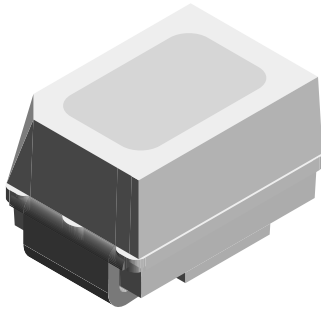


Standard Mini SMD LED



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
- ESD-withstand voltage: up to 2 kV (HBM) according to JESD22-A114-B
- Luminous intensity ratio in one packaging unit $I_{Vmax}/I_{Vmin.} \leq 1.6$
- Preconditioning according to JEDEC® level 2a
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



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
- General use

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.		
VLMS2100-GS08	Red	2.8	7.0	-	10	624	628	636	10	-	2.1	3	20	GaAsP on GaP
VLMS21J2L1-GS08	Red	5.6	7.0	14	10	624	628	636	10	-	2.1	3	20	GaAsP on GaP
VLMS21H2L1-GS08	Red	3.55	7.0	14	10	624	628	636	10	-	2.1	3	20	GaAsP on GaP
VLMO2100-GS08	Soft orange	3.55	7.3	-	10	598	605	611	10	-	2.1	3	20	GaAsP on GaP
VLMO21J2L1-GS08	Soft orange	5.6	7.3	14	10	598	605	611	10	-	2.1	3	20	GaAsP on GaP
VLMY2100-GS08	Yellow	3.55	7.7	-	10	581	588	594	10	-	2.2	3	20	GaAsP on GaP

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage ⁽¹⁾		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-to-ambient	Mounted on PC board (pad size > 5 mm ²)	R_{thJA}	480	K/W

Note

⁽¹⁾ 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	PARTS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 10\text{ mA}$	VLMS2100	I_V	2.8	7.0	-	mcd
	$I_F = 10\text{ mA}$	VLMS21J2L1	I_V	5.6	7.0	14	mcd
	$I_F = 10\text{ mA}$	VLMS21H2L1	I_V	3.55	7.0	14	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		λ_d	624	628	636	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p	-	640	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		j	-	± 60	-	$^{\circ}$
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	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		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)
VLMO21.., SOFT ORANGE

PARAMETER	TEST CONDITION	PARTS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 10\text{ mA}$	VLMO2100	I_V	3.55	7.3	-	mcd
	$I_F = 10\text{ mA}$	VLMO21J2L1	I_V	5.6	7.3	14	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		λ_d	598	605	611	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p	-	605	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		j	-	± 60	-	$^{\circ}$
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	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		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)							
VLMY21.., YELLOW							
PARAMETER	TEST CONDITION	PARTS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 10\text{ mA}$	VLMY2100	I_V	3.55	7.7	-	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		λ_d	581	588	594	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p	-	585	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		ϕ	-	± 60	-	$^{\circ}$
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	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_j	-	15	-	pF

Note

⁽¹⁾ In one packing unit $I_{Vmax}/I_{Vmin} \leq 1.6$

LUMINOUS INTENSITY CLASSIFICATION			
GROUP	LIGHT INTENSITY (mcd)		
	STANDARD	OPTIONAL	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.

COLOR CLASSIFICATION				
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

CROSSING TABLE	
VISHAY	OSRAM
VLMS2100	LSM670
VLMS21J2L1	LSM670-J2L1
VLMS21H2L1	LSM670-H2L1
VLMO2100	LOM670
VLMO21J2L1	LOM670-J2L1
VLMY2100	LYM670

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

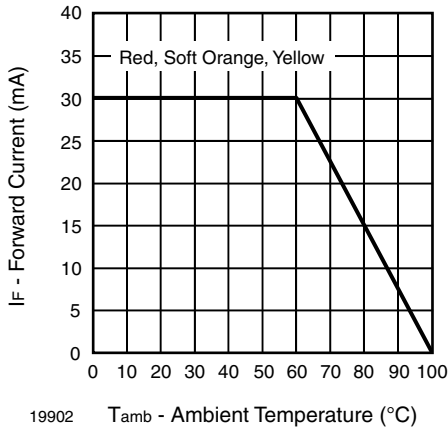


Fig. 1 - Forward Current vs. Ambient Temperature

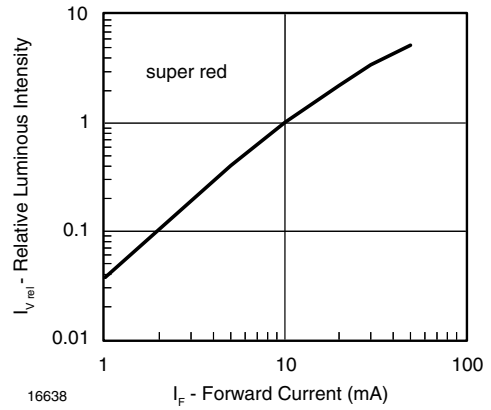


Fig. 4 - Relative Luminous Intensity vs. Forward Current

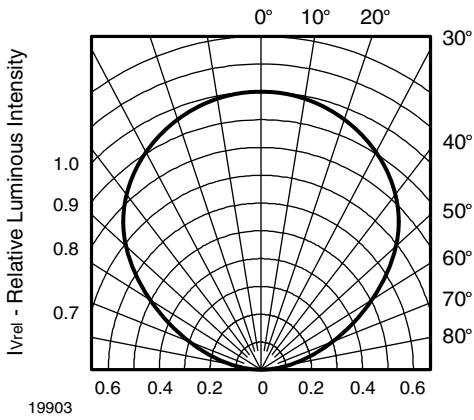


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

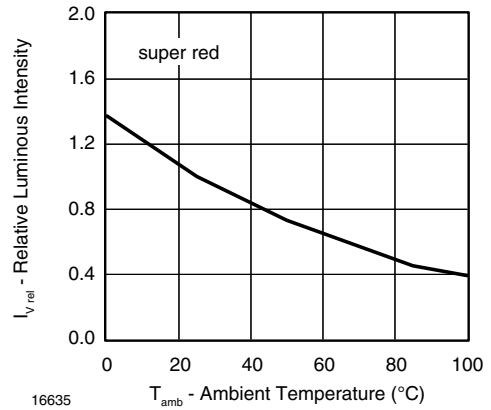


Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

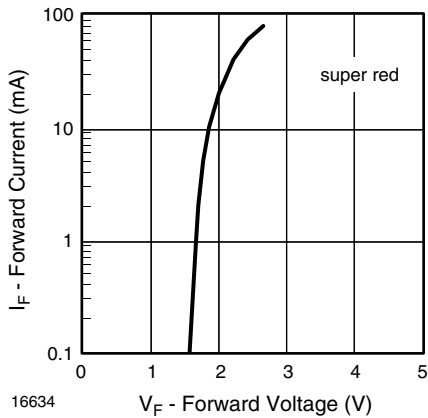


Fig. 3 - Forward Current vs. Forward Voltage

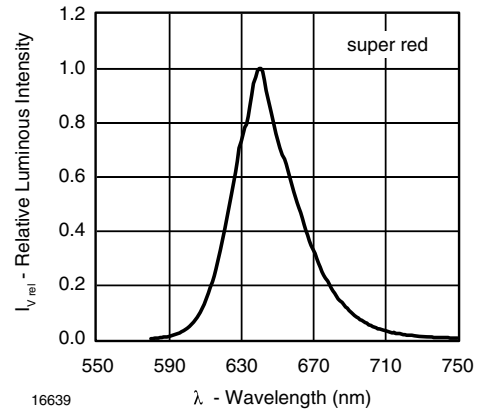


Fig. 6 - Relative Intensity vs. Wavelength

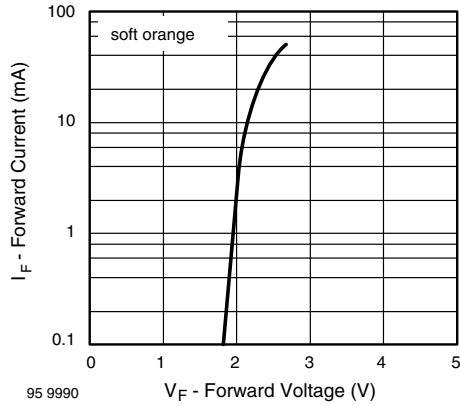


Fig. 7 - Forward Current vs. Forward Voltage

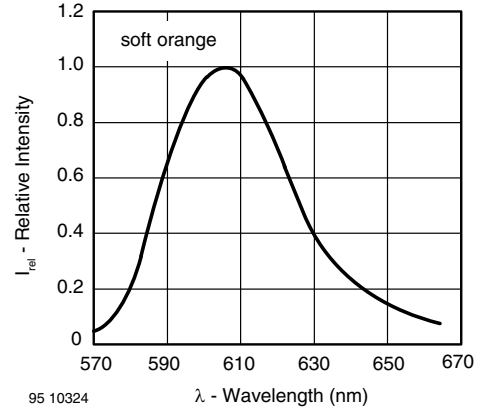


Fig. 10 - Relative Intensity vs. Wavelength

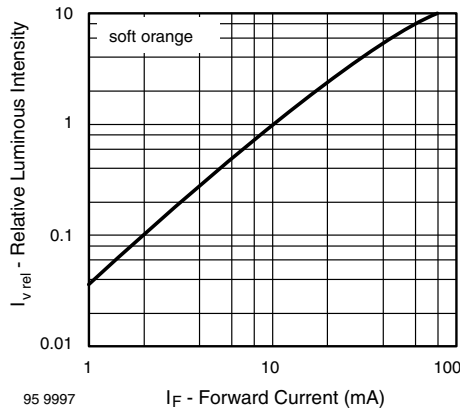


Fig. 8 - Relative Luminous Intensity vs. Forward Current

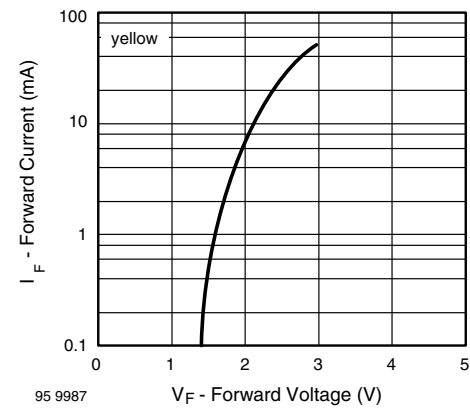


Fig. 11 - Forward Current vs. Forward Voltage

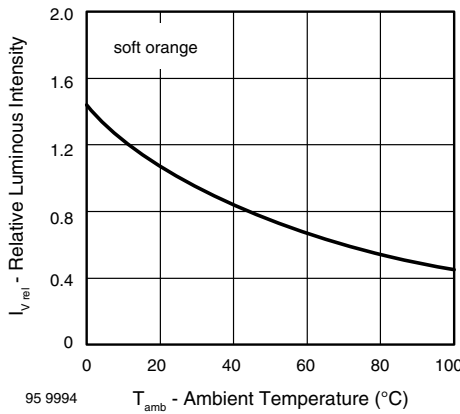


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

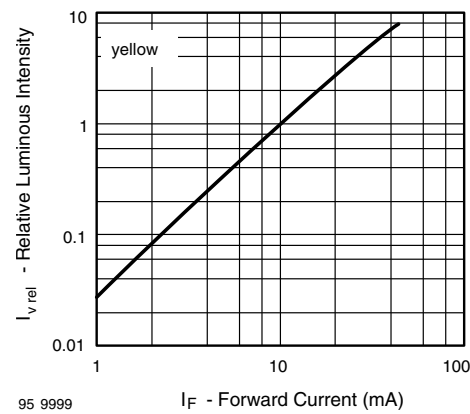


Fig. 12 - Relative Luminous Intensity vs. Forward Current

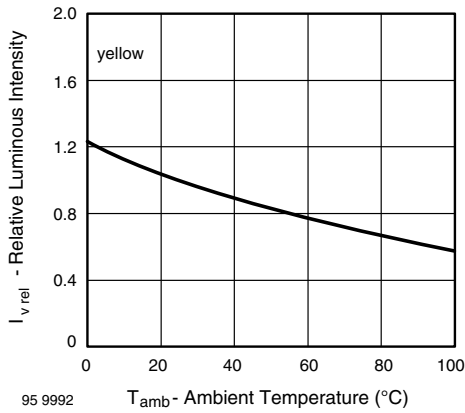


Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

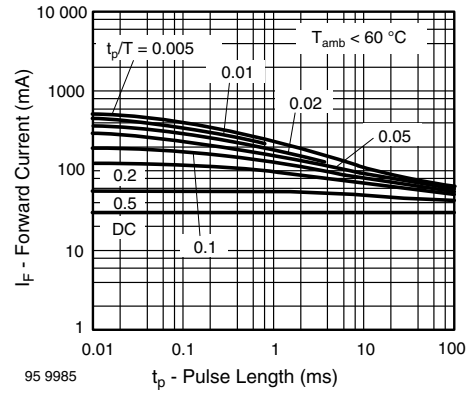


Fig. 15 - Pulse Forward Current vs. Pulse Duration

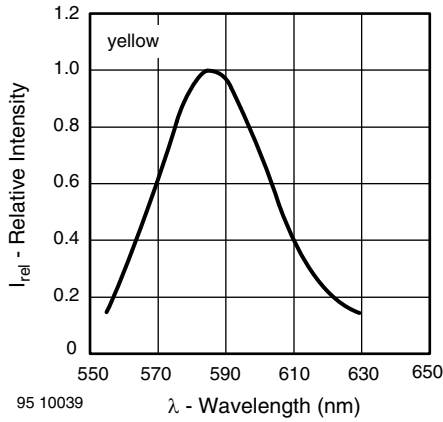


Fig. 14 - Relative Intensity vs. Wavelength

SOLDERING PROFILE

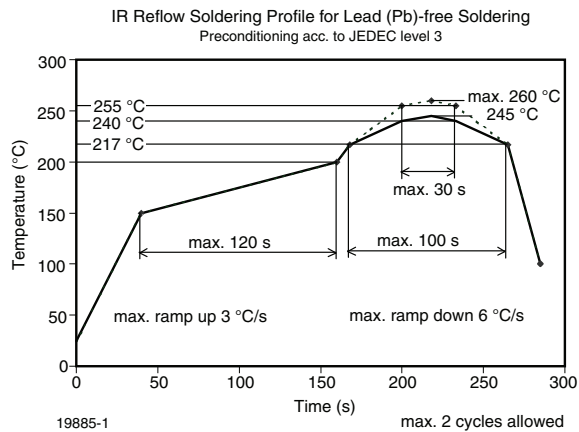
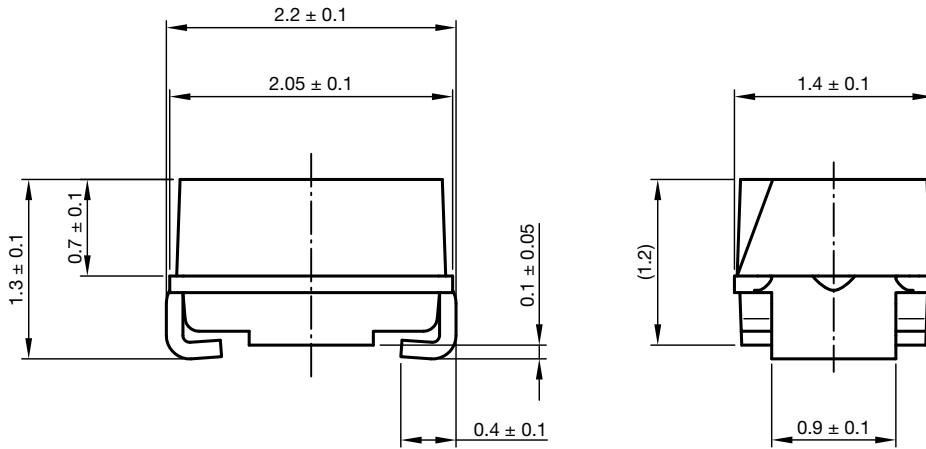


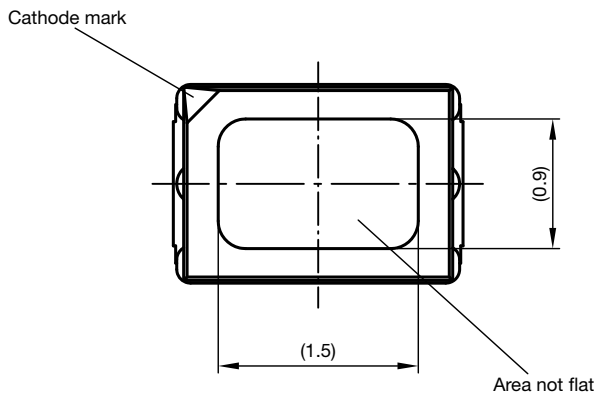
Fig. 16 - Vishay Leadfree Reflow Soldering Profile (acc. to J-STD-020)



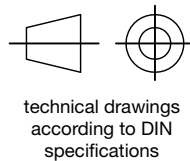
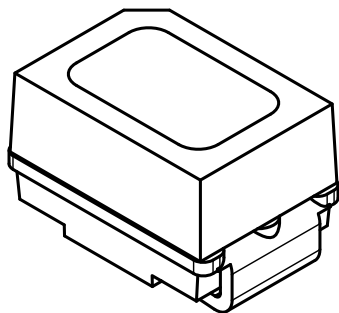
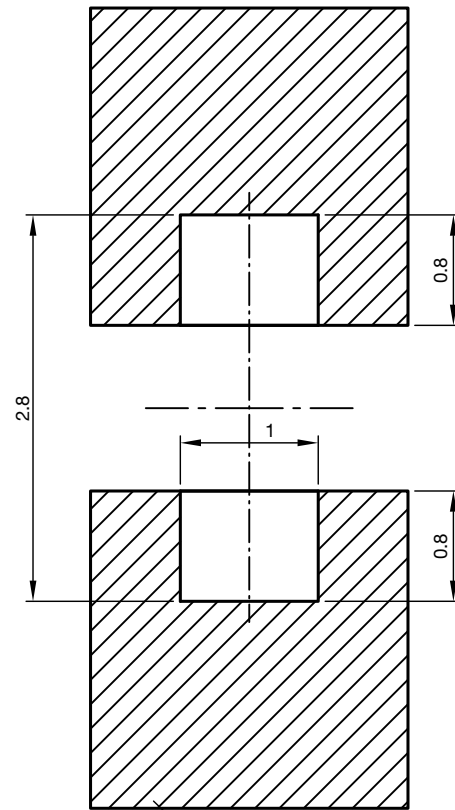
PACKAGE DIMENSIONS in millimeters



Not indicated tolerances ± 0.2



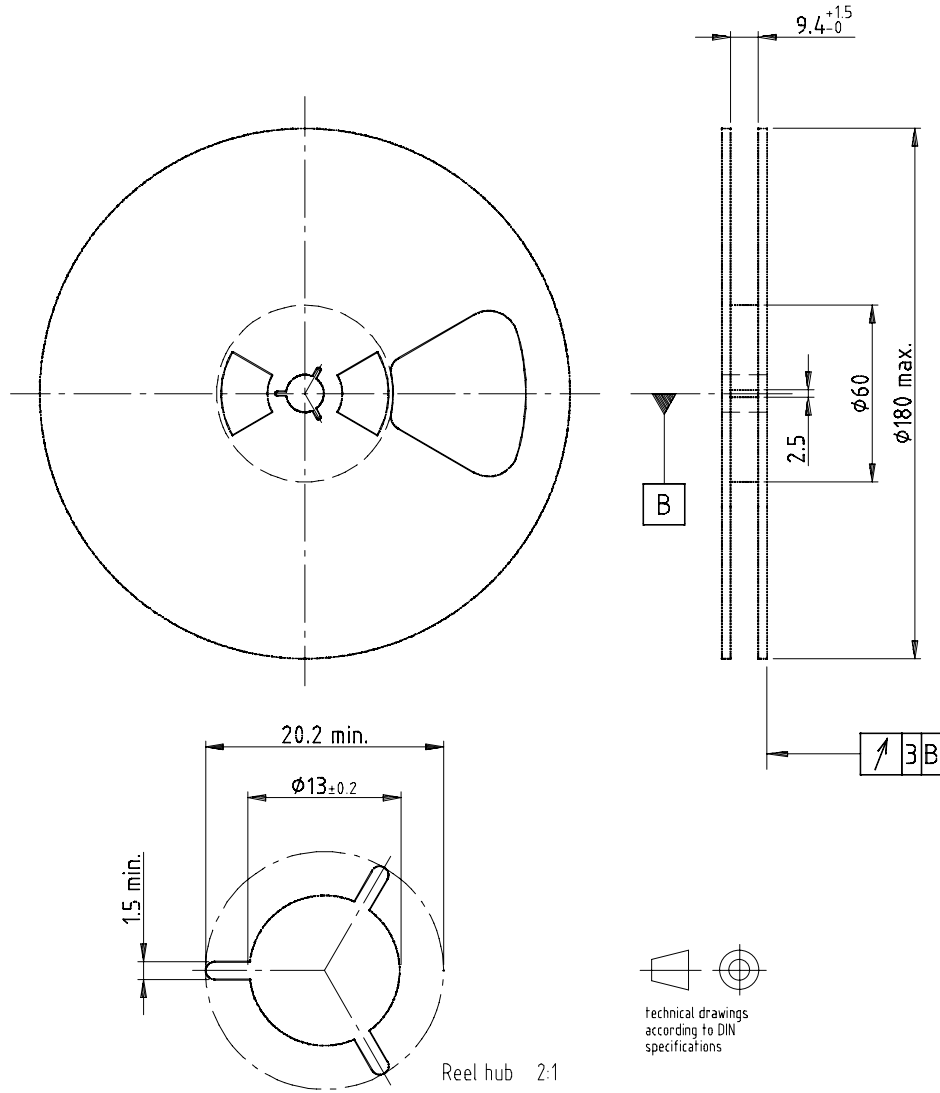
Proposed pad layout (for reference only)



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



REEL DIMENSIONS in millimeters



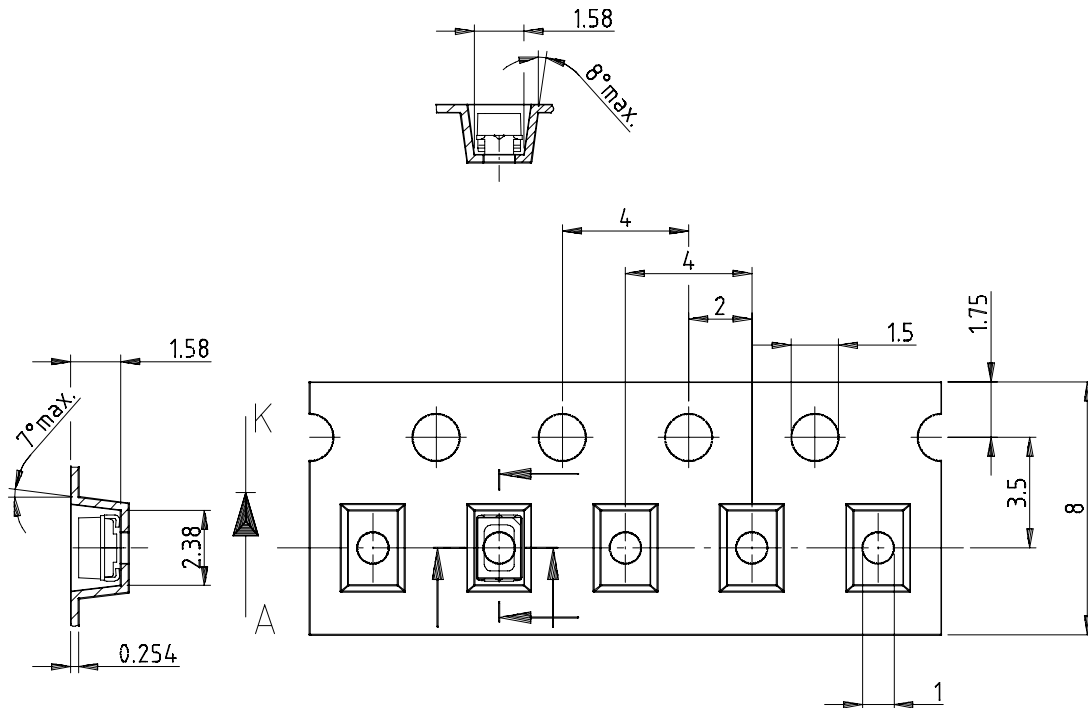
Drawing-No.: 9.800-5051.V5-4

Issue: 1; 25.07.02

16938



TAPE DIMENSIONS in millimeters

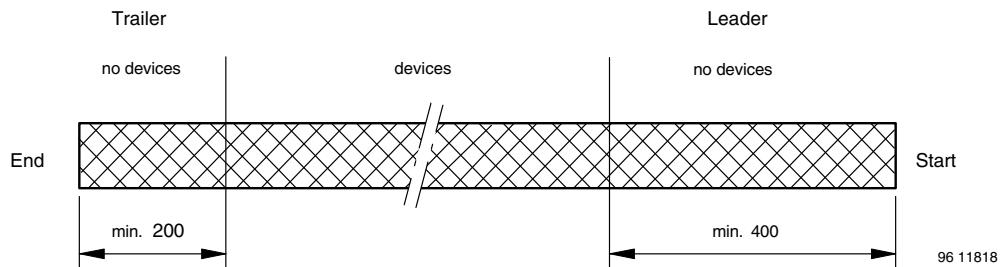


Drawing-No.: 9.700-5266.01-4

Issue: 1; 05.06.02

16939

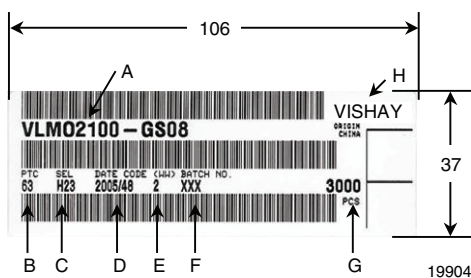
LEADER AND TRAILER DIMENSIONS in millimeters



Note

- 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

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

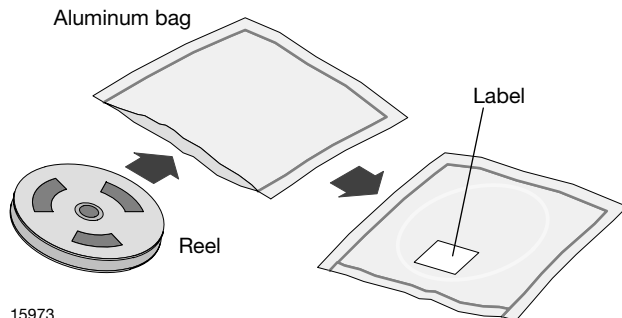
LABEL
Standard bar code labels for finished goods

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.

VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)		
PLAIN WRITTING	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

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.

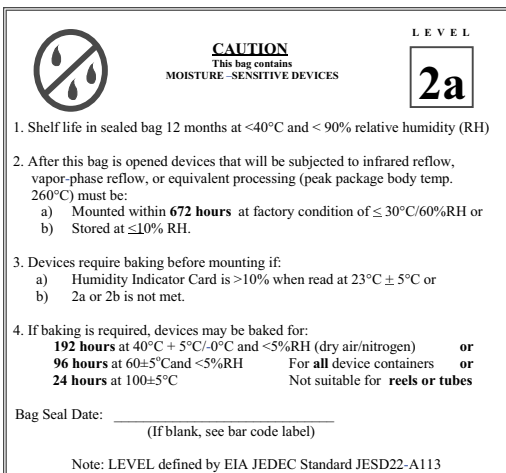
An EIA JEDEC standard JESD22-A112 level 2a label is included on all dry bags.

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.