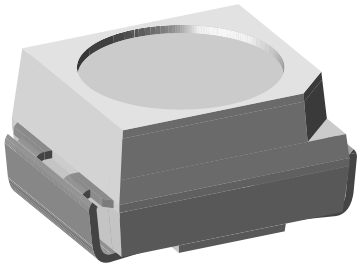
Power SMD LED PLCC-2



DESCRIPTION

The VLM.335.. series is an advanced modification of the Vishay VLM.31.. series. It is using the advanced, high efficient AlInGaP/Si chip technology, capable of withstanding a 50 mA drive current.

The package of the VLM.335.. is the PLCC-2.

It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled up with clear epoxy.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-2
- Product series: power
- Angle of half intensity: ± 60°

FEATURES

- Utilizing latest advanced AlInGaP technology
- Available in 8 mm tape
- Luminous intensity and color categorized per packing unit
- Luminous intensity ratio per packing unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
- Thermal resistance R = 400 K/W
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- Preconditioning according to JEDEC® level 2a
- Compatible with reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Traffic signals and signs
- Interior and exterior lighting
- Dashboard illumination
- Indicator and backlighting purposes for audio, video, LCDs switches, symbols, illuminated advertising etc

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.		
VLMS335T1U2-GS08	Super red	280	390	710	20	626	630	639	20	1.8	2	2.6	20	AlInGaP on Si
VLMR335U1V2-GS08	Red	450	560	1120	20	619	625	631	20	1.8	2	2.6	20	AlInGaP on Si
VLMR335U1V2-GS18	Red	450	560	1120	20	619	625	631	20	1.8	2	2.6	20	AlInGaP on Si
VLMK335U1V2-GS08	Orange red	450	630	1120	20	611	616	622	20	1.8	2.1	2.6	20	AlInGaP on Si
VLMO335U2AA-GS08	Soft orange	560	700	1400	20	600	605	611	20	1.8	2.1	2.6	20	AlInGaP on Si
VLMY335U1V2-GS08	Yellow	450	600	1120	20	583	589	594	20	1.8	2.15	2.6	20	AlInGaP on Si

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)
VLM.335...

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage (1)	Short term application only	V_R	5	V
DC forward current	$T_{amb} \leq 73$ °C (400 K/W)	I_F	50	mA
Power dissipation		P_V	130	mW
Junction temperature		T_j	125	°C
Operating temperature range		T_{amb}	-40 to +100	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Thermal resistance junction to ambient	Mounted on PC board (pad size > 16 mm²)	R_{thJA}	400	K/W

Note

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

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OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VLMS335.., SUPER RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	VLMS335T1U2	I_V	280	390	710	mcd
Luminous flux/luminous intensity			ϕ_V/I_V	-	3	-	mlm/mcd
Dominant wavelength	I_F = 20 mA		λ_d	626	630	639	nm
Peak wavelength	I_F = 20 mA		λ_p	-	639	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	I_F = 20 mA		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 60	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2	2.6	V
Reverse current	V_R = 5 V		I_R	-	0.01	10	µA

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VLMR335.., RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	VLMR335U1V2	I_V	450	560	1120	mcd
Luminous flux/luminous intensity			ϕ_V/I_V	-	3	-	mlm/mcd
Dominant wavelength	I_F = 20 mA		λ_d	619	625	631	nm
Peak wavelength	I_F = 20 mA		λ_p	-	632	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	I_F = 20 mA		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 60	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2	2.6	V
Reverse current	V_R = 5 V		I_R	-	0.01	10	µA

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VLMK335.., ORANGE RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	VLMK335U1V2	I_V	450	630	1120	mcd
Luminous flux/luminous intensity			ϕ_V/I_V	-	3	-	mlm/mcd
Dominant wavelength	I_F = 20 mA		λ_d	611	616	622	nm
Peak wavelength	I_F = 20 mA		λ_p	-	622	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	I_F = 20 mA		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 60	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2.1	2.6	V
Reverse current	V_R = 5 V		I_R	-	0.01	10	µA

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VLMO335.., SOFT ORANGE

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	VLMO335U2AA	I_V	560	700	1400	mcd
Luminous flux/luminous intensity			ϕ_V/I_V	-	3	-	mlm/mcd
Dominant wavelength	I_F = 20 mA		λ_d	600	605	611	nm
Peak wavelength	I_F = 20 mA		λ_p	-	611	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	I_F = 20 mA		$\Delta\lambda$	-	17	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 60	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2.1	2.6	V
Reverse current	V_R = 5 V		I_R	-	0.01	10	µA

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OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VLMY335.., YELLOW

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	VLMY335U1V2	I_V	450	600	1120	mcd
Luminous flux/luminous intensity			ϕ_V/I_V	-	3	-	mlm/mcd
Dominant wavelength	I_F = 20 mA		λ_d	583	589	594	nm
Peak wavelength	I_F = 20 mA		λ_p	-	591	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	I_F = 20 mA		$\Delta\lambda$	-	17	-	nm
Angle of half intensity	I_F = 20 mA		φ	-	± 60	-	°
Forward voltage	I_F = 20 mA		V_F	1.8	2.15	2.6	V
Reverse current	V_R = 5 V		I_R	-	0.01	10	µA

COLOR CLASSIFICATION

GROUP	DOM. WAVELENGTH (nm)					
	ORANGE RED		SOFT ORANGE		YELLOW	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	611	618	-	-	-	-
2	614	622	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

LUMINOUS INTENSITY CLASSIFICATION

GROUP		LIGHT INTENSITY (mcd)	
STANDARD	OPTIONAL	MIN.	MAX.
T	1	280	355
	2	355	450
U	1	450	560
	2	560	710
V	1	710	900
	2	900	1120
A	A	1120	1400

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

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TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

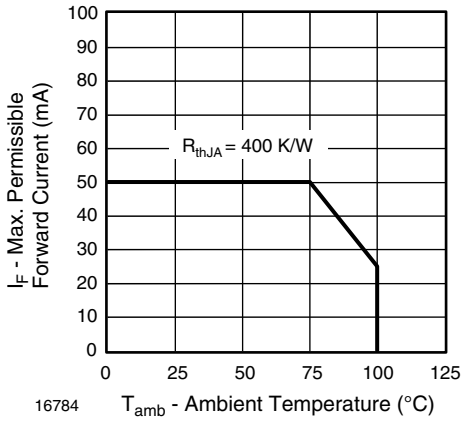


Fig. 1 - Maximum Permissible Forward Current vs. Ambient Temperature

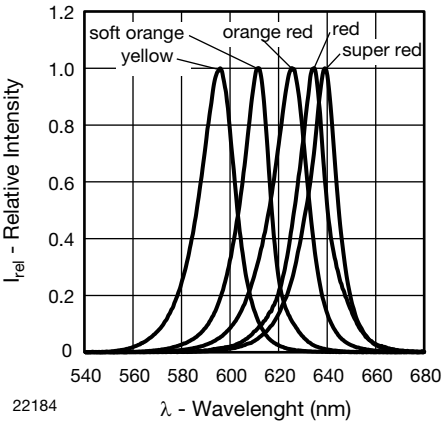


Fig. 4 - Relative Intensity vs. Wavelength

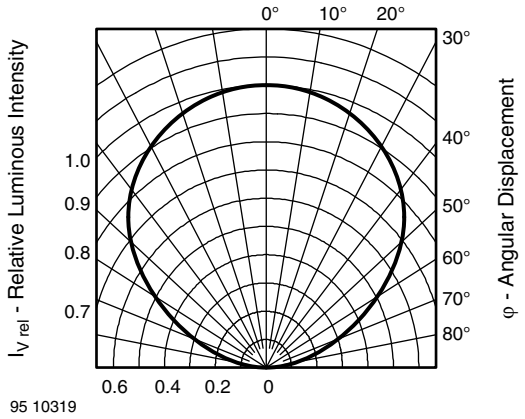


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

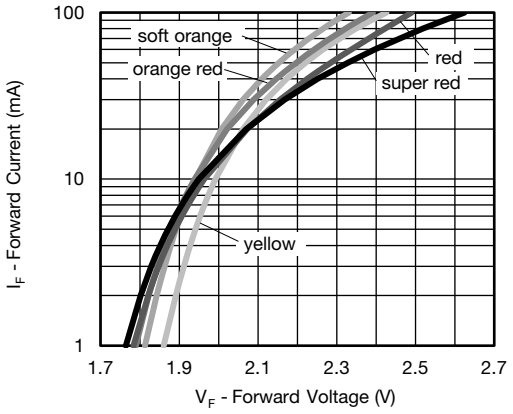


Fig. 5 - Forward Current vs. Forward Voltage

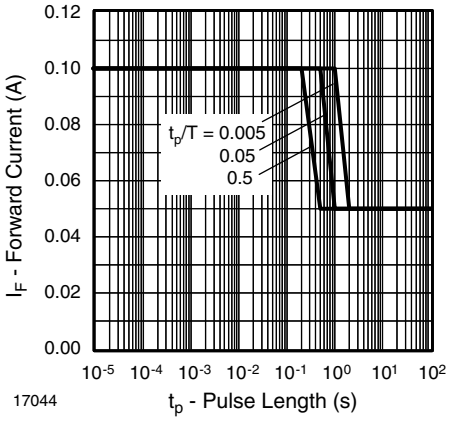


Fig. 3 - Forward Current vs. Pulse Length

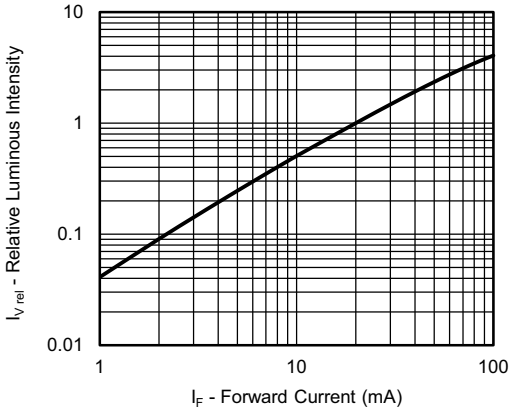


Fig. 6 - Relative Luminous Intensity vs. Forward Current

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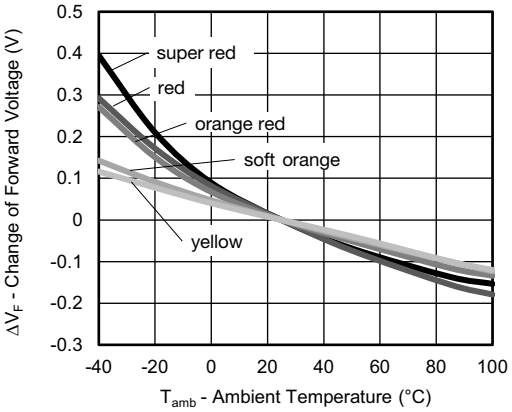


Fig. 7 - Change of Forward Voltage vs. Ambient Temperature

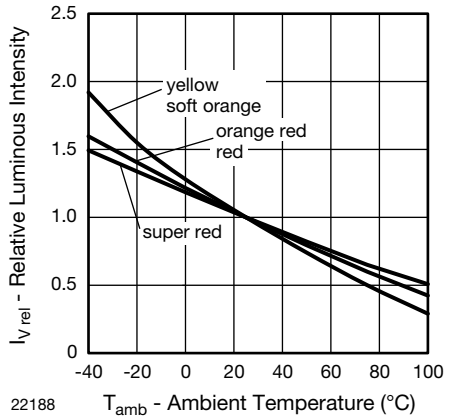


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

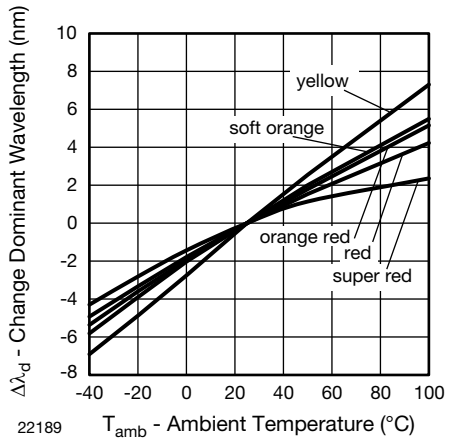
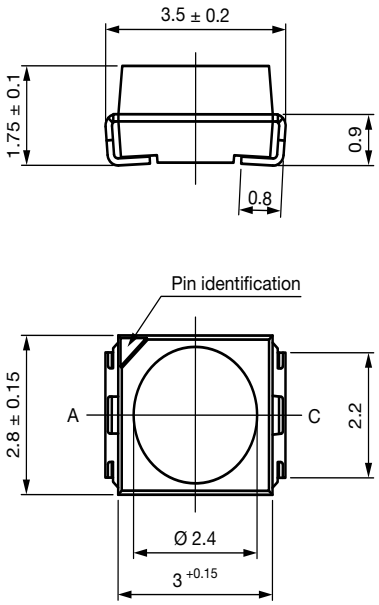


Fig. 9 - Change of Dominant Wavelength vs. Ambient Temperature

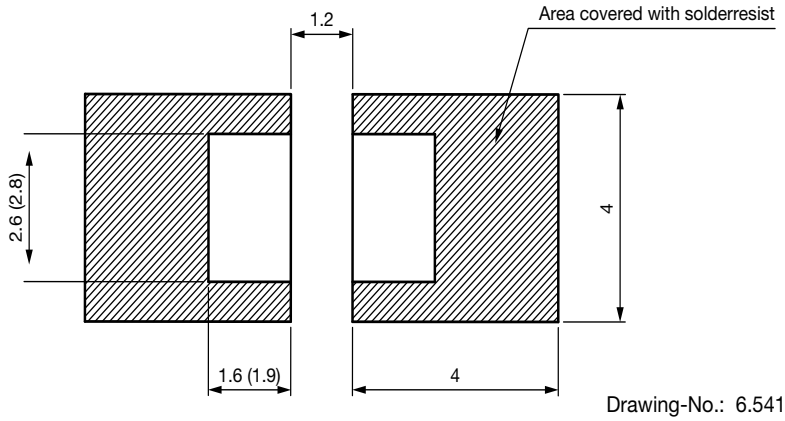
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PACKAGE DIMENSIONS in millimeters



Technical drawings according to DIN specifications

Mounting pad layout



Dimensions: reflow and vapor phase (wave soldering)

Drawing-No.: 6.541-5067.02-4
Issue: 9; 16.09.2019

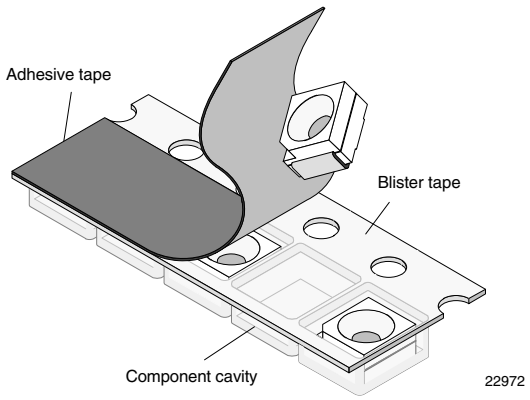
PACKING INFORMATION	
PART	**TAPE AND REEL**
VLMx335xxxx-GS08	7500 (5 x 1500)
VLMR335U1V2-GS18	8000 (1 reel)

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METHOD OF TAPING / POLARITY AND TAPE AND REEL

SMD LED (VLMx335..-SERIES)

Vishay's LEDs in SMD packages are available in an antistatic 8 mm blister tape (in accordance with DIN IEC 40 (CO) 564) for automatic component insertion. The blister tape is a plastic strip with impressed component cavities, covered by a top tape.



TAPING OF VLMx335..

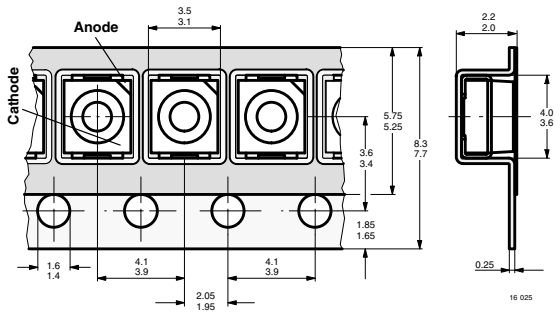


Fig. 10 - Tape Dimensions in mm for PLCC-2

REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDS, TAPE OPTION GS08 (= 1500 PCS.)

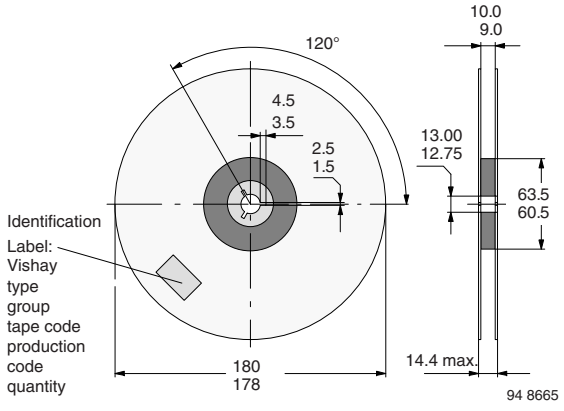


Fig. 11 - Reel Dimensions - GS08

REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDS, TAPE OPTION GS08 (= 1500 PCS.)

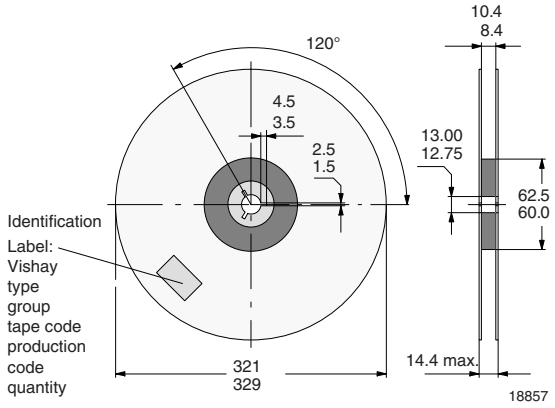


Fig. 12 - Reel Dimensions - GS18

SOLDERING PROFILE

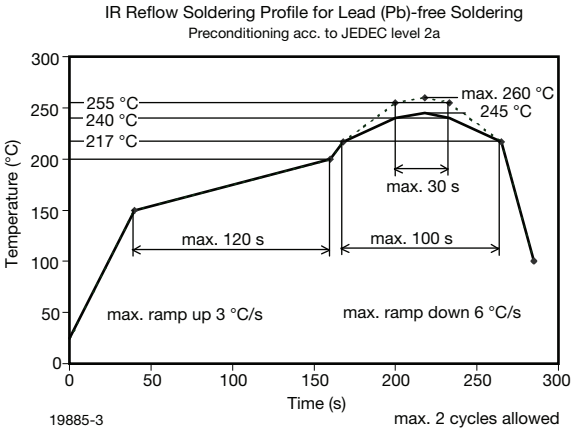


Fig. 13 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020)

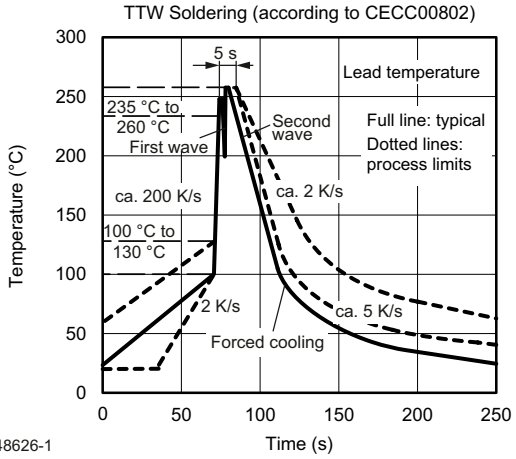
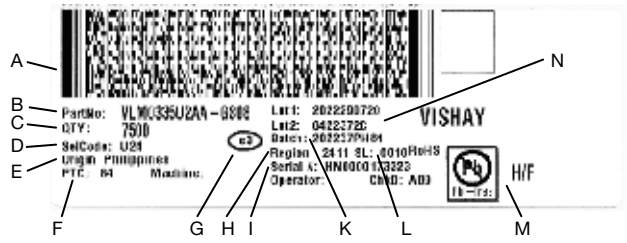


Fig. 14 - Double Wave Soldering of Opto Devices (all Packages)

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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

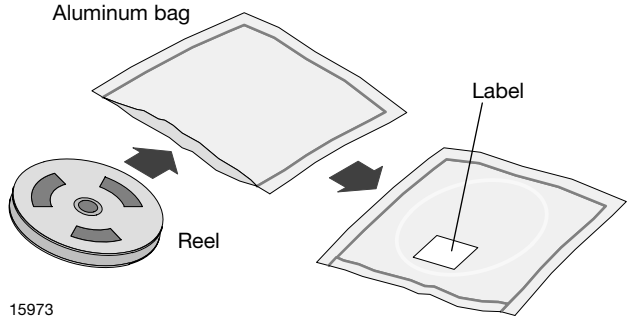
L. SL: storage location

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.



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.

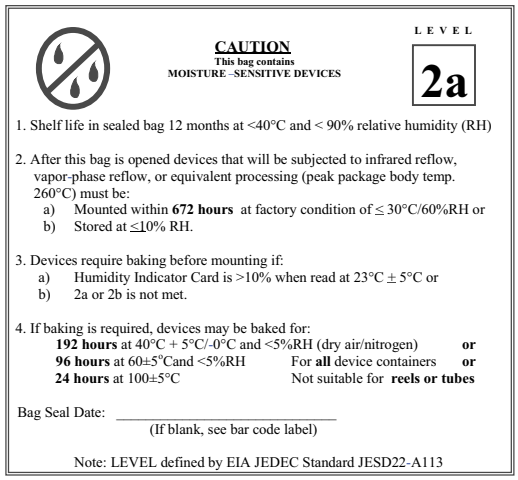
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.


CAUTION
This bag contains
MOISTURE–SENSITIVE DEVICES

LEVEL
2a

1. Shelf life in sealed bag 12 months at <40°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°C) must be:
   a) Mounted within **672 hours** at factory condition of ≤ 30°C/60%RH or
   b) Stored at ≤10% RH.

3. Devices require baking before mounting if:
   a) Humidity Indicator Card is >10% when read at 23°C ± 5°C or
   b) 2a or 2b is not met.

4. If baking is required, devices may be baked for:
   192 hours at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen) **or**
   96 hours at 60±5°Cand <5%RH For **all** device containers **or**
   24 hours at 100±5°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

19786

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. Electrostatic sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABEL

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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