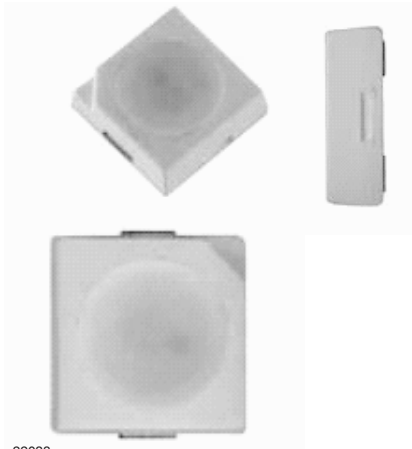


## Power SMD LED PLCC-2 Plus



22038

### DESCRIPTION

The VLMW51.. white LED in PLCC-2 plus package is an advanced product in terms of high luminous flux and low thermal resistance.

In combination with the small package outline (3.5 mm x 3.5 mm x 1.2 mm) the PLCC-2 plus is an ideal choice for backlighting, signage, exterior and interior automotive lighting as well as all general lighting applications.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-2 plus
- Product series: power
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- High efficient InGaN technology
- Long life, due to silicone resin casting
- Compact package outline 3.5 mm x 3.5 mm x 1.2 mm
- Angle of half intensity  $\varphi = \pm 60^\circ$
- Luminous flux and color categorized per packing unit
- Luminous flux ratio per packing unit  $\phi_{\max}/\phi_{\min} < 1.2$
- ESD-withstand voltage: up to 2 kV (HBM) according to JESD22-A114-B
- Preconditioning according to JEDEC level 2a
- Compatible with IR-reflow soldering profiles according to J-STD-020
- 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
- Marker lights
- Interior and exterior automotive lighting
- Decorative lighting
- Architectural lighting
- All kinds of general lighting
- Backlighting (TFT LCD displays)

### PARTS TABLE

| PART            | COLOR | LUMINOUS FLUX (lm) |        |        | 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. |                        |            |
| VLMW51Q2R3-GS08 | White | 30 600             | 40 000 | 51 700 | 150                    | -                 | 0.33, 0.33 | -    | 150                    | 3                   | 3.4  | 4.1  | 150                    | InGaN      |

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

#### VLMW51Q2R3

| PARAMETER                                | TEST CONDITION  | SYMBOL             | VALUE         | UNIT |
|--|---|--------------------|---------------|------|
| DC Forward current                       |   | I <sub>F</sub>     | 180           | mA   |
| Surge forward current                    | t <sub>p</sub> ≤ 10 μs                                  | I <sub>FSM</sub>   | 350           | mA   |
| Power dissipation                        |   | P <sub>V</sub>     | 738           | mW   |
| Junction temperature                     |   | T <sub>jmax.</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/solder point |   | R <sub>thJS</sub>  | 45            | K/W  |
| Thermal resistance junction/ambient      | Mounted on PC board total Cu area > 900 mm <sup>2</sup> | R <sub>thJA</sub>  | 125           | K/W  |

#### Note

- Not designed for reverse bias



| <b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)<br><b>VLMW51P2Q3, WHITE</b> |                       |            |           |      |          |      |      |
|--|-----------------------|------------|-----------|------|----------|------|------|
| PARAMETER  | TEST CONDITION        | PART       | SYMBOL    | MIN. | TYP.     | MAX. | UNIT |
| Luminous flux  | $I_F = 150\text{ mA}$ | VLMW51Q2R3 | $\phi_V$  | 30.6 | 40       | 51.7 | lm   |
| Luminous intensity   | $I_F = 150\text{ mA}$ | VLMW51Q2R3 | $I_V$     | -    | 13       | -    | cd   |
| Chromaticity coordinate x, y acc. to CIE 1931  | $I_F = 150\text{ mA}$ |            | x         | -    | 0.33     | -    |      |
|  |                       |            | y         | -    | 0.33     | -    |      |
| Angle of half intensity  | $I_F = 150\text{ mA}$ |            | $\phi$    | -    | $\pm 60$ | -    | deg  |
| Forward voltage  | $I_F = 150\text{ mA}$ |            | $V_F$     | 3    | 3.4      | 4.1  | V    |
| Temperature coefficient of $V_F$   | $I_F = 150\text{ mA}$ |            | $TC_{VF}$ | -    | -3.7     | -    | mV/K |
| Temperature coefficient of $I_V$   | $I_F = 150\text{ mA}$ |            | $TC_{IV}$ | -    | -0.25    | -    | %/K  |
| Temperature coefficient of x   | $I_F = 150\text{ mA}$ |            | $TC_x$    | -    | -0.00022 | -    | 1/K  |
| Temperature coefficient of y   | $I_F = 150\text{ mA}$ |            | $TC_y$    | -    | -0.00016 | -    | 1/K  |

**Note**

- Not designed for reverse bias

| <b>LUMINOUS FLUX CLASSIFICATION</b> |                    |      |
|-------------------------------------|--------------------|------|
| GROUP                               | LUMINOUS FLUX (lm) |      |
| STANDARD                            | MIN.               | MAX. |
| Q2                                  | 30.6               | 34.8 |
| Q3                                  | 34.8               | 39.8 |
| R2                                  | 39.8               | 45.2 |
| R3                                  | 45.2               | 51.7 |

**Note**

- Luminous flux 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.

| <b>CHROMATICITY COORDINATED GROUPS FOR WHITE PLCC-2 PLUS</b> |       |       |    |       |       |
|--|-------|-------|----|-------|-------|
|  | X     | Y     |    | X     | Y     |
| YU   | 0.274 | 0.301 | WL | 0.317 | 0.325 |
|  | 0.283 | 0.284 |    | 0.319 | 0.310 |
|  | 0.307 | 0.316 |    | 0.329 | 0.319 |
|  | 0.303 | 0.333 |    | 0.329 | 0.336 |
| YL   | 0.283 | 0.284 | VU | 0.329 | 0.354 |
|  | 0.290 | 0.270 |    | 0.329 | 0.336 |
|  | 0.310 | 0.299 |    | 0.345 | 0.350 |
|  | 0.307 | 0.316 |    | 0.347 | 0.368 |
| XU   | 0.303 | 0.333 | VL | 0.329 | 0.336 |
|  | 0.307 | 0.316 |    | 0.329 | 0.319 |
|  | 0.317 | 0.325 |    | 0.343 | 0.331 |
|  | 0.315 | 0.343 |    | 0.345 | 0.350 |
| XL   | 0.307 | 0.316 | UU | 0.347 | 0.368 |
|  | 0.310 | 0.299 |    | 0.345 | 0.350 |
|  | 0.319 | 0.310 |    | 0.361 | 0.365 |
|  | 0.317 | 0.325 |    | 0.364 | 0.383 |
| WU   | 0.315 | 0.343 | UL | 0.345 | 0.350 |
|  | 0.317 | 0.325 |    | 0.343 | 0.331 |
|  | 0.329 | 0.336 |    | 0.357 | 0.343 |
|  | 0.329 | 0.354 |    | 0.361 | 0.365 |

**Note**

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

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

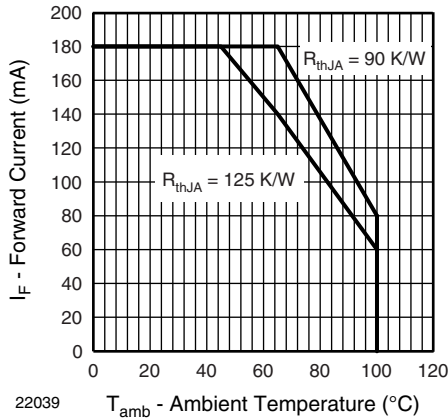


Fig. 1 - Forward Current vs. Ambient Temperature

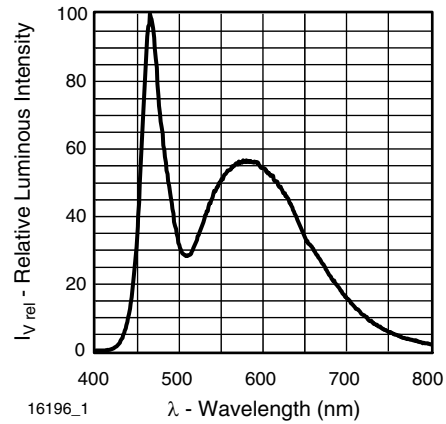


Fig. 4 - Relative Intensity vs. Wavelength

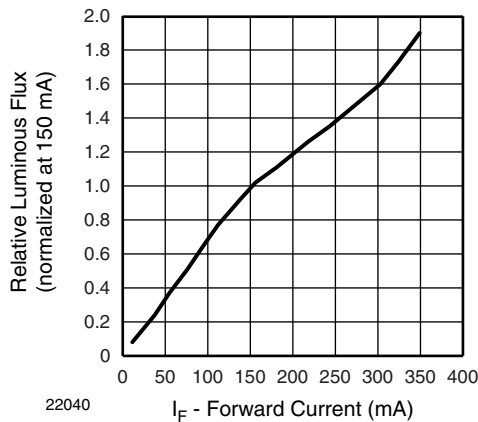


Fig. 2 - Relative Luminous Intensity vs. Forward Current

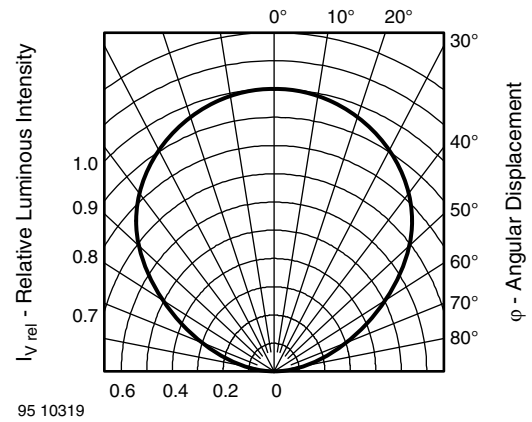


Fig. 5 - Relative Luminous Intensity vs. Angular Displacement

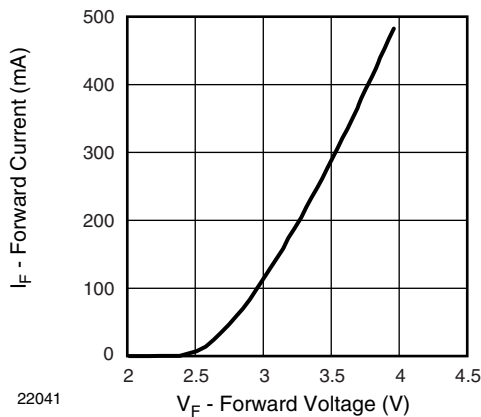


Fig. 3 - Forward Current vs. Forward Voltage

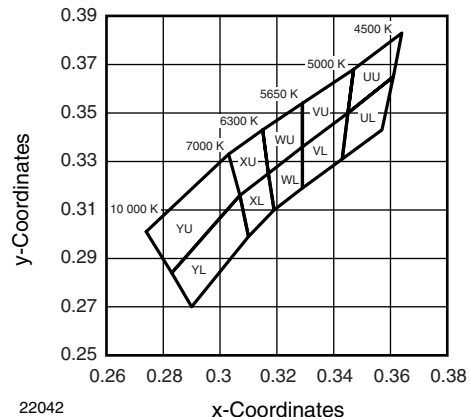
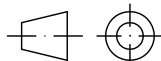
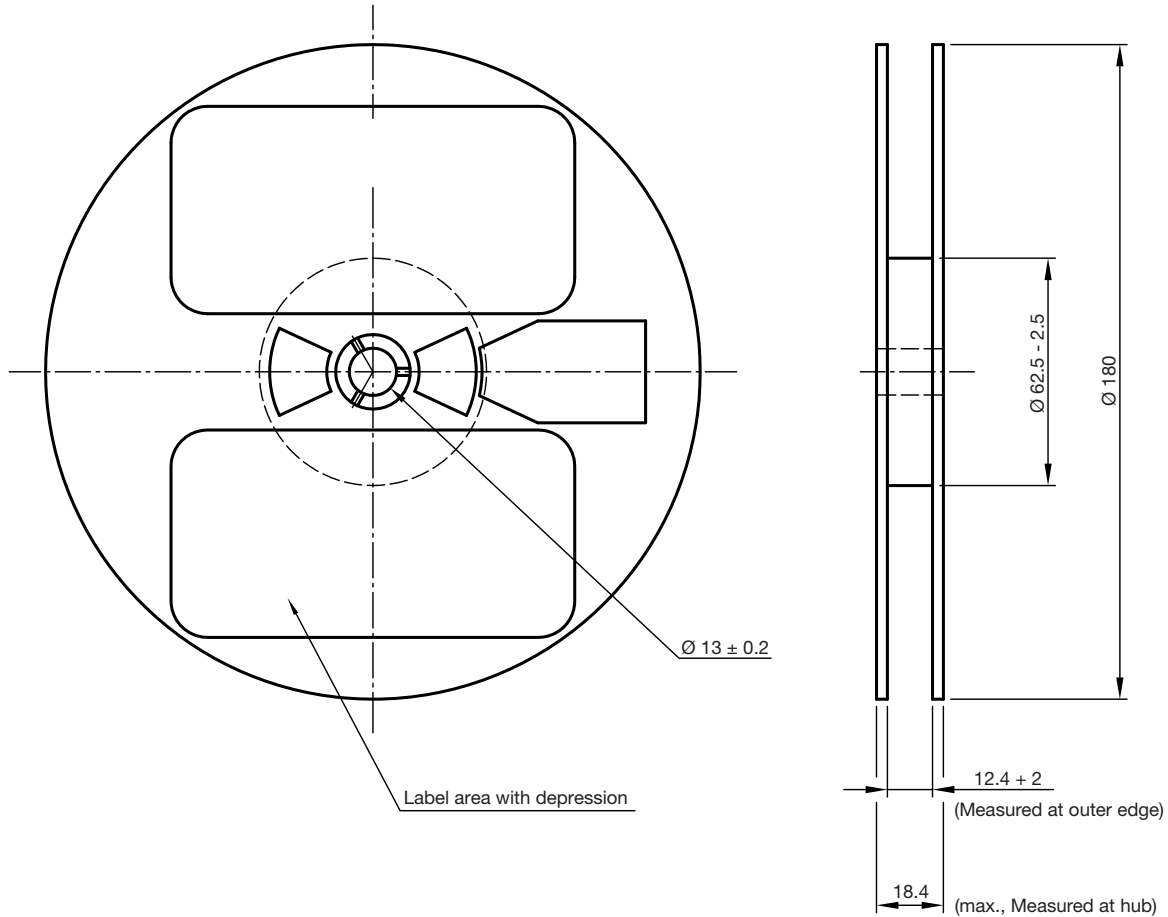


Fig. 6 - White Grouping SMD



REEL DIMENSIONS in millimeters



technical drawings according to DIN specifications

Not indicated tolerances ± 0.5

Material: black static dissipative

GS08 = 1000 pcs

Drawing-No.: 9.800-5104.01-4

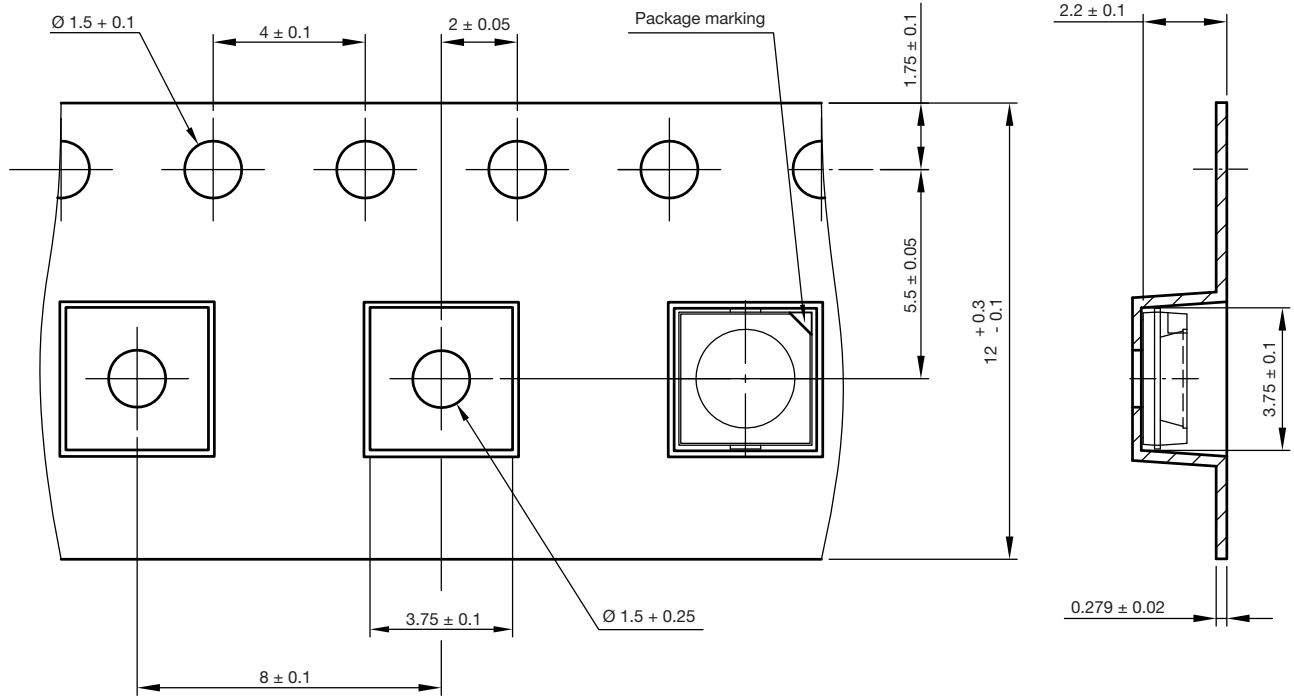
Issue: 2; 19.03.10

22067



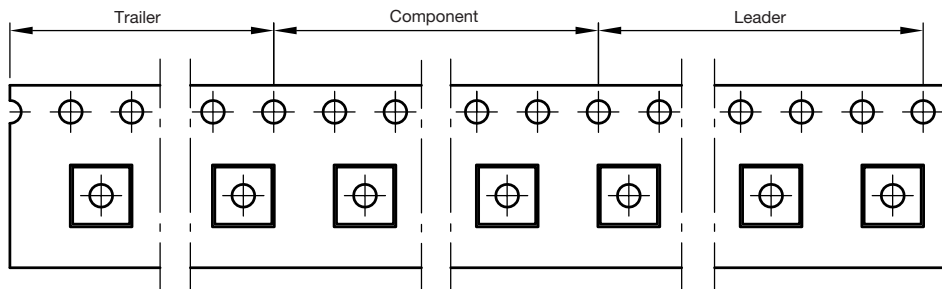
TAPING AND ORIENTATION DIMENSIONS in millimeters

Reels come in quantity of 1000 units.

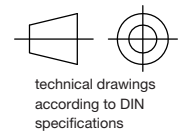


200 mm min. for  $\varnothing 180$  reel

480 mm min. for  $\varnothing 180$  reel



User feed direction



Drawing-No.: 9.700-5348.01-4

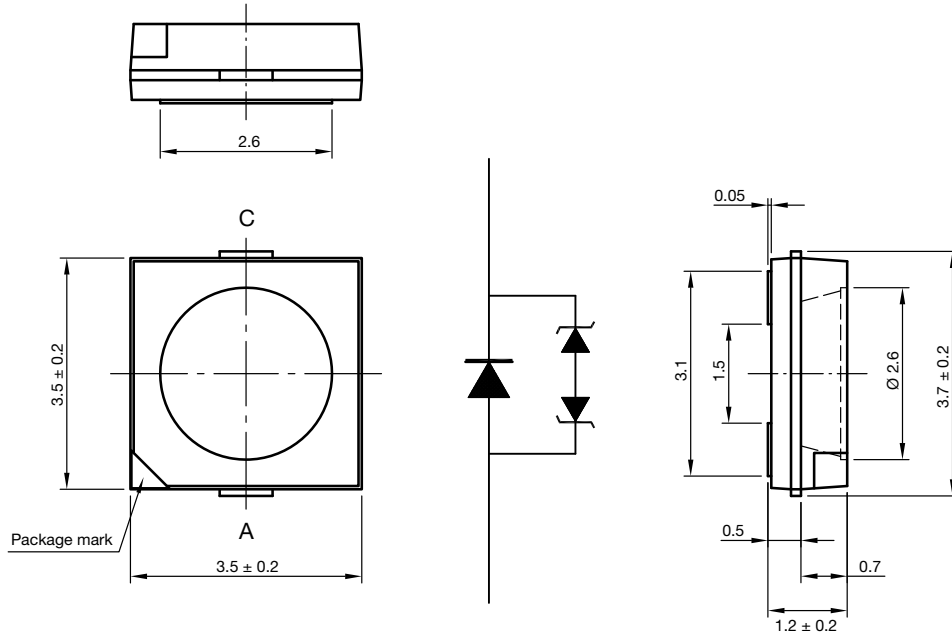
Issue: 1; 01.03.10

22066

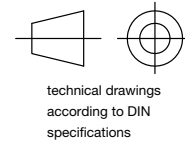
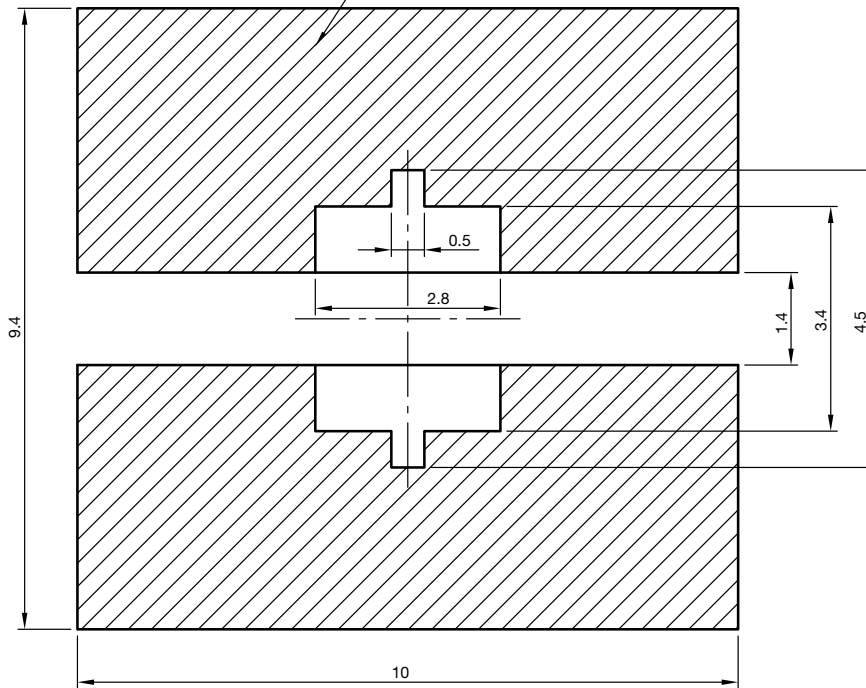
technical drawings according to DIN specifications



RECOMMENDED PAD DESIGN DIMENSIONS in millimeters



Recommended solder pad  
 Additional area covered by solder resist  
 for improved heat dissipation.



Drawing-No.: 6.541-5082.01-4  
 Issue: 2; 23.07.10  
 22065

**SOLDERING PROFILE**

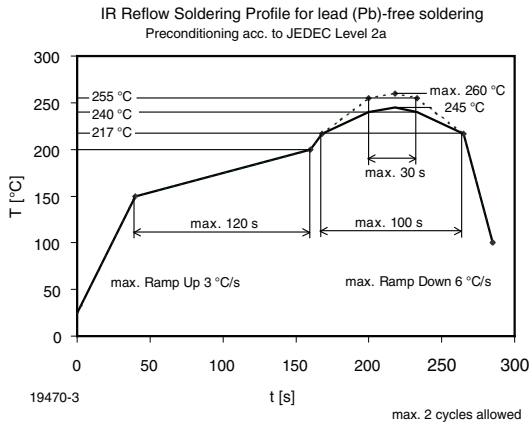
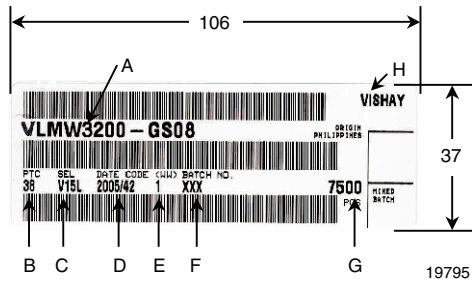


Fig. 7 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

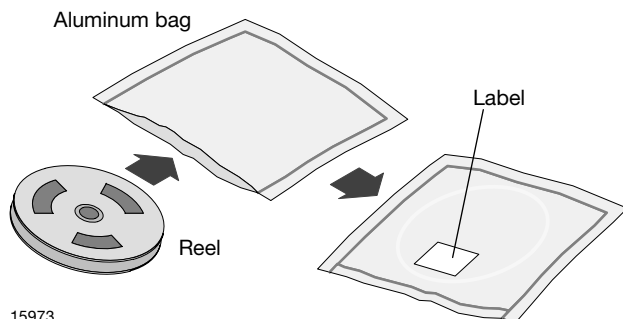
**BAR CODE PRODUCT LABEL (example)**



- A) Type of component
- B) Manufacturing plant
- C) SEL - selection code (bin):  
e.g.: V1 = code for luminous intensity group  
5L = code for chrom. coordinate group
- D) Date code year/week
- E) Day code (e. g. 1: Monday)
- 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.



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**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:

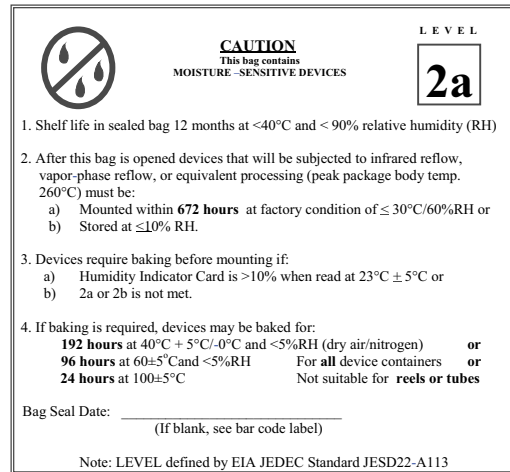
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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. Electro-static sensitive devices warning labels are on the packaging.



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