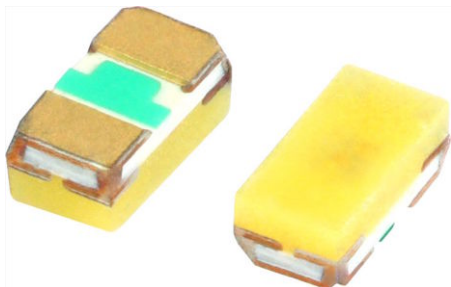


## Ultrabright 0402 ChipLED



### DESCRIPTION

The new 0402 ChipLED series has been designed in the smallest SMD package. This innovative 0402 ChipLED technology opens the way to

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

The 0402 LED is an obvious solution for small-scale products that are expected to work reliably in an arduous environment.

This package is filled with a mixture of epoxy and yellow converter.

The yellow converter converts the blue emission partially to yellow, which mixes with the remaining blue to give white.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD 0402 ChipLED
- Product series: standard
- Angle of half intensity:  $\pm 65^\circ$

### FEATURES

- High efficient InGaN technology
- Super thin ChipLED with exceptional brightness 1.0 mm x 0.5 mm x 0.35 mm (L x W x H)
- High reliability, PCB based
- Temperature range  $-30^\circ\text{C}$  to  $+80^\circ\text{C}$
- Chromaticity coordinates categorized according to CIE 1931 per packing unit
- Typical color temperature 7000 K
- EIA standard package
- Compatible to IR reflow soldering
- Available on 7" diameter reel
- Preconditioning according to JEDEC® level 2a
- ESD-sensitive device
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Telecommunication: indicator and backlighting in telephone and fax
- Backlighting for audio and video equipment
- Backlighting in office equipment
- Indoor and outdoor message boards
- Flat backlight for LCDs, switches, and symbols

### PARTS TABLE

| PART          | COLOR | LUMINOUS INTENSITY (mcd) |      |      | at I <sub>F</sub> (mA) | COORDINATE (x, y) |              |      | 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. |                        |                          |
| VLMW1500-GS08 | White | 45                       | 90   | 180  | 5                      | -                 | 0.304, 0.300 | -    | 5                      | 2.65                | 2.90 | 3.05 | 5                      | InGaN / yellow converter |
| VLMW1501-GS08 | White | 71                       | 90   | 180  | 5                      | -                 | 0.294, 0.286 | -    | 5                      | 2.65                | 2.90 | 3.05 | 5                      | InGaN / yellow converter |
| VLMW1502-GS08 | White | 71                       | 90   | 180  | 5                      | -                 | 0.314, 0.315 | -    | 5                      | 2.65                | 2.90 | 3.05 | 5                      | InGaN / yellow converter |
| VLMW1503-GS08 | White | 71                       | 90   | 180  | 5                      | -                 | 0.304, 0.300 | -    | 5                      | 2.65                | 2.90 | 3.05 | 5                      | InGaN / yellow converter |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**VLMW15..**

| PARAMETER                           | TEST CONDITION                            | SYMBOL     | VALUE       | UNIT               |
|-------------------------------------|-------------------------------------------|------------|-------------|--------------------|
| DC forward current                  | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ | $I_F$      | 20          | mA                 |
| Surge forward current               | $t_p \leq 10\text{ }\mu\text{s}$          | $I_{FSM}$  | 0.1         | A                  |
| Power dissipation                   |                                           | $P_V$      | 70          | mW                 |
| Operating temperature range         |                                           | $T_{amb}$  | -30 to +80  | $^{\circ}\text{C}$ |
| Storage temperature range           |                                           | $T_{stg}$  | -55 to +105 | $^{\circ}\text{C}$ |
| Thermal resistance junction/ambient |                                           | $R_{thJA}$ | 550         | K/W                |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**VLMW15.., WHITE**

| PARAMETER                                   | TEST CONDITION      | TYPE               | SYMBOL | MIN. | TYP.     | MAX. | UNIT          |
|---------------------------------------------|---------------------|--------------------|--------|------|----------|------|---------------|
| Luminous intensity                          | $I_F = 5\text{ mA}$ | VLMW1500           | $I_V$  | 45   | 90       | 180  | mcd           |
|                                             |                     | VLMW1501           | $I_V$  | 71   | 90       | 180  | mcd           |
|                                             |                     | VLMW1502           | $I_V$  | 71   | 90       | 180  | mcd           |
|                                             |                     | VLMW1503           | $I_V$  | 71   | 90       | 180  | mcd           |
| Chromatically coordinate x acc. to CIE 1931 | $I_F = 5\text{ mA}$ | VLMW1500, VLMW1503 | x      | -    | 0.304    | -    |               |
| Chromatically coordinate y acc. to CIE 1931 | $I_F = 5\text{ mA}$ |                    | y      | -    | 0.300    | -    |               |
| Chromatically coordinate x acc. to CIE 1931 | $I_F = 5\text{ mA}$ | VLMW1501           | x      | -    | 0.294    | -    |               |
| Chromatically coordinate y acc. to CIE 1931 | $I_F = 5\text{ mA}$ |                    | y      | -    | 0.286    | -    |               |
| Chromatically coordinate x acc. to CIE 1931 | $I_F = 5\text{ mA}$ | VLMW1502           | x      | -    | 0.314    | -    |               |
| Chromatically coordinate y acc. to CIE 1931 | $I_F = 5\text{ mA}$ |                    | y      | -    | 0.315    | -    |               |
| Angle of half intensity                     | $I_F = 5\text{ mA}$ |                    | $\phi$ | -    | $\pm 65$ | -    | deg           |
| Forward voltage                             | $I_F = 5\text{ mA}$ |                    | $V_F$  | 2.65 | 2.90     | 3.05 | V             |
| Reverse current <sup>(1)</sup>              | $V_R = 5\text{ V}$  |                    | $I_R$  | -    | 10       | -    | $\mu\text{A}$ |

**Note**

<sup>(1)</sup> Driving the LED in reverse direction is suitable for short term application

**LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LUMINOUS INTENSITY (mcd)<br>at 5 mA |      |
|-------|-------------------------------------|------|
|       | MIN.                                | MAX. |
| P     | 45                                  | 71   |
| Q     | 71                                  | 112  |
| R     | 112                                 | 180  |

**Note**

- Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of  $\pm 15\%$ .  
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.

**FORWARD VOLTAGE CLASSIFICATION**

| GROUP | FORWARD VOLTAGE (V) |      |
|-------|---------------------|------|
|       | MIN.                | MAX. |
| V2    | 2.65                | 2.75 |
| V3    | 2.75                | 2.85 |
| V4    | 2.85                | 2.95 |
| V5    | 2.95                | 3.05 |

**Note**

- Forward voltage is measured with a tolerance of  $\pm 0.1\text{ V}$ .

| TYPE              | CC GROUP |
|-------------------|----------|
| VLMW1500,VLMW1503 | S1 to S6 |
| VLMW1501          | S1 to S4 |
| VLMW1502          | S3 to S6 |

| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED |       |       |    |       |       |
|---------------------------------------------------|-------|-------|----|-------|-------|
|                                                   | X     | Y     |    | X     | Y     |
| S1                                                | 0.274 | 0.226 | S4 | 0.294 | 0.286 |
|                                                   | 0.274 | 0.258 |    | 0.294 | 0.319 |
|                                                   | 0.294 | 0.286 |    | 0.314 | 0.347 |
|                                                   | 0.294 | 0.254 |    | 0.314 | 0.315 |
| S2                                                | 0.274 | 0.258 | S5 | 0.314 | 0.282 |
|                                                   | 0.274 | 0.291 |    | 0.314 | 0.315 |
|                                                   | 0.294 | 0.319 |    | 0.334 | 0.343 |
|                                                   | 0.294 | 0.286 |    | 0.334 | 0.311 |
| S3                                                | 0.294 | 0.254 | S6 | 0.314 | 0.315 |
|                                                   | 0.294 | 0.286 |    | 0.314 | 0.347 |
|                                                   | 0.314 | 0.315 |    | 0.334 | 0.376 |
|                                                   | 0.314 | 0.282 |    | 0.334 | 0.343 |

**Note**

- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

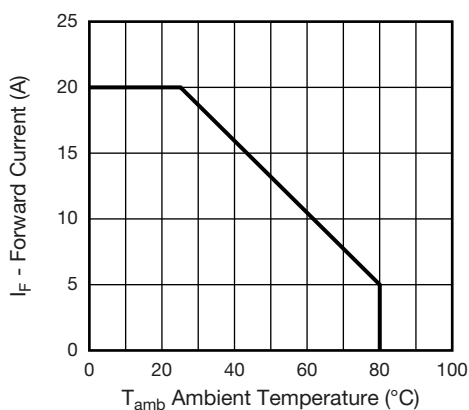
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

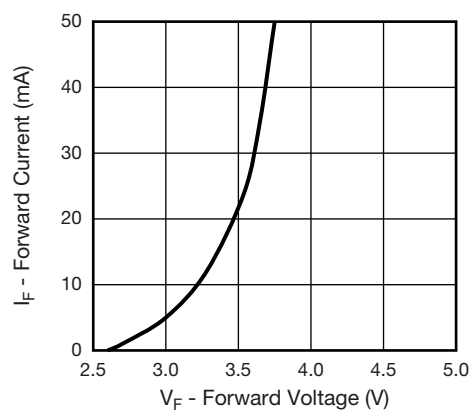


Fig. 3 - Forward Current vs. Forward Voltage

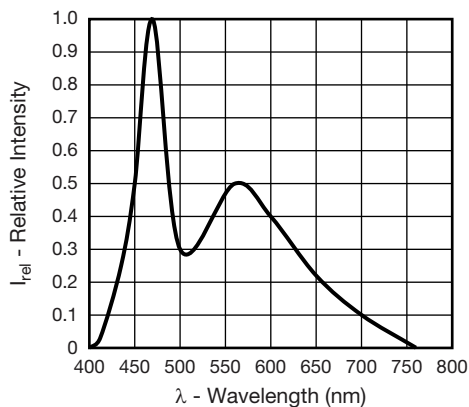


Fig. 2 - Relative Intensity vs. Wavelength

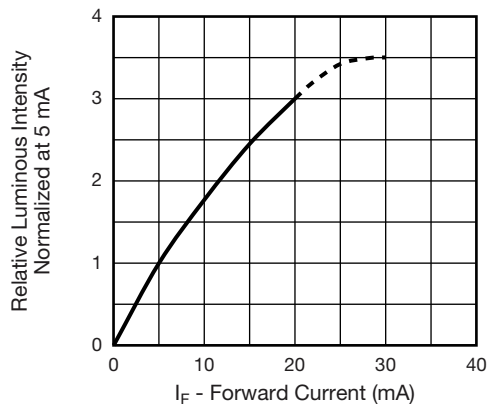


Fig. 4 - Relative Luminous Intensity vs. Forward Current

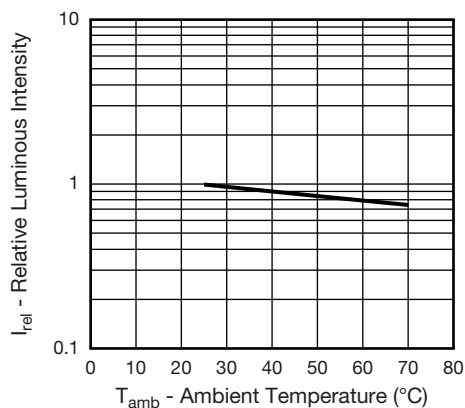


Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

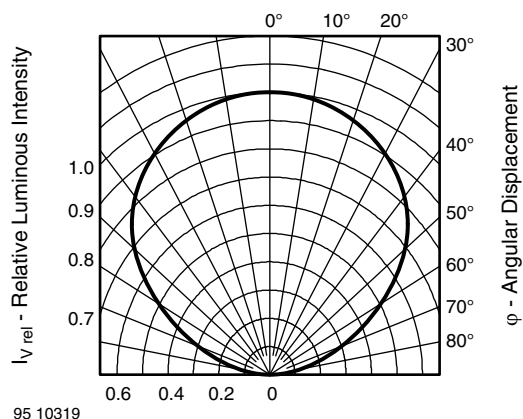


Fig. 7 - Relative Luminous Intensity vs. Angular Displacement

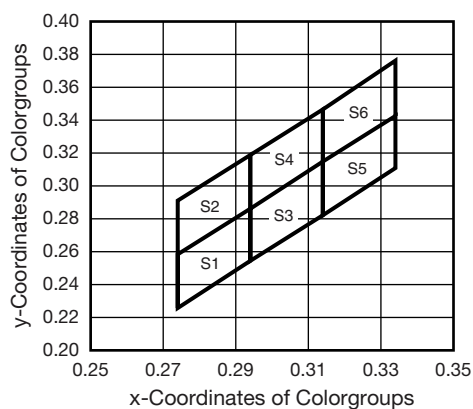
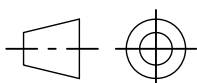
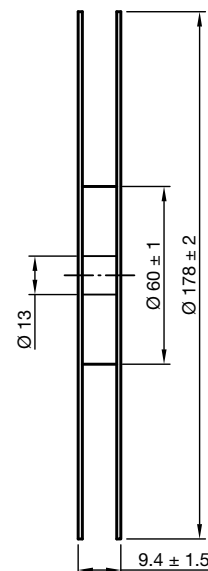
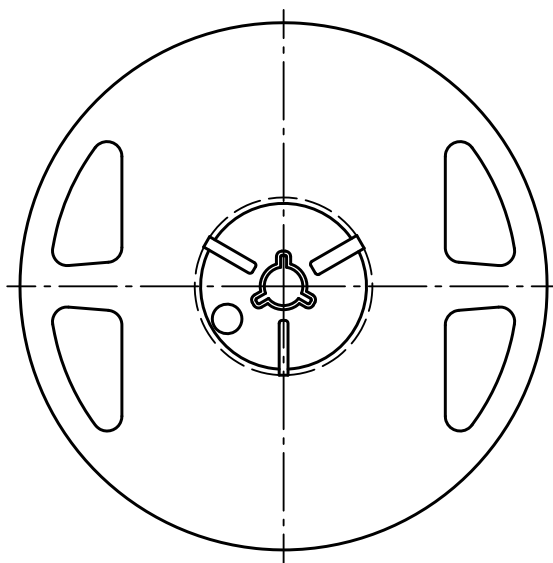


Fig. 6 - Coordinates of Colorgroups

## REEL DIMENSIONS in millimeters

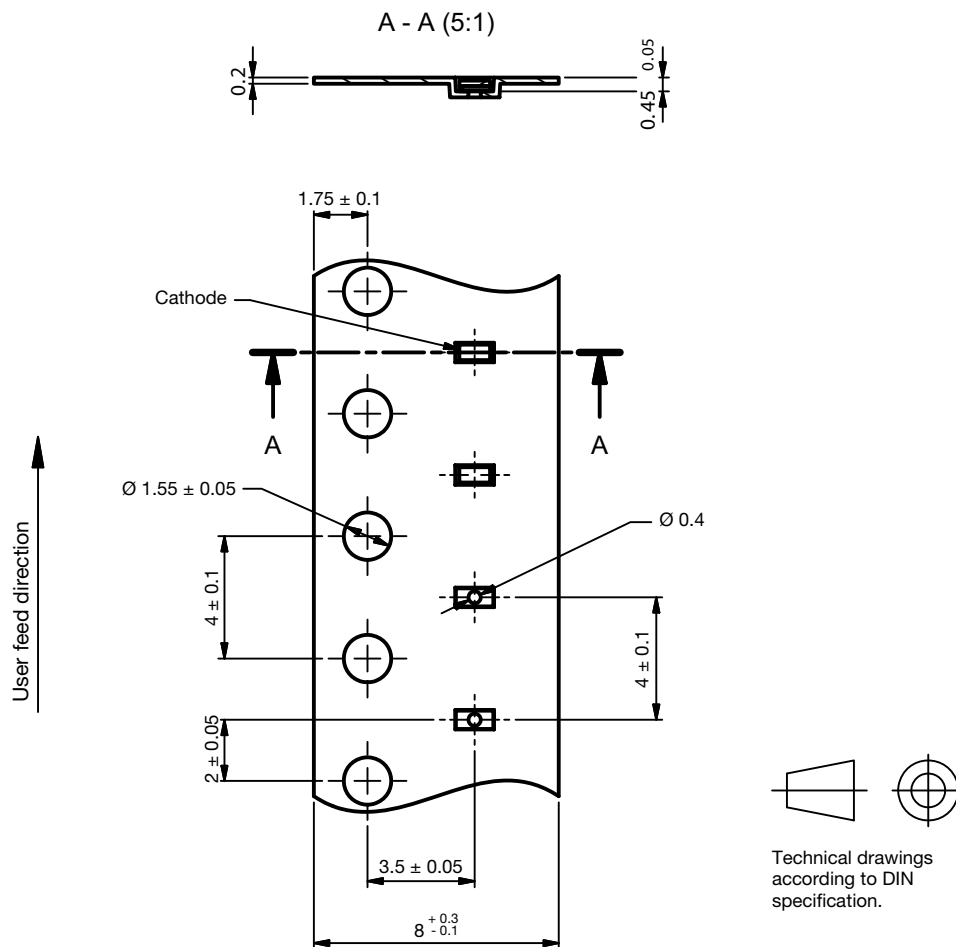


technical drawings  
according to DIN  
specifications

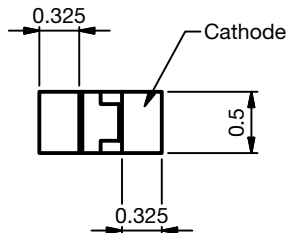


Drawing-No.: 9.800-5122.01-4  
Issue: 2; 03.11.11  
22611

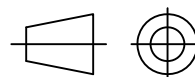
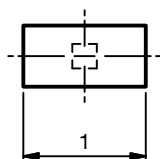
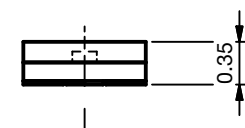
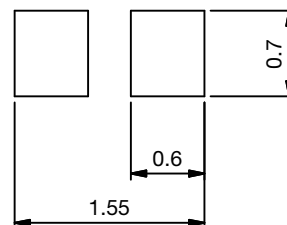
3000 pieces per reel / 3 reels per box

**TAPE DIMENSIONS** in millimeters


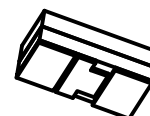
Drawing-No.: 9.700-5388.01-4  
Issue: 1; 20.03.12

**PACKAGE DIMENSIONS** in millimeters


Recommended solder  
pad footprint



Technical drawings  
according to DIN  
specification



Not indicated tolerances  $\pm 0.2$

Drawing-No.: 6.541-5096.01-4  
Issue: 1; 20.03.12

**SOLDERING PROFILE**

IR Reflow Soldering Profile for lead (Pb)-free Soldering  
Preconditioning acc. to JEDEC Level 2a

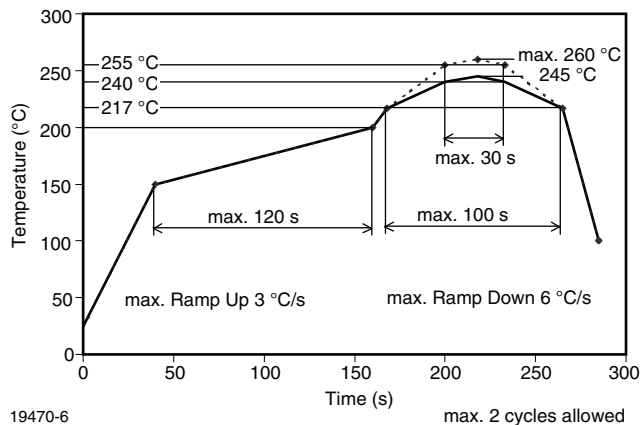
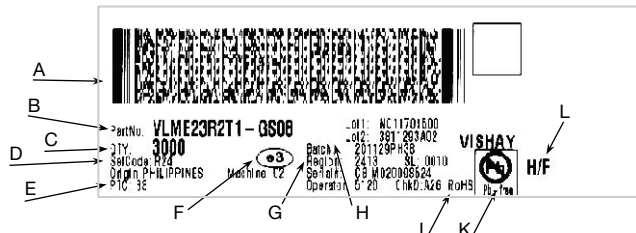


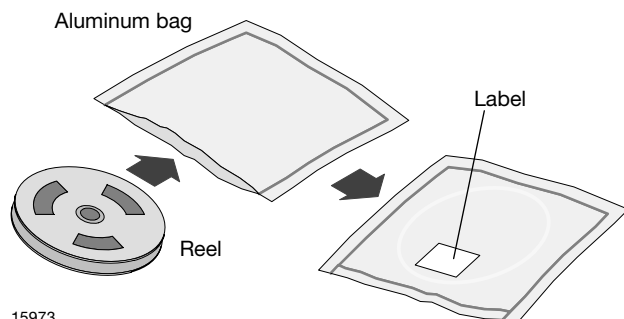
Fig. 8 - Vishay Lead (Pb)-free Reflow Soldering Profile  
(according to J-STD-020C)

**BAR CODE PRODUCT LABEL (example)**


- A) 2D barcode
- B) PartNo = Vishay part number
- C) QTY = quantity
- D) SelCode = selection code (binning)
- E) PTC = code of manufacturing plant
- F) Terminations finishing
- G) Region code
- H) Batch = date code: year / week / plant code
- I) RoHS symbol
- K) Lead (Pb)-free symbol
- L) Halogen-free symbol

**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.

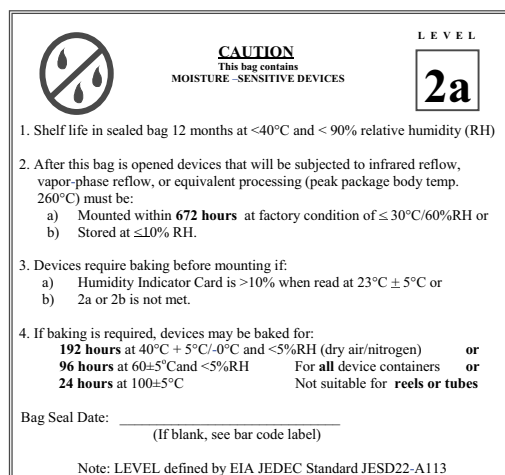
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:  
192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen)

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.



19786

Example of JESD22-A112 Level 2a 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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