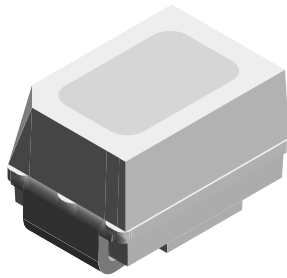


## Power Mini SMD LED



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)

AUTOMOTIVE GRADE


**RoHS**  
 COMPLIANT  
 HALOGEN  
**FREE**  
**GREEN**  
 (5-2008)

### 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 <sub>F</sub> (mA)	WAVELENGTH (nm)			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.		
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
VLME2300-GS08 <sup>(1)</sup>	Yellow	56	112	-	20	581	588	594	20	-	2.0	2.6	20	AllnGaP on GaAs

#### Note

<sup>(1)</sup> Not for new design

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified) VLMK2300, VLMF2300, VLME2300

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>(1)</sup>		V <sub>R</sub>	5	V
DC forward current	T <sub>amb</sub> ≤ 80 °C	I <sub>F</sub>	30	mA
Single forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	0.1	A
Power dissipation	T <sub>amb</sub> ≤ 80 °C	P <sub>V</sub>	80	mW
Junction temperature		T <sub>J</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
Soldering temperature	According to IPC 9501	T <sub>sd</sub>	245	°C
Thermal resistance junction to ambient	Mounted on PC board (pad size > 5 mm <sup>2</sup> )	R <sub>thJA</sub>	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**(1) 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**(1) 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)  
**VLME2300, YELLOW, NOT FOR NEW DESIGNS**

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	$I_F = 20\text{ mA}$	$\lambda_d$	581	588	594	nm
Peak wavelength	$I_F = 20\text{ mA}$	$\lambda_p$	-	590	-	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**(1) In one packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$

LUMINOUS INTENSITY/FLUX			
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
VLME2300	LYM676

COLOR CLASSIFICATION				
GROUP	DOM. WAVELENGTH (nm)			
	SOFT ORANGE		YELLOW	
	MIN.	MAX.	MIN.	MAX.
1	598	601	581	584
2	600	603	583	586
3	602	605	585	588
4	604	607	587	590
5	606	609	589	592
6	608	611	591	594

**Note**

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

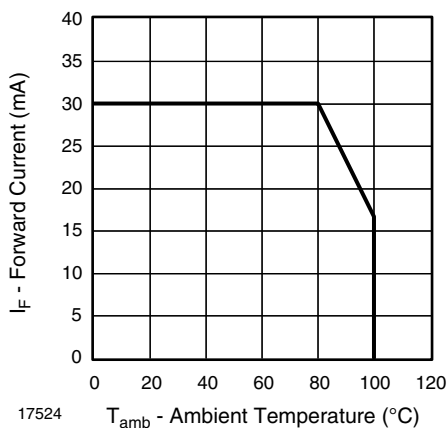
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

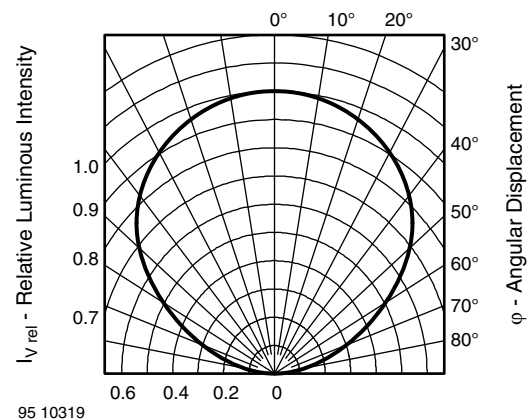


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

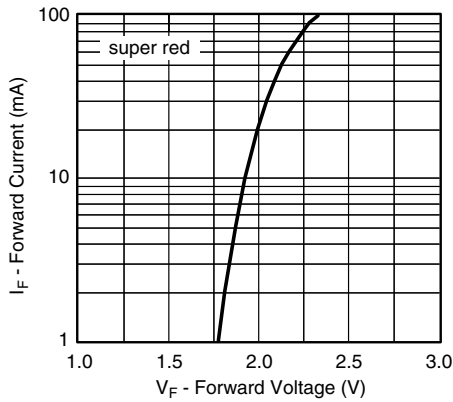


Fig. 3 - Forward Current vs. Forward Voltage

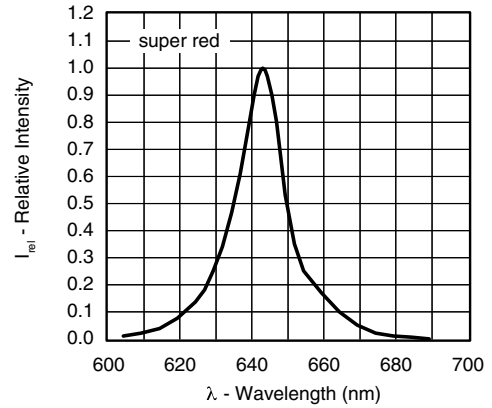


Fig. 6 - Relative Intensity vs. Wavelength

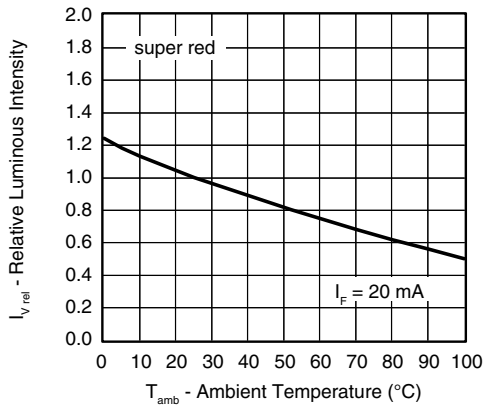


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

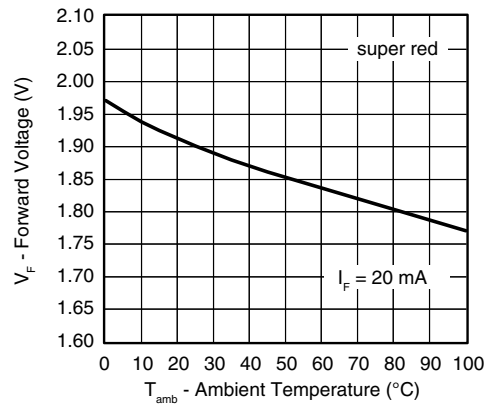


Fig. 7 - Forward Voltage vs. Ambient Temperature

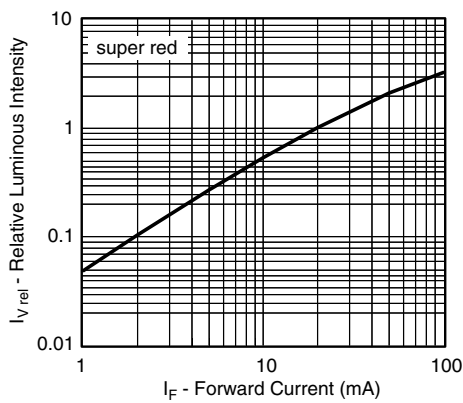


Fig. 5 - Relative Luminous Intensity vs. Forward Current

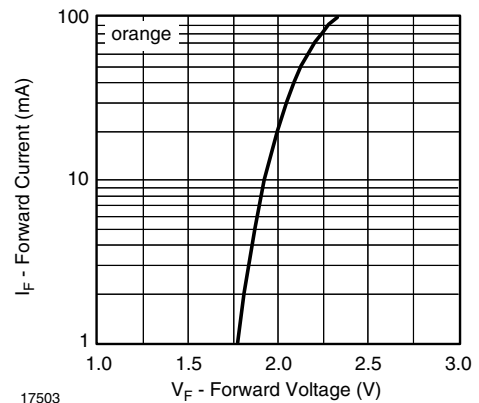


Fig. 8 - Forward Current vs. Forward Voltage

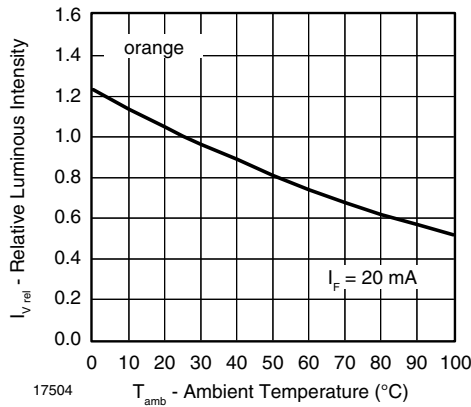


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

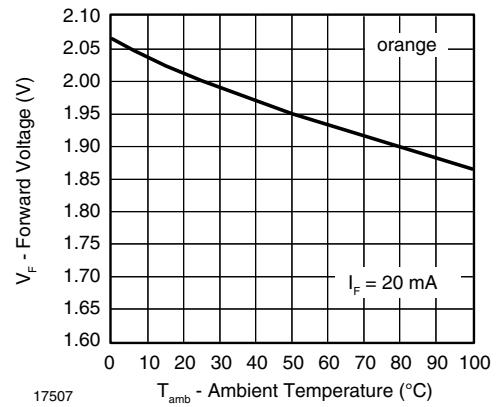


Fig. 12 - Forward Voltage vs. Ambient Temperature

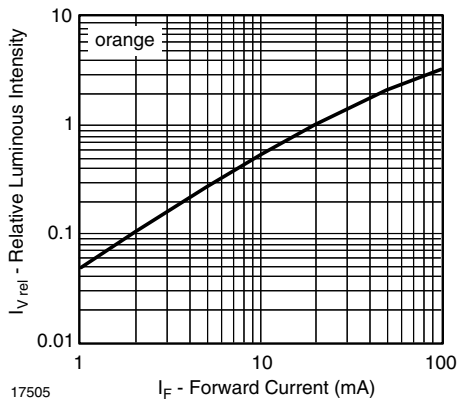


Fig. 10 - Relative Luminous Intensity vs. Forward Current

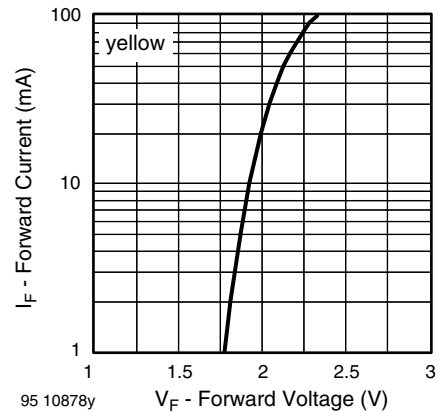


Fig. 13 - Forward Current vs. Forward Voltage

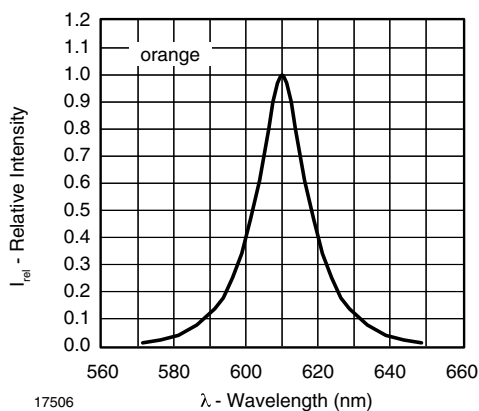


Fig. 11 - Relative Intensity vs. Wavelength

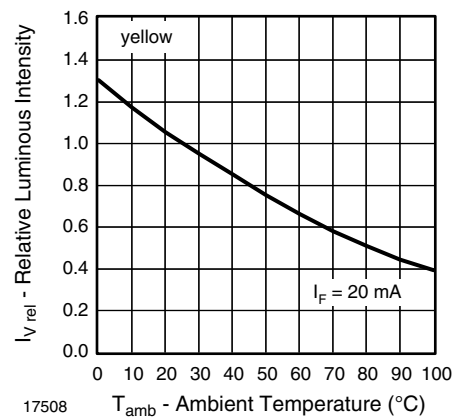


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature

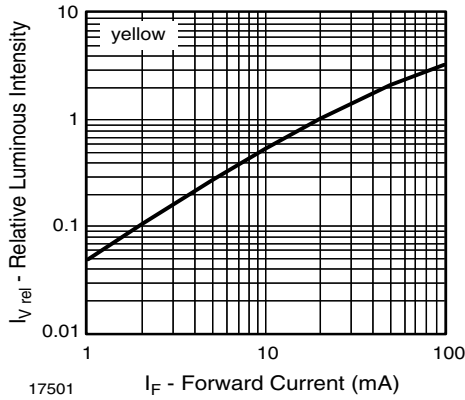


Fig. 15 - Relative Luminous Intensity vs. Forward Current

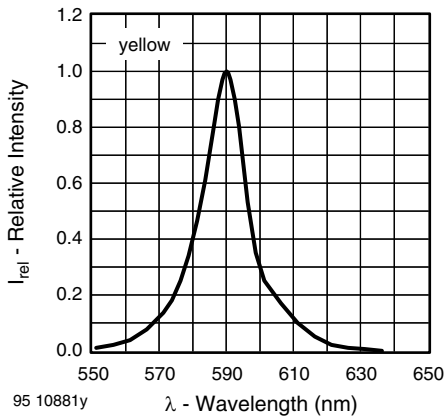


Fig. 16 - Relative Intensity vs. Wavelength

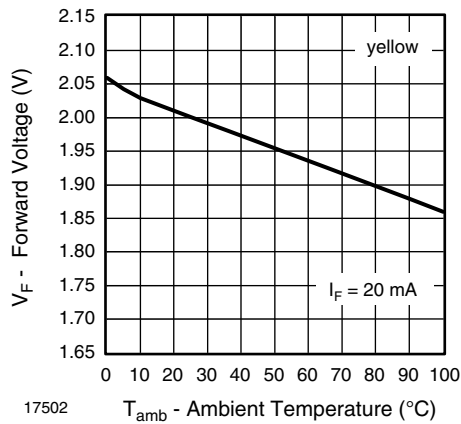
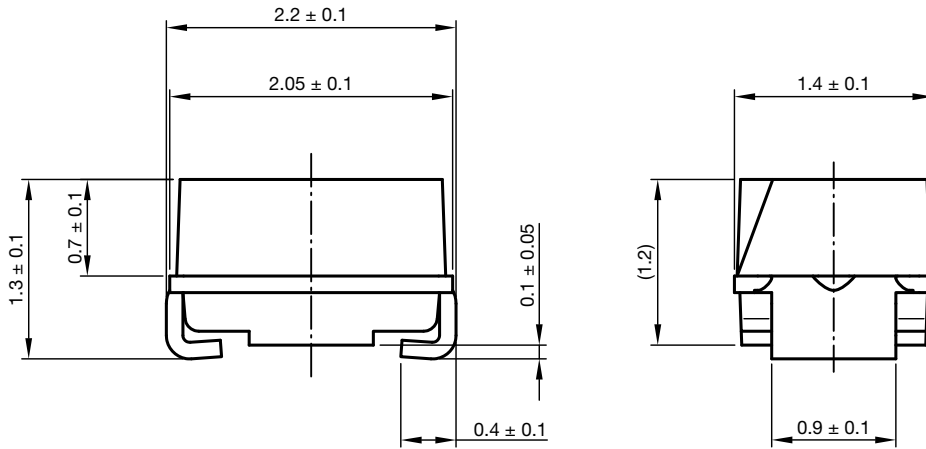


Fig. 17 - Forward Voltage vs. Ambient Temperature

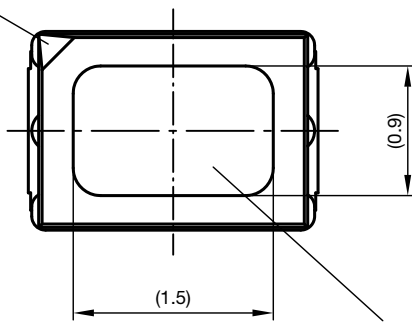


## PACKAGE DIMENSIONS in millimeters



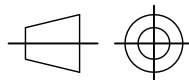
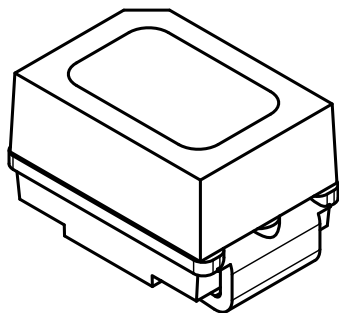
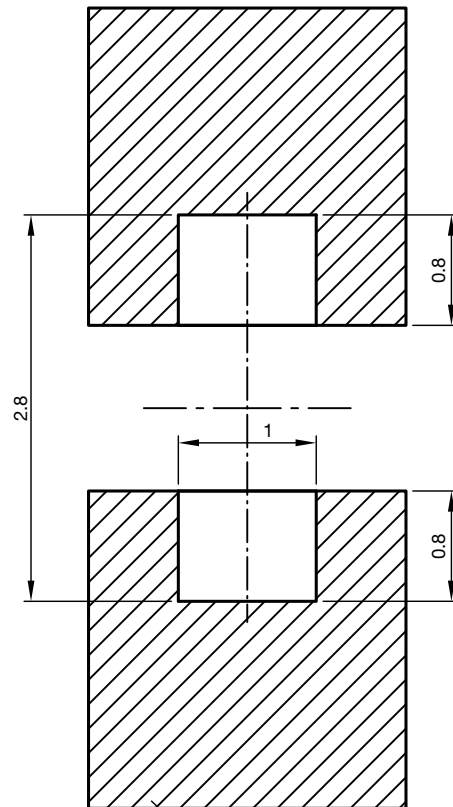
Not indicated tolerances ± 0.2

Cathode mark



Area not flat

Proposed pad layout  
(for reference only)



technical drawings  
according to DIN  
specifications



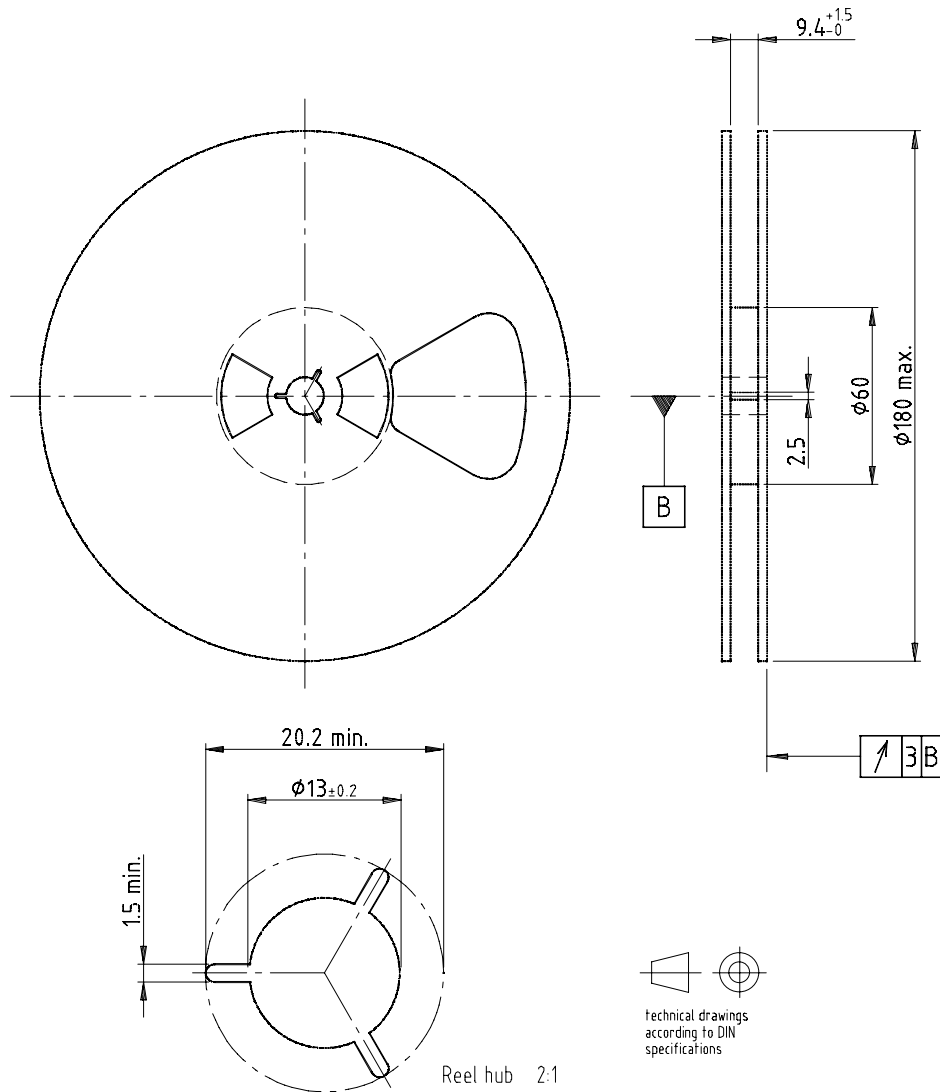
Solder resist

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

Cu.area > 5 mm<sup>2</sup>



## REEL DIMENSIONS in millimeters



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

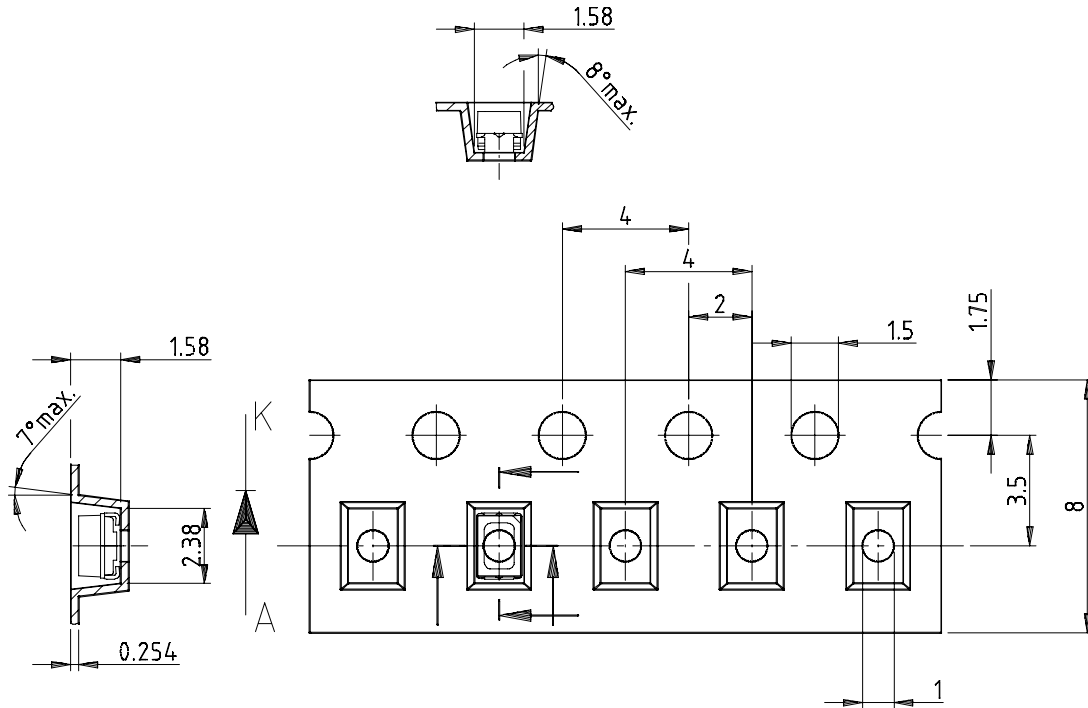
Issue: 1; 25.07.02

16938



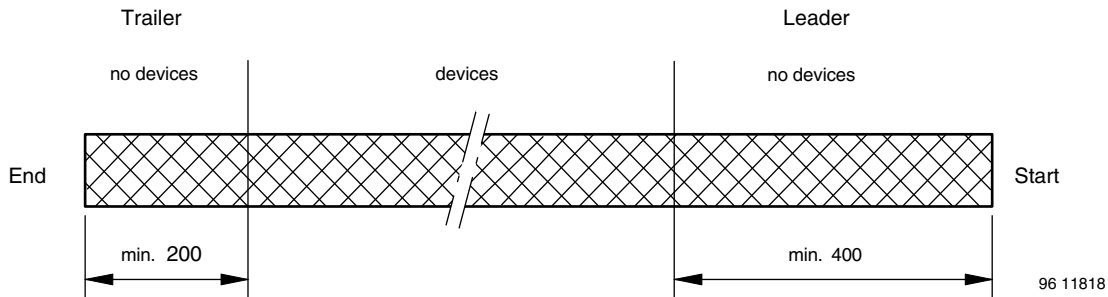


TAPE DIMENSIONS in millimeters



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 ± 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 (finished goods)</b>		
<b>PLAIN WRITING</b>	<b>ABBREVIATION</b>	<b>LENGTH</b>
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
<b>LONG BAR CODE TOP</b>	<b>TYPE</b>	<b>LENGTH</b>
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
<b>SHORT BAR CODE BOTTOM</b>	<b>TYPE</b>	<b>LENGTH</b>
Selection-code	X	3
Data-code	N	3
Batch-number	X	10
Filter	-	1
Total length	-	17

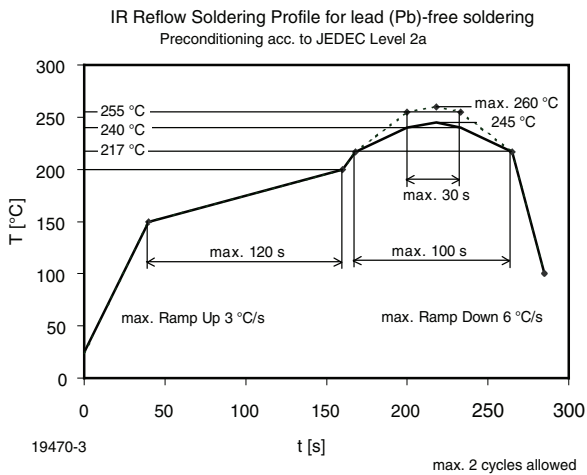
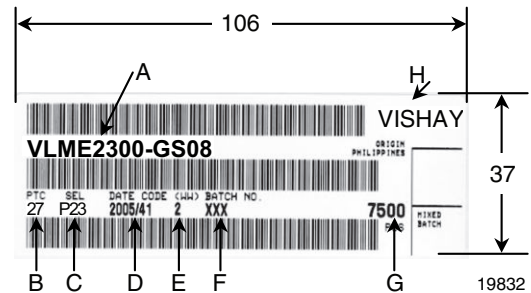
**SOLDERING PROFILE**


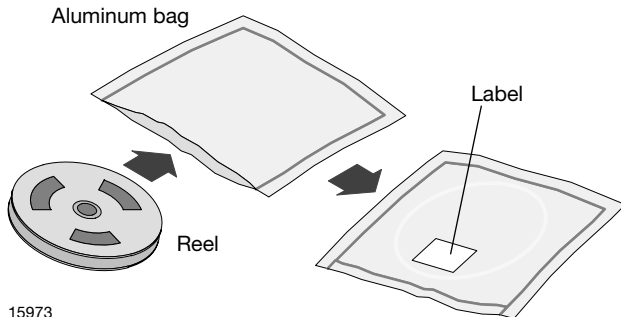
Fig. 18 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

**BAR CODE PRODUCT LABEL (example)**


- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: J2 = code for luminous intensity group  
4 = code for color group
- d. Date code year / week
- E. Day code (e.g. 2: Tuesday)
- 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.



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 ≤ 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.

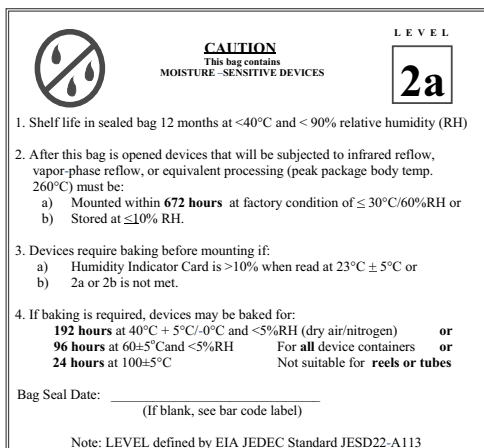
An EIA JEDEC® standard JESD22-A112 level 2a label is included on all dry bags.

**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.



Example of JESD22-A112 level 2a label



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