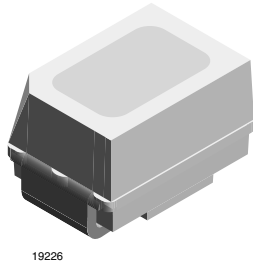


Standard Mini SMD LED



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 $I_{Vmax}/I_{Vmin} \leq 2.0$, optional ≤ 1.6
- Preconditioning acc. to JEDEC level 2a
- Lead (Pb)-free device
- Component in accordance to RoHS 2002/95/EC and 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

ABSOLUTE MAXIMUM RATINGS ¹⁾ VLMS21.., VLMO21.., VLMS21..				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage ²⁾		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 ²)	R_{thJA}	480	K/W

Note:

¹⁾ $T_{amb} = 25\text{ }^\circ\text{C}$, unless otherwise specified

²⁾ Driving the LED in reverse direction is suitable for a short term application

OPTICAL AND ELECTRICAL CHARACTERISTICS ¹⁾ VLMS21.., RED							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity ²⁾	$I_F = 10\text{ mA}$	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	$I_F = 10\text{ mA}$		λ_d	624	628	636	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p		640		nm
Angle of half intensity	$I_F = 10\text{ mA}$		ϕ		± 60		deg
Forward voltage	$I_F = 20\text{ mA}$		V_F		2.1	3.0	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:

¹⁾ $T_{amb} = 25\text{ }^\circ\text{C}$ unless otherwise specified

²⁾ In one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

OPTICAL AND ELECTRICAL CHARACTERISTICS ¹⁾ VLMO21.., SOFT ORANGE							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity ²⁾	$I_F = 10\text{ mA}$	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	$I_F = 10\text{ mA}$		λ_d	598	605	611	nm
Peak wavelength	$I_F = 10\text{ mA}$		λ_p		605		nm
Angle of half intensity	$I_F = 10\text{ mA}$		ϕ		± 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:

¹⁾ $T_{amb} = 25\text{ }^\circ\text{C}$ unless otherwise specified

²⁾ In one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$



OPTICAL AND ELECTRICAL CHARACTERISTICS¹⁾ VLMY21..., YELLOW							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity ²⁾	I _F = 10 mA	VLMY2100	I _V	3.55	7.1		mcd
	I _F = 10 mA	VLMY21H2K1	I _V	3.55		9	mcd
	I _F = 10 mA	VLMY21J2L1	I _V	5.6		14	mcd
	I _F = 10 mA	VLMY21H2L1	I _V	3.55		14	mcd
Dominant wavelength	I _F = 10 mA		λ _d	581	588	594	nm
Peak wavelength	I _F = 10 mA		λ _p		585		nm
Angle of half intensity	I _F = 10 mA		φ		± 60		deg
Forward voltage	I _F = 20 mA		V _F		2.2	3	V
Reverse voltage	I _R = 10 μA		V _R	6	15		V
Junction capacitance	V _R = 0, f = 1 MHz		C _j		15		pF

Note:

¹⁾ T_{amb} = 25 °C unless otherwise specified

²⁾ In one Packing Unit I_{Vmax}/I_{Vmin} ≤ 2.0

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 ± 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
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

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 and an accuracy of ± 1 nm.

TYPICAL CHARACTERISTICS

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

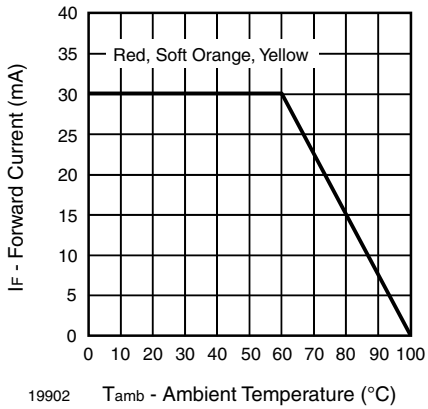


Figure 1. Forward Current vs. Ambient Temperature

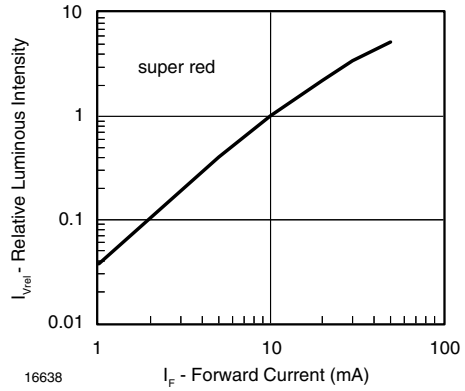


Figure 4. Relative Luminous Intensity vs. Forward Current

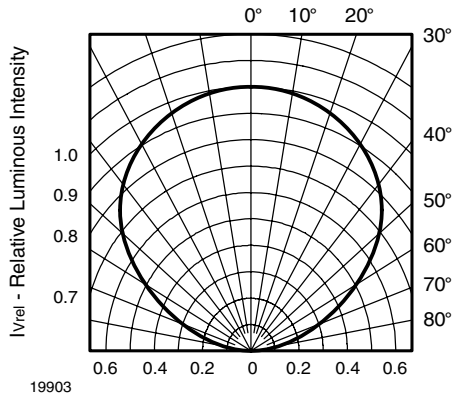


Figure 2. Rel. Luminous Intensity vs. Angular Displacement

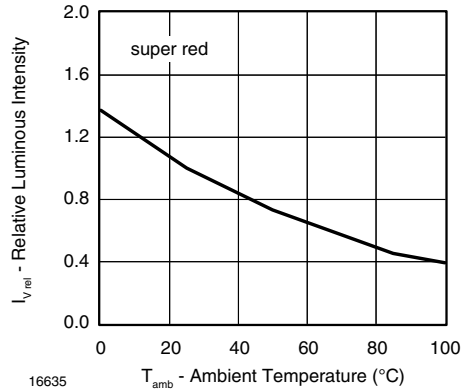


Figure 5. Rel. Luminous Intensity vs. Ambient Temperature

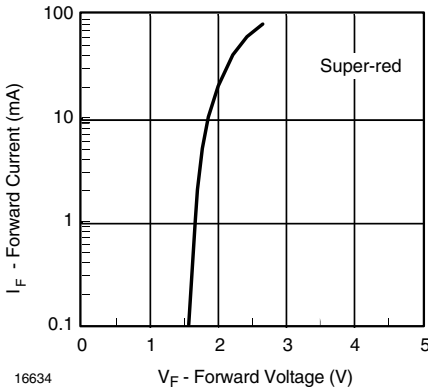


Figure 3. Forward Current vs. Forward Voltage

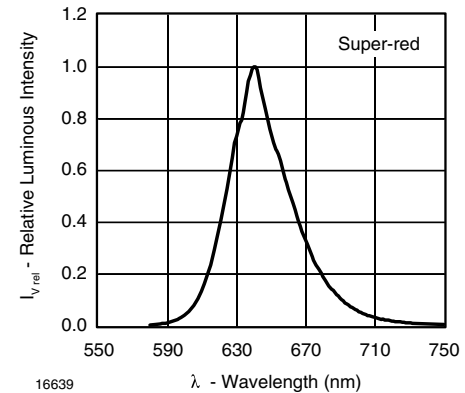


Figure 6. Relative Intensity vs. Wavelength

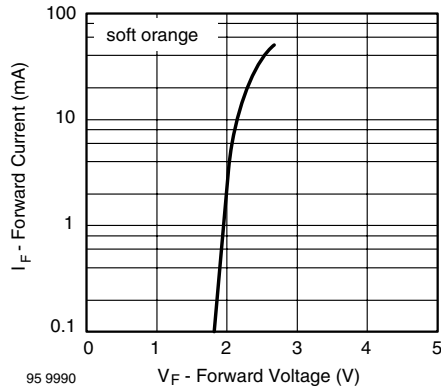


Figure 7. Forward Current vs. Forward Voltage

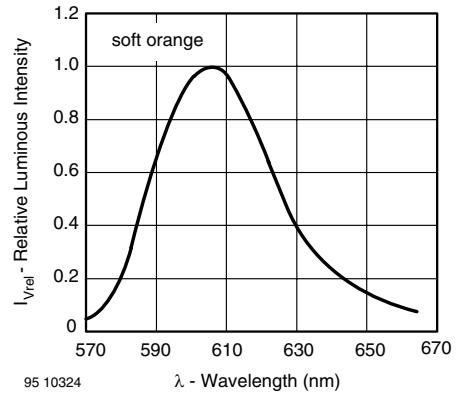


Figure 10. Relative Intensity vs. Wavelength

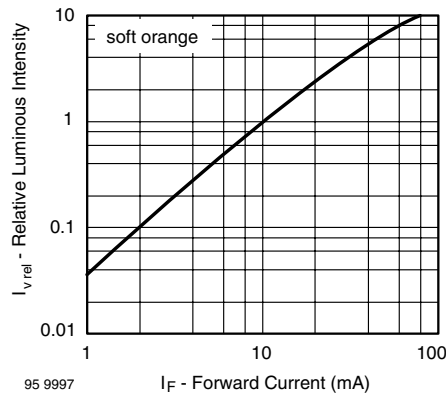


Figure 8. Relative Luminous Intensity vs. Forward Current

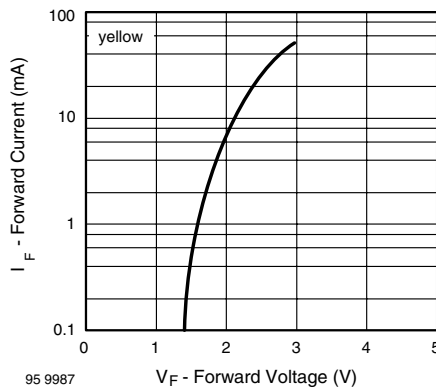


Figure 11. Forward Current vs. Forward Voltage

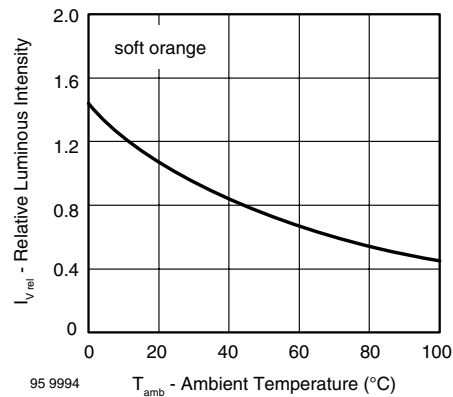


Figure 9. Rel. Luminous Intensity vs. Ambient Temperature

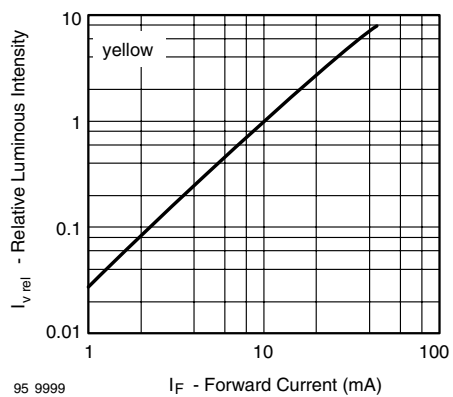


Figure 12. Relative Luminous Intensity vs. Forward Current

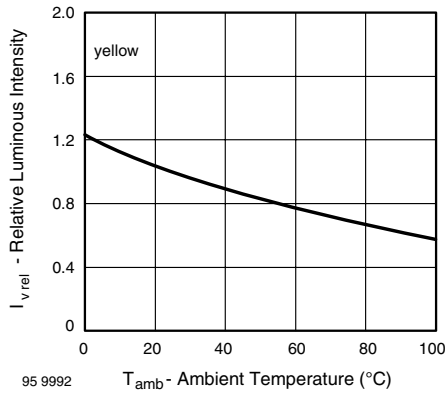


Figure 13. Rel. Luminous Intensity vs. Ambient Temperature

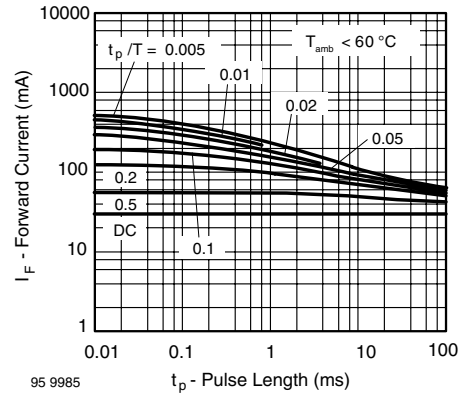


Figure 15. Pulse Forward Current vs. Pulse Duration

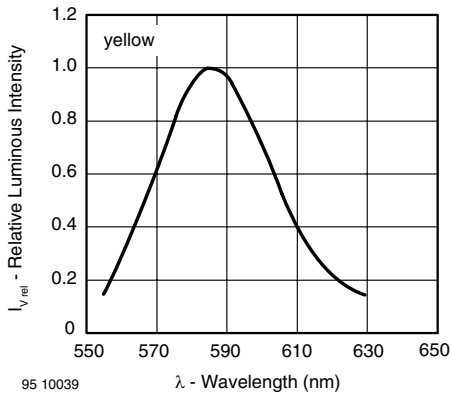


Figure 14. Relative Intensity vs. Wavelength

SOLDERING PROFILE

IR Reflow Soldering Profile for lead (Pb)-free soldering
Preconditioning acc. to JEDEC Level 2a

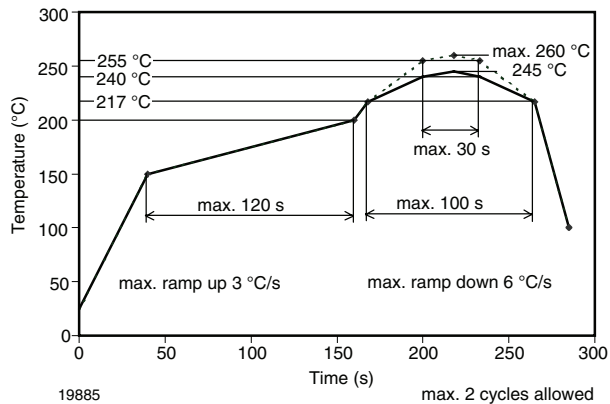
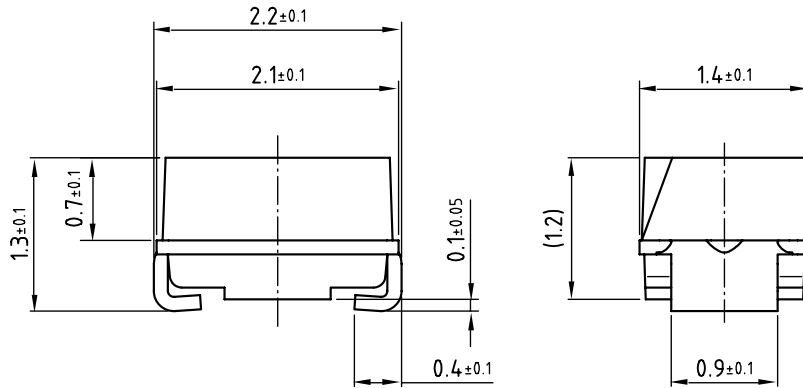


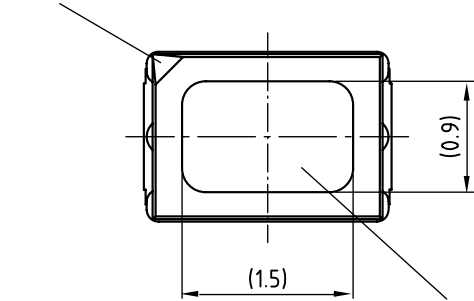
Figure 16. Vishay Leadfree Reflow Soldering Profile
(acc. to J-STD-020B)

PACKAGE DIMENSIONS in millimeters

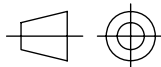


Cathode mark

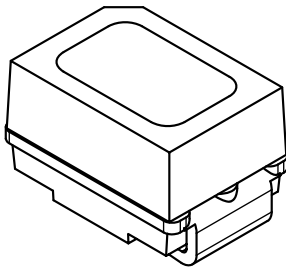
Not indicated tolerances ± 0.2



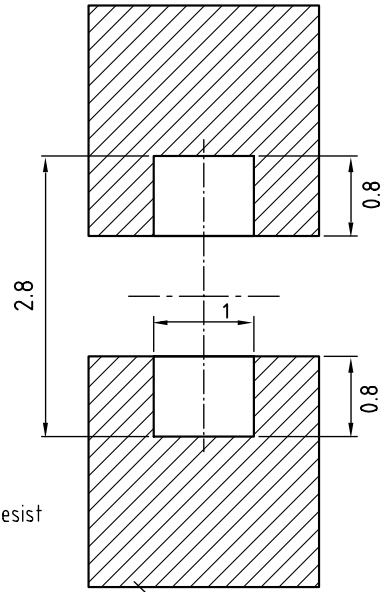
Area not flat



technical drawings according to DIN specifications



Proposed pad layout (for reference only)

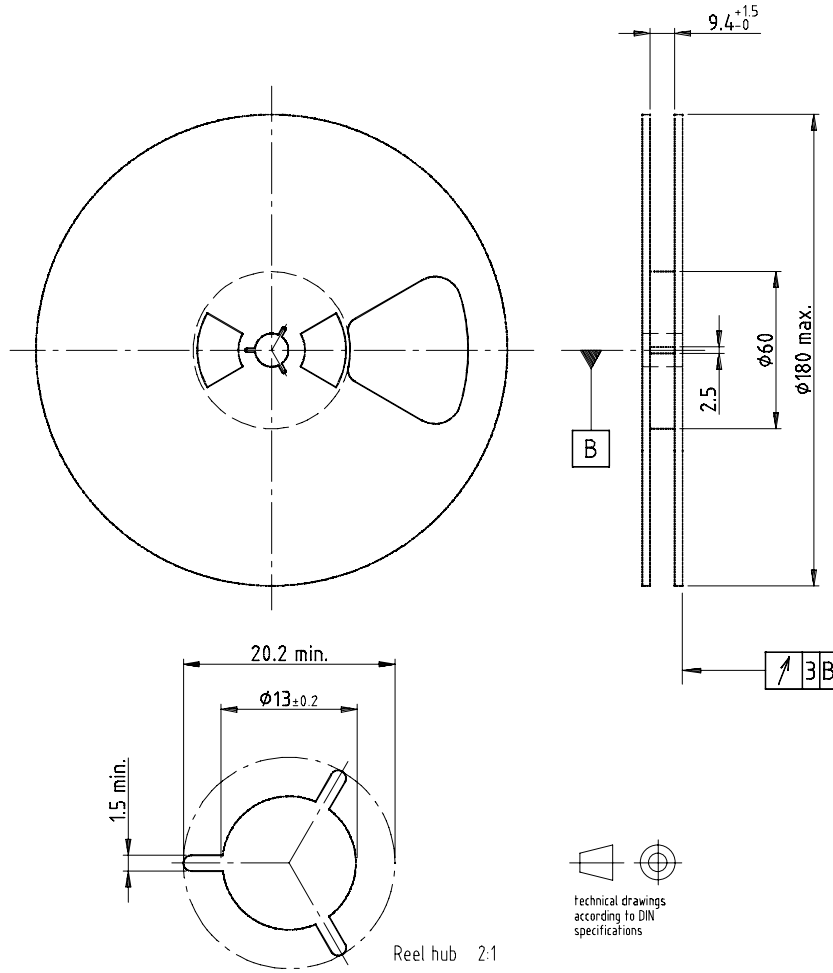


Solder resist

Cu-area > 5mm²

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

REEL DIMENSIONS in millimeters

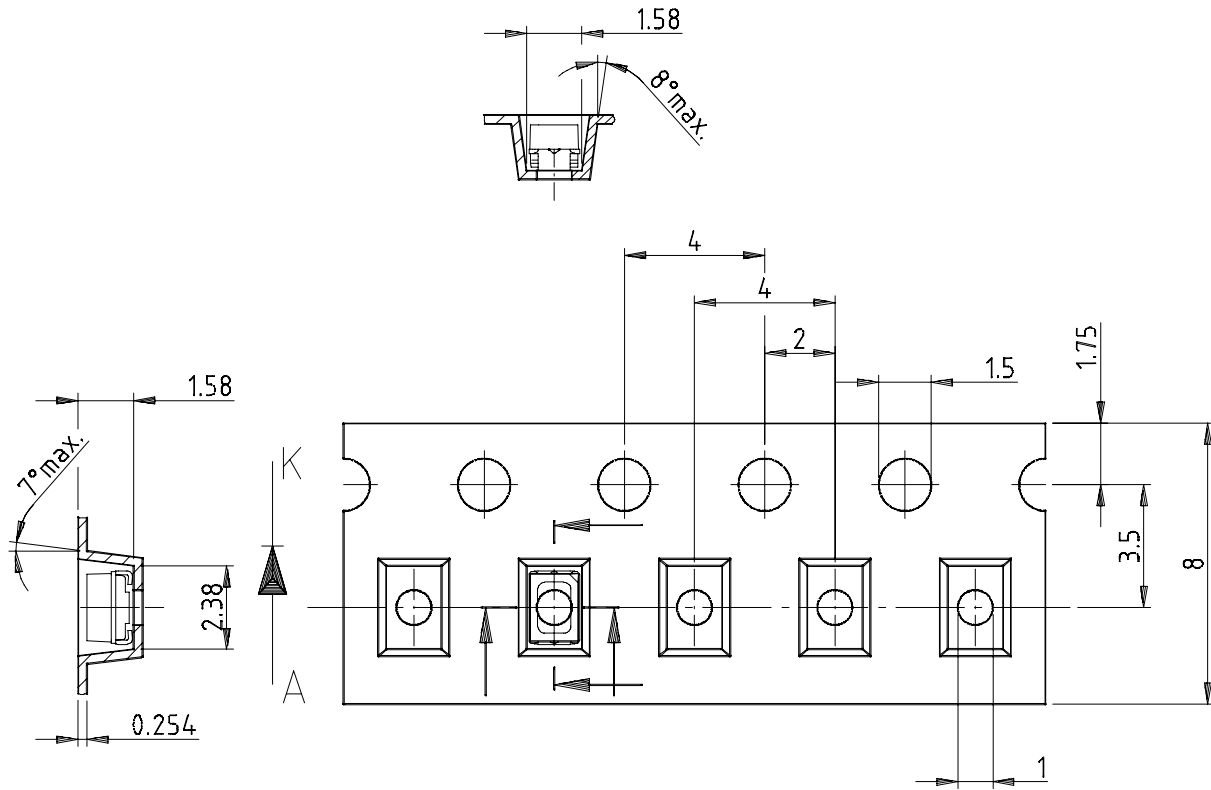


Drawing-No.: 9.800-5051.V5-4

Issue: 1; 25.07.02

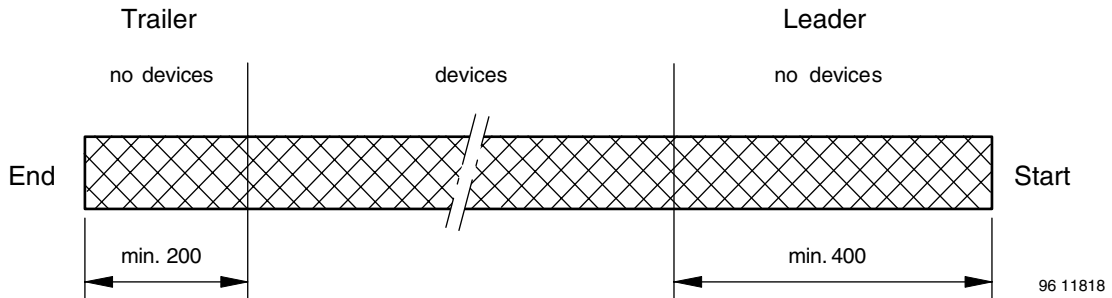
16938

TAPE DIMENSIONS in millimeters



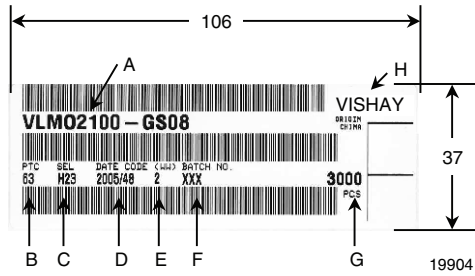
Drawing-No.: 9.700-5266.01-4
Issue: 1; 05.06.02
16939

LEADER AND TRAILER Dimensions in millimeters



GS08 = 3000 pcs

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 to 1.3 N
300 ± 10 mm/min
165° - 180° peel angle

LABEL

Standard bar code labels for finished goods

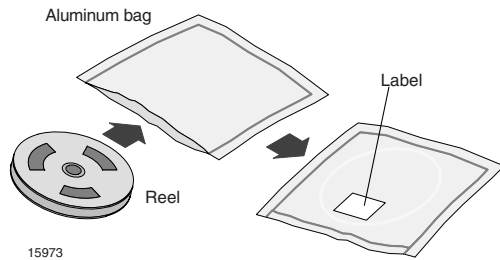
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain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



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.

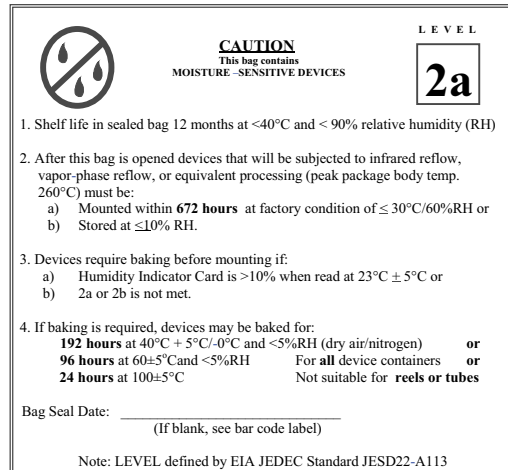
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



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.



Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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All product specifications and data are subject to change without notice.

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