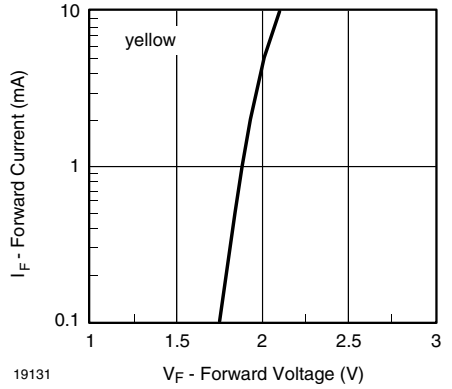


Figure 8. Forward Current vs. Forward Voltage

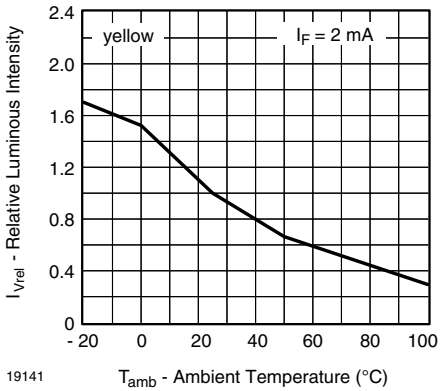


Figure 11. Relative Luminous Intensity vs. Amb. Temperature

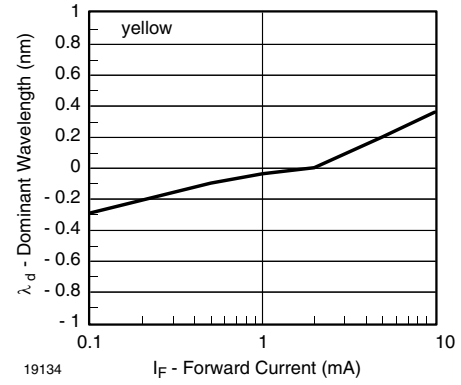


Figure 9. Dominant Wavelength vs. Forward Current

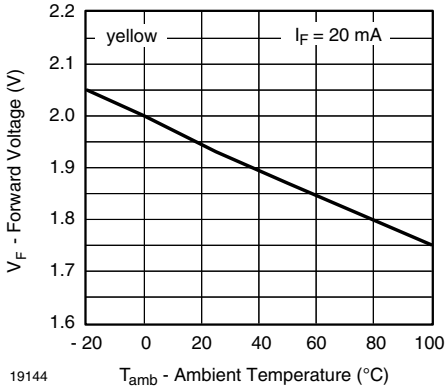


Figure 12. Forward Voltage vs. Ambient Temperature

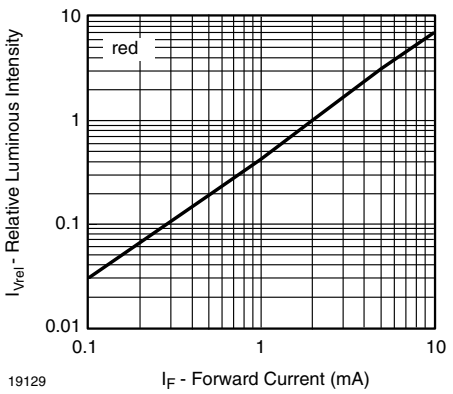


Figure 13. Relative Luminous Intensity vs. Forward Current

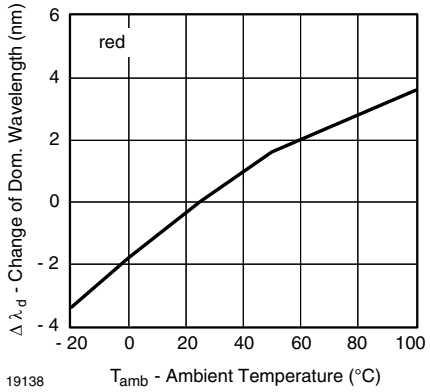


Figure 16. Change of Dominant Wavelength vs. Ambient Temperature

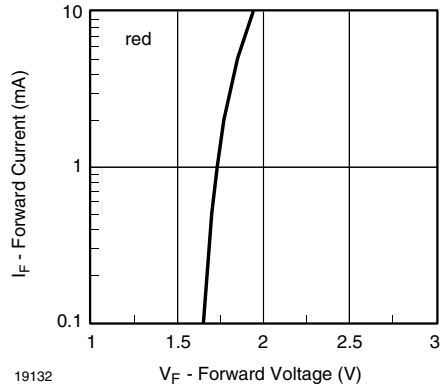


Figure 14. Forward Current vs. Forward Voltage

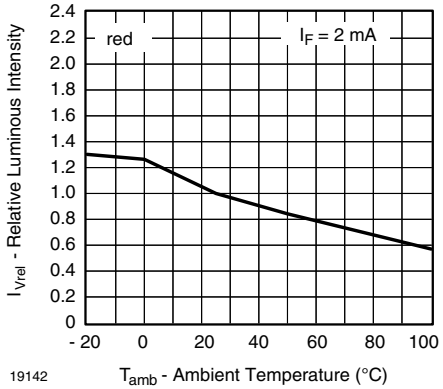


Figure 17. Relative Luminous Intensity vs. Amb. Temperature

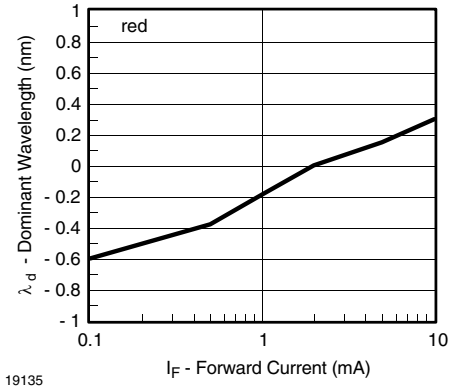


Figure 15. Dominant Wavelength vs. Forward Current

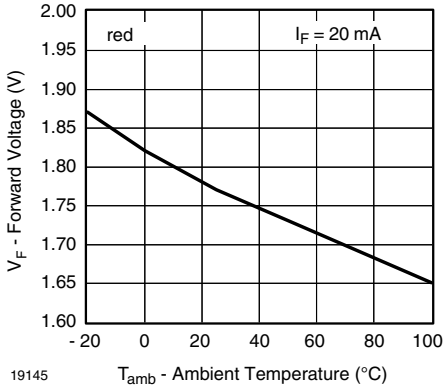
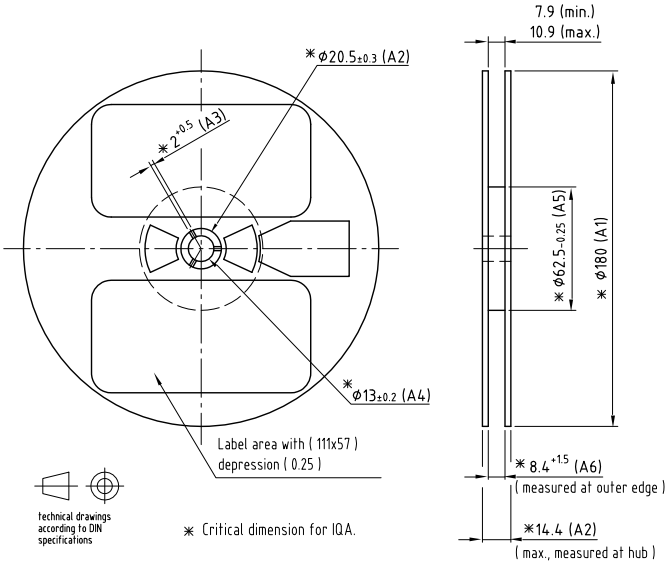


Figure 18. Forward Voltage vs. Ambient Temperature

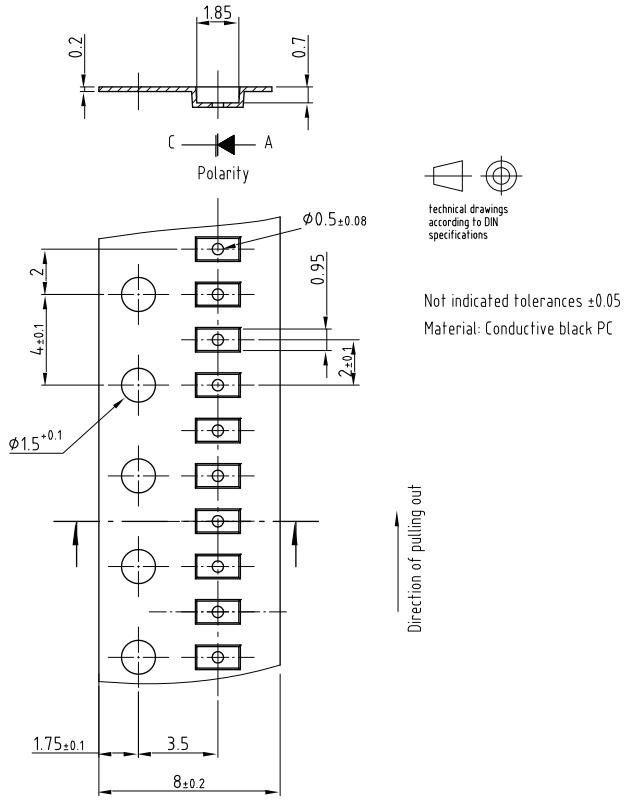
REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5086.01-4
Issue: 1; 29.04.04
19043

Not indicated tolerances ±0.05
Material: black static dissipative

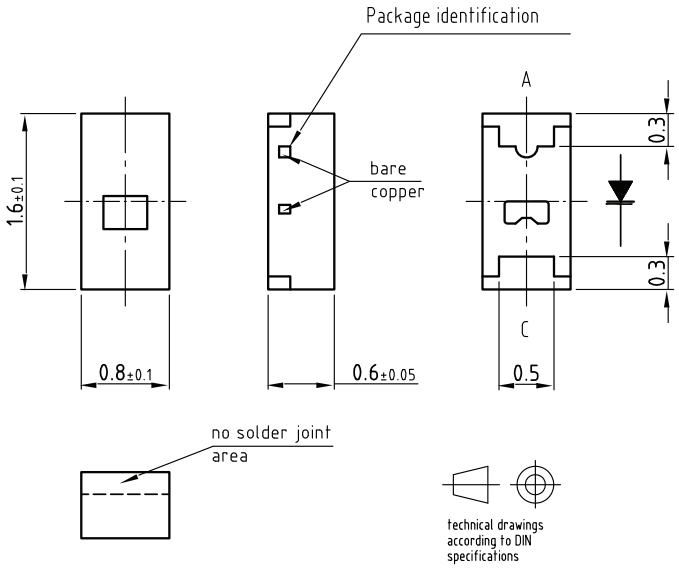
TAPE DIMENSIONS in millimeters



Drawing-No.: 9.700-5290.01-4
Issue: 2; 10.07.06
19044

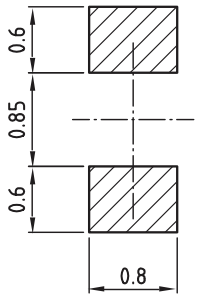
Not indicated tolerances ±0.05
Material: Conductive black PC

PACKAGE DIMENSIONS in millimeters



Not indicated tolerances ±0.1

Recommended solder pad



Drawing-No.: 6.541-5056.01-4
Issue: 2; 04.05.05

19426

SOLDERING PROFILE

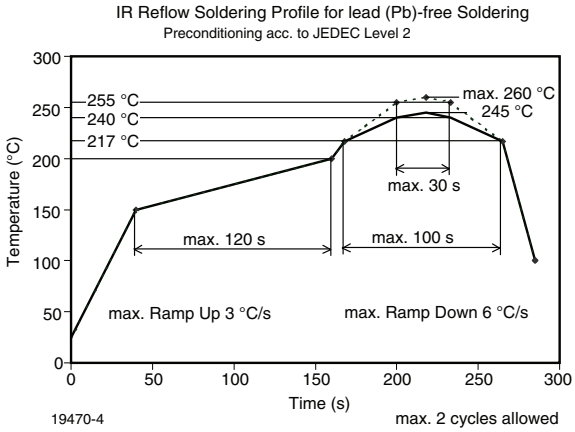
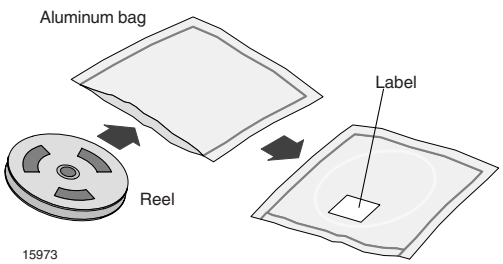


Figure 19. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

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.

RECOMMENDED METHOD OF STORAGE

Dry box storage is recommended as soon as the aluminium 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.

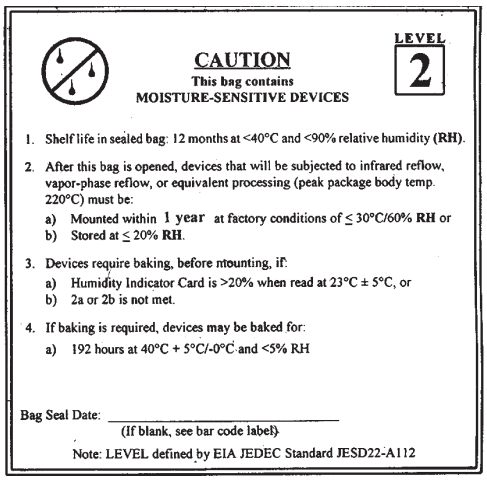
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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 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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Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

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.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.