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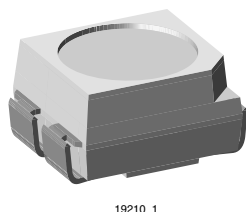
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Power SMD LED PLCC-4



19210_1

DESCRIPTION

The VLMW320.. white LED is an advanced product in terms of heat dissipation.

The leadframe profile of this PLCC-4 SMD package is optimized to reduce the thermal resistance.

This allows higher drive current and doubles the light output compared to Vishay's high intensity SMD LED in PLCC-2 standard package.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-4
- Product series: power
- Angle of half intensity: $\pm 60^\circ$

FEATURES

- High efficient INGaN technology
- Available in 8 mm tape
- Luminous intensity, color and forward voltage categorized per packing unit
- Luminous intensity ratio per packing unit
 $I_{Vmax}/I_{Vmin.} \leq 1.6$
- ESD class 1
- Suitable for all soldering methods according to CECC
- Lead (Pb)-free device
- Preconditioning: according to JEDEC level 2a



APPLICATIONS

- Interior and exterior lighting
- Indicator and backlighting purposes for audio, video, LCD's switches, symbols, illuminated advertising etc.
- Illumination purpose, alternative to incandescent lamps
- General use

PARTS TABLE

| PART | COLOR, LUMINOUS INTENSITY | TECHNOLOGY WAVELENGTH |
|---------------|---|-----------------------|
| VLMW3200-GS08 | White, $I_V \geq 560$ mcd (typ 900 mcd) | INGaN/TAG in SiC |
| VLMW3201-GS08 | White, $I_V \geq 710$ mcd | INGaN/TAG in SiC |

ABSOLUTE MAXIMUM RATINGS ¹⁾ VLMW320.

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-------------------------------------|---|------------|---------------|------------------|
| Reverse voltage ²⁾ | | V_R | 5 | V |
| DC Forward current | $T_{amb} \leq 65^\circ\text{C}$ | I_F | 30 | mA |
| Surge forward current | $t_p \leq 10 \mu\text{s}$ | I_{FSM} | 0.1 | A |
| Power dissipation | | PV | 127 | 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 | $^\circ\text{C}$ |
| Soldering temperature | $t \leq 5 \text{ s}$ | T_{sd} | 260 | $^\circ\text{C}$ |
| Thermal resistance junction/ambient | mounted on PC board (pad design see page 6) | R_{thJA} | 270 | K/W |

Note:

¹⁾ $T_{amb} = 25^\circ\text{C}$, unless otherwise specified²⁾ Driving the LED in reverse direction is suitable for a short term application**OPTICAL AND ELECTRICAL CHARACTERISTICS ¹⁾ VLMW320., WHITE**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|------------------------|----------|-----------|------|--------------|------|------|
| Luminous intensity ²⁾ | $I_F = 30 \text{ mA}$ | VLMW3200 | I_V | 560 | | | mcd |
| | | VLMW3201 | I_V | 710 | 900 | | mcd |
| Chromaticity coordinate x, y acc. to CIE 1931 | $I_F = 30 \text{ mA}$ | VLMW320. | x y | | 0.33 0.33 | | |
| Angle of half intensity | $I_F = 30 \text{ mA}$ | | φ | | ± 60 | | deg |
| Forward voltage | $I_F = 30 \text{ mA}$ | | V_F | | 3.7 | 4.2 | V |
| Reverse voltage | $I_R = 10 \mu\text{A}$ | | V_R | 5 | | | V |
| Temperature coefficient of V_F | $I_F = 20 \text{ mA}$ | | TC_{VF} | | - 4 | | mV/K |
| Temperature coefficient of I_V | $I_F = 20 \text{ mA}$ | | TC_{IV} | | - 0.5 | | %/K |

Note:

¹⁾ $T_{amb} = 25^\circ\text{C}$, unless otherwise specified²⁾ In one Packing Unit $I_{Vmax}/I_{Vmin.} \leq 1.6$ **LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LIGHT INTENSITY (mcd) | |
|-------|-----------------------|------|
| | MIN. | MAX. |
| U2 | 560 | 710 |
| V1 | 710 | 900 |
| V2 | 900 | 1120 |
| AA | 1120 | 1400 |
| AB | 1400 | 1800 |
| BA | 1800 | 2240 |
| BB | 2240 | 2800 |

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.

CROSSING TABLE

| VISHAY | OSRAM | NICHIA |
|----------|-------------|----------|
| VLMW3200 | LWE67C-U2V2 | NSCW021T |
| VLMW3201 | LWE67C-V1V2 | NSCW021T |

| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED | | | | | |
|---|-------|-------|----|-------|-------|
| | X | Y | | X | Y |
| 5L | 0.291 | 0.268 | 7L | 0.330 | 0.330 |
| | 0.285 | 0.279 | | 0.330 | 0.347 |
| | 0.307 | 0.312 | | 0.347 | 0.371 |
| | 0.310 | 0.297 | | 0.345 | 0.352 |
| 5K | 0.296 | 0.259 | 7K | 0.330 | 0.310 |
| | 0.291 | 0.268 | | 0.330 | 0.330 |
| | 0.310 | 0.297 | | 0.338 | 0.342 |
| | 0.313 | 0.284 | | 0.352 | 0.344 |
| 6L | 0.310 | 0.297 | 8L | 0.345 | 0.352 |
| | 0.307 | 0.312 | | 0.347 | 0.371 |
| | 0.330 | 0.347 | | 0.367 | 0.401 |
| | 0.330 | 0.330 | | 0.364 | 0.380 |
| 6K | 0.313 | 0.284 | 8K | 0.352 | 0.344 |
| | 0.310 | 0.297 | | 0.338 | 0.342 |
| | 0.330 | 0.330 | | 0.364 | 0.380 |
| | 0.330 | 0.310 | | 0.360 | 0.357 |

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

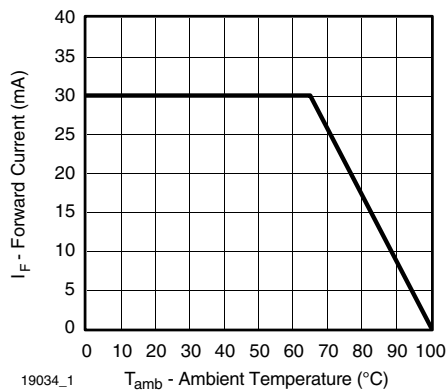


Figure 1. Forward Current vs. Ambient Temperature

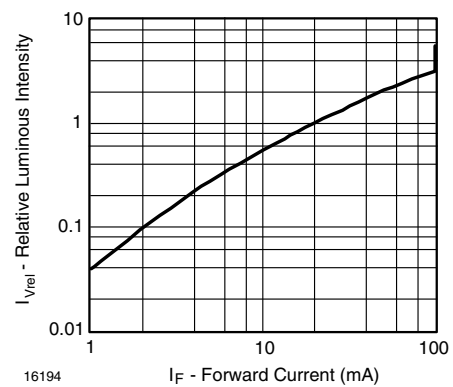


Figure 2. Relative Luminous Intensity vs. Forward Current

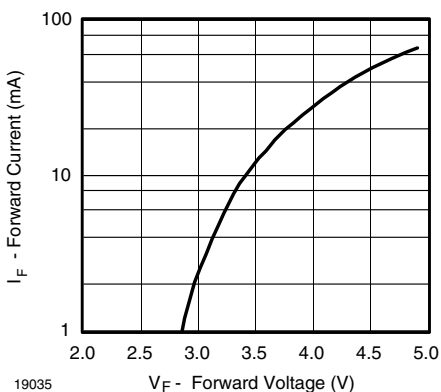


Figure 3. Forward Current vs. Forward Voltage

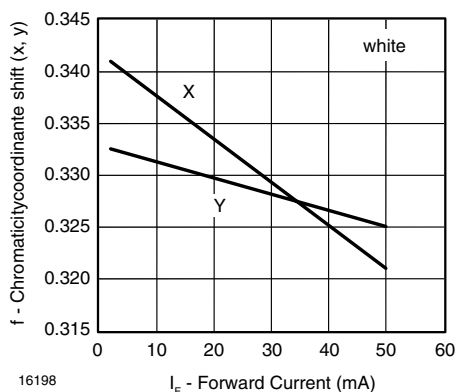


Figure 6. Chromaticity Coordinate Shift vs. Forward Current

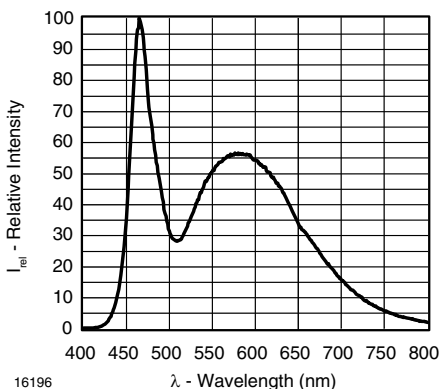


Figure 4. Relative Intensity vs. Wavelength

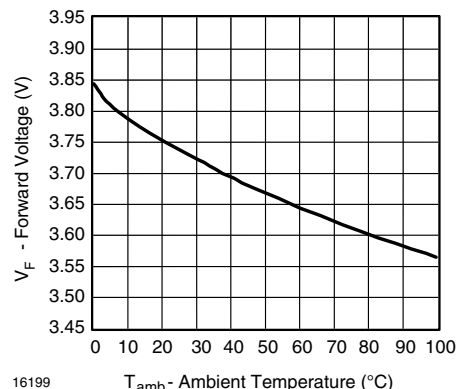


Figure 7. Forward Voltage vs. Ambient Temperature

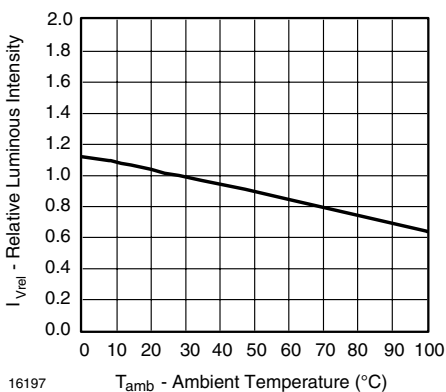


Figure 5. Relative Luminous Intensity vs. Ambient Temperature

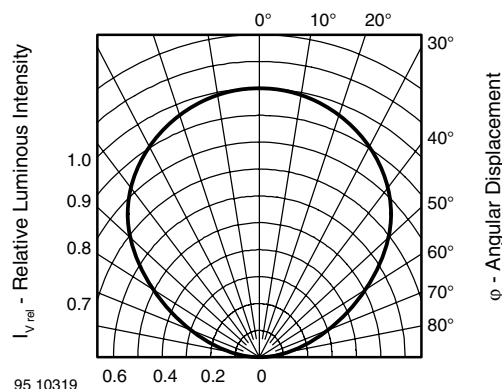


Figure 8. Relative Luminous Intensity vs. Angular Displacement

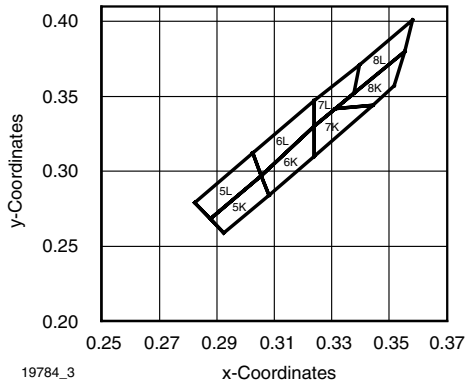


Figure 9. White Grouping SMD

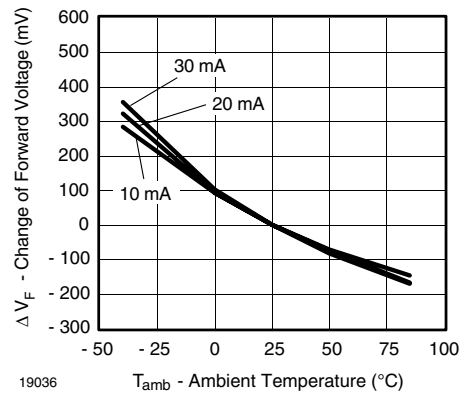
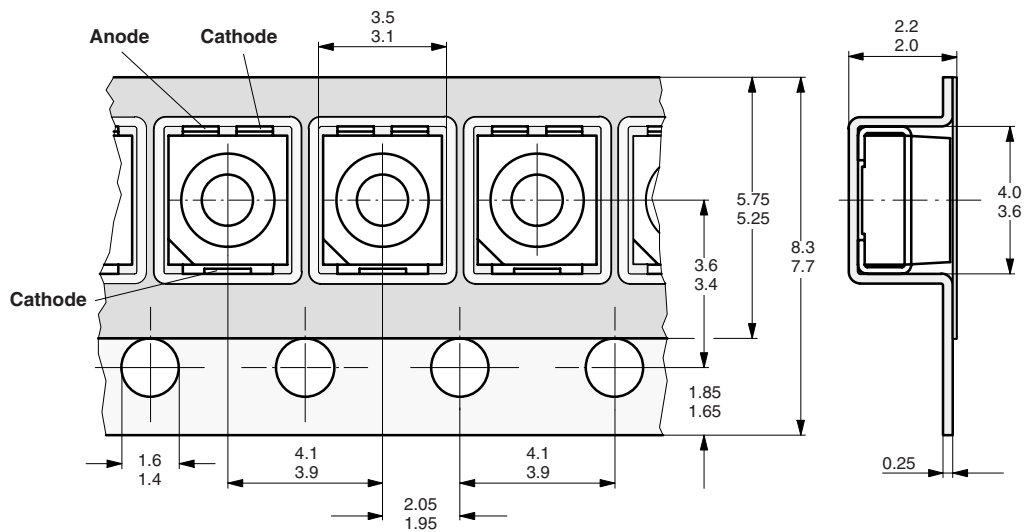


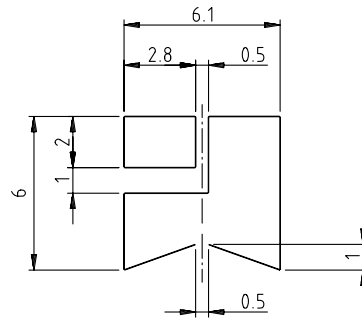
Figure 10. Change of Forward Voltage vs. Ambient Temperature

TAPING Dimensions in millimeters



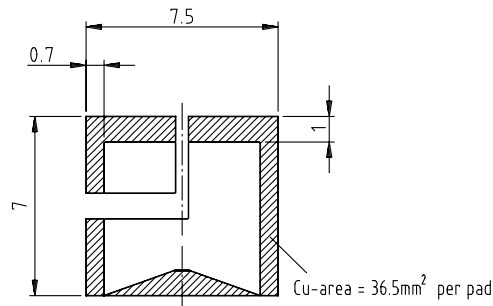
18596

RECOMMENDED PAD DESIGN Dimensions in millimeters
(Wave-soldering), $R_{THJA} = 270 \text{ K/W}$

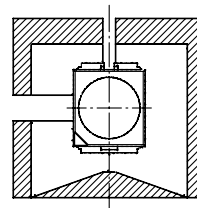


Pad design for improved head dissipation

solder resist

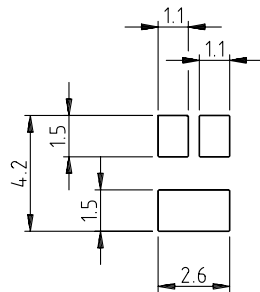


Component location on pad



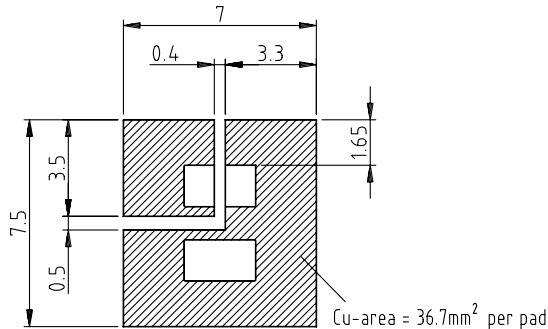
16260

RECOMMENDED PAD DESIGN Dimensions in millimeters
(Reflow-soldering), $R_{THJA} = 270 \text{ K/W}$

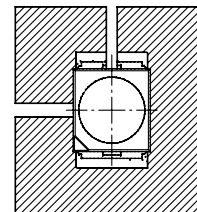


Pad design for improved head dissipation

solder resist



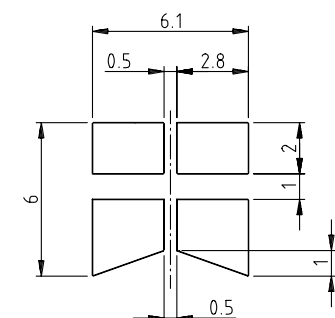
Component location on pad



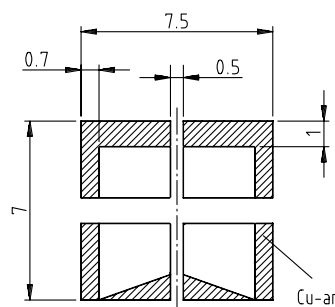
16261

OPTIONAL PAD DESIGN

(Wave-soldering), $R_{THJA} = 290 \text{ K/W}$

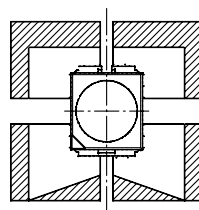


Optional padding



Cu-area = 10.5mm^2 per pad

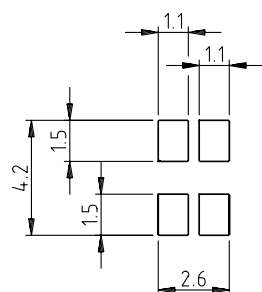
Component location on pad



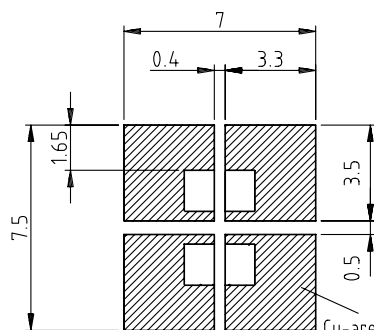
16262

OPTIONAL PAD DESIGN

(Reflow-soldering), $R_{THJA} = 290 \text{ K/W}$

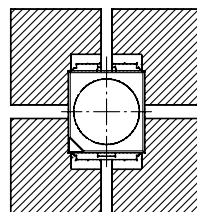


Optional padding



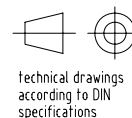
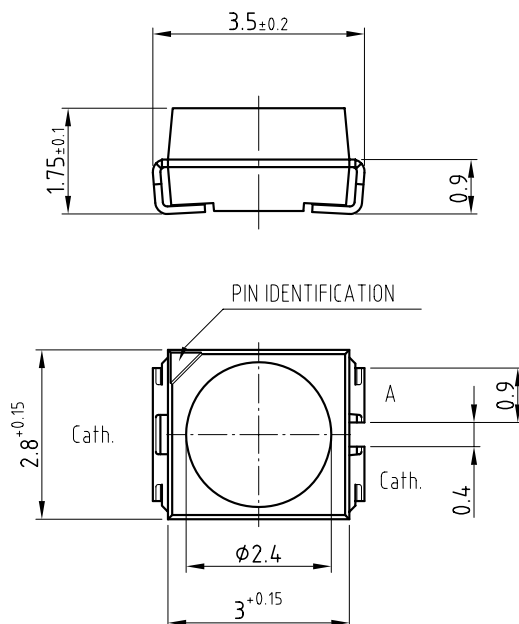
Cu-area = 11.6mm^2 per pad

Component location on pad

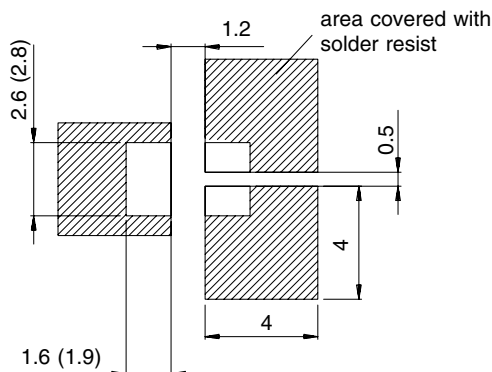


16263

PACKAGE DIMENSIONS in millimeters



Mounting Pad Layout



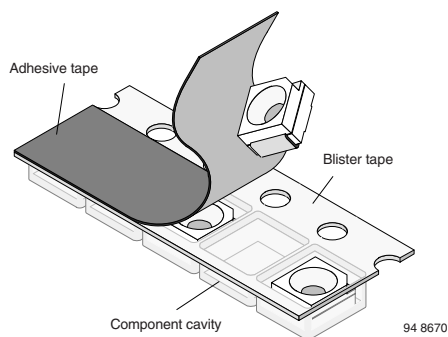
Dimensions: IR and Vaporphase
(Wave soldering)

Drawing-No. : 6.541-5054.01-4
Issue: 3; 31.03.08
16276_1

METHOD OF TAPING/POLARITY AND TAPE AND REEL

SMD LED (VLM.3-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.



TAPING OF VLM.3...

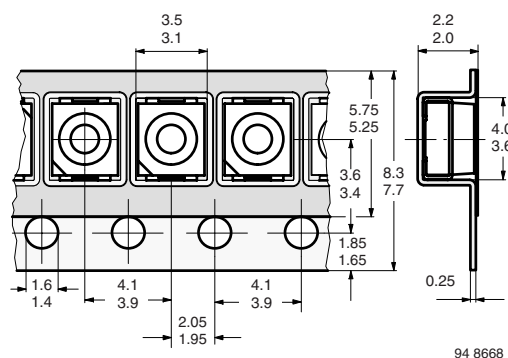


Figure 11. Tape Dimensions in mm for PLCC-2

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

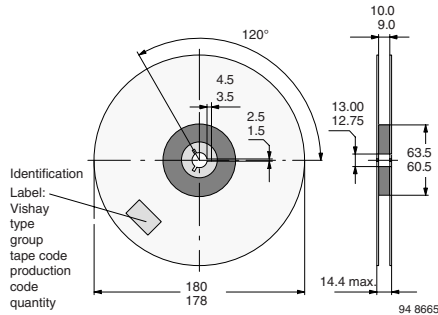


Figure 12. Reel Dimensions - GS08

BAR CODE PRODUCT LABEL EXAMPLE:

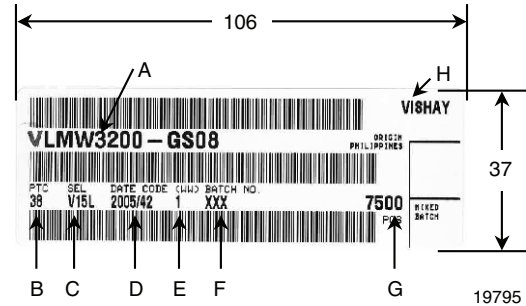


Figure 13. Vishay Lead (Pb)-free Reflow Soldering Profile
(acc. to J-STD-020C)

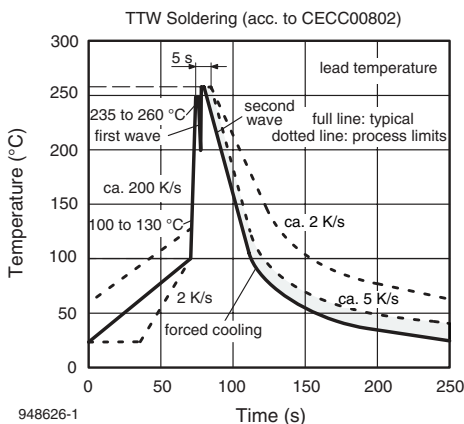
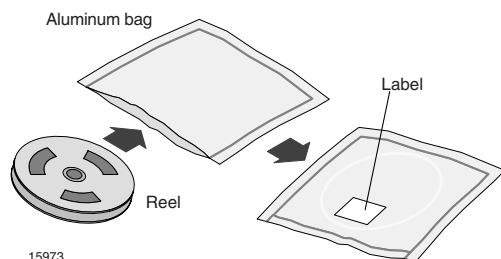


Figure 14. Double Wave Soldering of Opto Devices (all Packages)

- 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.



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 $\leq 60\%$ 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.

| | | | | | | | | |
|---|--|--------------------|--|----|---|------------------------------|--|--|
|  | 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 $\leq 30^\circ\text{C}/60\%\text{RH}$ or b) Stored at $\leq 10\%$ RH. | | | | | | | | |
| 3. Devices require baking before mounting if: a) Humidity Indicator Card is >10% when read at $23^\circ\text{C} \pm 5^\circ\text{C}$ or b) 2a or 2b is not met. | | | | | | | | |
| 4. If baking is required, devices may be baked for: <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"> 192 hours at $40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}$ and <5%RH (dry air/nitrogen) </td> <td style="text-align: center; vertical-align: bottom;">or</td> </tr> <tr> <td style="text-align: center;"> 96 hours at $60 \pm 5^\circ\text{C}$ and <5%RH </td> <td style="text-align: center; vertical-align: bottom;">For all device containers or</td> </tr> <tr> <td style="text-align: center;"> 24 hours at $100 \pm 5^\circ\text{C}$ </td> <td style="text-align: center; vertical-align: bottom;">Not suitable for reels or tubes</td> </tr> </table> | | | 192 hours at $40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}$ and <5%RH (dry air/nitrogen) | or | 96 hours at $60 \pm 5^\circ\text{C}$ and <5%RH | For all device containers or | 24 hours at $100 \pm 5^\circ\text{C}$ | Not suitable for reels or tubes |
| 192 hours at $40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}$ and <5%RH (dry air/nitrogen) | or | | | | | | | |
| 96 hours at $60 \pm 5^\circ\text{C}$ and <5%RH | For all device containers or | | | | | | | |
| 24 hours at $100 \pm 5^\circ\text{C}$ | Not suitable for reels or tubes | | | | | | | |
| Bag Seal Date: _____ (If blank, see bar code label) | | | | | | | | |
| Note: LEVEL defined by EIA JEDEC Standard JESD22-A113 | | | | | | | | |

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

**OZONE DEPLETING SUBSTANCES POLICY STATEMENT**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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