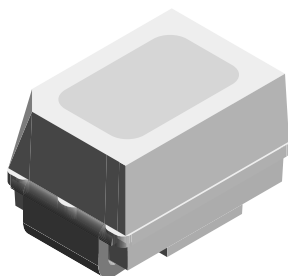


## Power Mini SMD LED



19226

### DESCRIPTION

The new MiniLED series have been designed in a small white SMT package. The feature of the device is the very small package 2.3 mm x 1.3 mm x 1.4 mm. The MiniLED is an obvious solution for small-scale, high-power products that are expected to work reliably in an arduous environment. This is often the case in automotive and industrial application.

### PRODUCT GROUP AND PACKAGE DATA

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

### FEATURES

- SMD LEDs with exceptional brightness
- Luminous intensity categorized
- Compatible with automatic placement equipment
- IR reflow soldering
- Available in 8 mm tape
- Low profile package
- Non-diffused lens: excellent for coupling to light pipes and backlighting
- Low power consumption
- Luminous intensity ratio in one packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Automotive: backlighting in dashboards and switches
- Telecommunication: indicator and backlighting in telephone and fax
- Indicator and backlight for audio and video equipment
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches, and symbols

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at $I_F$ (mA)	WAVELENGTH (nm)			at $I_F$ (mA)	FORWARD VOLTAGE (V)			at $I_F$ (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
VLMK2300-GS08	Super red	35.5	90	-	20	-	630	-	20	-	1.9	2.6	20	AllnGaP on GaAs
VLMF2300-GS08	Soft orange	56	112	-	20	598	605	611	20	-	2.0	2.6	20	AllnGaP on GaAs

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

#### VLMK2300, VLMF2300

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>(1)</sup>		$V_R$	5	V
DC forward current	$T_{amb} \leq 80^\circ\text{C}$	$I_F$	30	mA
Single forward current	$t_p \leq 10 \mu\text{s}$	$I_{FSM}$	0.1	A
Power dissipation	$T_{amb} \leq 80^\circ\text{C}$	$P_V$	80	mW
Junction temperature		$T_j$	+125	$^\circ\text{C}$
Operating temperature range		$T_{amb}$	-40 to +100	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-40 to +100	$^\circ\text{C}$
Soldering temperature	According to IPC 9501	$T_{sd}$	245	$^\circ\text{C}$
Thermal resistance junction to ambient	Mounted on PC board (pad size > 5 mm <sup>2</sup> )	$R_{thJA}$	580	K/W

#### Note

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

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMK2300, SUPER RED**

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 20\text{ mA}$	$I_V$	35.5	90	-	mcd
Dominant wavelength	$I_F = 20\text{ mA}$	$\lambda_d$	-	630	-	nm
Peak wavelength	$I_F = 20\text{ mA}$	$\lambda_p$	-	643	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$	$\phi$	-	$\pm 60$	-	$^{\circ}$
Forward voltage	$I_F = 20\text{ mA}$	$V_F$	-	1.9	2.6	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$	$V_R$	5	-	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_j$	-	15	-	pF

**Note**<sup>(1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$ **OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMF2300, SOFT ORANGE**

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 20\text{ mA}$	$I_V$	56	112	-	mcd
Dominant wavelength	$I_F = 20\text{ mA}$	$\lambda_d$	598	605	611	nm
Peak wavelength	$I_F = 20\text{ mA}$	$\lambda_p$	-	610	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$	$\phi$	-	$\pm 60$	-	$^{\circ}$
Forward voltage	$I_F = 20\text{ mA}$	$V_F$	-	2.0	2.6	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$	$V_R$	5	-	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_j$	-	15	-	pF

**Note**<sup>(1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$ **LUMINOUS INTENSITY/FLUX**

LUMINOUS INTENSITY $I_V$ (mcd)			
GROUP	LUMINOUS INTENSITY $I_V$ (mcd)		
STANDARD	OPTIONAL	MIN.	MAX.
N	1	-	-
	2	35.5	45
P	1	45	56
	2	56	71
Q	1	71	90
	2	90	112
R	1	112	140
	2	140	180
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 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
VLMK2300	LSM676
VLMF2300	LOM676

**COLOR CLASSIFICATION**

GROUP	DOM. WAVELENGTH (nm)	
	SOFT ORANGE	
	MIN.	MAX.
1	598	601
2	600	603
3	602	605
4	604	607
5	606	609
6	608	611

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms

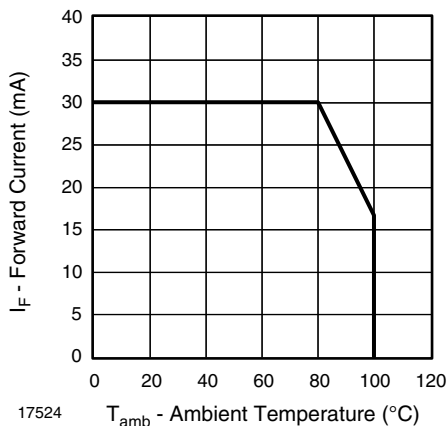
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

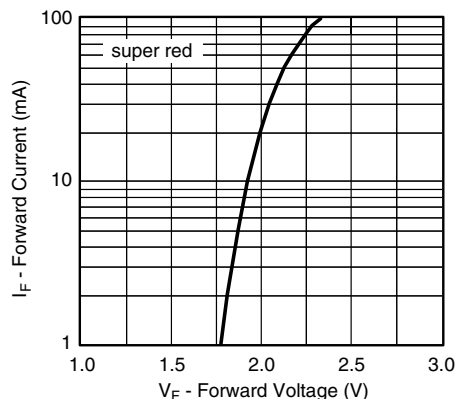


Fig. 4 - Forward Current vs. Forward Voltage

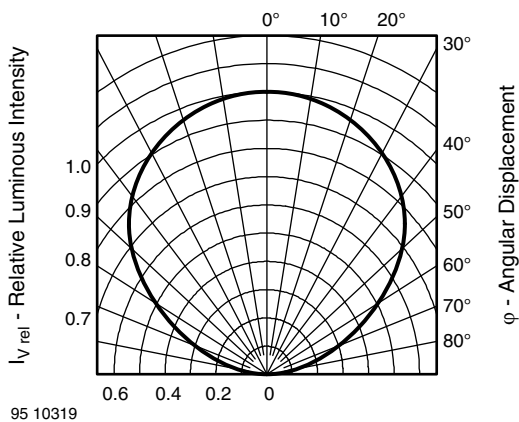


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

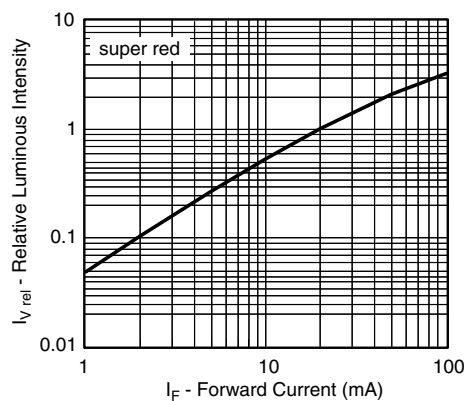


Fig. 5 - Relative Luminous Intensity vs. Forward Current

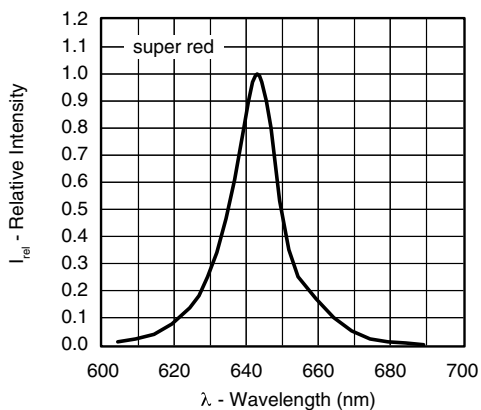


Fig. 3 - Relative Intensity vs. Wavelength

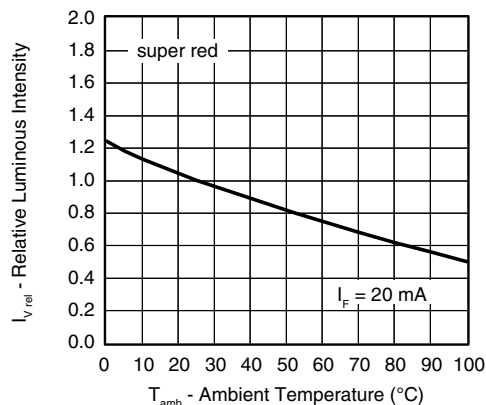


Fig. 6 - Relative Luminous Intensity vs. Ambient Temperature

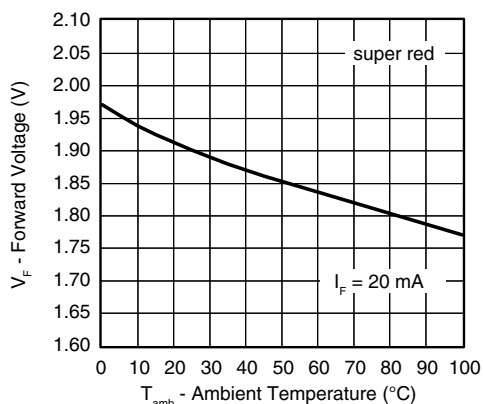


Fig. 7 - Forward Voltage vs. Ambient Temperature

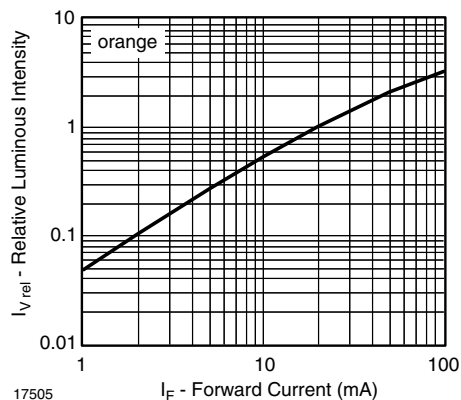


Fig. 10 - Relative Luminous Intensity vs. Forward Current

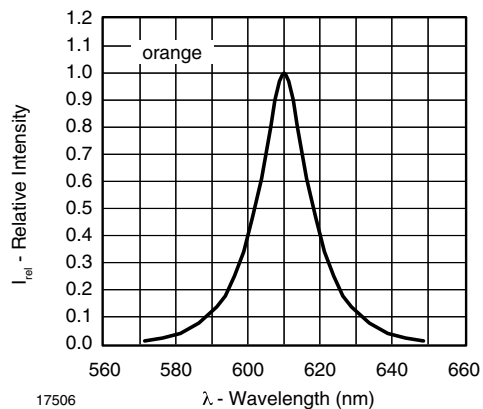


Fig. 8 - Relative Intensity vs. Wavelength

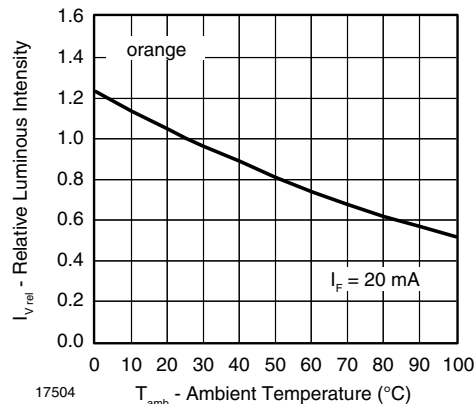


Fig. 11 - Relative Luminous Intensity vs. Ambient Temperature

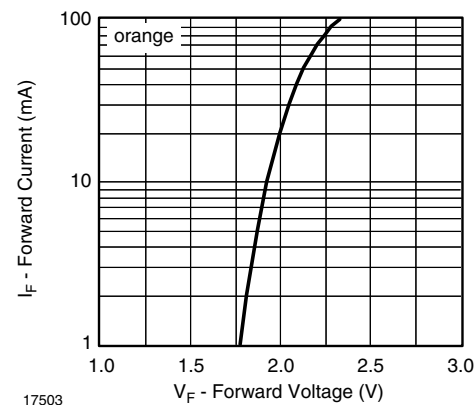


Fig. 9 - Forward Current vs. Forward Voltage

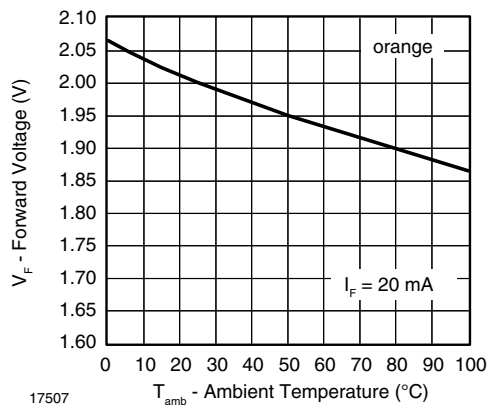
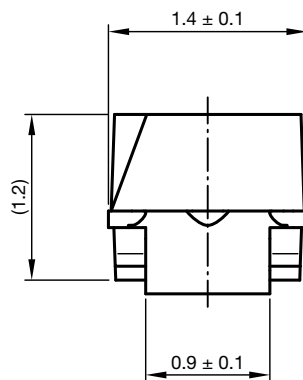
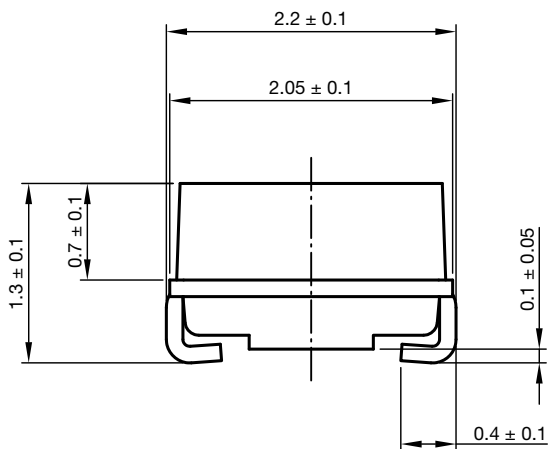


Fig. 12 - Forward Voltage vs. Ambient Temperature

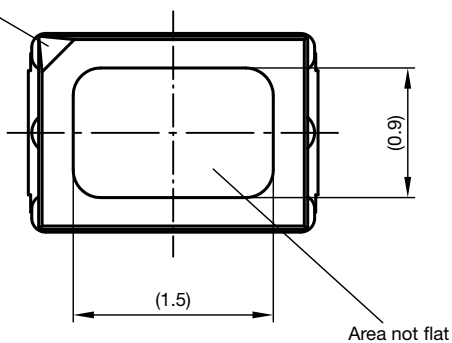


**PACKAGE DIMENSIONS** in millimeters

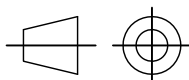
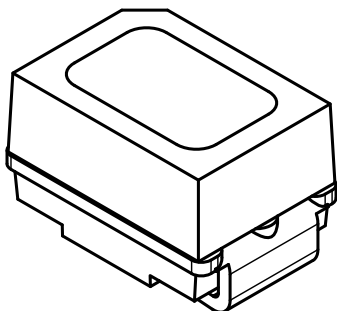
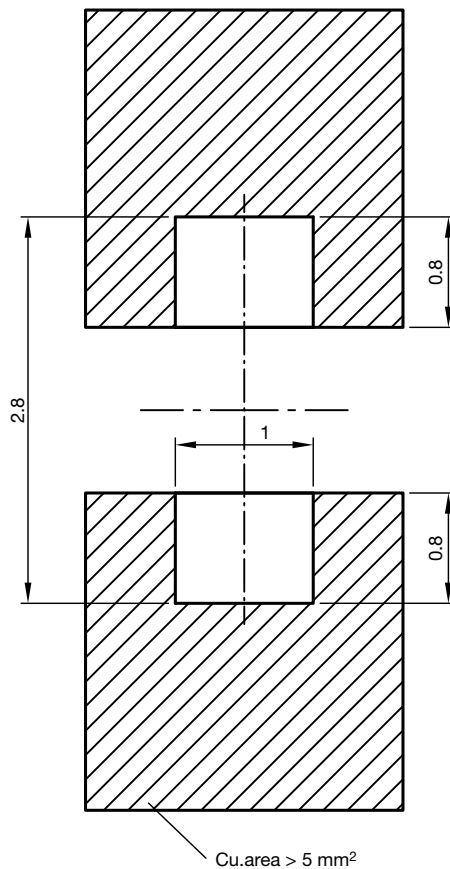


Not indicated tolerances  $\pm 0.2$

Cathode mark



Proposed pad layout  
(for reference only)



technical drawings  
according to DIN  
specifications

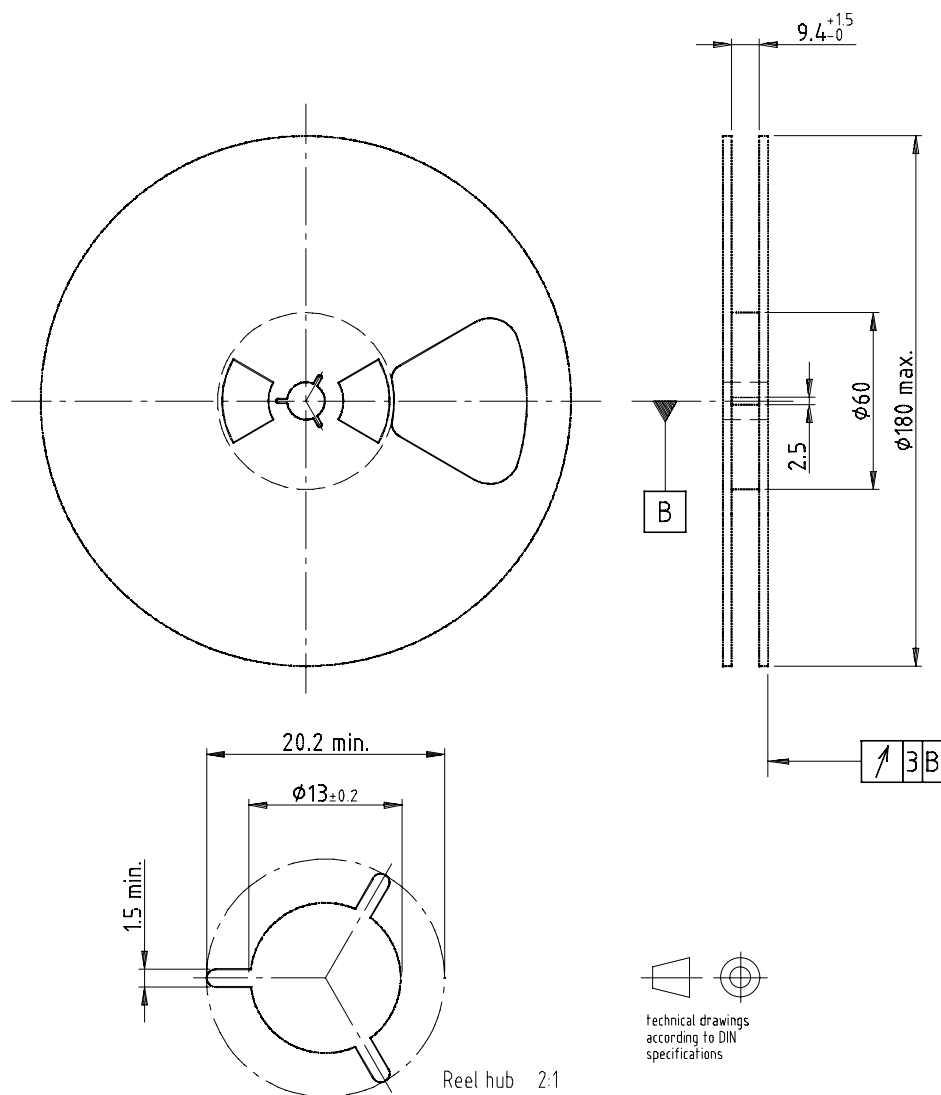


Solder resist

Drawing-No.: 6.541-5069.01-4  
Issue: 2; 24.11.14



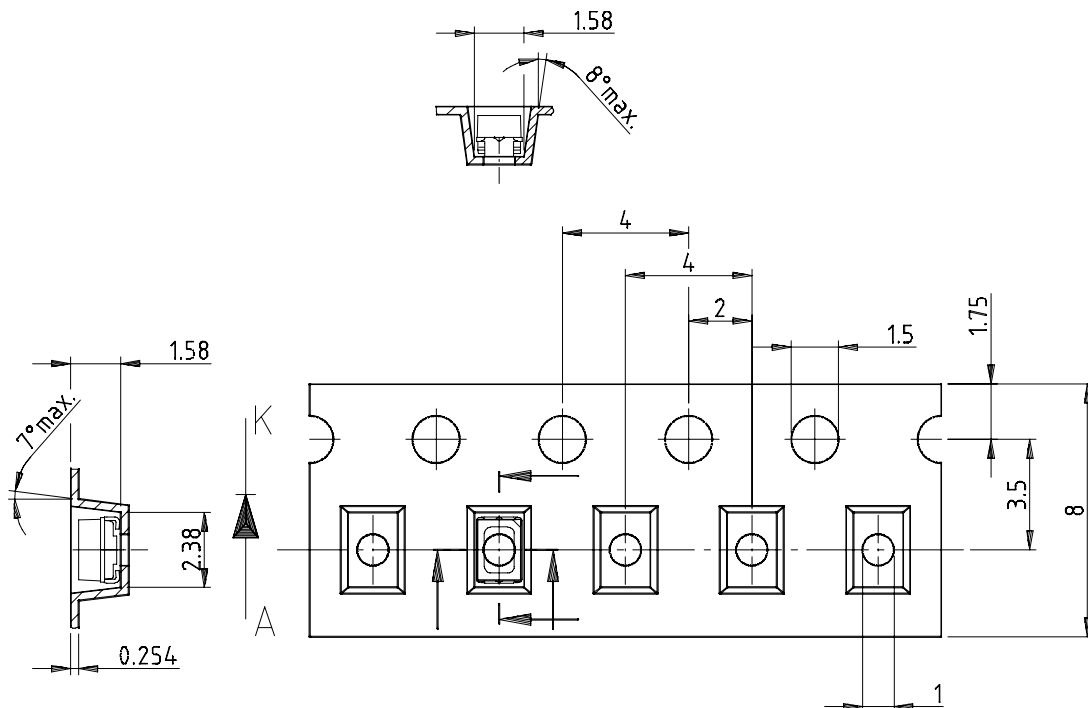
**REEL DIMENSIONS** in millimeters



Drawing-No.: 9.800-5051.V5-4

Issue: 1; 25.07.02

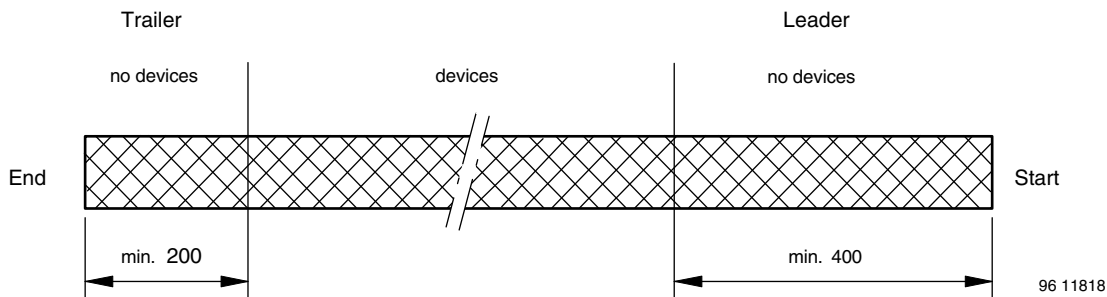
16938

**TAPE DIMENSIONS** in millimeters


Drawing-No.: 9.700-5266.01-4

Issue: 1; 05.06.02

16939

**LEADER AND TRAILER DIMENSIONS** in millimeters


GS08 = 3000 pcs

**COVER TAPE PEEL STRENGTH**

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min  $\pm$  10 mm/min

165° to 180° peel angle

**LABEL**
**Standard Bar Code Labels for Finished Goods**

The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.

<b>VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL</b> (finished goods)		
PLAIN WRITING	ABBREVIATION	LENGTH
Item-description	-	18
Item-number	INO	8
Selection-code	SEL	3
LOT-/serial-number	BATCH	10
Data-code	COD	3 (YWW)
Plant-code	PTC	2
Quantity	QTY	8
Accepted by	ACC	-
Packed by	PCK	-
Mixed code indicator	MIXED CODE	-
Origin	xxxxxxx+	Company logo
LONG BAR CODE TOP	TYPE	LENGTH
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
SHORT BAR CODE BOTTOM	TYPE	LENGTH
Selection-code	X	3
Data-code	N	3
Batch-number	X	10
Filter	-	1
Total length	-	17

## SOLDERING PROFILE

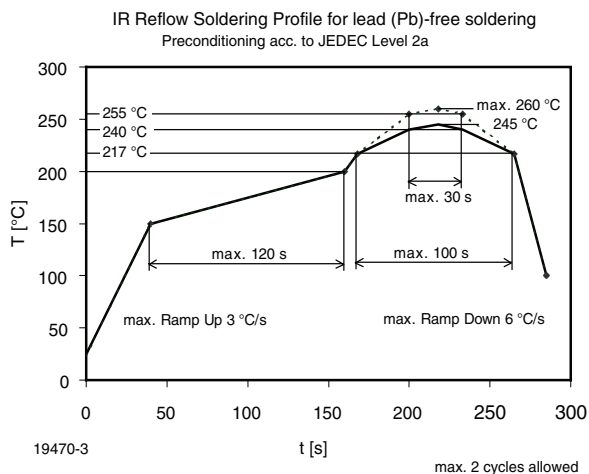
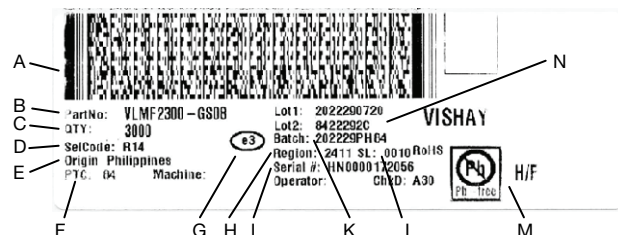


Fig. 13 - Vishay Lead (Pb)-free Reflow Soldering Profile  
(acc. to J-STD-020)

## BAR CODE PRODUCT LABEL (example)

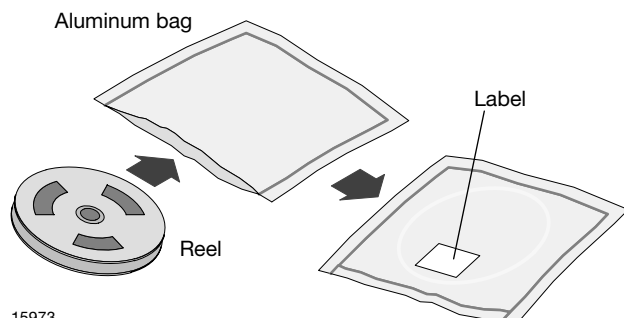


- A. 2D barcode
- B. Part No: Vishay part number
- C. QTY: quantity
- D. SelCode: selection bin code
- E. Country of origin
- F. PTC: production plant code
- G. Termination finish
- H. Region code
- I. Serial#: serial number
- K. Batch number: year, week, country code, plant code
- L. SL: storage location
- M. Environmental symbols: RoHS, lead (Pb)-free, halogen-free
- N. Lot numbers



**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  $\leq 60\%$  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.

**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.

	<b>CAUTION</b> This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>2a</b> </div>
1. Shelf life in sealed bag 12 months at $< 40^{\circ}\text{C}$ 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. $260^{\circ}\text{C}$ ) must be:		
a) Mounted within <b>672 hours</b> 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:		
<b>192 hours</b> at $40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}$ and $< 5\%\text{RH}$ (dry air/nitrogen) <b>or</b> <b>96 hours</b> at $60 \pm 5^{\circ}\text{C}$ and $< 5\%\text{RH}$ For all device containers <b>or</b> <b>24 hours</b> 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		

159736

Example of JESD22-A112 level 2a label



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