



## Little Star® 1 W Power SMD LED White



20784-1

### DESCRIPTION

The VLMW712U2U3XV, VLMW712T3U3US, and VLMW712T2T3QN are the most robust and light efficient LEDs in the market. Using new nitride phosphor system display negligible color shift across operation temperature range. With its extremely high level of brightness and the ultra low high profile, which is only 1.5 mm are highly suitable for both conventional lighting and specialized application such as automotive signal lights, traffic lights, channel lights, tube lights and garden lights among others.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD Little Star
- Product series: power
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- Super high brightness surface mount LED
- High flux output; up to 113 lm
- $120^\circ$  viewing angle
- Compact package outline (L x W x H) in mm: 6.0 x 6.0 x 1.5
- Ultra low height profile - 1.5 mm
- Designed for high current drive; up to 350 mA
- Low thermal resistance;  $R_{thJP} = 10$  K/W
- Qualified according to JEDEC moisture sensitivity level 2a
- Compatible with IR reflow soldering
- Little Star® are class 1M LED products. Do not view directly with optical instrument
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B


RoHS  
COMPLIANT

### APPLICATIONS

- Communication: flashLED
- Industry: white goods (e.g.: oven, microwave, etc.)
- Lighting: garden light, architecture lighting, general lighting, etc.

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at $I_F$ (mA)	WAVELENGTH (nm)			FORWARD VOLTAGE (V)			TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
VLMW712U2U3XV-GS08	Cool white	-	33 500	-	350	-	-	-	3	3.5	4	InGaN
VLMW712T3U3US-GS08	Natural white	-	29 400	-	350	-	-	-	3	3.6	4	InGaN
VLMW712T2T3QN-GS08	Warm white	-	25 000	-	350	-	-	-	-	3.6	4	InGaN

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

#### VLMW712U2U3XV, VLMW712T3U3US, VLMW712T2T3QN

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Forward current		$I_F$	350	mA
Power dissipation		$P_{tot}$	1.4	W
Junction temperature		$T_j$	+ 120	$^\circ\text{C}$
Surge current $t < 10 \mu\text{s}$ , $d = 0.1$		$I_{FM}$	1000	mA
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/pin		$R_{thJP}$	10	K/W

#### Note

- Not designed for reverse operation



## OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified) VLMW712U2U3XV, COOL WHITE

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 350\text{ mA}$	$\phi$	87 400	100 000	113 600	mlm
		$I_V$	-	33 500	-	mcd
Chromaticity coordinate x acc. to CIE 1931	$I_F = 350\text{ mA}$	x	-	0.37	-	
Chromaticity coordinate y acc. to CIE 1931	$I_F = 350\text{ mA}$	y	-	0.38	-	
Angle of half intensity	$I_F = 350\text{ mA}$	$\varphi$	-	$\pm 60$	-	deg
Forward voltage <sup>(1)</sup>	$I_F = 350\text{ mA}$	$V_F$	3	3.5	4	V
Temperature coefficient of $V_F$	$I_F = 350\text{ mA}$	$TC_{VF}$	-	- 3	-	mV/K
Temperature coefficient of $I_V$	$I_F = 350\text{ mA}$	$TC_{IV}$	-	- 0.4	-	%/K

### Note

<sup>(1)</sup> Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.05\text{ V}$

## OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified) VLMW712T3U3US, NATURAL WHITE

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 350\text{ mA}$	$\phi$	76 500	90 000	113 000	mlm
		$I_V$	-	29 700	-	mcd
Chromaticity coordinate x acc. to CIE 1931	$I_F = 350\text{ mA}$	x	-	0.33	-	
Chromaticity coordinate y acc. to CIE 1931	$I_F = 350\text{ mA}$	y	-	0.33	-	
Angle of half intensity	$I_F = 350\text{ mA}$	$\varphi$	-	$\pm 60$	-	deg
Forward voltage <sup>(1)</sup>	$I_F = 350\text{ mA}$	$V_F$	3	3.6	4	V
Temperature coefficient of $V_F$	$I_F = 350\text{ mA}$	$TC_{VF}$	-	- 3	-	mV/K
Temperature coefficient of $I_V$	$I_F = 350\text{ mA}$	$TC_{IV}$	-	- 0.4	-	%/K

### Note

<sup>(1)</sup> Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.05\text{ V}$

## OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified) VLMW712T2T3QN, WARM WHITE

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 350\text{ mA}$	$\phi$	67 200	-	87 400	mlm
		$I_V$	-	25 000	-	mcd
Chromaticity coordinate x acc. to CIE 1931	$I_F = 350\text{ mA}$	x	-	0.44	-	
Chromaticity coordinate y acc. to CIE 1931	$I_F = 350\text{ mA}$	y	-	0.41	-	
Angle of half intensity	$I_F = 350\text{ mA}$	$\varphi$	-	$\pm 60$	-	deg
Forward voltage <sup>(1)</sup>	$I_F = 350\text{ mA}$	$V_F$	3	3.6	4	V
Temperature coefficient of $V_F$	$I_F = 350\text{ mA}$	$TC_{VF}$	-	- 3	-	mV/K
Temperature coefficient of $I_V$	$I_F = 350\text{ mA}$	$TC_{IV}$	-	- 0.4	-	%/K

### Note

<sup>(1)</sup> Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.05\text{ V}$



LUMINOUS INTENSITY/FLUX CLASSIFICATION		
GROUP	LUMINOUS FLUX $\Phi_v$ (lm) CORRELATION TABLE	
STANDARD	MIN.	MAX.
S2	51 700	59 000
S3	59 000	67 200
T2	67 200	76 500
T3	76 500	87 400
U2	87 400	99 400
U3	99 400	113 600

**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 color groups are measured and binned, single color groups will be shipped in any one reel. In order to ensure availability, single color groups will not be orderable.

CHROMATICITY COORDINATED GROUPS FOR COOL WHITE SMD LED		
BIN	Cx	Cy
XM	0.301	0.342
	0.314	0.353
	0.315	0.343
	0.303	0.333
	0.301	0.342
XN	0.303	0.333
	0.315	0.343
	0.316	0.332
	0.305	0.322
	0.303	0.333
XO	0.305	0.322
	0.316	0.332
	0.318	0.319
	0.308	0.311
	0.305	0.322
XP	0.308	0.311
	0.318	0.319
	0.32	0.301
	0.311	0.293
	0.308	0.311
WM	0.314	0.353
	0.329	0.366
	0.329	0.354
	0.315	0.343
	0.314	0.353
WN	0.315	0.343
	0.329	0.354
	0.329	0.343
	0.316	0.332
	0.315	0.343
WO	0.316	0.332
	0.329	0.343
	0.329	0.33
	0.318	0.319
	0.316	0.332
WP	0.318	0.319
	0.329	0.33
	0.329	0.319
	0.319	0.31
	0.318	0.319

**CHROMATICITY COORDINATED GROUPS FOR COOL WHITE SMD LED**

BIN	Cx	Cy
WQ	0.319	0.31
	0.329	0.319
	0.33	0.311
	0.32	0.301
	0.319	0.31
VM	0.329	0.366
	0.348	0.383
	0.347	0.368
	0.329	0.354
	0.329	0.366
VN	0.329	0.354
	0.347	0.368
	0.346	0.357
	0.329	0.343
	0.329	0.354
VO	0.329	0.343
	0.346	0.357
	0.344	0.343
	0.329	0.33
	0.329	0.343
VP	0.329	0.33
	0.344	0.343
	0.343	0.331
	0.329	0.319
	0.329	0.33

**Note**

- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

**CHROMATICITY COORDINATED GROUPS FOR NATURAL WHITE SMD LED**

BIN	Cx	Cy
UM	0.348	0.383
	0.367	0.4
	0.364	0.383
	0.347	0.368
UN	0.347	0.368
	0.364	0.383
	0.362	0.372
	0.346	0.357
UO	0.346	0.357
	0.362	0.372
	0.359	0.356
	0.344	0.343
UP	0.344	0.343
	0.359	0.356
	0.357	0.343
	0.343	0.331
TM	0.367	0.4
	0.364	0.383
	0.381	0.394
	0.386	0.411

**CHROMATICITY COORDINATED GROUPS FOR NATURAL WHITE SMD LED**

BIN	Cx	Cy
TN	0.364	0.383
	0.362	0.372
	0.378	0.381
	0.381	0.394
TO	0.362	0.372
	0.359	0.356
	0.374	0.365
	0.378	0.381
TP	0.359	0.356
	0.357	0.343
	0.37	0.351
	0.374	0.365
SM	0.386	0.411
	0.381	0.394
	0.396	0.404
	0.402	0.421
SN	0.381	0.394
	0.378	0.381
	0.392	0.389
	0.396	0.404
SO	0.378	0.381
	0.374	0.365
	0.387	0.373
	0.392	0.389
SP	0.374	0.365
	0.37	0.351
	0.382	0.358
	0.387	0.373

**Note**

- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

**CHROMATICITY COORDINATED GROUPS FOR WARM WHITE SMD LED**

BIN	Cx	Cy
QM	0.421	0.433
	0.437	0.438
	0.43	0.421
	0.415	0.416
	0.421	0.433
QN	0.415	0.416
	0.43	0.421
	0.423	0.405
	0.409	0.4
	0.415	0.416
QO	0.409	0.4
	0.423	0.405
	0.416	0.387
	0.402	0.382
	0.409	0.4



CHROMATICITY COORDINATED GROUPS FOR WARM WHITE SMD LED		
BIN	Cx	Cy
QP	0.402	0.382
	0.416	0.387
	0.409	0.372
	0.397	0.367
	0.402	0.382
PM	0.437	0.438
	0.452	0.443
	0.444	0.426
	0.43	0.421
	0.437	0.438
PN	0.43	0.421
	0.444	0.426
	0.436	0.409
	0.423	0.405
	0.43	0.421
PO	0.423	0.405
	0.436	0.409
	0.428	0.392
	0.416	0.387
	0.423	0.405
PP	0.416	0.387
	0.428	0.392
	0.421	0.377
	0.409	0.372
	0.416	0.387
NM	0.452	0.443
	0.469	0.448
	0.46	0.431
	0.444	0.426
	0.452	0.443
NN	0.444	0.426
	0.46	0.431
	0.451	0.414
	0.436	0.409
	0.444	0.426
NO	0.436	0.409
	0.451	0.414
	0.443	0.397
	0.428	0.392
	0.436	0.409
NP	0.428	0.392
	0.443	0.397
	0.435	0.382
	0.421	0.377
	0.428	0.392

**Note**

- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .



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

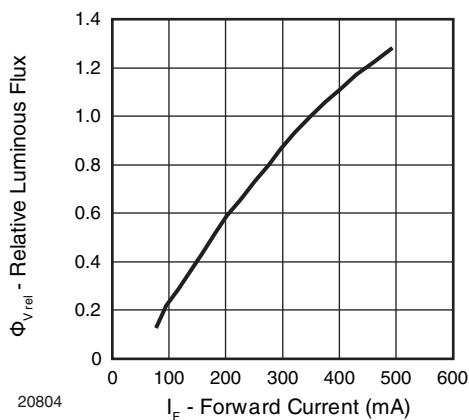


Fig. 1 - Relative Luminous Flux vs. Forward Current

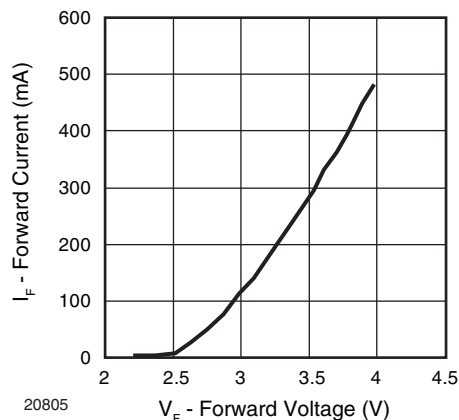


Fig. 4 - Forward Current vs. Forward Voltage

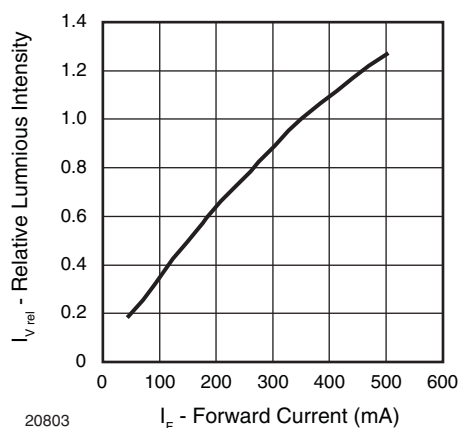


Fig. 2 - Relative Luminous Intensity vs. Forward Current

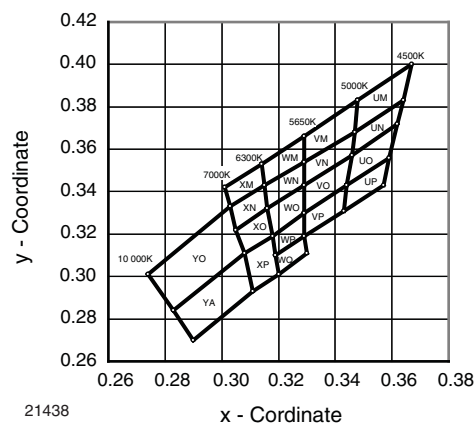


Fig. 5 - Coordinates of Color Groups for Cool White

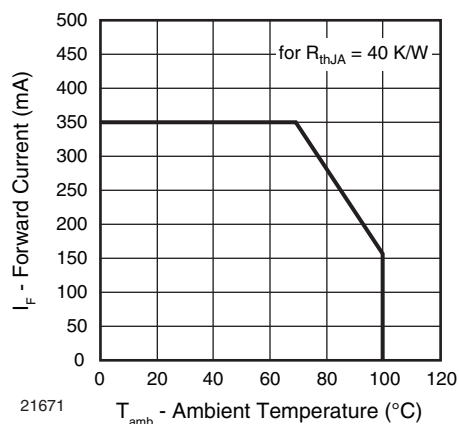


Fig. 3 - Forward Current vs. Solder Point Temperature

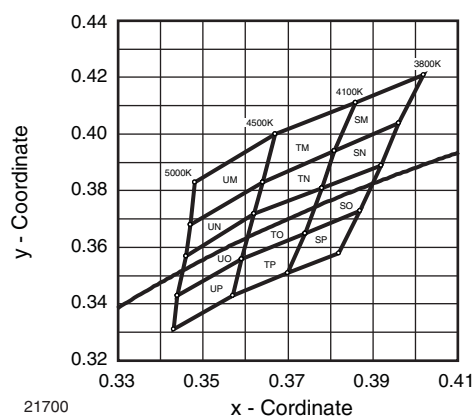


Fig. 6 - Coordinates of Color Groups for Natural White



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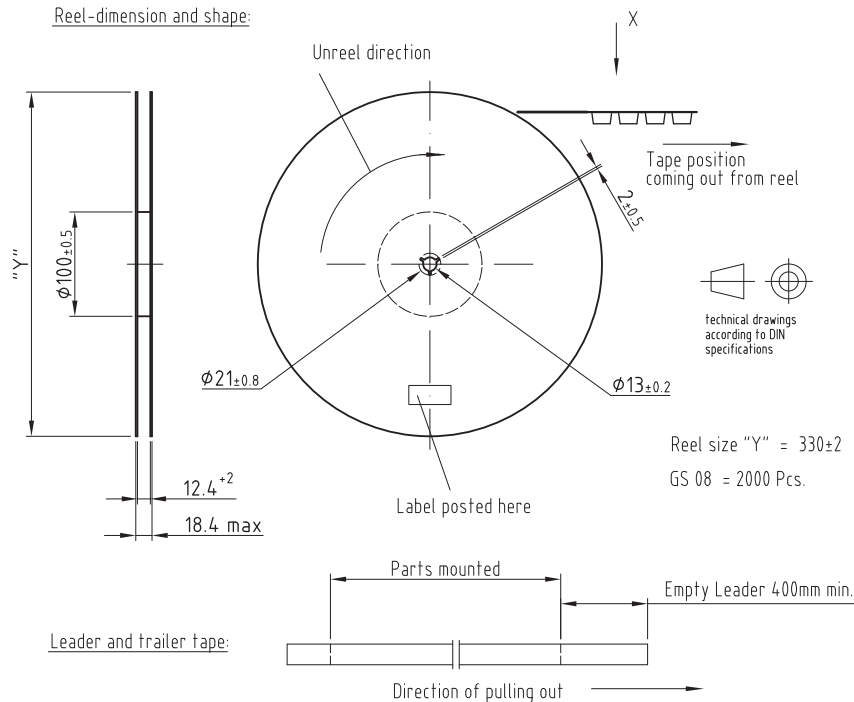
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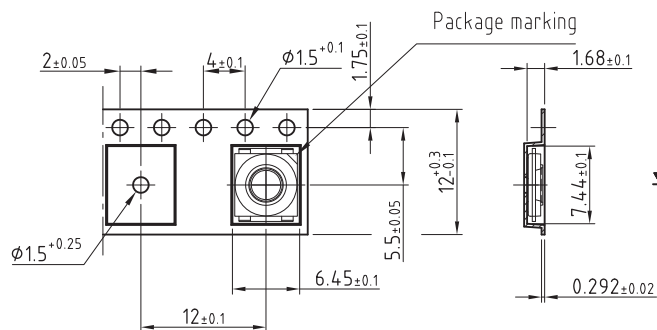


## TAPING DIMENSIONS in millimeters

Reel-dimension and shape:



Leader and trailer tape:



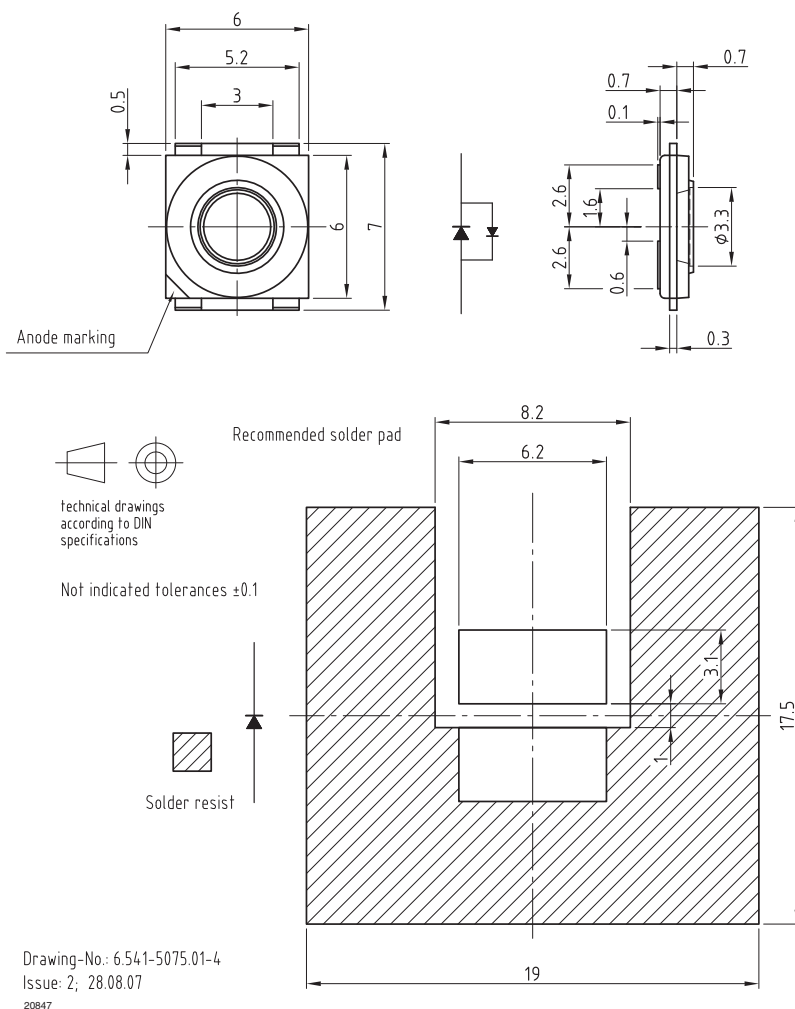
Drawing-No.: 9.800-5094.01-4

Issue: 3; 22.01.08

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## PACKAGE DIMENSIONS/SOLDERING PADS DIMENSIONS in millimeters



## SOLDERING PROFILE

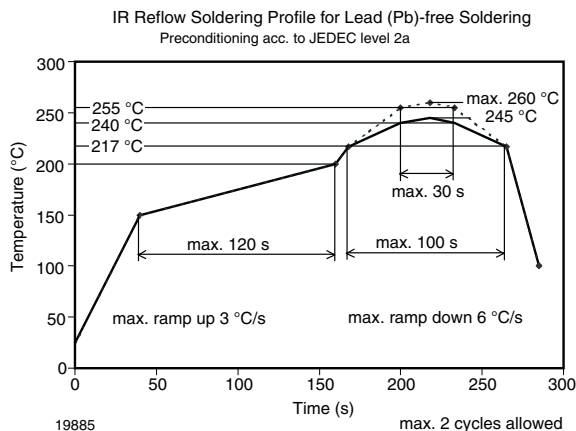
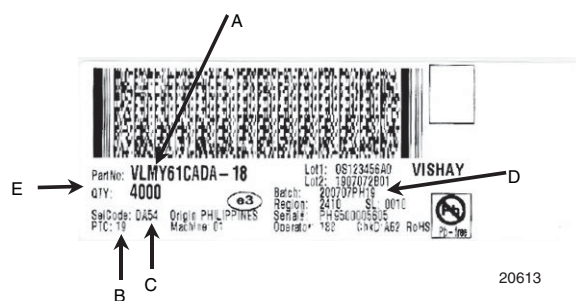


Fig. 12 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

## BAR CODE PRODUCT LABEL (example)

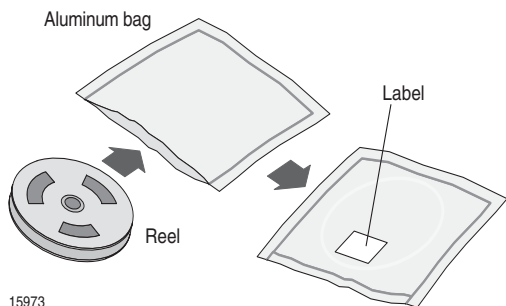


- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: DA = code for luminous intensity group  
5 = code for color group
- D. Batch no.  
20070 = year 2007, week 07  
PH19 = plant code
- E. Total quantity



## 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.

## 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.

	<b>CAUTION</b> This bag contains MOISTURE-SENSITIVE DEVICES	<b>LEVEL</b> <b>2a</b>						
<p>1. Shelf life in sealed bag 12 months at &lt;40°C and &lt; 90% relative humidity (RH)</p> <p>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:</p> <ul style="list-style-type: none"><li>a) Mounted within <b>672 hours</b> at factory condition of ≤ 30°C/60%RH or</li><li>b) Stored at ≤10% RH.</li></ul> <p>3. Devices require baking before mounting if:</p> <ul style="list-style-type: none"><li>a) Humidity Indicator Card is &gt;10% when read at 23°C ± 5°C or</li><li>b) 2a or 2b is not met.</li></ul> <p>4. If baking is required, devices may be baked for:</p> <table border="0"><tr><td><b>192 hours</b> at 40°C + 5°C/-0°C and &lt;5%RH (dry air/nitrogen)</td><td><b>or</b></td></tr><tr><td><b>96 hours</b> at 60±5°C and &lt;5%RH</td><td><b>For all device containers or</b></td></tr><tr><td><b>24 hours</b> at 100±5°C</td><td><b>Not suitable for reels or tubes</b></td></tr></table>			<b>192 hours</b> at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)	<b>or</b>	<b>96 hours</b> at 60±5°C and <5%RH	<b>For all device containers or</b>	<b>24 hours</b> at 100±5°C	<b>Not suitable for reels or tubes</b>
<b>192 hours</b> at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)	<b>or</b>							
<b>96 hours</b> at 60±5°C and <5%RH	<b>For all device containers or</b>							
<b>24 hours</b> at 100±5°C	<b>Not suitable for reels or tubes</b>							
Bag Seal Date: _____ (If blank, see bar code label)								
Note: LEVEL defined by EIA JEDEC Standard JESD22-A113								

Example of JESD22-A112 level 2a label



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