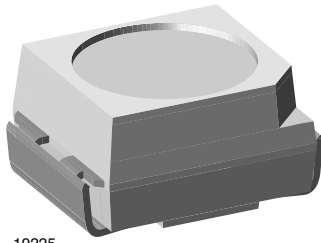


## Standard SMD LED PLCC-2



19225

### DESCRIPTION

This device has been designed to meet the increasing demand for white SMD LED.

The package of the VLMW41.. is the PLCC-2.

It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled with a mixture of epoxy and TAG phosphor.

The TAG phosphor 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 PLCC-2
- Product series: standard
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- High efficient InGaN technology
- Very narrow chromaticity coordinate group categorization according to CIE1931 per packing unit
- Typical color temperature 5500 K
- EIA and ICE standard package
- Compatible with reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020
- Available in 8 mm tape reel
- Preconditioning according to JEDEC® level 2a
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- 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

- Camera flash light
- Signal and symbol luminaire
- Marker lights
- Interior and exterior automotive lighting: brake lights, turn lights, backlighting, side markers
- Indicator lighting

### 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. |                        |                          |
| VLMW41S1T2-JKPL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.33, 0.33 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-JKPL-18 | White | 180                      | 275  | 450  | 10                     | -                 | 0.33, 0.33 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-JKKL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.30, 0.28 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-KKLL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.31, 0.30 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-LKML-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.32, 0.31 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-LKML-18 | White | 180                      | 275  | 450  | 10                     | -                 | 0.32, 0.31 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-MKNL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.33, 0.33 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-NKOL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.34, 0.34 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |
| VLMW41S1T2-OKPL-08 | White | 180                      | 275  | 450  | 10                     | -                 | 0.35, 0.36 | -    | 10                     | 2.7                 | 3.3  | 4.2  | 20                     | InGaN / sapphire and TAG |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMW41.....-.....**

| PARAMETER                             | TEST CONDITION                                       | SYMBOL     | VALUE       | UNIT               |
|---------------------------------------|--|------------|-------------|--------------------|
| DC forward current                    | $T_{amb} \leq 80\text{ }^{\circ}\text{C}$            | $I_F$      | 20          | mA                 |
| Surge forward current                 | $t_p \leq 10\text{ }\mu\text{s}$                     | $I_{FSM}$  | 0.1         | A                  |
| Power dissipation                     |  | $P_V$      | 84          | mW                 |
| Junction temperature                  |  | $T_j$      | 110         | $^{\circ}\text{C}$ |
| Storage temperature range             |  | $T_{stg}$  | -40 to +100 | $^{\circ}\text{C}$ |
| Operating temperature range           |  | $T_{amb}$  | -40 to +100 | $^{\circ}\text{C}$ |
| Thermal resistance junction / ambient | Mounted on PC board (pad size > 16 mm <sup>2</sup> ) | $R_{thJA}$ | 360         | K/W                |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMW41.....-....., WHITE**

| PARAMETER                                      | TEST CONDITION       | PART            | SYMBOL    | MIN. | TYP.       | MAX. | UNIT |
|--|----------------------|-----------------|-----------|------|------------|------|------|
| Luminous intensity                             | $I_F = 10\text{ mA}$ | VLMW41S1T2...   | $I_V$     | 180  | 275        | 450  | mcd  |
| Chromaticity coordinates according to CIE 1931 | $I_F = 10\text{ mA}$ | VLMW41S1T2-JKPL | x/y       | -    | 0.33, 0.33 | -    |      |
|  |                      | VLMW41S1T2-JKKL |           | -    | 0.30, 0.28 | -    |      |
|  |                      | VLMW41S1T2-KKLL |           | -    | 0.31, 0.30 | -    |      |
|  |                      | VLMW41S1T2-LKML |           | -    | 0.32, 0.31 | -    |      |
|  |                      | VLMW41S1T2-MKNL |           | -    | 0.33, 0.33 | -    |      |
|  |                      | VLMW41S1T2-NKOL |           | -    | 0.34, 0.34 | -    |      |
|  |                      | VLMW41S1T2-OKPL |           | -    | 0.35, 0.36 | -    |      |
| Angle of half intensity                        | $I_F = 10\text{ mA}$ |                 | $\phi$    | -    | $\pm 60$   | -    | deg  |
| Forward voltage                                | $I_F = 20\text{ mA}$ |                 | $V_F$     | 2.7  | 3.3        | 4.2  | V    |
| Temperature coefficient of $V_F$               | $I_F = 10\text{ mA}$ |                 | $TC_{VF}$ | -    | -3         | -    | mV/K |
| Temperature coefficient of $I_V$               | $I_F = 10\text{ mA}$ |                 | $TC_{IV}$ | -    | -0.4       | -    | %/K  |

**Note**

- Not designed for reverse operation

**LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LIGHT INTENSITY (mcd) |          |             |
|-------|-----------------------|----------|-------------|
|       | STANDARD              | OPTIONAL | MIN. / MAX. |
| S     | 1                     | 180      | 224         |
|       | 2                     | 224      | 280         |
| T     | 1                     | 280      | 355         |
|       | 2                     | 355      | 450         |

**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 are 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 are not be orderable.

**CROSSING TABLE**

| VISHAY   | OSRAM    |
|----------|----------|
| VLMW41.. | LWT67C.. |

| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED |        |        |    |        |        |
|---|--------|--------|----|--------|--------|
|   | X      | Y      |    | X      | Y      |
| JK  | 0.2960 | 0.2590 | ML | 0.3189 | 0.3302 |
|   | 0.2910 | 0.2680 |    | 0.3288 | 0.3452 |
|   | 0.3005 | 0.2825 |    | 0.3288 | 0.3282 |
|   | 0.3045 | 0.2715 |    | 0.3197 | 0.3131 |
| JL  | 0.2910 | 0.2680 | NK | 0.3288 | 0.3081 |
|   | 0.2850 | 0.2790 |    | 0.3288 | 0.3282 |
|   | 0.2960 | 0.2955 |    | 0.3386 | 0.3426 |
|   | 0.3005 | 0.2825 |    | 0.3386 | 0.3235 |
| KK  | 0.3045 | 0.2715 | NL | 0.3288 | 0.3282 |
|   | 0.3005 | 0.2825 |    | 0.3288 | 0.3453 |
|   | 0.3100 | 0.2970 |    | 0.3386 | 0.3591 |
|   | 0.3130 | 0.2840 |    | 0.3386 | 0.3426 |
| KL  | 0.3005 | 0.2825 | OK | 0.3386 | 0.3235 |
|   | 0.2960 | 0.2955 |    | 0.3386 | 0.3426 |
|   | 0.3070 | 0.3120 |    | 0.3484 | 0.3571 |
|   | 0.3100 | 0.2970 |    | 0.3484 | 0.3388 |
| LK  | 0.3100 | 0.2970 | OL | 0.3386 | 0.3426 |
|   | 0.3197 | 0.3131 |    | 0.3386 | 0.3591 |
|   | 0.3205 | 0.2956 |    | 0.3484 | 0.3730 |
|   | 0.3130 | 0.2840 |    | 0.3484 | 0.3571 |
| LL  | 0.3070 | 0.3120 | PK | 0.3484 | 0.3388 |
|   | 0.3189 | 0.3302 |    | 0.3484 | 0.3571 |
|   | 0.3197 | 0.3131 |    | 0.3582 | 0.3715 |
|   | 0.3100 | 0.2970 |    | 0.3582 | 0.3542 |
| MK  | 0.3197 | 0.3131 | PL | 0.3484 | 0.3571 |
|   | 0.3288 | 0.3282 |    | 0.3484 | 0.3730 |
|   | 0.3288 | 0.3081 |    | 0.3582 | 0.3792 |
|   | 0.3205 | 0.2956 |    | 0.3582 | 0.3715 |

**Note**

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

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

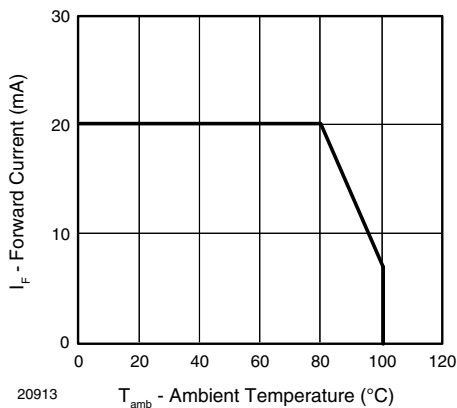


Fig. 1 - Forward Current vs. Ambient Temperature

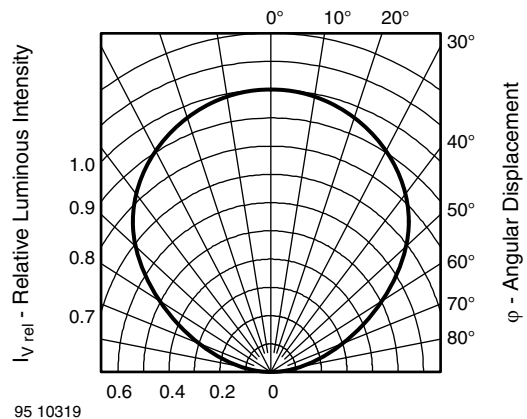


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

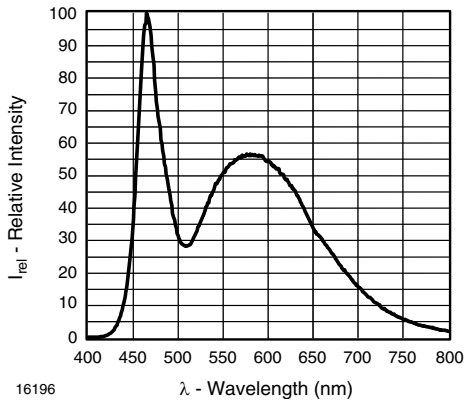


Fig. 3 - Relative Intensity vs. Wavelength

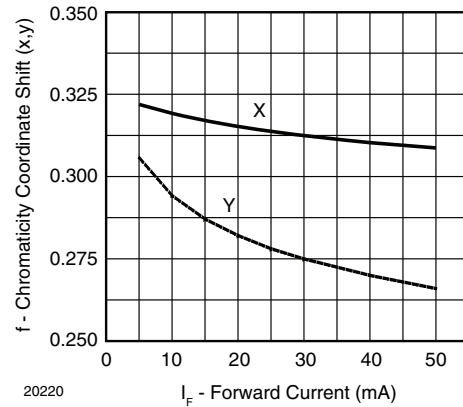


Fig. 6 - Chromaticity Coordinate Shift vs. Forward Current

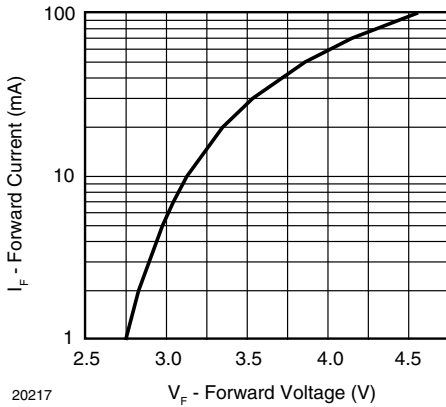


Fig. 4 - Forward Current vs. Forward Voltage

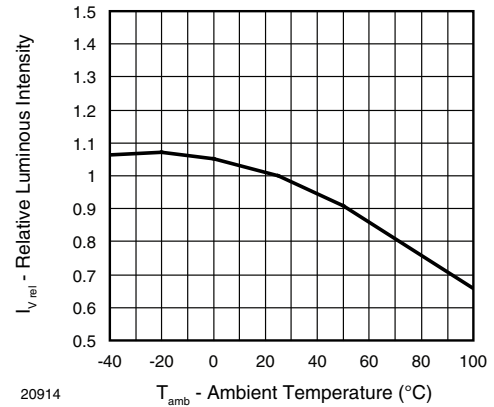


Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

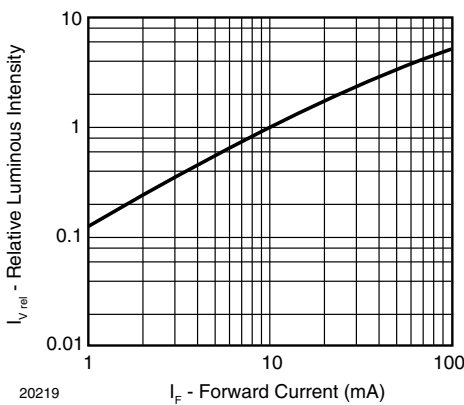


Fig. 5 - Relative Luminous Intensity vs. Forward Current

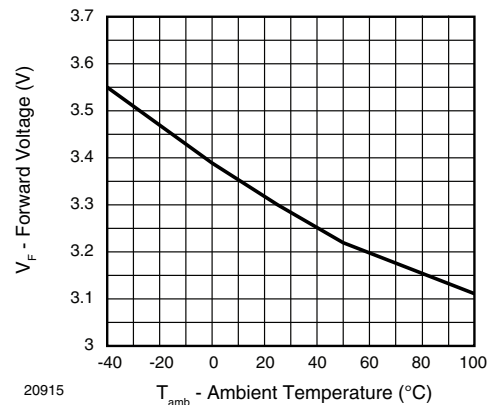


Fig. 8 - Forward Voltage vs. Ambient Temperature

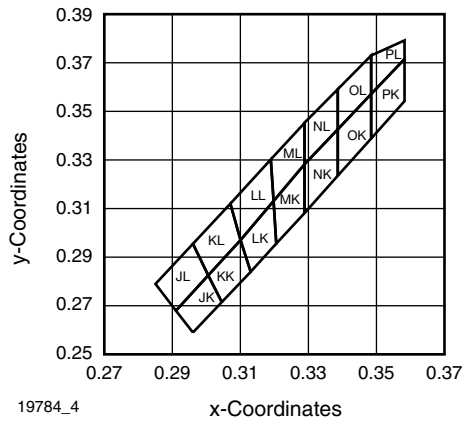
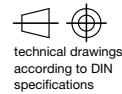
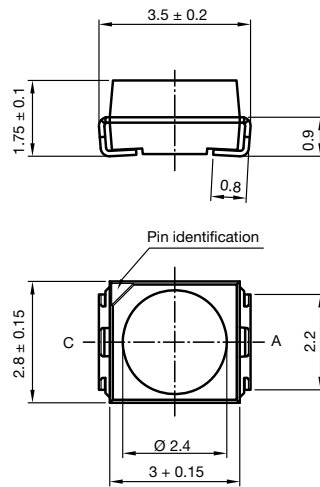


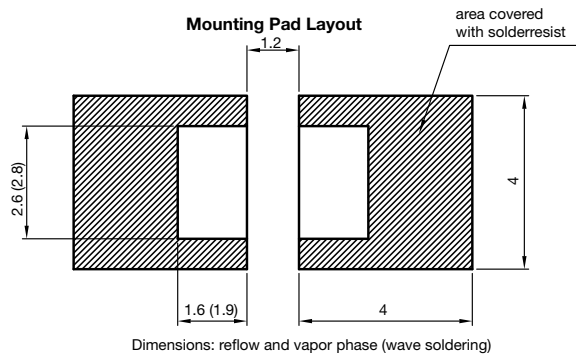
Fig. 9 - Coordinates of Colorgroups

**PACKAGE DIMENSIONS** in millimeters

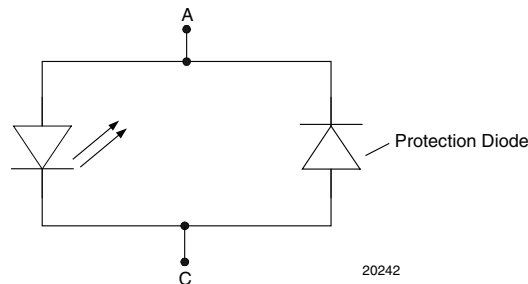


Dimensions in mm

Drawing-No: 6.541-5089.01-4  
Issue: 2; 23.09.13



Dimensions: reflow and vapor phase (wave soldering)

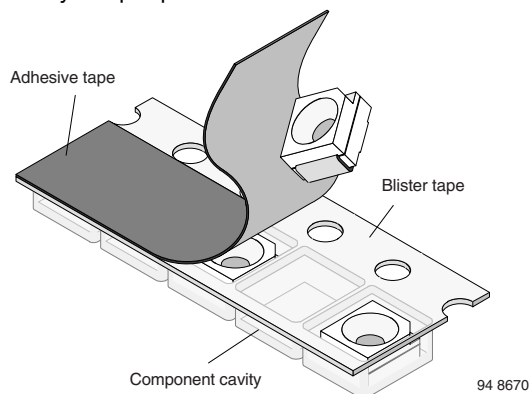


20242

**METHOD OF TAPING / POLARITY AND TAPE AND REEL**

**SMD LED (VLM.3..., VLM.4...-SERIES)**

Vishay's LEDs in SMD packages are available in an antistatic 8 mm blister tape (in accordance with DIN IEC 40 (CO) 564) for automatic component insertion. The blister tape is a plastic strip with impressed component cavities, covered by a top tape.



**REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDs, TAPE OPTION GS18 (= 8000 PCS.) PREFERRED**

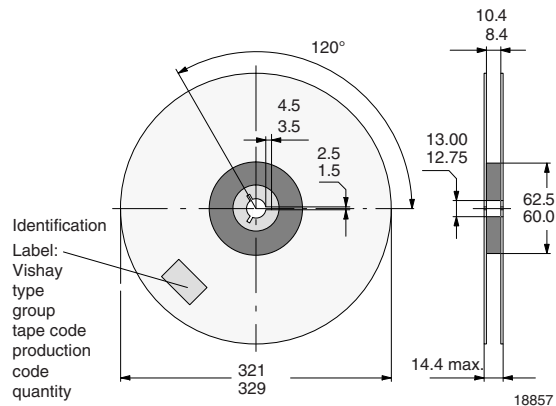


Fig. 12 - Reel Dimensions - GS18

**TAPING OF VLM.3..., VLM.4...**

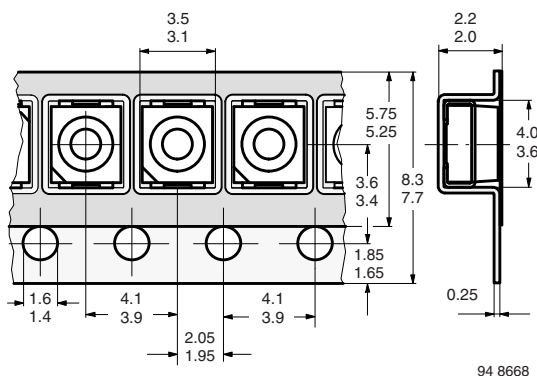


Fig. 10 - Tape Dimensions in mm for PLCC-2

**SOLDERING PROFILE**

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

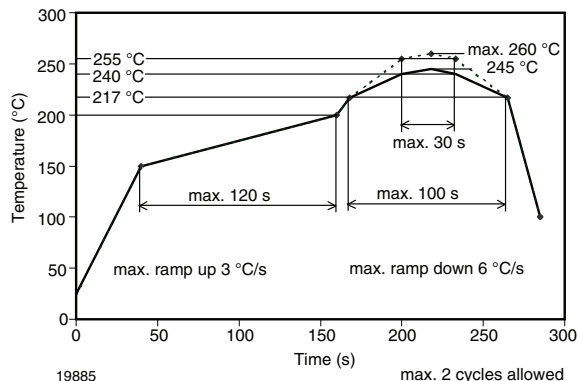


Fig. 13 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

**REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDs, TAPE OPTION GS08 (= 1500 PCS.)**

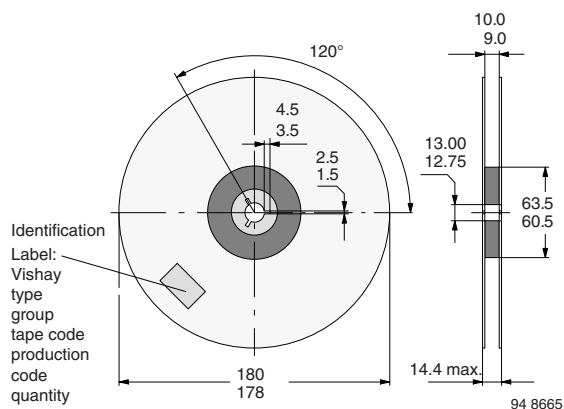


Fig. 11 - Reel Dimensions - GS08

TTW Soldering (acc. to CECC00802)

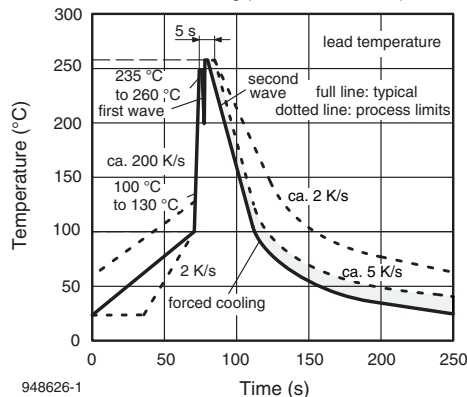
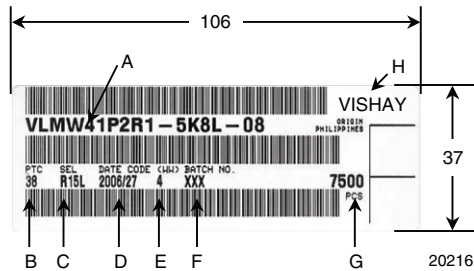


Fig. 14 - Double Wave Soldering of Opto Devices (all Packages)

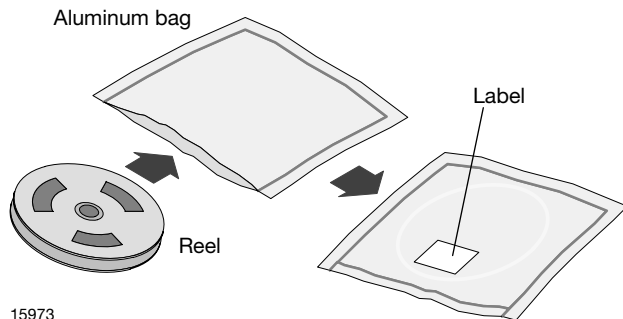
**BAR CODE PRODUCT LABEL** (example)



- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: R1 = code for luminous intensity group  
5L = code for chrom. coordinate group
- D. Date code year / week
- E. Day code (e.g. 4: Thursday)
- F. Batch no.
- G. Total quantity
- H. Company code

**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:

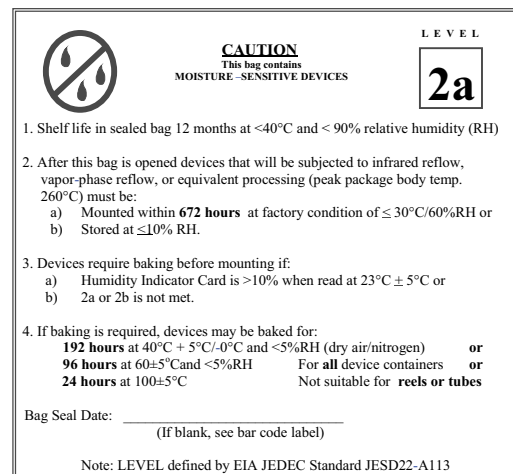
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.



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 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.



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[VLMW41S1T2-OKPL-08](#)