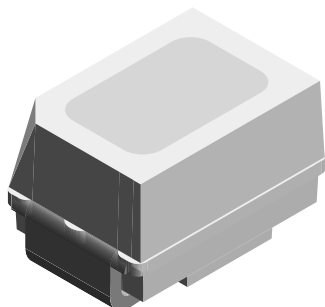


Standard Mini SMD LED



19226

DESCRIPTION

The MiniLED series has been designed in a small white SMT package. The feature of the device is the very small package 2.3 mm x 1.3 mm x 1.4 mm. The MiniLED is an obvious solution for small-scale, high-power products that are expected to work reliably in an arduous environment. This is often the case in automotive and industrial application of course.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD MiniLED
- Product series: standard
- Angle of half intensity: $\pm 60^\circ$

FEATURES

- SMD LEDs with exceptional brightness
- Luminous intensity categorized
- Compatible with automatic placement equipment
- EIA and ICE standard package
- IR reflow soldering
- Available in 8 mm tape
- Low profile package
- Non-diffused lens: excellent for coupling to light pipes and backlighting
- Low power consumption
- Luminous intensity ratio in one packaging unit $I_{Vmax}/I_{Vmin.} \leq 1.6$
- Preconditioning according to JEDEC® level 2a
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Automotive: backlighting in dashboards and switches
- Telecommunication: indicator and backlighting in telephone and fax
- Indicator and backlight for audio and video equipment
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches, and symbols
- General use

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.		
VLMG21K1L2-GS08	Green	7.1	-	18	10	562	568	575	10	-	2.1	2.8	10	GaP on GaP
VLMG21J2L1-GS08	Green	5.6	-	14	10	562	568	575	10	-	2.1	2.8	10	GaP on GaP
VLMG21K2M1-GS08	Green	9	-	22.4	10	562	568	575	10	-	2.1	2.8	10	GaP on GaP
VLMG21J2M1-GS08	Green	5.6	-	22.4	10	562	568	575	10	-	2.1	2.8	10	GaP on GaP

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

VLMG21..

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage ⁽¹⁾		V_R	6	V
DC forward current	$T_{amb} \leq 60^\circ\text{C}$	I_F	30	mA
Surge forward current	$t_p \leq 10 \mu\text{s}$	I_{FSM}	0.5	A
Power dissipation		P_V	95	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}	-40 to +100	$^\circ\text{C}$
Thermal resistance junction/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 a short term application

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
VLMG21.., GREEN

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 10\text{ mA}$	VLMG21J2L1	I_V	5.6	-	14	mcd
	$I_F = 10\text{ mA}$	VLMG21K2M1	I_V	9	-	22.4	mcd
	$I_F = 10\text{ mA}$	VLMG21J2M1	I_V	5.6	-	22.4	mcd
	$I_F = 10\text{ mA}$	VLMG21K1L2	I_V	7.1	-	18	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		λ_d	562	568	575	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p	-	565	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		ϕ	-	± 60	-	deg
Forward voltage	$I_F = 10\text{ mA}$		V_F	-	2.1	2.8	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		V_R	6	15	-	V
Junction capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_j	-	15	-	pF

Note

(1) In one packing unit $I_{Vmax}/I_{Vmin.} \leq 1.6$

LUMINOUS INTENSITY CLASSIFICATION

GROUP	LIGHT INTENSITY (mcd)		
	OPTIONAL	MIN.	MAX.
J	2	5.6	7.1
K	1	7.1	9.0
	2	9.0	11.2
L	1	11.2	14.0
	2	14.0	18.0
M	1	18.0	22.4

CROSSING TABLE

VISHAY	OSRAM
VLMG21J2L1	LGM670J2L1
VLMG21K2M1	LGM670K2M1
VLMG21J2M1	LGM670J2M1
VLMG21K1L2	LGM670K1L2

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 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 on any one reel.
In order to ensure availability, single wavelength groups will not be orderable.

COLOR CLASSIFICATION

GROUP	GREEN	
	DOM. WAVELENGTH (nm)	
	MIN.	MAX.
3	562	565
4	564	567
5	566	569
6	568	571
7	570	573
8	572	575

Note

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

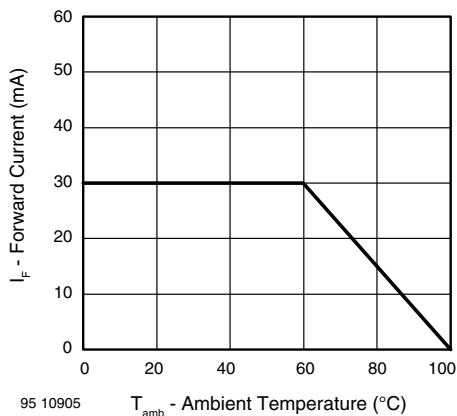
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

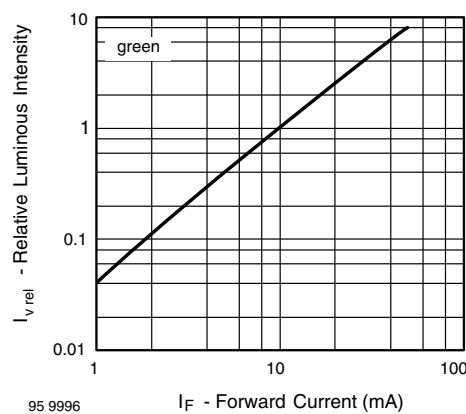


Fig. 4 - Relative Luminous Intensity vs. Forward Current

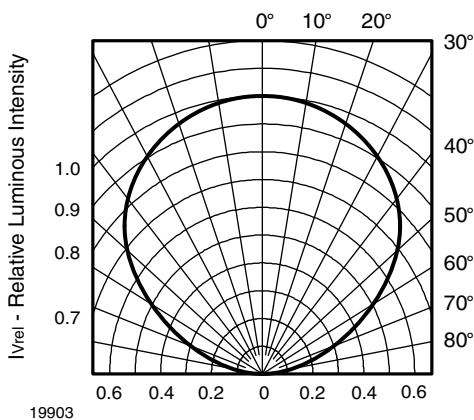


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

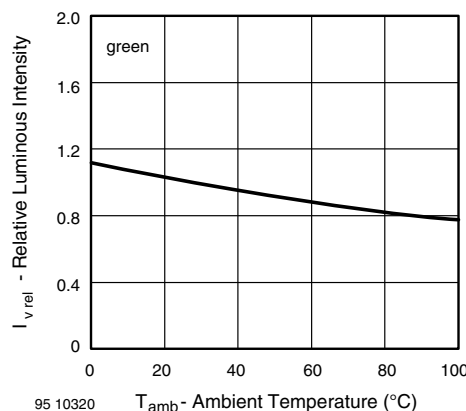


Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

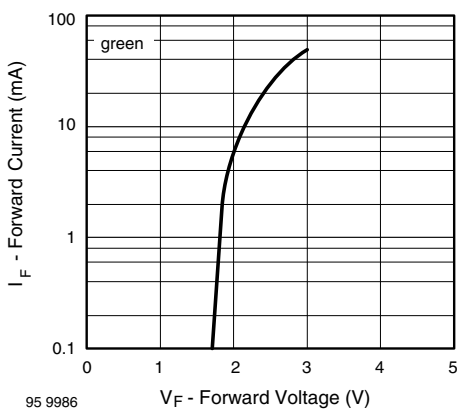


Fig. 3 - Forward Current vs. Forward Voltage

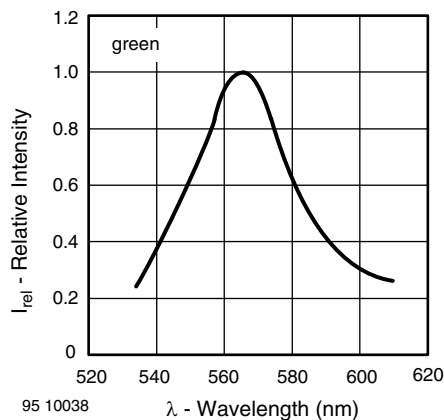


Fig. 6 - Relative Intensity vs. Wavelength

SOLDERING PROFILE

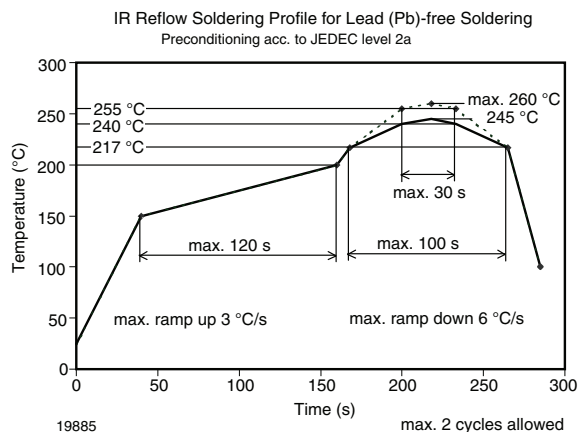
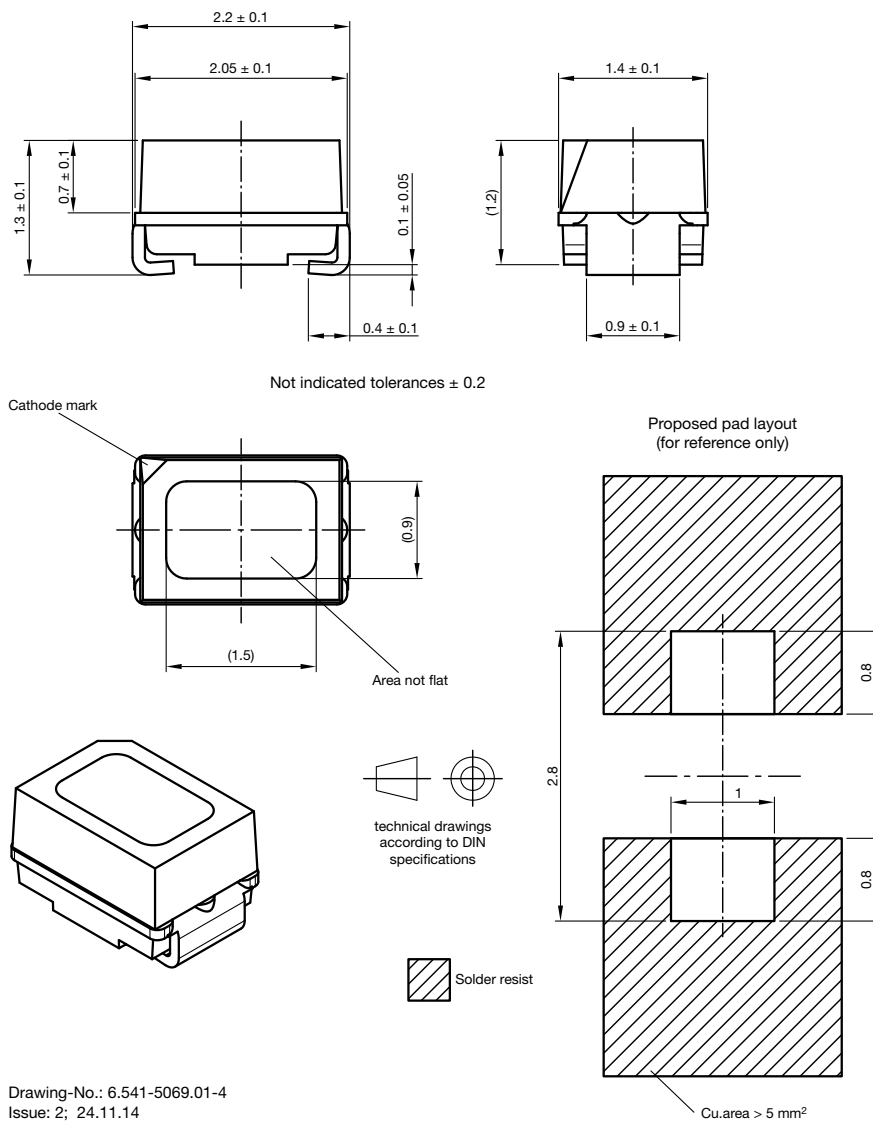


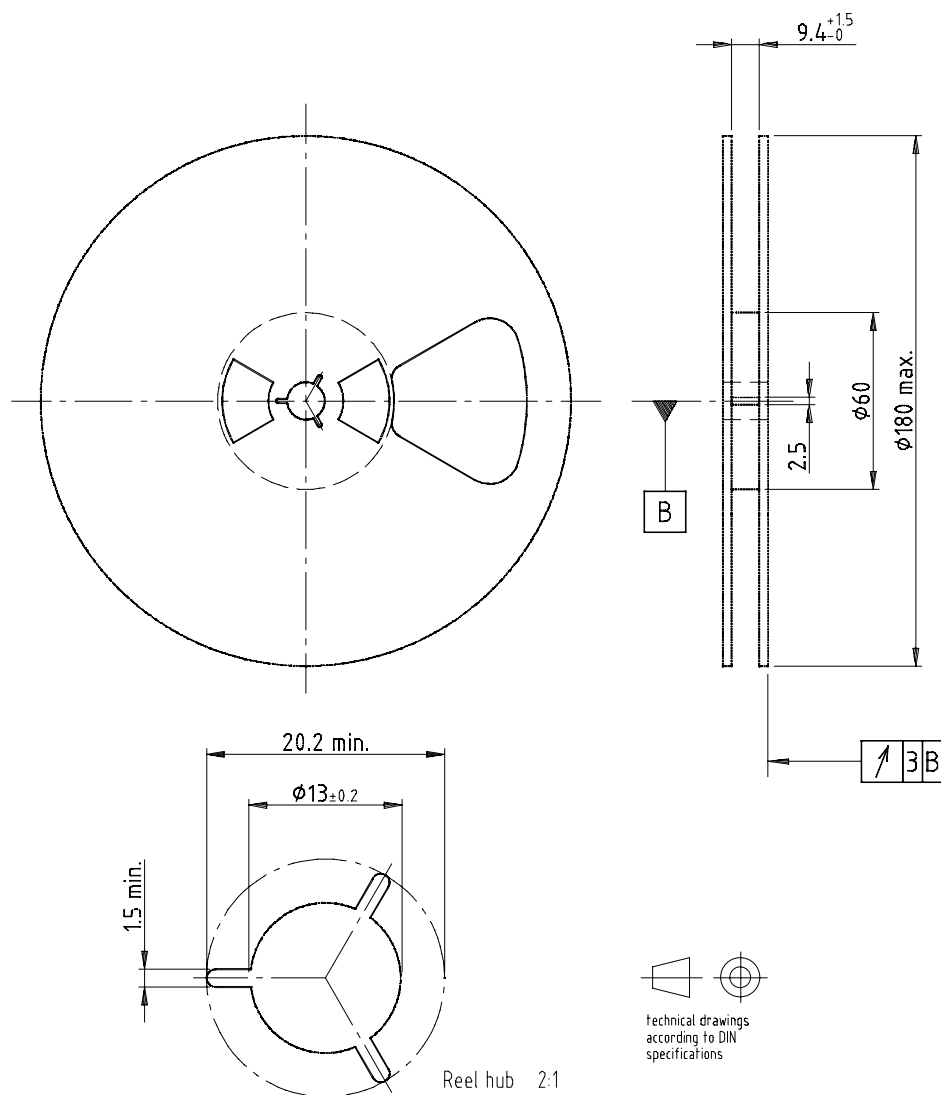
Fig. 7 - Vishay Lead (Pb)-free Reflow Soldering Profile
(acc. to J-STD-020)

PACKAGE DIMENSIONS in millimeters





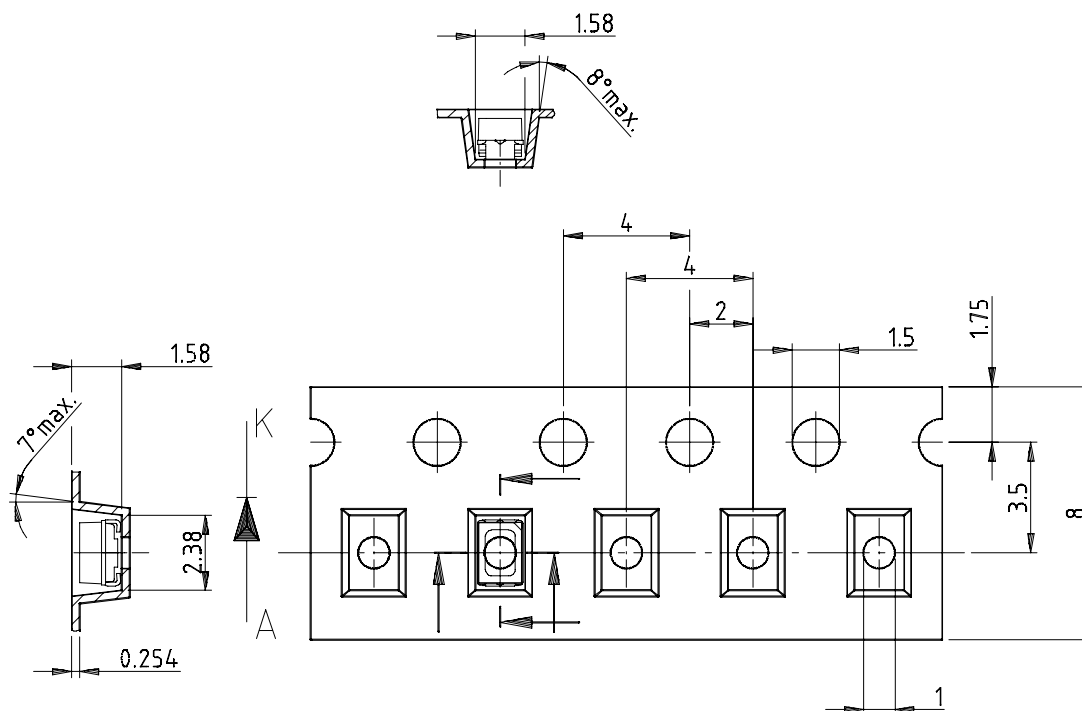
REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5051.V5-4

Issue: 1; 25.07.02

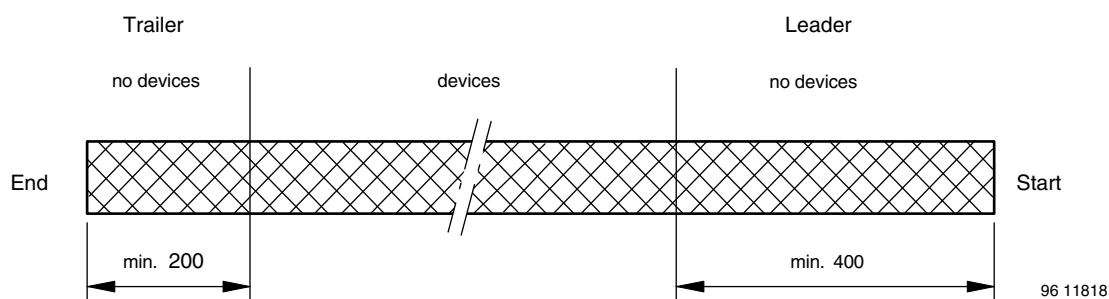
16938

TAPE DIMENSIONS in millimeters


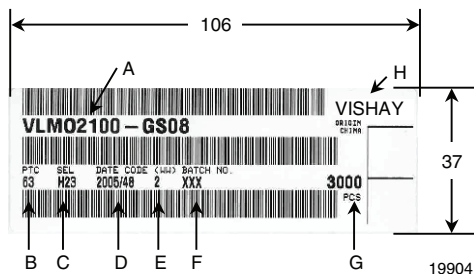
Drawing-No.: 9.700-5266.01-4

Issue: 1; 05.06.02

16939

LEADER AND TRAILER DIMENSIONS in millimeters

Note

- GS08 = 3000 pcs

BAR CODE PRODUCT LABEL


- A. Type of component
- B. Manufacturing plant
- C. Date code year / week
- D. Day code (e.g. 2: Tuesday)
- E. Batch no.
- F. Total quantity
- G. Company code

COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min $\pm$ 10 mm/min

165° to 180° peel angle

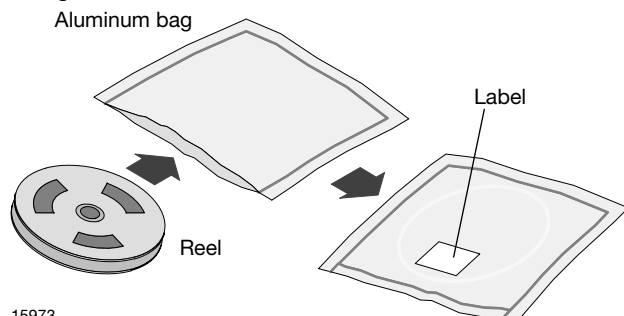
LABEL
Standard bar code labels for finished goods

The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.

VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)		
PLAIN WRITTING	ABBREVIATION	LENGTH
Item-description	-	18
Item-number	INO	8
Selection-code	SEL	3
LOT-/serial-number	BATCH	10
Data-code	COD	3 (YWW)
Plant-code	PTC	2
Quantity	QTY	8
Accepted by	ACC	-
Packed by	PCK	-
Mixed code indicator	MIXED CODE	-
Origin	xxxxxxx+	Company logo
LONG BAR CODE TOP	TYPE	LENGTH
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
SHORT BAR CODE BOTTOM	TYPE	LENGTH
Selection-code	X	3
Data-code	N	3
Batch-number	X	10
Filter	-	1
Total length	-	17

DRY PACKING

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



15973

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 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 672 h 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 2a label is included on all dry bags.

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 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.

	CAUTION This bag contains MOISTURE - SENSITIVE DEVICES	LEVEL 2a						
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. 260°C) must be: a) Mounted within 672 hours at factory condition of ≤ 30°C/60%RH or b) Stored at ≤10% RH.								
3. Devices require baking before mounting if: a) Humidity Indicator Card is >10% 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: <table border="0" style="width: 100%;"> <tr> <td>192 hours at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)</td> <td style="text-align: right;">or</td> </tr> <tr> <td>96 hours at 60±5°C and <5%RH</td> <td style="text-align: right;">For all device containers or</td> </tr> <tr> <td>24 hours at 100±5°C</td> <td style="text-align: right;">Not suitable for reels or tubes</td> </tr> </table>			192 hours at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)	or	96 hours at 60±5°C and <5%RH	For all device containers or	24 hours at 100±5°C	Not suitable for reels or tubes
192 hours at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)	or							
96 hours at 60±5°C and <5%RH	For all device containers or							
24 hours at 100±5°C	Not suitable for reels or tubes							
Bag Seal Date: _____ (If blank, see bar code label)								
Note: LEVEL defined by EIA JEDEC Standard JESD22-A113								

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Example of JESD22-A112 level 2a label



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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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Электрон
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