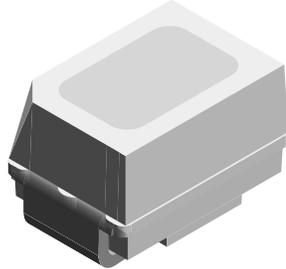


## Standard Mini SMD LED



19226

### DESCRIPTION

The new MiniLED Series has 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 of course.

### PRODUCT GROUP AND PACKAGE DATA

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

### FEATURES

- SMD LEDs with exceptional brightness
- Luminous intensity categorized
- Compatible with automatic placement equipment
- EIA and ICE standard package
- 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 packaging unit  $I_{Vmax}/I_{Vmin.} \leq 2$ , optional  $\leq 1.6$
- Preconditioning acc. to JEDEC level 2a
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



### 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
- General use

### PARTS TABLE

PART	COLOR, LUMINOUS INTENSITY	TECHNOLOGY
VLMS2100-GS08	Red, $I_V = 7.1$ mcd	GaAsP on GaP
VLMS21H2K1-GS08	Red, $I_V = (3.55 \text{ to } 9)$ mcd	GaAsP on GaP
VLMS21J2L1-GS08	Red, $I_V = (5.6 \text{ to } 14)$ mcd	GaAsP on GaP
VLMS21H2L1-GS08	Red, $I_V = (3.55 \text{ to } 14)$ mcd	GaAsP on GaP
VLMO2100-GS08	Soft orange, $I_V = 7.1$ mcd	GaAsP on GaP
VLMO21H2K1-GS08	Soft orange, $I_V = (3.55 \text{ to } 9)$ mcd	GaAsP on GaP
VLMO21J2L1-GS08	Soft orange, $I_V = (5.6 \text{ to } 14)$ mcd	GaAsP on GaP
VLMO21H2L1-GS08	Soft orange, $I_V = (3.55 \text{ to } 14)$ mcd	GaAsP on GaP
VLMY2100-GS08	Yellow, $I_V = 7.1$ mcd	GaAsP on GaP
VLMY21H2K1-GS08	Yellow, $I_V = (3.55 \text{ to } 9)$ mcd	GaAsP on GaP
VLMY21J2L1-GS08	Yellow, $I_V = (5.6 \text{ to } 14)$ mcd	GaAsP on GaP
VLMY21H2L1-GS08	Yellow, $I_V = (3.55 \text{ to } 14)$ mcd	GaAsP on GaP

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLMS21..., VLMO21..., VLMY21..

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>1)</sup>		$V_R$	6	V
DC forward current	$T_{amb} \leq 60\text{ }^{\circ}\text{C}$	$I_F$	30	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	0.5	A
Power dissipation		$P_V$	95	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	$^{\circ}\text{C}$
Thermal resistance junction/ ambient	Mounted on PC board (pad size > 5 mm <sup>2</sup> )	$R_{thJA}$	480	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) VLMS21..., RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity <sup>1)</sup>	$I_F = 10\text{ mA}$	VLMS2100	$I_V$	2.8	7.1		mcd
	$I_F = 10\text{ mA}$	VLMS21H2K1	$I_V$	3.55		9	mcd
	$I_F = 10\text{ mA}$	VLMS21J2L1	$I_V$	5.6		14	mcd
	$I_F = 10\text{ mA}$	VLMS21H2L1	$I_V$	3.55		14	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		$\lambda_d$	624	628	636	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$		640		nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\phi$		$\pm 60$		deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$		2.1	3	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15		V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$		$C_j$		15		pF

Note:

<sup>1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin} \leq 2$

### OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) VLMO21..., SOFT ORANGE

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity <sup>1)</sup>	$I_F = 10\text{ mA}$	VLMO2100	$I_V$	3.55	7.1		mcd
	$I_F = 10\text{ mA}$	VLMO21H2K1	$I_V$	3.55		9	mcd
	$I_F = 10\text{ mA}$	VLMO21J2L1	$I_V$	5.6		14	mcd
	$I_F = 10\text{ mA}$	VLMO2H2L1	$I_V$	3.55		14	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		$\lambda_d$	598	605	611	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$		605		nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\phi$		$\pm 60$		deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$		2.1	3	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15		V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$		$C_j$		15		pF

Note:

<sup>1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin} \leq 2$



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>VLMY21..., YELLOW</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity <sup>1)</sup>	$I_F = 10\text{ mA}$	VLMY2100	$I_V$	3.55	7.1		mcd
	$I_F = 10\text{ mA}$	VLMS21H2K1	$I_V$	3.55		9	mcd
	$I_F = 10\text{ mA}$	VLMS21J2L1	$I_V$	5.6		14	mcd
	$I_F = 10\text{ mA}$	VLMS21H2L1	$I_V$	3.55		14	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		$\lambda_d$	581	588	594	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$		585		nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\varphi$		$\pm 60$		deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$		2.2	3	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15		V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$		$C_j$		15		pF

Note:

<sup>1)</sup> In one Packing Unit  $I_{Vmax}/I_{Vmin} \leq 2$

<b>LUMINOUS INTENSITY CLASSIFICATION</b>				
GROUP	LIGHT INTENSITY (mcd)			
	STANDARD	OPTIONAL	MIN	MAX
H	1	2.8	3.55	
	2	3.55	4.5	
J	1	4.5	5.6	
	2	5.6	7.1	
K	1	7.1	9.0	
	2	9.0	11.2	
L	1	11.2	14.0	
	2	14.0	18.0	
M	1	18.0	22.4	
	2	22.4	28.0	
N	1	28.0	35.5	
	2	35.5	45.0	

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.

<b>CROSSING TABLE</b>	
VISHAY	OSRAM
VLMS2100	LSM670
VLMS21H2K1	LSM670-H2K1
VLMS21J2L1	LSM670-J2L1
VLMS21H2L1	LSM670-H2L1
VLMO2100	LOM670
VLMO21H2K1	LOM670-H2K1
VLMO21J2L1	LOM670-J2L1
VLMO21H2L1	LOM670-H2L1
VLMY2100	LYM670
VLMY21H2K1	LYM670-H2K1
VLMY21J2L1	LYM670-J2L1
VLMY21H2L1	LYM670-H2L1

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

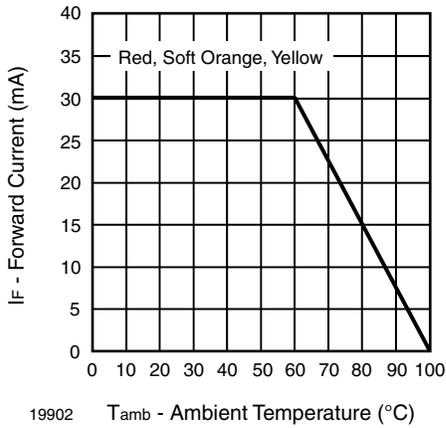


Figure 1. Forward Current vs. Ambient Temperature

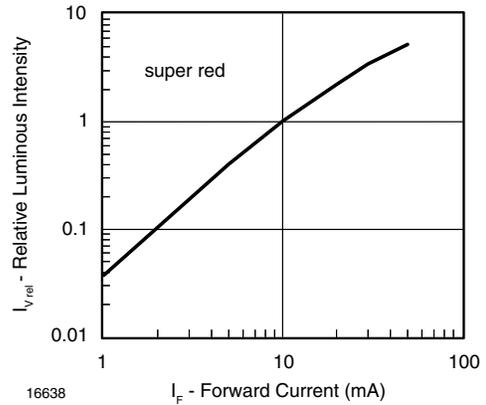


Figure 4. Relative Luminous Intensity vs. Forward Current

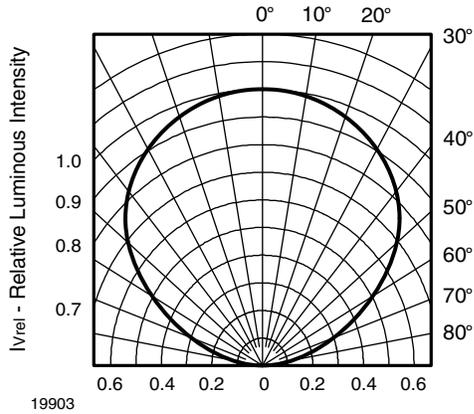


Figure 2. Rel. Luminous Intensity vs. Angular Displacement

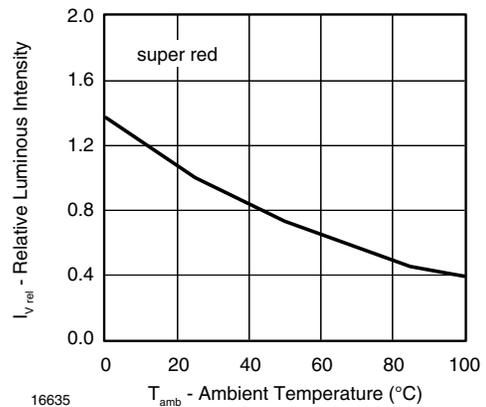


Figure 5. Rel. Luminous Intensity vs. Ambient Temperature

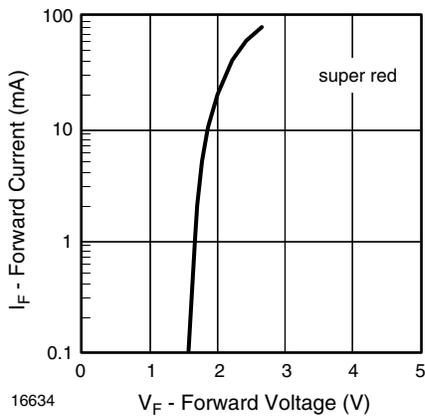


Figure 3. Forward Current vs. Forward Voltage

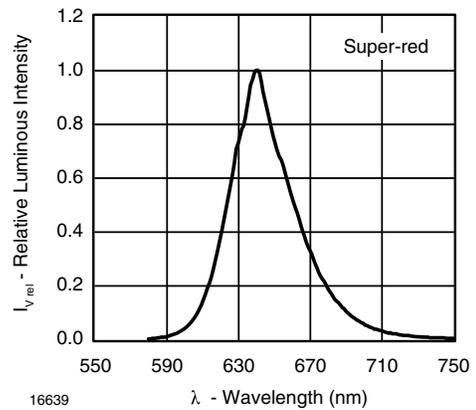


Figure 6. Relative Intensity vs. Wavelength

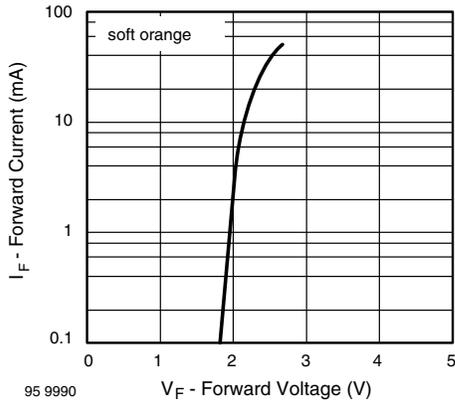


Figure 7. Forward Current vs. Forward Voltage

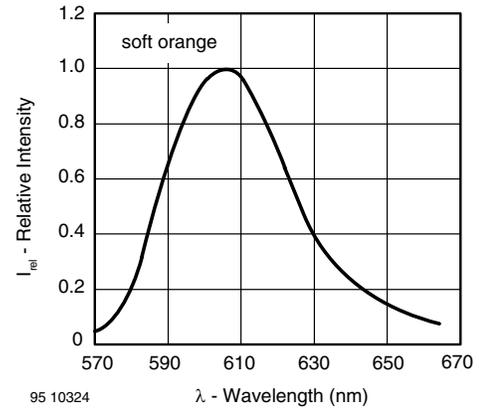


Figure 10. Relative Intensity vs. Wavelength

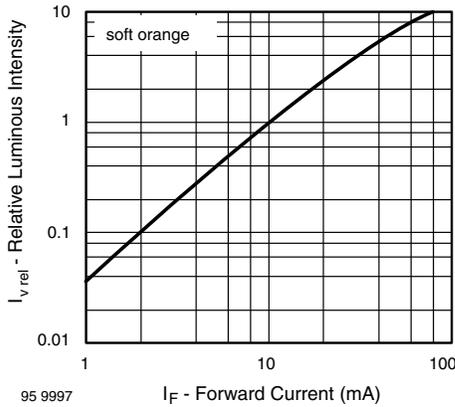


Figure 8. Relative Luminous Intensity vs. Forward Current

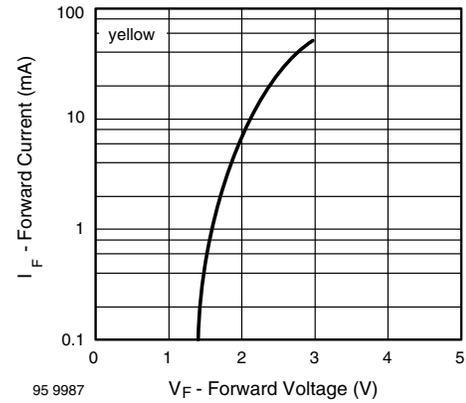


Figure 11. Forward Current vs. Forward Voltage

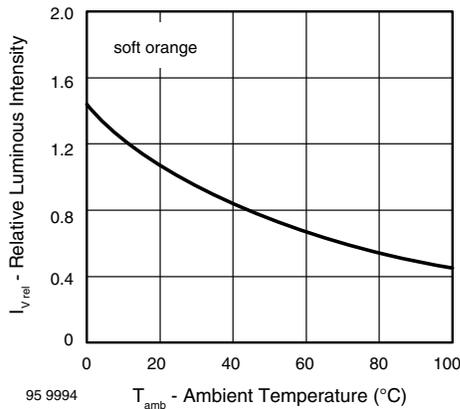


Figure 9. Rel. Luminous Intensity vs. Ambient Temperature

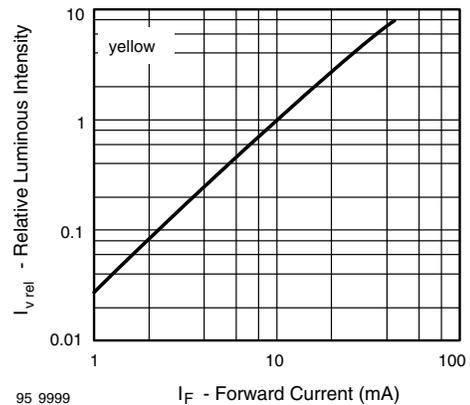


Figure 12. Relative Luminous Intensity vs. Forward Current

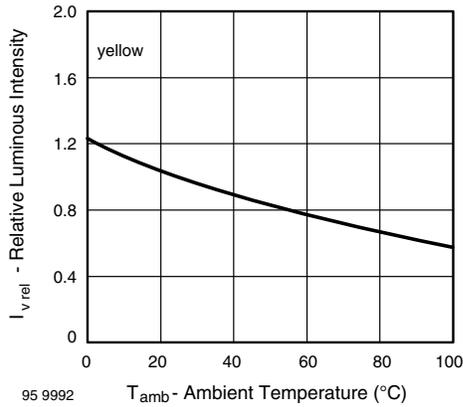


Figure 13. Rel. Luminous Intensity vs. Ambient Temperature

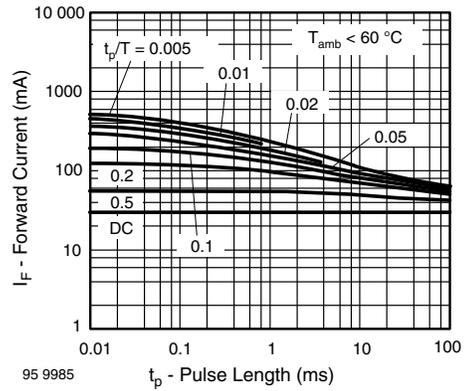


Figure 15. Pulse Forward Current vs. Pulse Duration

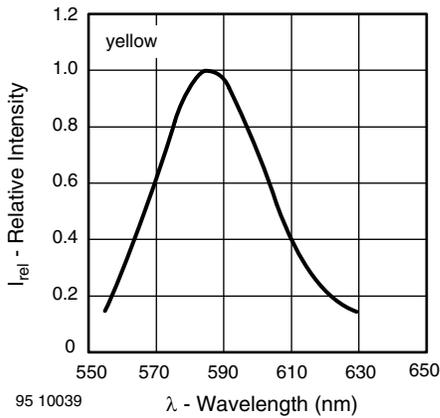


Figure 14. Relative Intensity vs. Wavelength

**SOLDERING PROFILE**

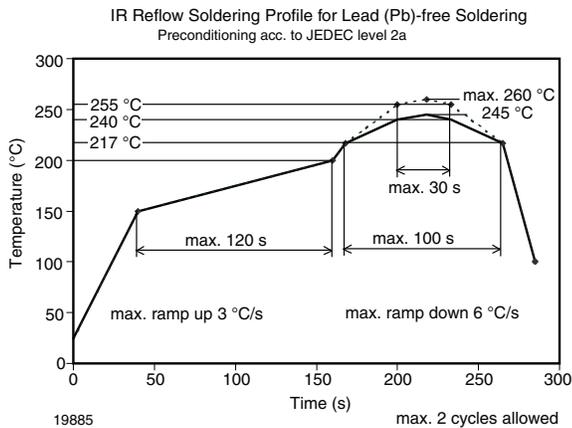
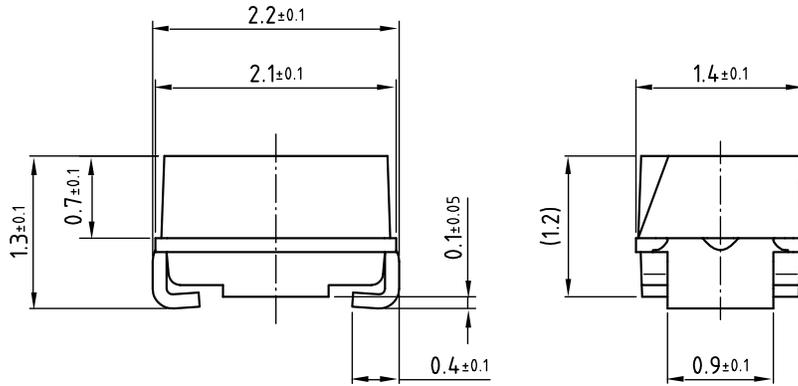


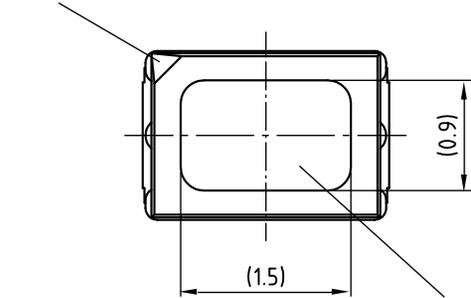
Figure 16. Vishay Leadfree Reflow Soldering Profile (acc. to J-STD-020)

**PACKAGE DIMENSIONS** in millimeters

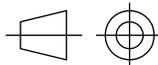


Cathode mark

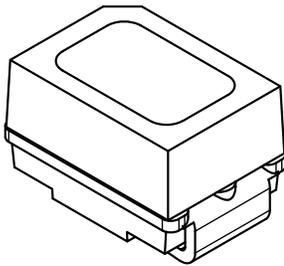
Not indicated tolerances  $\pm 0.2$



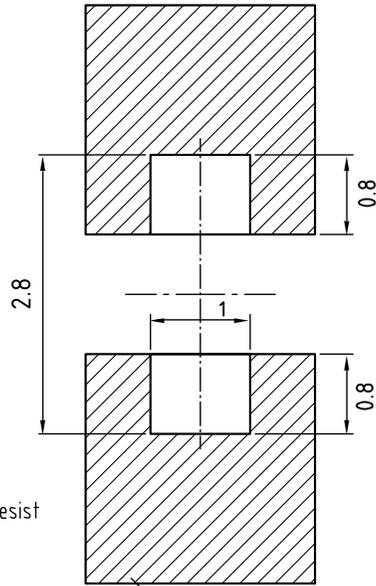
Area not flat



technical drawings according to DIN specifications



Proposed pad layout (for reference only)



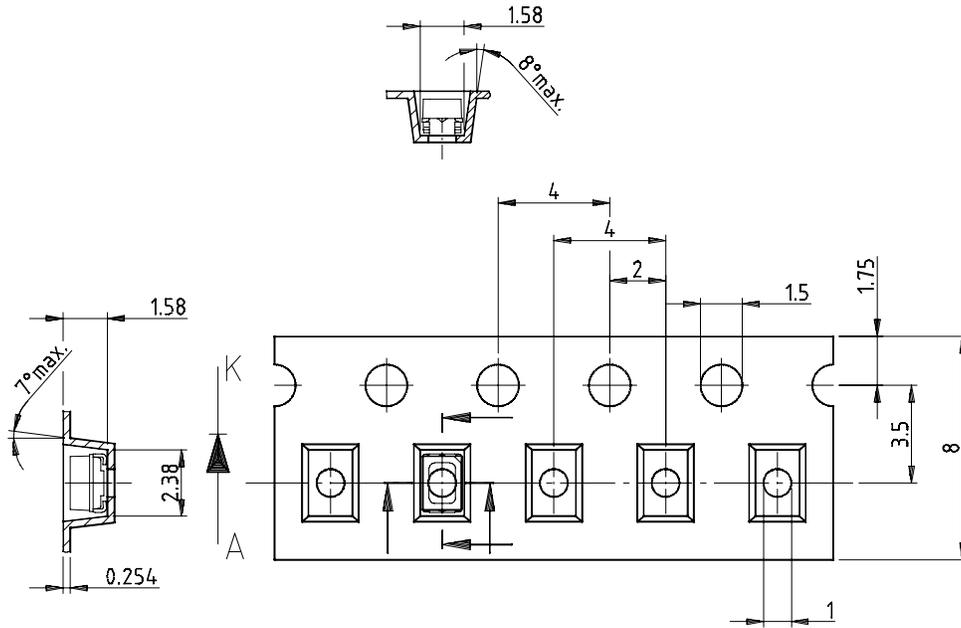
Solder resist

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

Drawing-No.: 6.541-5052.01-4  
 Issue: 3; 22.04.03  
 16892

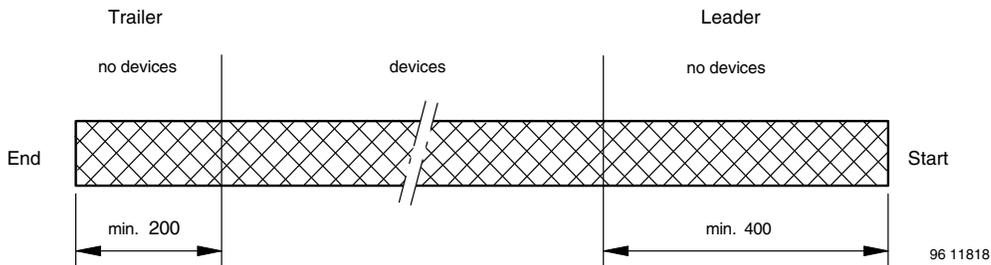


**TAPE DIMENSIONS** in millimeters



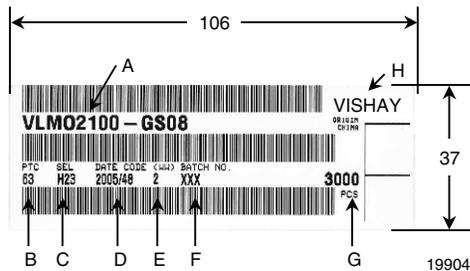
Drawing-No.: 9.700-5266.01-4  
Issue: 1; 05.06.02  
16939

**LEADER AND TRAILER DIMENSIONS** in millimeters



GS08 = 3000 pcs

**BAR CODE PRODUCT LABEL**



- A) Type of component
- B) Manufacturing plant
- C) SEL - Selection code (bin):  
e.g.: H2 = bode for luminous intensity group  
3 = bode for color group
- D) Date code year/week
- E) Day code (e.g. 2: Tuesday)
- F) Batch no.
- G) Total quantity
- H) Company code

## Vishay Semiconductors

### 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

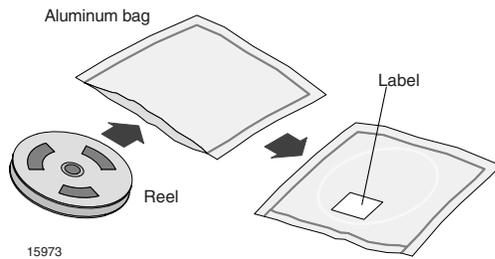
#### Standard bar code labels for finished goods

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 (finished goods)</b>		
<b>PLAIN WRITTING</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	xxxxxx <sup>+</sup>	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

**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 ≤ 60 % RH max.

After more than 672 h under these conditions moisture content will be too high for reflow soldering.

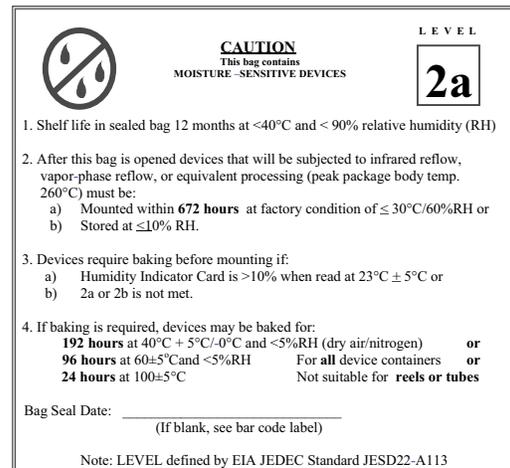
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.

**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.



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## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**