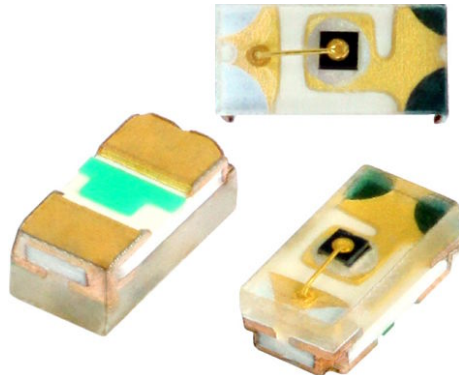




## Ultrabright 0402 ChipLED



### FEATURES

- 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
- Wavelength (470 to 475) nm (blue), typ. 571 nm (yellow green), (587 to 597) nm (yellow), typ. 605 nm (soft orange), typ. 631 nm (super red)
- AllnGaP and InGaN technology
- Viewing angle: extremely wide 130°
- Grouping parameter: luminous intensity, wavelength,  $V_F$
- Available in 8 mm tape on 7" diameter reel
- Compatible to IR reflow soldering
- Preconditioning: according to JEDEC level 2a
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### DESCRIPTION

The new ChipLED series have been designed in the smallest SMD package. This innovative 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, high brightness products that are expected to work reliable in an arduous environment.

### PRODUCT GROUP AND PACKAGE DATA

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

### APPLICATIONS

- Backlight keypads
- Navigation systems
- Cellular phone displays
- Displays for industrial control systems
- Miniaturized color effects
- Traffic displays

### PARTS TABLE

| PART          | COLOR        | LUMINOUS INTENSITY (mcd) |      |      | at $I_F$ (mA) | WAVELENGTH (nm) |      |      | FORWARD VOLTAGE (V) |      |      | TECHNOLOGY |
|---------------|--------------|--------------------------|------|------|---------------|-----------------|------|------|---------------------|------|------|------------|
|               |              | MIN.                     | TYP. | MAX. |               | MIN.            | TYP. | MAX. | MIN.                | TYP. | MAX. |            |
| VLMS1500-GS08 | Super red    | 18                       | 54   | -    | 20            | -               | 631  | -    | -                   | 2.0  | 2.4  | AllnGaP    |
| VLMO1500-GS08 | Soft orange  | 45                       | 90   | -    | 20            | -               | 605  | -    | -                   | 2.0  | 2.4  | AllnGaP    |
| VLMY1500-GS08 | Yellow       | 28                       | -    | 180  | 20            | 587             | -    | 597  | -                   | 2.0  | 2.4  | AllnGaP    |
| VLMG1500-GS08 | Yellow green | 18                       | 35   | -    | 20            | -               | 571  | -    | -                   | 2.0  | 2.4  | AllnGaP    |
| VLMB1500-GS08 | Blue         | 11.2                     | -    | 45   | 5             | 470             | -    | 475  | 2.65                | -    | 3.15 | InGaN      |

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified) VLMS1500, VLMO1500, VLMY1500, VLMG1500 (AllnGaP technology)

| PARAMETER                      | TEST CONDITION                      | SYMBOL    | VALUE        | UNIT             |
|--------------------------------|-------------------------------------|-----------|--------------|------------------|
| Reverse voltage <sup>(1)</sup> |                                     | $V_R$     | 5            | V                |
| DC forward current             |                                     | $I_F$     | 30           | mA               |
| Surge forward current          | 1/10 duty cycle, 0.1 ms pulse width | $I_{FSM}$ | 80           | mA               |
| Power dissipation              | $T_{amb} \leq 25^\circ\text{C}$     | $P_V$     | 75           | mW               |
| Operating temperature range    |                                     | $T_{amb}$ | - 30 to + 85 | $^\circ\text{C}$ |
| Storage temperature range      |                                     | $T_{stg}$ | - 40 to + 85 | $^\circ\text{C}$ |
| IREDD solder conditions        | according Vishay specifications     | $T_{st}$  | 260          | $^\circ\text{C}$ |

#### Note

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



**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMB1500** (InGaN technology)

| PARAMETER                   | TEST CONDITION                            | SYMBOL    | VALUE         | UNIT               |
|-----------------------------|---|-----------|---------------|--------------------|
| DC forward current          |   | $I_F$     | 20            | mA                 |
| Surge forward current       | 1/10 duty cycle, 0.1 ms pulse width       | $I_{FSM}$ | 100           | mA                 |
| Power dissipation           | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ | $P_V$     | 76            | mW                 |
| Operating temperature range |   | $T_{amb}$ | - 20 to + 80  | $^{\circ}\text{C}$ |
| Storage temperature range   |   | $T_{stg}$ | - 30 to + 100 | $^{\circ}\text{C}$ |
| IREC solder conditions      | according Vishay specifications           | $T_{st}$  | 260           | $^{\circ}\text{C}$ |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMS1500, SUPER RED**

| PARAMETER                | TEST CONDITION       | SYMBOL          | MIN. | TYP.     | MAX. | UNIT          |
|--------------------------|----------------------|-----------------|------|----------|------|---------------|
| Luminous intensity       | $I_F = 20\text{ mA}$ | $I_V$           | 18   | 54       | -    | mcd           |
| Dominant wavelength      | $I_F = 20\text{ mA}$ | $\lambda_d$     | -    | 631      | -    | nm            |
| Peak wavelength          | $I_F = 20\text{ mA}$ | $\lambda_p$     | -    | 639      | -    | nm            |
| Angle of half intensity  | $I_F = 20\text{ mA}$ | $\phi$          | -    | $\pm 65$ | -    | deg           |
| Spectral line half width | $I_F = 20\text{ mA}$ | $\Delta\lambda$ | -    | 20       | -    | nm            |
| Forward voltage          | $I_F = 20\text{ mA}$ | $V_F$           | -    | 2.0      | 2.4  | V             |
| Reverse current          | $V_R = 5\text{ V}$   | $I_R$           | -    | -        | 10   | $\mu\text{A}$ |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMO1500, SOFT ORANGE**

| PARAMETER                | TEST CONDITION       | SYMBOL          | MIN. | TYP.     | MAX. | UNIT          |
|--------------------------|----------------------|-----------------|------|----------|------|---------------|
| Luminous intensity       | $I_F = 20\text{ mA}$ | $I_V$           | 45   | 90       | -    | mcd           |
| Dominant wavelength      | $I_F = 20\text{ mA}$ | $\lambda_d$     | -    | 605      | -    | nm            |
| Peak wavelength          | $I_F = 20\text{ mA}$ | $\lambda_p$     | -    | 611      | -    | nm            |
| Angle of half intensity  | $I_F = 20\text{ mA}$ | $\phi$          | -    | $\pm 65$ | -    | deg           |
| Spectral line half width | $I_F = 20\text{ mA}$ | $\Delta\lambda$ | -    | 17       | -    | nm            |
| Forward voltage          | $I_F = 20\text{ mA}$ | $V_F$           | -    | 2.0      | 2.4  | V             |
| Reverse current          | $V_R = 5\text{ V}$   | $I_R$           | -    | -        | 10   | $\mu\text{A}$ |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMY1500, YELLOW**

| PARAMETER                | TEST CONDITION       | SYMBOL          | MIN. | TYP.     | MAX. | UNIT          |
|--------------------------|----------------------|-----------------|------|----------|------|---------------|
| Luminous intensity       | $I_F = 20\text{ mA}$ | $I_V$           | 28   | -        | 180  | mcd           |
| Dominant wavelength      | $I_F = 20\text{ mA}$ | $\lambda_d$     | 587  | -        | 597  | nm            |
| Peak wavelength          | $I_F = 20\text{ mA}$ | $\lambda_p$     | -    | 588      | -    | nm            |
| Angle of half intensity  | $I_F = 20\text{ mA}$ | $\phi$          | -    | $\pm 65$ | -    | deg           |
| Spectral line half width | $I_F = 20\text{ mA}$ | $\Delta\lambda$ | -    | 15       | -    | nm            |
| Forward voltage          | $I_F = 20\text{ mA}$ | $V_F$           | -    | 2.0      | 2.4  | V             |
| Reverse current          | $V_R = 5\text{ V}$   | $I_R$           | -    | -        | 10   | $\mu\text{A}$ |



**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMG1500, YELLOW GREEN**

| PARAMETER                | TEST CONDITION                       | SYMBOL          | MIN. | TYP.     | MAX. | UNIT          |
|--------------------------|--------------------------------------|-----------------|------|----------|------|---------------|
| Luminous intensity       | $I_F = 20\text{ mA}$                 | $I_V$           | 18   | 35       | -    | mcd           |
| Dominant wavelength      | $I_F = 20\text{ mA}$                 | $\lambda_d$     | -    | 571      | -    | nm            |
| Peak wavelength          | $I_F = 20\text{ mA}$                 | $\lambda_p$     | -    | 574      | -    | nm            |
| Angle of half intensity  | $I_F = 20\text{ mA}$                 | $\phi$          | -    | $\pm 65$ | -    | deg           |
| Spectral line half width | $I_F = 20\text{ mA}$                 | $\Delta\lambda$ | -    | 15       | -    | nm            |
| Forward voltage          | $I_F = 20\text{ mA}$                 | $V_F$           | -    | 2.0      | 2.4  | V             |
| Junction capacitance     | $V_R = 0\text{ V}, f = 1\text{ MHz}$ | $C_j$           | -    | 40       | -    | pF            |
| Reverse current          | $V_R = 5\text{ V}$                   | $I_R$           | -    | -        | 10   | $\mu\text{A}$ |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMB1500, BLUE**

| PARAMETER                | TEST CONDITION      | SYMBOL          | MIN. | TYP.     | MAX. | UNIT          |
|--------------------------|---------------------|-----------------|------|----------|------|---------------|
| Luminous intensity       | $I_F = 5\text{ mA}$ | $I_V$           | 11.2 | -        | 45   | mcd           |
| Dominant wavelength      | $I_F = 5\text{ mA}$ | $\lambda_d$     | 470  | -        | 475  | nm            |
| Peak wavelength          | $I_F = 5\text{ mA}$ | $\lambda_p$     | -    | 468      | -    | nm            |
| Angle of half intensity  | $I_F = 5\text{ mA}$ | $\phi$          | -    | $\pm 65$ | -    | deg           |
| Spectral line half width | $I_F = 5\text{ mA}$ | $\Delta\lambda$ | -    | 25       | -    | nm            |
| Forward voltage          | $I_F = 5\text{ mA}$ | $V_F$           | 2.65 | -        | 3.15 | V             |
| Reverse current          | $V_R = 5\text{ V}$  | $I_R$           | -    | -        | 10   | $\mu\text{A}$ |

**LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LUMINOUS INTENSITY (mcd) |      |
|-------|--------------------------|------|
|       | MIN.                     | MAX. |
| L     | 11.2                     | 18   |
| M     | 18                       | 28   |
| N     | 28                       | 45   |
| P     | 45                       | 71   |
| Q     | 71                       | 112  |
| R     | 112                      | 180  |
| S     | 180                      | 280  |
| T     | 280                      | 450  |

**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.

**COLOR CLASSIFICATION**

| COLOR        | GROUP | DOMINANT WAVELENGTH (nm) |       |
|--------------|-------|--------------------------|-------|
|              |       | MIN.                     | MAX.  |
| Yellow       | J     | 587                      | 589.5 |
|              | K     | 589.5                    | 592   |
|              | L     | 592                      | 594.5 |
|              | M     | 594.5                    | 597   |
| Yellow green | C     | 567.5                    | 570.5 |
|              | D     | 570.5                    | 573.5 |
|              | E     | 573.5                    | 576.5 |
| Blue         | AD    | 470                      | 475   |

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of  $\pm 1\text{ nm}$ .



| FORWARD VOLTAGE CLASSIFICATION |       |                     |      |
|--------------------------------|-------|---------------------|------|
| COLOR                          | GROUP | FORWARD VOLTAGE (V) |      |
|                                |       | MIN.                | MAX. |
| Yellow                         | D2    | 1.8                 | 2.0  |
|                                | D3    | 2.0                 | 2.2  |
|                                | D4    | 2.2                 | 2.4  |
| Yellow green                   | 4     | 1.9                 | 2    |
|                                | 5     | 2                   | 2.1  |
|                                | 6     | 2.1                 | 2.2  |
|                                | 7     | 2.2                 | 2.3  |
| Blue                           | 8     | 2.3                 | 2.4  |
|                                | 1     | 2.65                | 2.75 |
|                                | 2     | 2.75                | 2.85 |
|                                | 3     | 2.85                | 2.95 |
|                                | 4     | 2.95                | 3.05 |
|                                | 5     | 3.05                | 3.15 |

**Note**

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

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

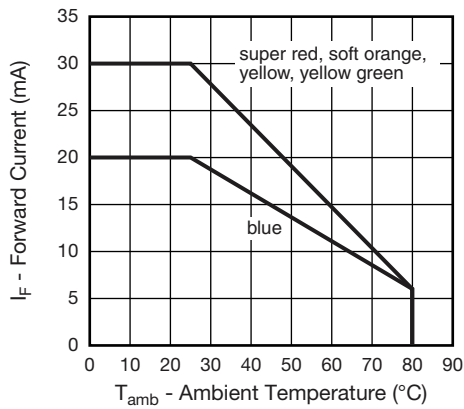


Fig. 1 - Forward Current vs. Ambient Temperature

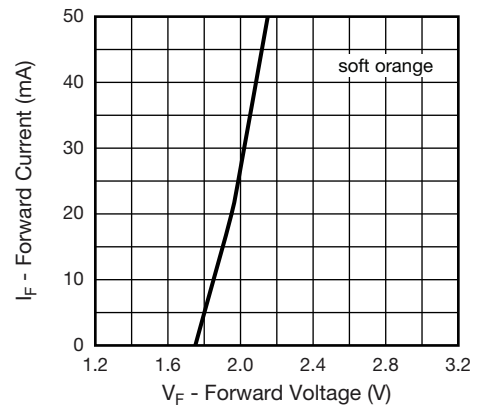


Fig. 3 - Forward Current vs. Forward Voltage (soft orange)

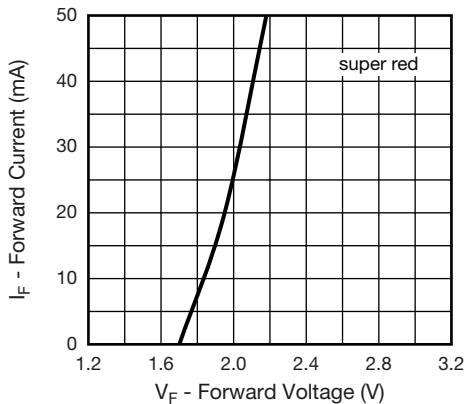


Fig. 2 - Forward Current vs. Forward Voltage (super red)

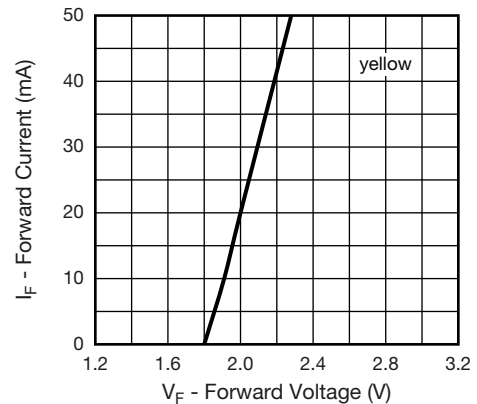


Fig. 4 - Forward Current vs. Forward Voltage (yellow)

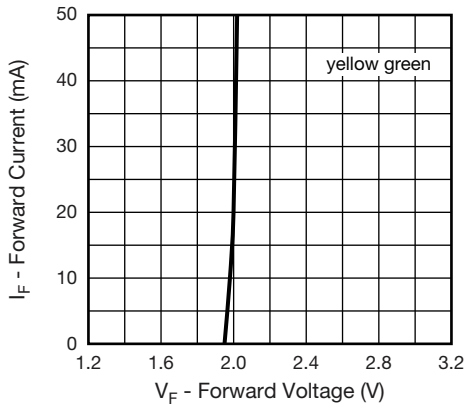


Fig. 5 - Forward Current vs. Forward Voltage (yellow green)

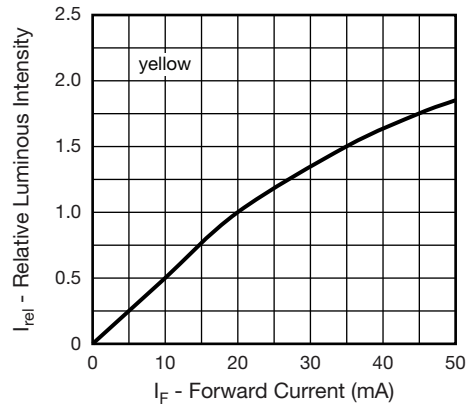


Fig. 8 - Relative Luminous Intensity vs. Forward Current (yellow)

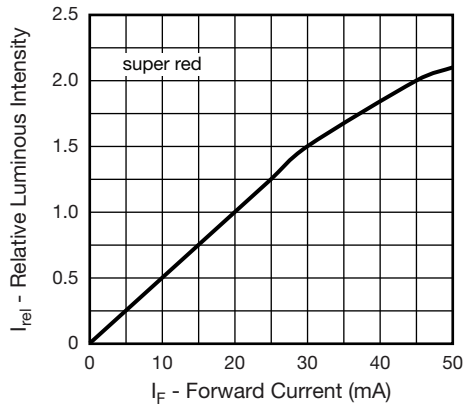


Fig. 6 - Relative Luminous Intensity vs. Forward Current (super red)

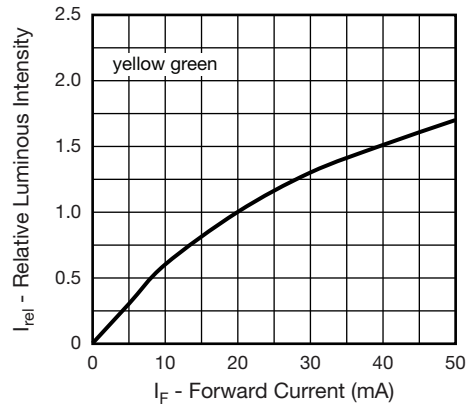


Fig. 9 - Relative Luminous Intensity vs. Forward Current (yellow green)

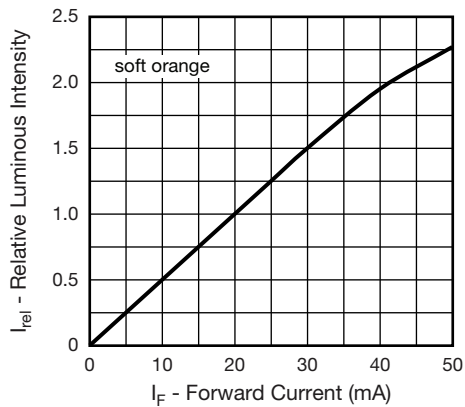


Fig. 7 - Relative Luminous Intensity vs. Forward Current (soft orange)

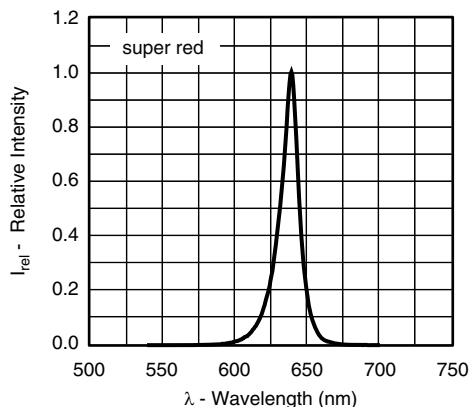


Fig. 10 - Relative Intensity vs. Wavelength (super red)

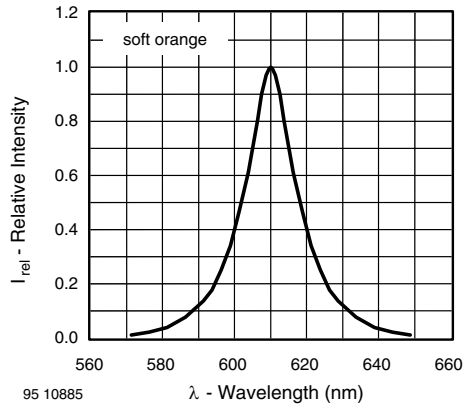


Fig. 11 - Relative Intensity vs. Wavelength (soft orange)

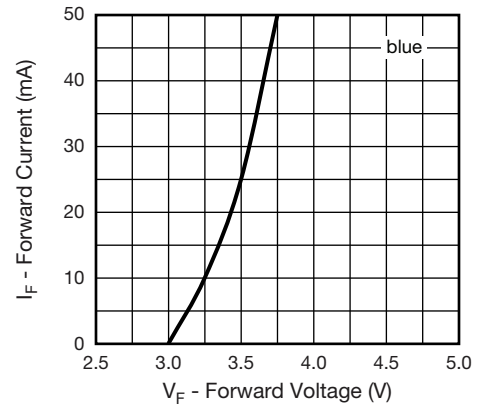


Fig. 14 - Forward Current vs. Forward Voltage (blue)

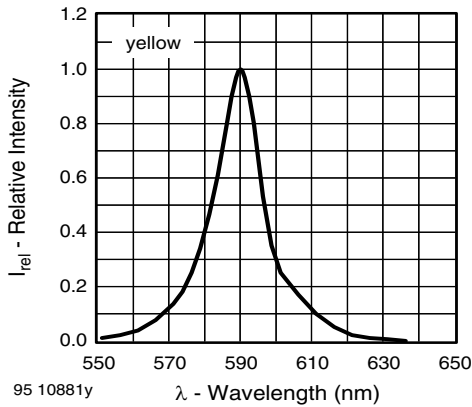


Fig. 12 - Relative Intensity vs. Wavelength (yellow)

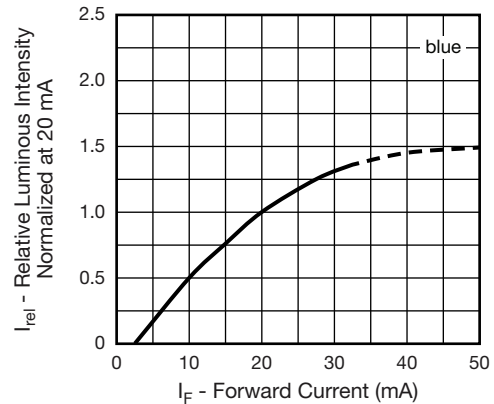


Fig. 15 - Relative Luminous Intensity vs. Forward Current (blue)

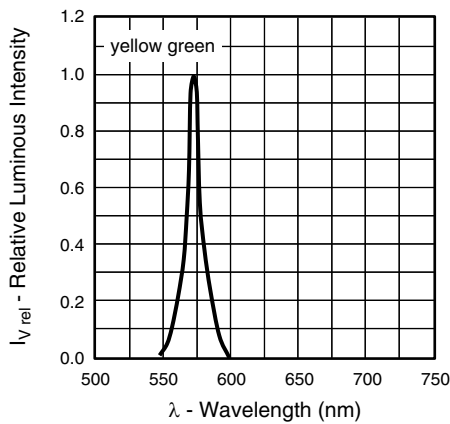


Fig. 13 - Relative Intensity vs. Wavelength (yellow green)

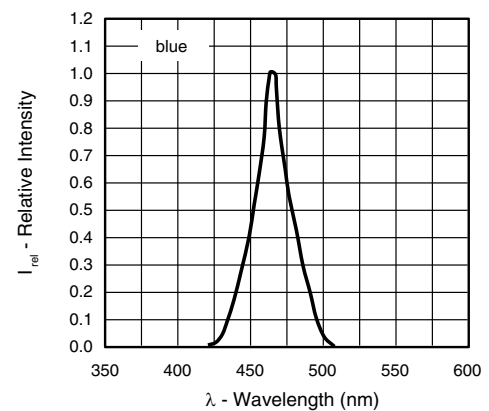


Fig. 16 - Relative Intensity vs. Wavelength (blue)

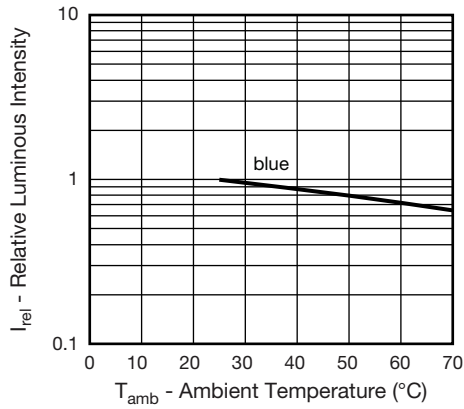


Fig. 17 - Relative Luminous Intensity vs. Ambient Temperature

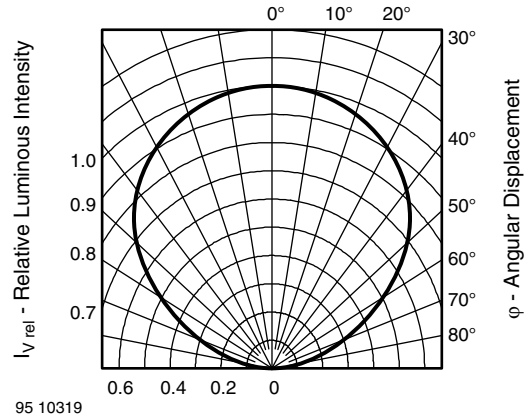
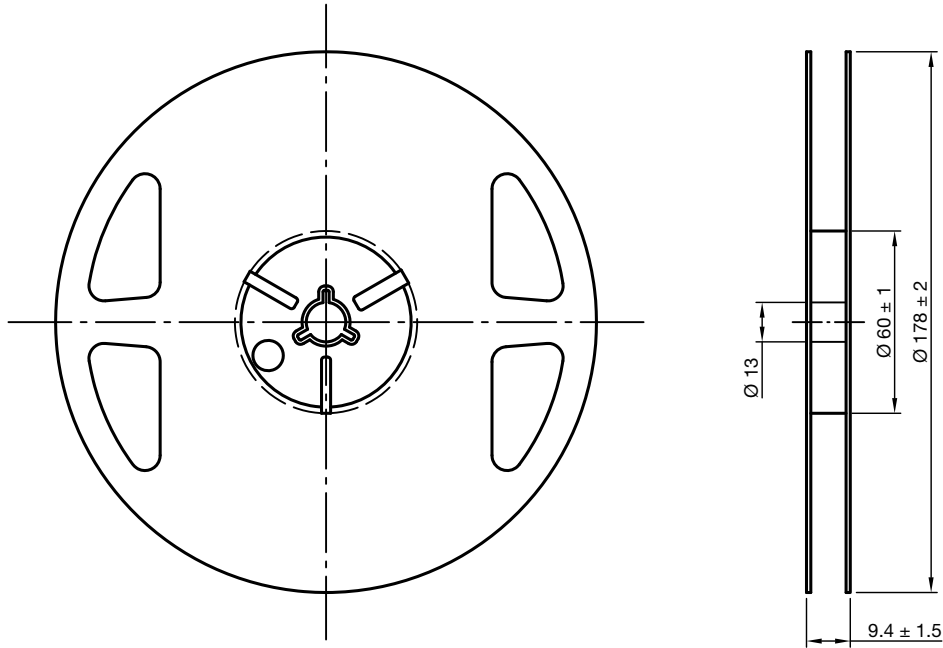
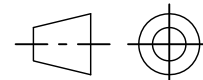


Fig. 18 - Relative Luminous Intensity vs. Angular Displacement

**REEL DIMENSIONS** in millimeters



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

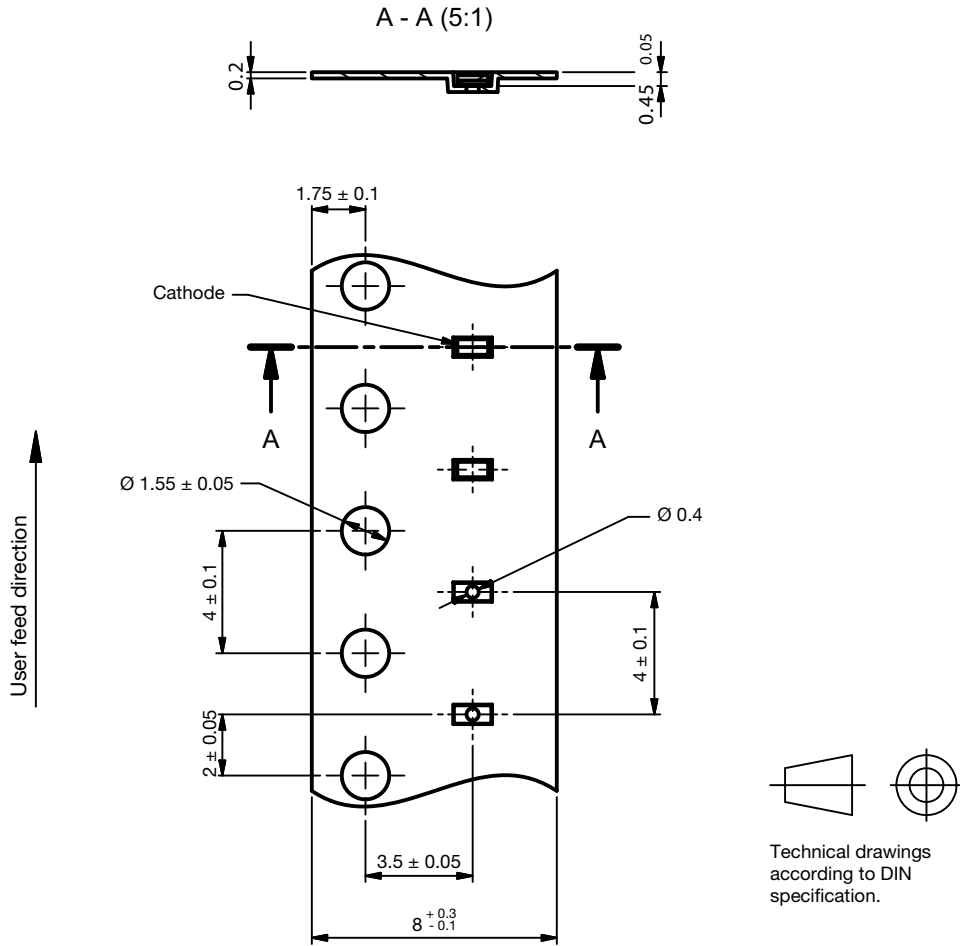


technical drawings according to DIN specifications



**TAPE DIMENSIONS** in millimeters

VLMS1500, VLMO1500, VLMY1500, VLMG1500, VLMB1500



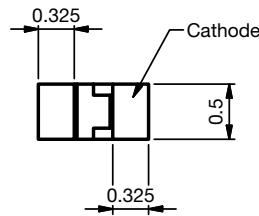
Drawing-No.: 9.700-5388.01-4  
Issue: 1; 20.03.12



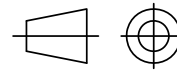
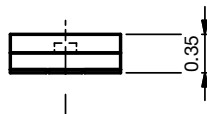
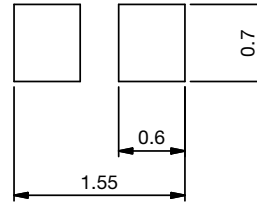


## PACKAGE DIMENSIONS in millimeters

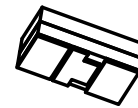
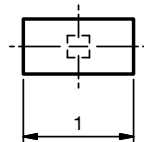
### VLMS1500, VLMO1500, VLMY1500, VLMG1500, VLMB1500



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 2

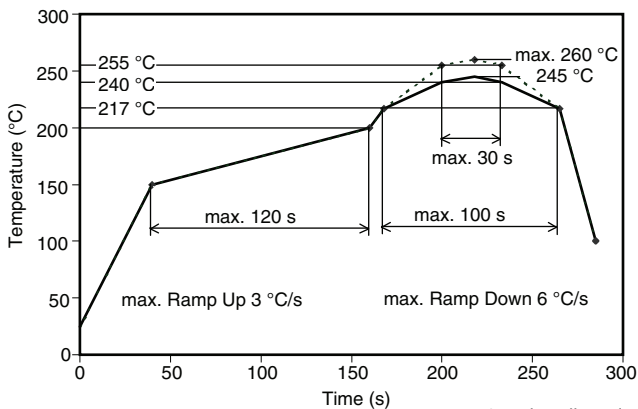
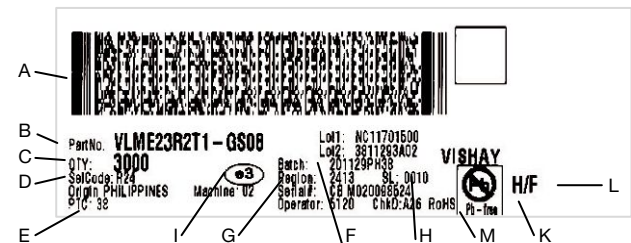


Fig. 19 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020C)

## BAR CODE PRODUCT LABEL (example only)

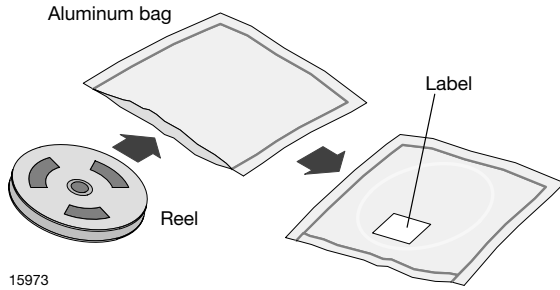


- A) 2D barcode
- B) Vishay part number
- C) Quantity
- D) PTC = selection code (binning)
- E) Code of manufacturing plant
- F) Batch = date code: year/week/plant code
- G) Region code
- H) SL = sales location
- I) Terminations finishing
- K) Lead (Pb)-free symbol
- L) Halogen-free symbol
- M) RoHS symbol



**DRY PACKING**

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



**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.

**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.

**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)

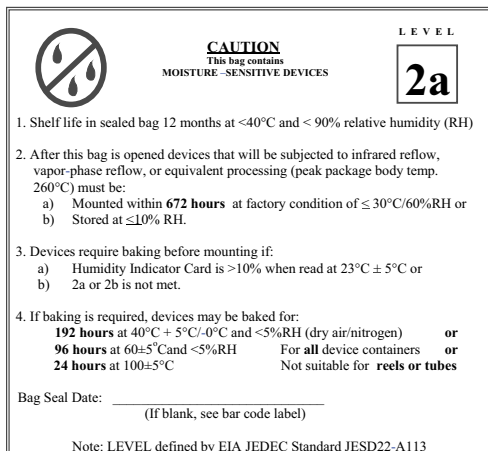
or

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



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## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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