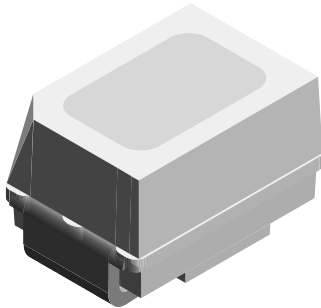


## Power Mini SMD LED



19226

### DESCRIPTION

The new MiniLED series have 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.

### PRODUCT GROUP AND PACKAGE DATA

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

### FEATURES

- SMD LEDs with exceptional brightness
- Luminous intensity categorized
- Compatible with automatic placement equipment
- 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 packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$ , optional  $\leq 1.6$
- ESD withstand voltage: up to 2 kV according to JESD22-A114-B
- Preconditioning according to JEDEC® level 2a
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### 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

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I <sub>F</sub> (mA)	WAVELENGTH (nm)			at I <sub>F</sub> (mA)	FORWARD VOLTAGE (V)			at I <sub>F</sub> (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
VLMP232M2N2-GS08	Pure green	22.4	-	45	30	555	558	565	30	-	2.2	2.6	30	AllnGaP on GaAs
VLMP232N1P1-GS08	Pure green	28	-	56	30	555	558	565	30	-	2.2	2.6	30	AllnGaP on GaAs
VLMP232M2P1-GS08	Pure green	22.4	-	56	30	555	558	565	30	-	2.2	2.6	30	AllnGaP on GaAs

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>(1)</sup>		V	5	V
DC forward current	T <sub>amb</sub> ≤ 80 °C	I <sub>F</sub>	40	mA
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	0.1	A
Power dissipation		P <sub>V</sub>	110	mW
Junction temperature		T <sub>j</sub>	+125	°C
Operating temperature range		T <sub>amb</sub>	-40 to +100	°C
Storage temperature range		T <sub>stg</sub>	-40 to +100	°C
Thermal resistance junction / ambient	Mounted on PC board (pad size > 5 mm <sup>2</sup> )	R <sub>thJA</sub>	400	K/W

#### Note

<sup>(1)</sup> 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)  
**VLMP232.., PURE GREEN**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 30\text{ mA}$	VLMP232M2N2	$I_V$	22.4	-	45	mcd
		VLMP232N1P1	$I_V$	28	-	56	mcd
		VLMP232M2P1	$I_V$	22.4	-	56	mcd
Dominant wavelength	$I_F = 30\text{ mA}$		$\lambda_d$	555	558	565	nm
Peak wavelength	$I_F = 30\text{ mA}$		$\lambda_p$	-	555	-	nm
Angle of half intensity	$I_F = 30\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 30\text{ mA}$		$V_F$	-	2.2	2.6	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	-	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	15	-	pF

**Note**

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

**LUMINOUS INTENSITY CLASSIFICATION**

GROUP	LIGHT INTENSITY (mcd)			
	STANDARD	OPTIONAL	MIN.	MAX.
M	1		18	22.4
	2		22.4	28
N	1		28	35.5
	2		35.5	45
P	1		45	56
	2		56	71

**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	DOMINANT WAVELENGTH (nm)	
	PURE GREEN	
	MIN.	MAX.
0	555	559
1	558	561
2	560	563
3	562	565

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms.

**CROSSING TABLE**

VISHAY	OSRAM
VLMP232M2P1	LPM675-M2P1

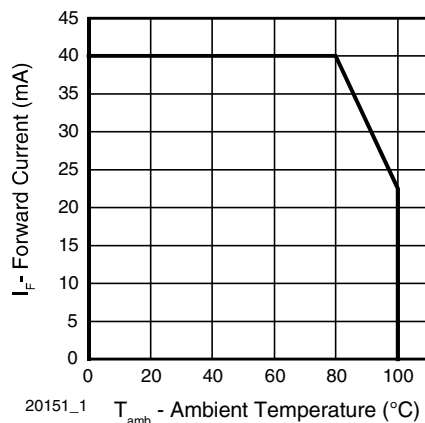
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

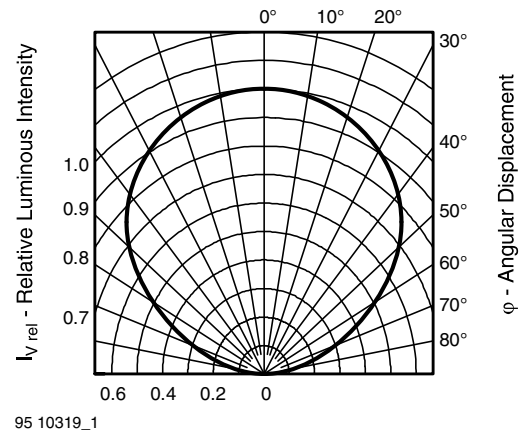


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

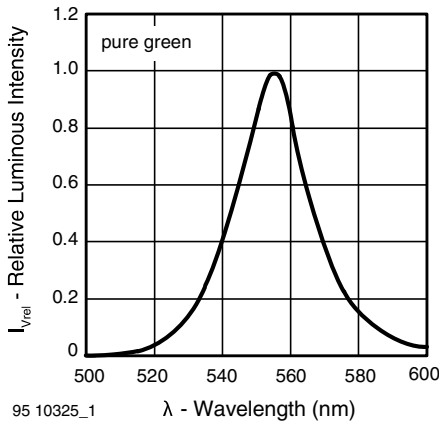


Fig. 3 - Relative Intensity vs. Wavelength

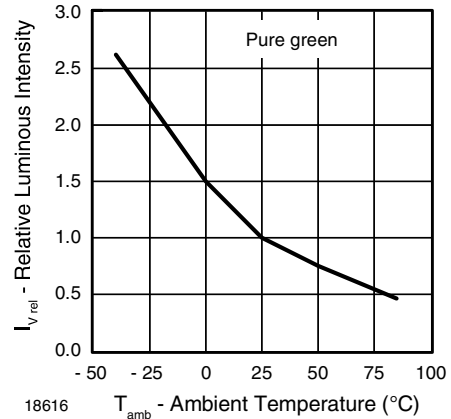


Fig. 6 - Relative Luminous Intensity vs. Ambient Temperature

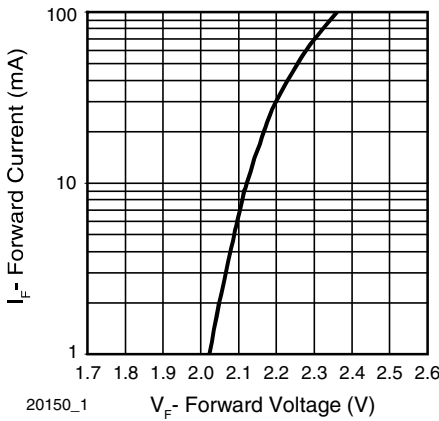


Fig. 4 - Forward Current vs. Forward Voltage

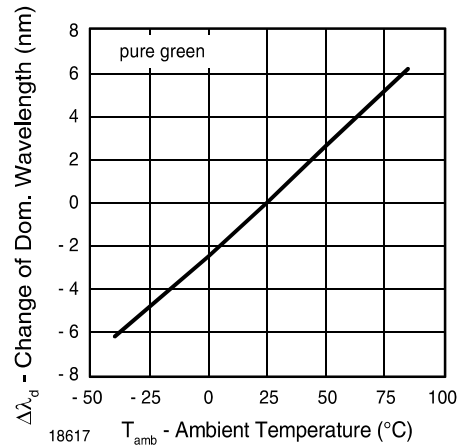


Fig. 7 - Change of Dominant Wavelength vs. Ambient Temperature

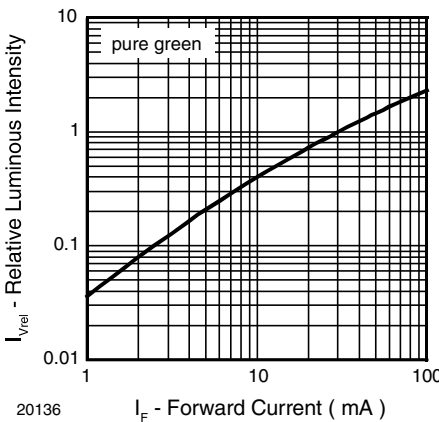


Fig. 5 - Relative Luminous Intensity vs. Forward Current

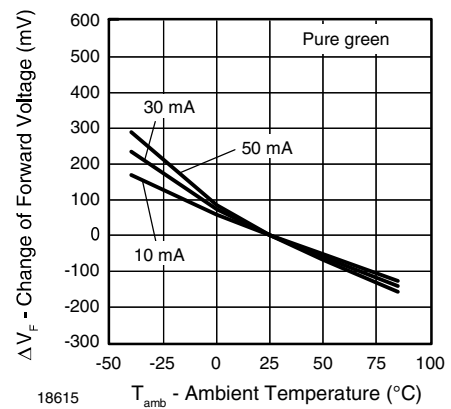
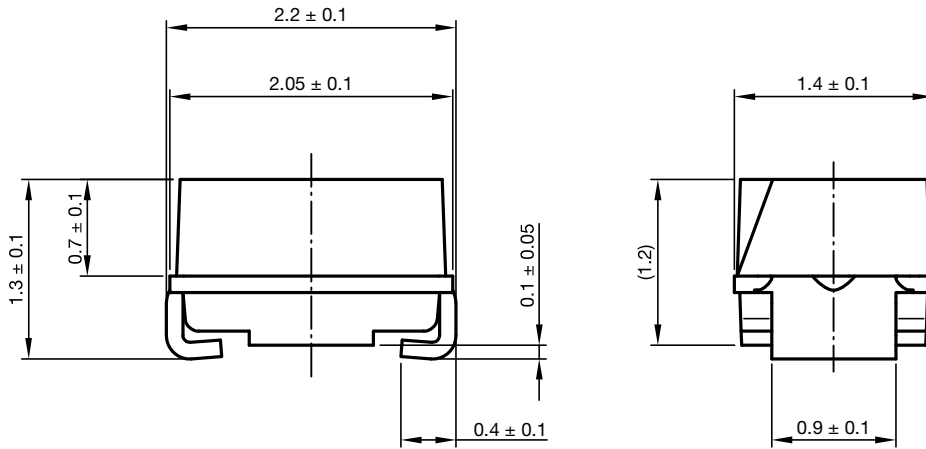


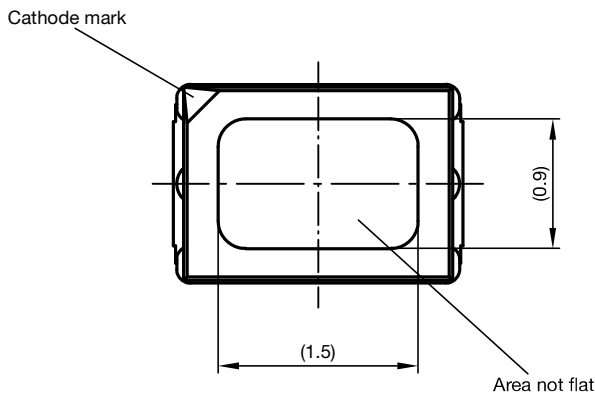
Fig. 8 - Change of Forward Voltage vs. Ambient Temperature



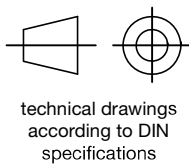
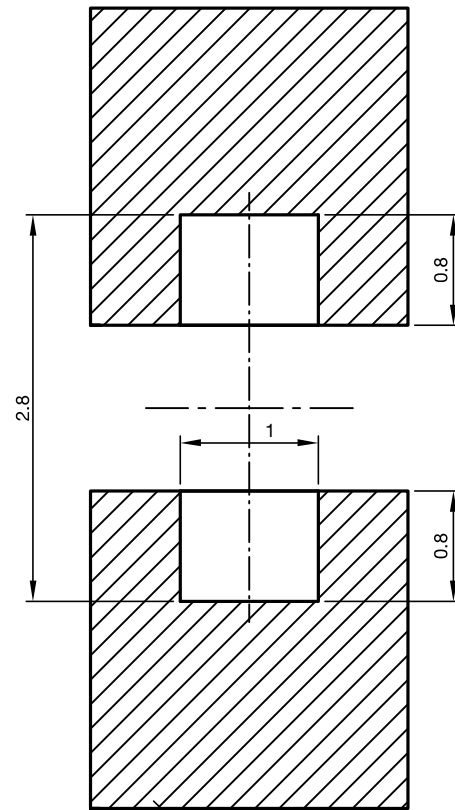
PACKAGE DIMENSIONS in millimeters



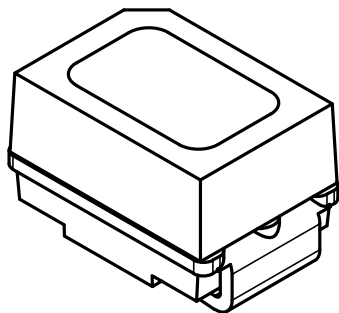
Not indicated tolerances ± 0.2



Proposed pad layout (for reference only)



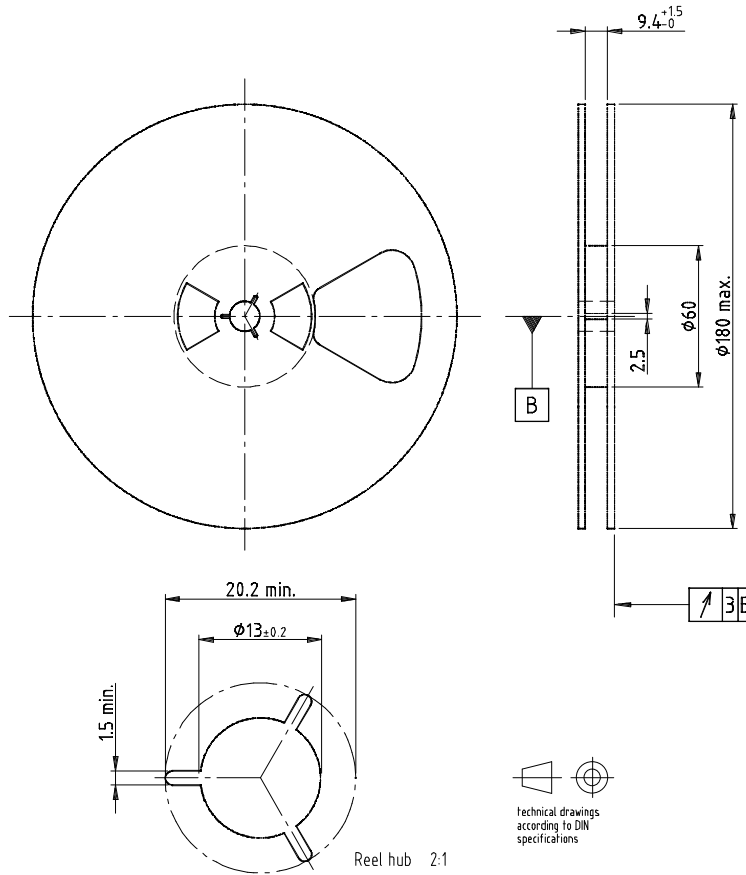
technical drawings according to DIN specifications



Cu.area > 5 mm<sup>2</sup>

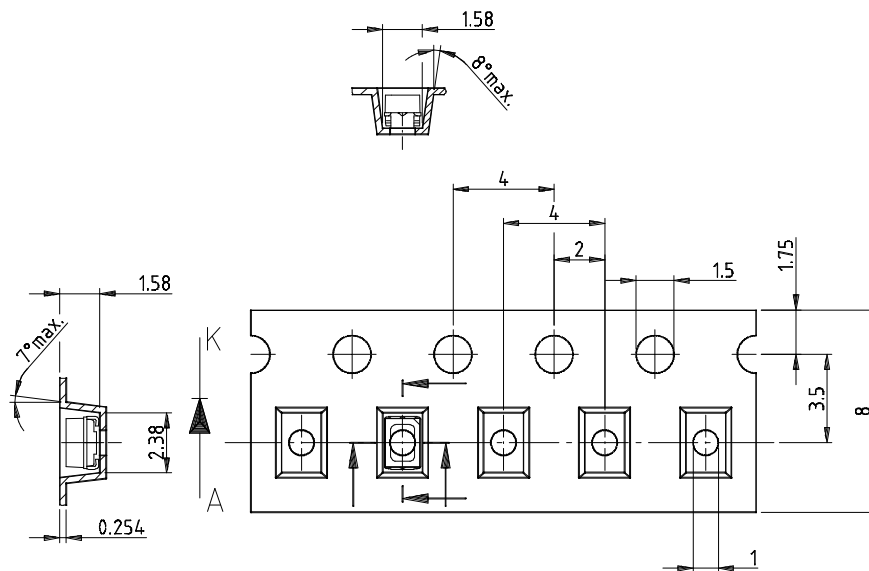
Drawing-No.: 6.541-5069.01-4  
Issue: 2; 24.11.14

**REEL DIMENSIONS** in millimeters



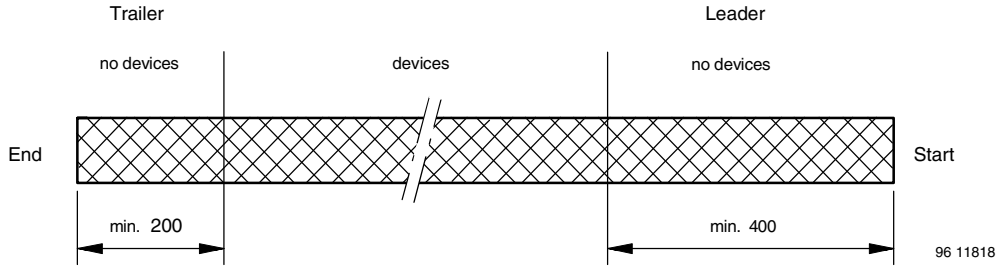
Drawing-No.: 9.800-5051.V5-4  
 Issue: 1; 25.07.02  
 16938

**TAPE DIMENSIONS** in millimeters



Drawing-No.: 9.700-5266.01-4  
 Issue: 1; 05.06.02  
 16939

**LEADER AND TRAILER DIMENSIONS** in millimeters



GS08 = 3000 pcs

**COVER TAPE PEEL STRENGTH**

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min ± 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.

**SOLDERING PROFILE**

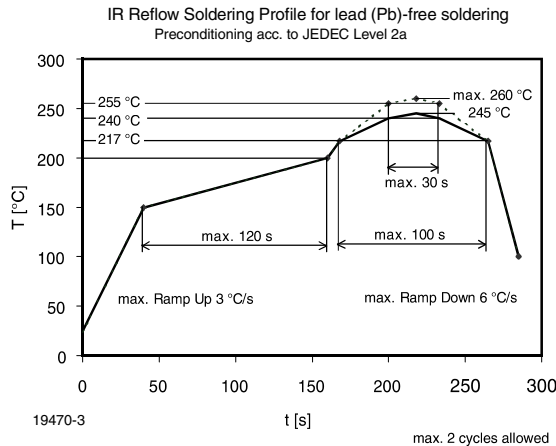
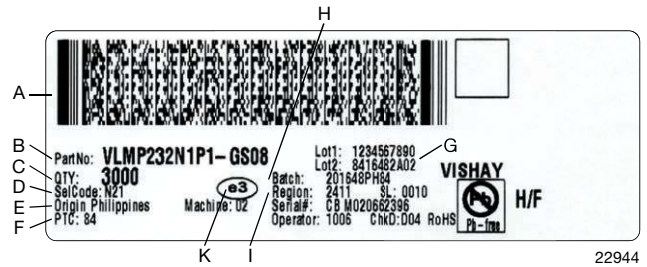


Fig. 9 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020)

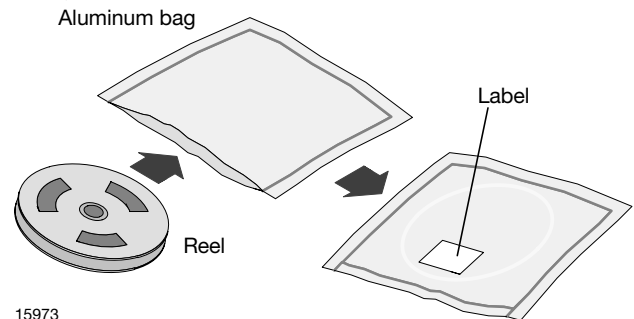
**BAR CODE PRODUCT LABEL** (example)



- A. 2D bar code label
- B. Vishay part number
- C. QTY: quantity
- D. SelCode: N21: N2 (LOP group)  
1 (LD group)
- E. Origin Philippines: country of origin
- F. PTC: 84 = product tracking code
- G. Lot1: internal lot number  
Lot2: internal lot number
- H. Batch: 201648PH84:  
201648 (date code YYYYWW)  
PH (country of origin)  
84 (PTC)
- I. Region: 2411: plant code
- K. e3: terminations finishing

**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 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.

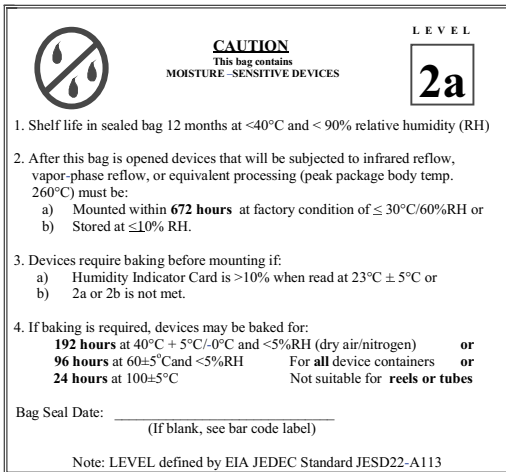
An EIA JEDEC standard JESD22-A112 level 2a label is included on all dry bags.

**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 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.



Example of JESD22-A112 level 2a label



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