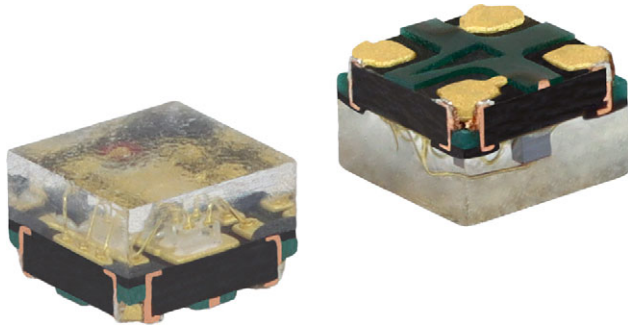


Multi SMD LED RGB



DESCRIPTION

The VLMRGB1500... is a high brightness tricolor LED designed primarily for RGB displays and backlights. It is using the popular PCB based 0404 SMD package with 120° emission characteristic. The 4 pin package with common anode allows individual driving of each chip and thus a gapless coverage of a wide color space by additive color mixing. It provides high reliability in a temperature range from -40 °C to +85 °C, using highly suitable blue light stable package materials.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD 0404, 4 pin
- Product series: RGB
- Angle of half intensity: $\pm 60^\circ$

FEATURES

- Utilizing high brightness AlInGaP and InGaN chip technologies
- 4 pin RGB SMD LED package allows individual control the driving current of each chip
- Compact package outline dimensions (L x W x H in mm): 1.0 x 1.0 x 0.65
- Qualified according to JEDEC® moisture sensitivity level 3
- Compatible to IR reflow soldering
- Operation temperature range: -40 °C to +85 °C
- ESD-withstand voltage: up to 2 kV for red and 1 kV for blue and green according to JESD22-A114-B
- Luminous intensities and colors categorized per reel
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Telecommunication, office equipment, home appliances, industrial equipment, white goods
- Wide range of accent and decorative lighting
- Displays: full color message and displays video boards
- Keyboard backlighting
- Status indicator
- Signal and symbol illumination

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.		
		VLMRGB1500-GS08	Red	26		-	65	5		616	-	628		
	True green	122	-	303	5	519	-	537	5	2.0	-	3.2	5	InGaN
	Blue	22	-	66	5	464	-	479	5	2.0	-	3.2	5	InGaN

Note

- Measurement accuracy: $\pm 11\%$ for luminous intensity, ± 1 nm for dominant wavelength, ± 0.1 V for forward voltage



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
VLMRGB1500, RED				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Forward current		I_F	25	mA
Power dissipation		P_{tot}	62	mW
Junction temperature		T_j	95	$^{\circ}\text{C}$
Peak forward current	$t_p < 100\text{ }\mu\text{s}$, duty cycle = 0.1	I_{FM}	60	mA
Thermal resistance junction-to-solder point, 1 chip		R_{thJP}	300	K/W
Thermal resistance junction-to-ambient, 1 chip	Mounted on FR4 PC board ($t = 1.6\text{ mm}$) with Cu pad size $> 16\text{ mm}^2$	R_{thJA}	500	K/W
Operating temperature		T_{amb}	-40 to +85	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-40 to +90	$^{\circ}\text{C}$
ESD voltage	HBM	V_{ESD}	2000	V

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
VLMRGB1500, TRUE GREEN, BLUE				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Forward current		I_F	20	mA
Power dissipation		P_{tot}	76	mW
Junction temperature		T_j	95	$^{\circ}\text{C}$
Peak forward current	$t_p < 100\text{ }\mu\text{s}$, duty cycle = 0.1	I_{FM}	100	mA
Thermal resistance junction-to-solder point, 1 chip		R_{thJP}	300	K/W
Thermal resistance junction-to-ambient, 1 chip	Mounted on FR4 PC board ($t = 1.6\text{ mm}$) with Cu pad size $> 16\text{ mm}^2$	R_{thJA}	500	K/W
Operating temperature		T_{amb}	-40 to +85	$^{\circ}\text{C}$
Storage temperature		T_{stg}	-40 to +90	$^{\circ}\text{C}$
ESD voltage	HBM	V_{ESD}	1000	V

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
VLMRGB1500, RED, TRUE GREEN, BLUE							
PARAMETER	TEST CONDITION	COLOR	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 5\text{ mA}$	Red	I_v	26	-	65	mcd
		True green		122	-	303	
		Blue		22	-	66	
Dominant wavelength		Red	λ_d	616	-	628	nm
		True green		519	-	537	
		Blue		464	-	479	
Peak wavelength		Red	λ_p	-	632	-	nm
		True green		-	518	-	
		Blue		-	468	-	
Spectral half width at 50 % I_{rel} max.	Red	$\Delta\lambda_{0.5}$	-	12	-	nm	
	True green		-	27	-		
	Blue		-	20	-		
Angle of half intensity	Red	ϕ	-	± 60	-	$^{\circ}$	
	True green		-	± 60	-		
	Blue		-	± 60	-		
Forward voltage	Red	V_F	1.5	-	2.15	V	
	True green		2.0	-	3.2		
	Blue		2.0	-	3.2		
Reverse current ⁽¹⁾	$V_R = 5\text{ V}$	Red	I_R	-	-	10	μA
		True green		-	-	10	
		Blue		-	-	10	

Notes

- Not designed for operating in reverse direction.
Measurement accuracy: $\pm 11\%$ for luminous intensity, $\pm 1\text{ nm}$ for dominant wavelength, $\pm 0.1\text{ V}$ for forward voltage
- (1) Not designed for operating in reverse direction; reverse voltage is only applied for testing purpose; only applied for testing purpose



LUMINOUS INTENSITY (in mcd at 5 mA)						
BIN CODE	RED		TRUE GREEN		BLUE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
A	26.0	31.0	122.0	146.0	22.0	26.5
B	31.0	37.0	146.0	175.0	26.5	32.0
C	37.0	45.0	175.0	210.0	32.0	38.0
D	45.0	54.0	210.0	252.0	38.0	46.0
E	54.0	65.0	252.0	303.0	46.0	55.0
F	-	-	-	-	55.0	66.0

Note

- Tolerance on each luminous intensity bin is $\pm 11\%$.
The above classification represents the brightness range which includes only a few brightness groups.
Only one luminous intensity group per color 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.

DOMINANT WAVELENGTH (in nm at 5 mA)						
BIN CODE	RED		TRUE GREEN		BLUE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	616.0	619.0	519.0	522.0	464.0	467.0
2	619.0	622.0	522.0	525.0	467.0	470.0
3	622.0	625.0	525.0	528.0	470.0	473.0
4	625.0	628.0	528.0	531.0	473.0	476.0
5	-	-	531.0	534.0	476.0	479.0
6	-	-	534.0	537.0	-	-

Note

- Tolerance for each dominate wavelength bin is $\pm 1\text{ nm}$.
The above classification represents the wavelength range which includes only a few brightness groups.
Only one wavelength group per color will be shipped on each reel (there will be no mixing of two groups on each reel).
In order to ensure availability, single wavelength groups will not be orderable.

MARKING EXAMPLE FOR SELECTION CODE ON LABEL

Selection code: BBC/232 (sequence: RGB for both IV and color groups)

- BBC:
 - I_v group red: B (31 mcd to 37 mcd)
 - I_v group true green: B (164 mcd to 175 mcd)
 - I_v group blue: C (32 mcd to 38 mcd)
- 232:
 - LD group red: 2 (619 mcd to 622 nm)
 - LD group true green: 3 (525 mcd to 528 nm)
 - LD group blue: 2 (467 mcd to 470 nm)

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

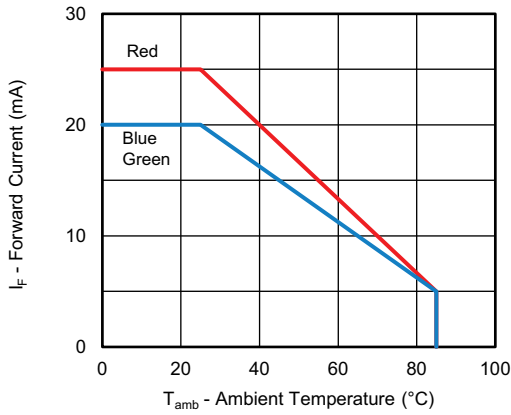


Fig. 1 - Forward Current vs. Ambient Temperature

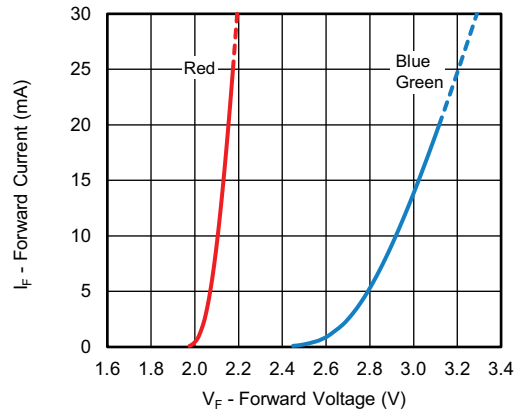


Fig. 4 - Forward Current vs. Forward Voltage

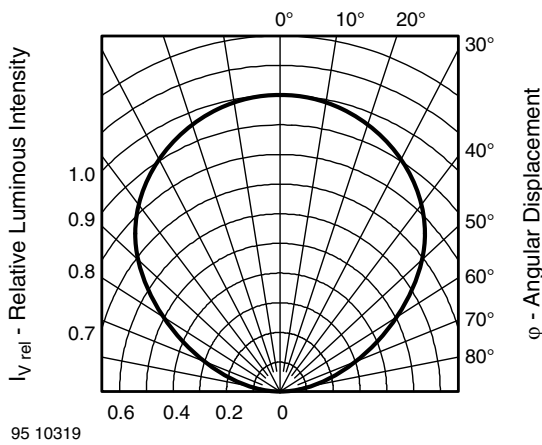


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

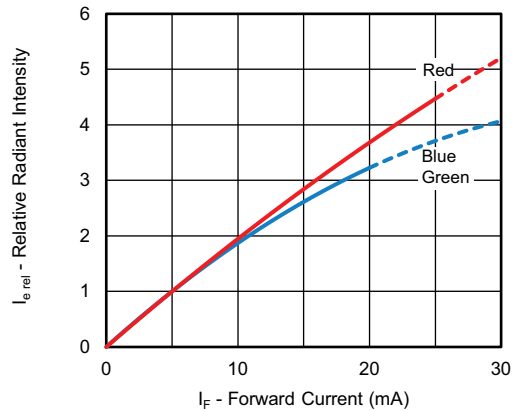


Fig. 5 - Relative Luminous Intensity vs. Forward Current

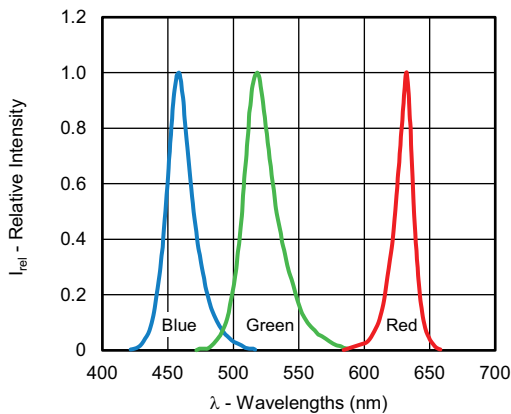
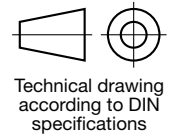
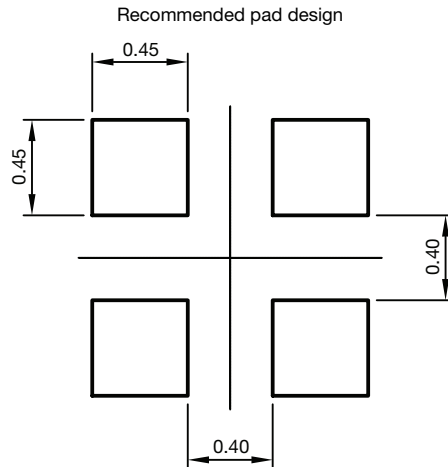
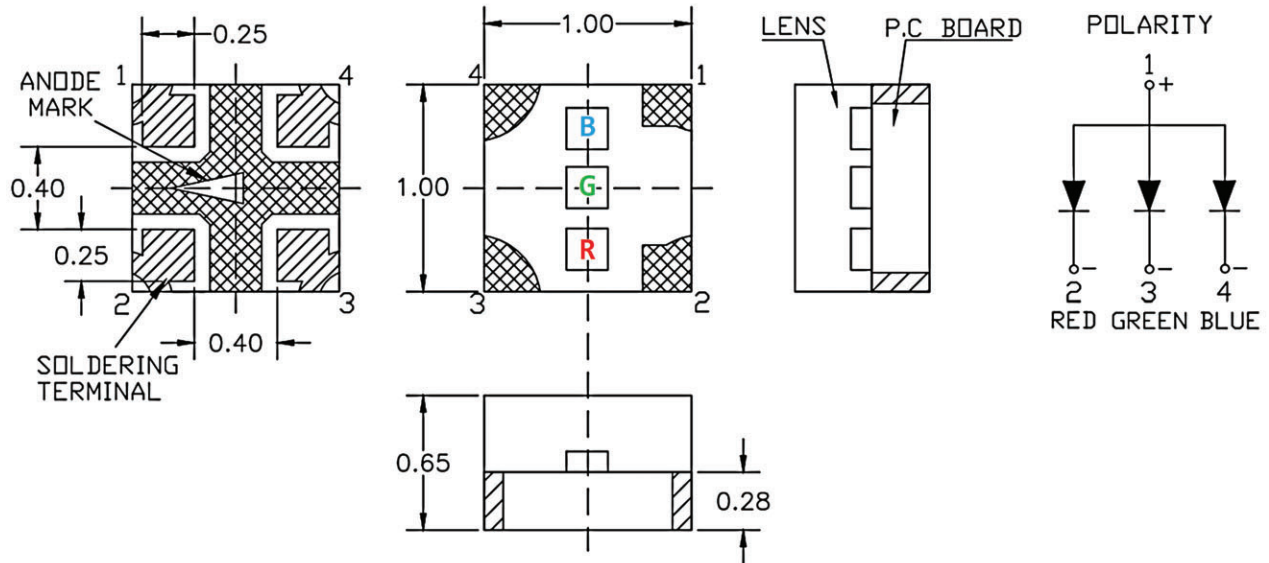
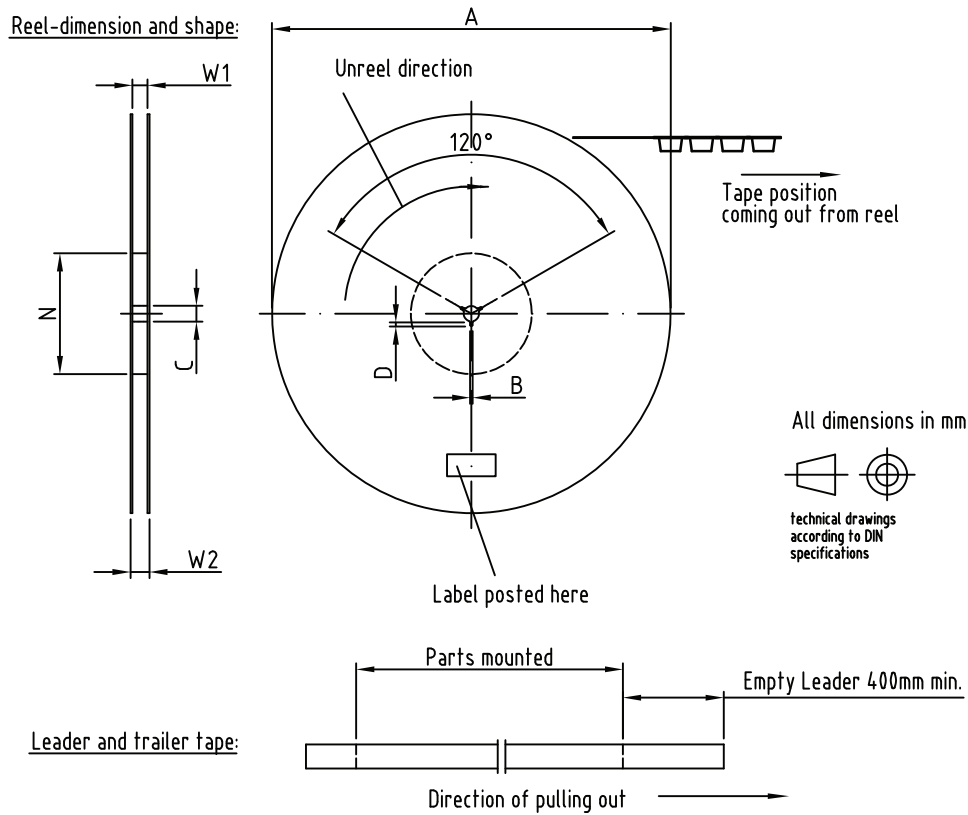


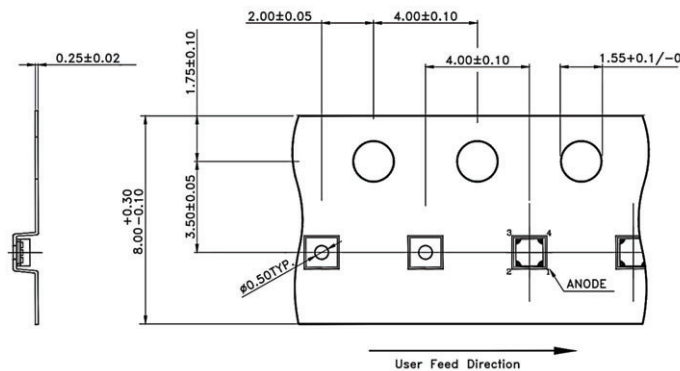
Fig. 3 - Relative Intensity vs. Wavelength

PACKAGE DIMENSIONS / SOLDERING PADS DIMENSIONS in millimeters



Not indicated tolerances ± 0.1

TAPING DIMENSIONS in millimeters

 Drawing-No.: 9.800-5172.01
 Issue: VK; 18.04.24

 QTY per reel: 4000 pcs
 MOQ: 20 000 pcs


REEL DIMENSIONS							
TAPING VERSION	REEL DIMENSIONS IN mm ACCORDING DRAWING REFERENCE						
	A	B	C	D	N	W1	W2
GS08	178 ± 1	2 ± 0.5	13 ± 0.5	4 ± 0.5	60 ± 0.2	9 ± 0.2	12 ± 1

SOLDERING PROFILE

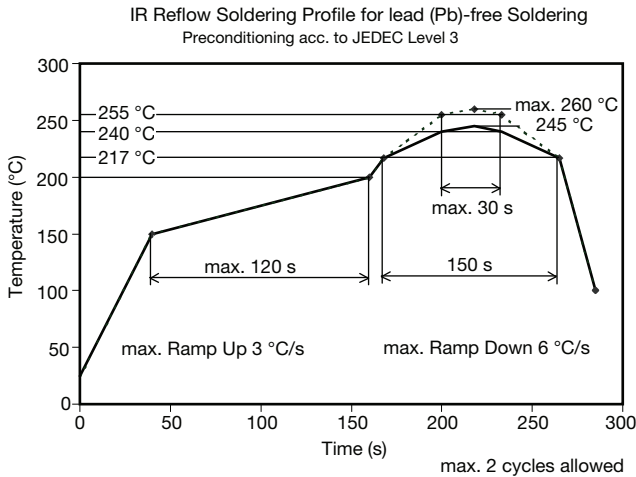
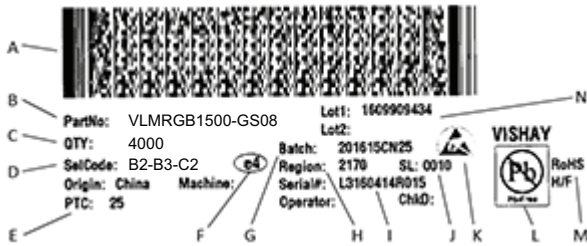


Fig. 6 - Vishay Lead (Pb)-free Reflow Soldering Profile According to J-STD-020

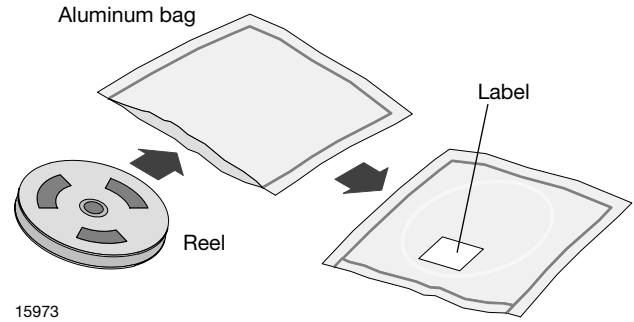
BAR CODE PRODUCT LABEL (example)



- A. 2D bar code
- B. Vishay part number
- C. Quantity
- D. Selection code (bin): brightness and color groups
- E. Code of manufacturing plant
- F. Termination plating finish
- G. Batch = date code: year / week / plant code
- H. Region code
- I. Internal serial number
- J. Sales location
- K. ESD symbol
- L. Lead (Pb)-free symbol
- M. RoHS symbol, halogen-free symbol
- N. Internal 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.

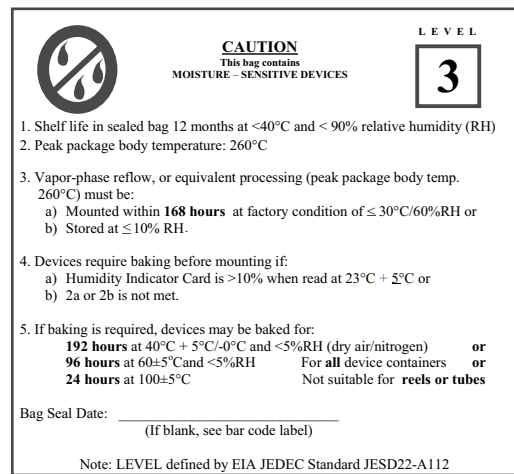
After more than 168 h under these conditions moisture content will be too high for reflow soldering.

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 3 label is included on all aluminum dry bags.



Example of JESD22-A112 level 3 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 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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