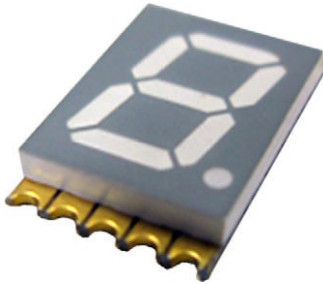




## Standard 7-Segment SMD Display 10 mm



### FEATURES

- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Yellow, green, and soft orange categorized for color
- Wide viewing angle
- Suitable for DC and high peak current
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

### DESCRIPTION

The VDM.10A1 series are 10 mm SMD seven segment LED displays in a very compact package.

The devices utilize AlInGaP on GaAs chip technology.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: display
- Package: 10 mm
- Product series: SMD
- Angle of half intensity:  $\pm 50^\circ$

### APPLICATIONS

- Panel meters
- Test- and measure-equipment
- Point-of-sale terminals
- Control units

PARTS TABLE														
PART	COLOR	LUMINOUS INTENSITY ( $\mu\text{cd}$ )			at $I_F$ (mA)	WAVELENGTH (nm)			at $I_F$ (mA)	FORWARD VOLTAGE (V)			at $I_F$ (mA)	CIRCUITRY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
VDMR10A1	Super red	450	1600	-	1	-	631	-	20	-	2.0	2.6	20	Common anode
VDMO10A1 <sup>(1)</sup>	Soft orange	180	650	-	1	-	605	-	20	-	2.0	2.6	20	Common anode
VDMY10A1	Yellow	450	1600	-	1	-	587	-	20	-	2.0	2.6	20	Common anode
VDMG10A1 <sup>(1)</sup>	Green	110	500	-	1	-	572	-	20	-	2.0	2.6	20	Common anode

#### Note

<sup>(1)</sup> Not for new designs

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)				
VDMR10A1, VDMO10A1, VDMY10A1, VDMG10A1				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Power dissipation per segment		$P_V$	70	mW
Peak forward current per segment (frequency 1 kHz, 10 % duty cycle)		$I_F$	60	mA
Continuous forward current per segment		$I_F$	25	mA
Forward current derating from 25 °C			0.28	mA/°C
Operating temperature range		$T_{amb}$	-35 to +105	°C
Storage temperature range		$T_{stg}$	-35 to +105	°C
Iron soldering conditions: 1/16" below seating plane for 3 s at 260 °C				

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VDMR10A1, SUPER RED**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 1\text{ mA}$	VDMR10A1	$I_V$	450	1600	-	$\mu\text{cd}$
	$I_F = 10\text{ mA}$	VDMR10A1	$I_V$	-	20 800	-	$\mu\text{cd}$
Dominant wavelength	$I_F = 20\text{ mA}$	VDMR10A1	$\lambda_d$	-	631	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	639	-	nm
Spectral line half-width	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	20	-	
Forward voltage per segment	$I_F = 20\text{ mA}$		$V_F$	-	2.0	2.6	V
Reverse current per segment <sup>(2)</sup>	$V_R = 5\text{ V}$		$I_R$	-	-	100	$\mu\text{A}$
Luminous intensity matching ratio	$I_F = 10\text{ mA}$		$I_{V-m}$	-	-	2:1	

**Notes**

- (2) Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve  
(3) Reverse voltage is only for IR test. It can not continue to operate at this situation  
(4) Cross talk specification  $\leq 2.5\%$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VDMO10A1, SOFT ORANGE, NOT FOR NEW DESIGNS**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 1\text{ mA}$	VDMO10A1	$I_V$	180	650	-	$\mu\text{cd}$
	$I_F = 10\text{ mA}$	VDMO10A1	$I_V$	-	8250	-	$\mu\text{cd}$
Dominant wavelength	$I_F = 20\text{ mA}$	VDMO10A1	$\lambda_d$	-	605	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	611	-	nm
Spectral line half-width	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	17	-	
Forward voltage per segment	$I_F = 20\text{ mA}$		$V_F$	-	2.0	2.6	V
Reverse current per segment <sup>(2)</sup>	$V_R = 5\text{ V}$		$I_R$	-	-	100	$\mu\text{A}$
Luminous intensity matching ratio	$I_F = 10\text{ mA}$		$I_{V-m}$	-	-	2:1	

**Notes**

- (1) Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve  
(2) Reverse voltage is only for IR test. It can not continue to operate at this situation  
(3) Cross talk specification  $\leq 2.5\%$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VDMY10A1, YELLOW**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 1\text{ mA}$	VDMY10A1	$I_V$	450	1600	-	$\mu\text{cd}$
	$I_F = 10\text{ mA}$	VDMY10A1	$I_V$	-	17 600	-	$\mu\text{cd}$
Dominant wavelength	$I_F = 20\text{ mA}$	VDMY10A1	$\lambda_d$	-	587	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	588	-	nm
Spectral line half-width	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	15	-	
Forward voltage per segment	$I_F = 20\text{ mA}$		$V_F$	-	2.0	2.6	V
Reverse current per segment <sup>(2)</sup>	$V_R = 5\text{ V}$		$I_R$	-	-	100	$\mu\text{A}$
Luminous intensity matching ratio	$I_F = 10\text{ mA}$		$I_{V-m}$	-	-	2:1	

**Notes**

- (1) Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve  
(2) Reverse voltage is only for IR test. It can not continue to operate at this situation  
(3) Cross talk specification  $\leq 2.5\%$



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>VDMG10A1, GREEN, NOT FOR NEW DESIGNS</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity <sup>(1)</sup>	$I_F = 1\text{ mA}$	VDMG10A1	$I_V$	110	500	-	$\mu\text{cd}$
	$I_F = 10\text{ mA}$	VDMG10A1	$I_V$	-	5500	-	$\mu\text{cd}$
Dominant wavelength	$I_F = 20\text{ mA}$	VDMG10A1	$\lambda_d$	-	572	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	571	-	nm
Spectral line half-width	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	15	-	
Forward voltage per segment	$I_F = 20\text{ mA}$		$V_F$	-	2.0	2.6	V
Reverse current per segment <sup>(2)</sup>	$V_R = 5\text{ V}$		$I_R$	-	-	100	$\mu\text{A}$
Luminous intensity matching ratio	$I_F = 10\text{ mA}$		$I_{V-m}$	-	-	2:1	

**Notes**

- (1) Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve
- (2) Reverse voltage is only for IR test. It can not continue to operate at this situation
- (3) Cross talk specification  $\leq 2.5\%$

<b>LUMINOUS INTENSITY CLASSIFICATION</b>		
GROUP	LIGHT INTENSITY ( $\mu\text{cd}$ )	
	MIN.	MAX.
STANDARD		
D	110	220
E	180	360
F	280	560
G	450	900
H	700	1400
I	1100	2200
K	1800	3600
L	2800	5600
M	4500	9000
N	7000	14 000
P	11 000	22 000
Q	18 000	36 000
R	28 000	56 000
S	45 000	90 000

**Note**

- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube). In order to ensure availability, single brightness groups will not be orderable

<b>COLOR CLASSIFICATION</b>						
GROUP	SOFT ORANGE		YELLOW		GREEN	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	598	601	581	584	-	-
2	600	603	583	586	-	-
3	602	605	585	588	562	565
4	604	607	587	590	564	567
5	606	609	589	592	566	569
6	608	611	591	594	568	571
7	-	-	-	-	570	573
8	-	-	-	-	572	575

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms



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

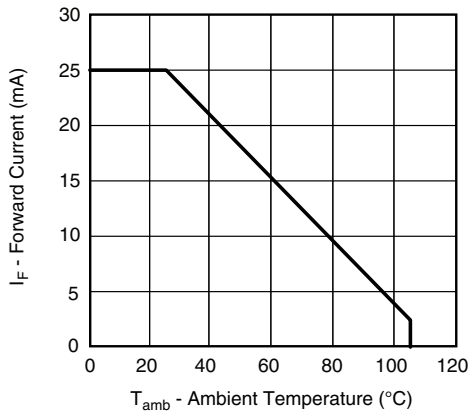


Fig. 1 - Forward Current vs. Ambient Temperature

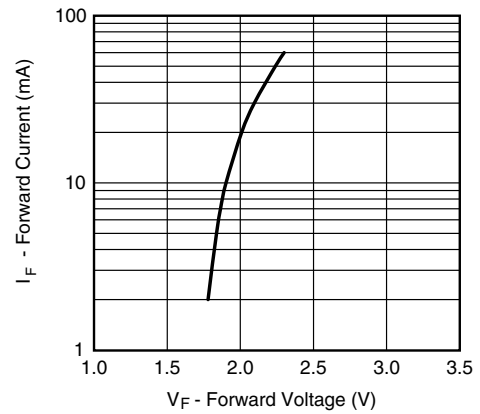


Fig. 4 - Forward Current vs. Forward Voltage

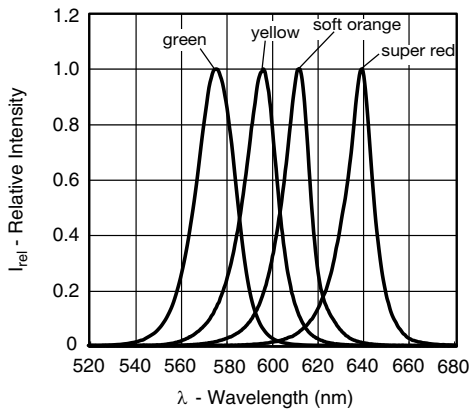


Fig. 2 - Relative Intensity vs. Wavelength

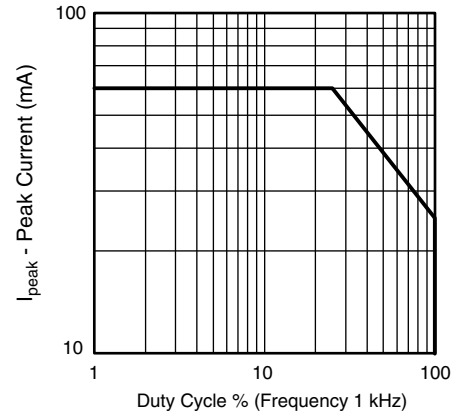


Fig. 5 - Peak Current vs. Duty Cycle

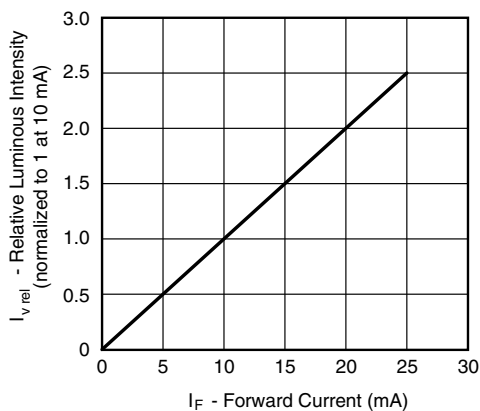
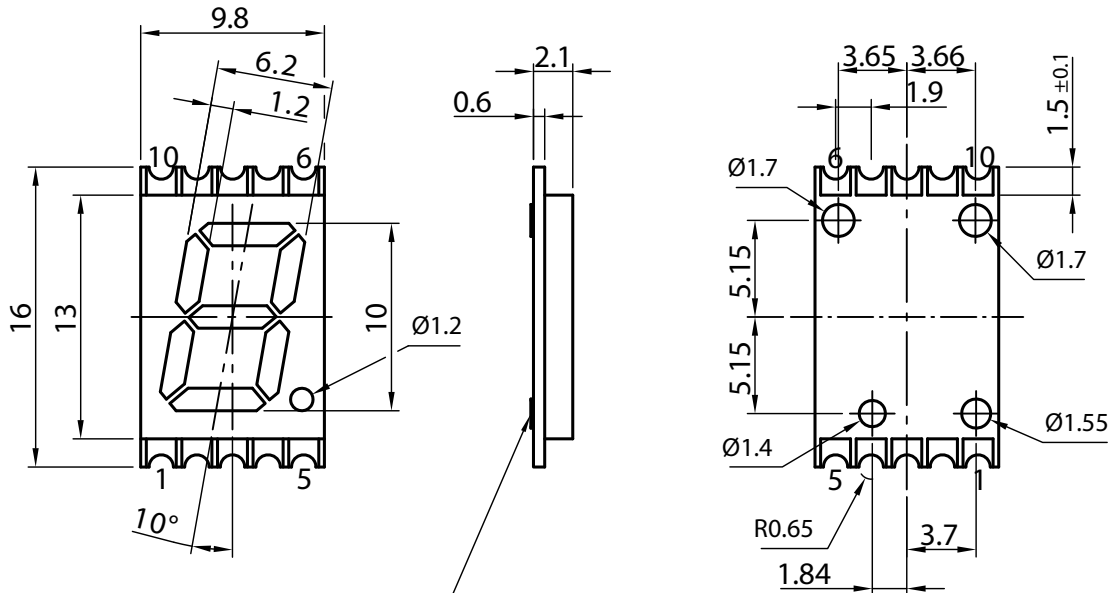


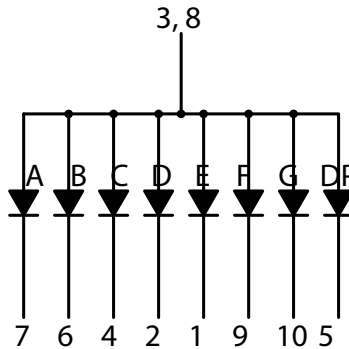
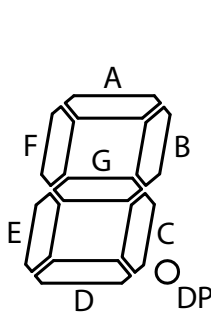
Fig. 3 - Relative Luminous Intensity vs. Forward Current



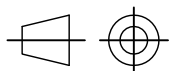
PACKAGE DIMENSIONS in millimeters



Plastic pins' burr max. 0.14 mm



No.	Connection
1	Cathode E
2	Cathode D
3	Common Anode
4	Cathode C
5	Cathode DP
6	Cathode B
7	Cathode A
8	Common Anode
9	Cathode F
10	Cathode G



technical drawings according to DIN specifications

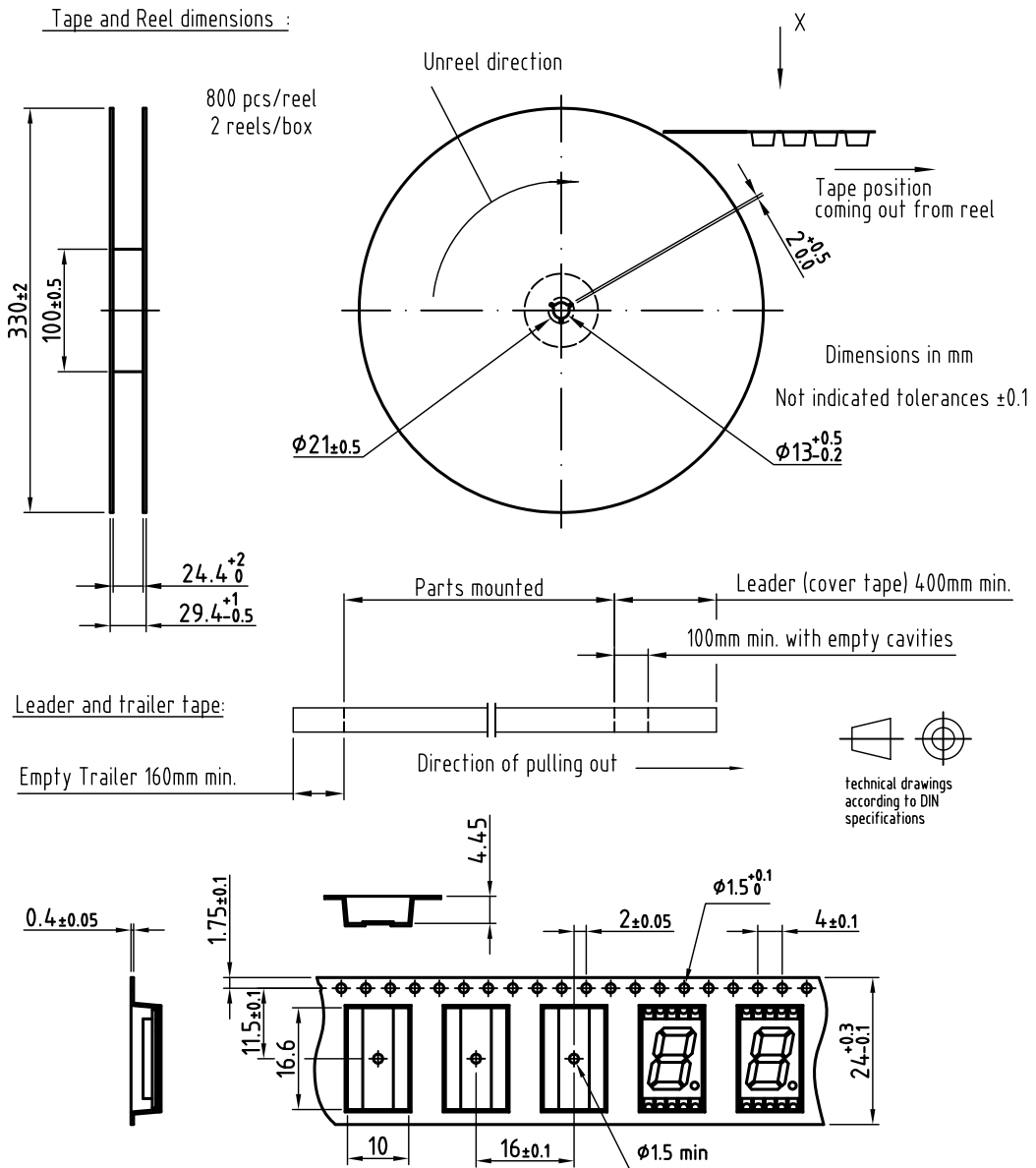
Tolerances are  $\pm 0.25$  mm unless otherwise mentioned

Drawing-No.: 6.544-5426.01-4

Issue: 2; 02.10.13



## TAPE AND REEL DIMENSIONS in millimeters



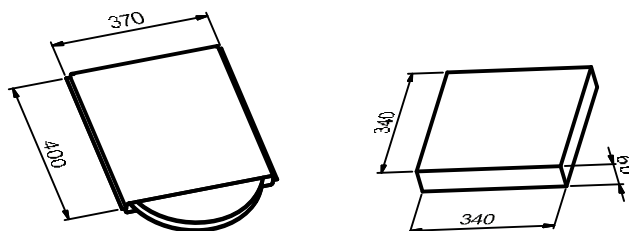
Drawing refers to following types: VDMx10x

Reel dimensions and tape

Drawing-No.: 9.800-5125.01-4

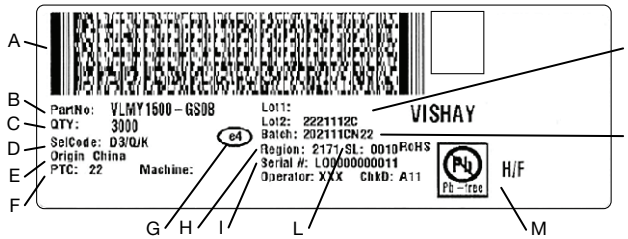
Issue: prel; 10.04.13

## TAPE IN BOX





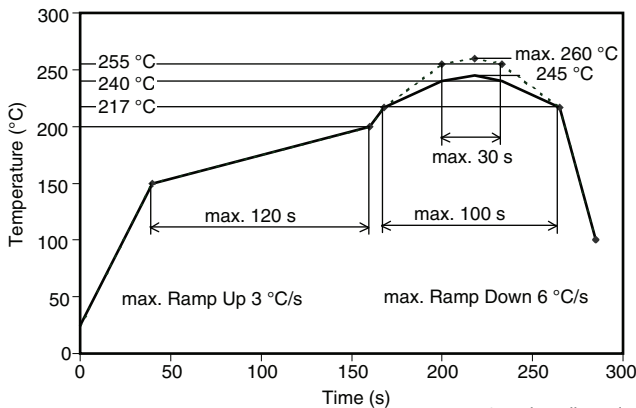
**BAR CODE PRODUCT LABEL** (example only)



- A) 2D barcode
- B) Vishay part number
- C) Quantity
- D) PTC = selection code (binning)
- E) Code of manufacturing plant
- F) Batch = date code: year/week/plant code
- G) Region code
- H) SL = sales location
- I) Terminations finishing
- K) Lead (Pb)-free symbol
- L) Halogen-free symbol
- M) RoHS symbol

**SOLDERING PROFILE**

IR Reflow Soldering Profile for lead (Pb)-free Soldering  
Preconditioning acc. to JEDEC Level 3

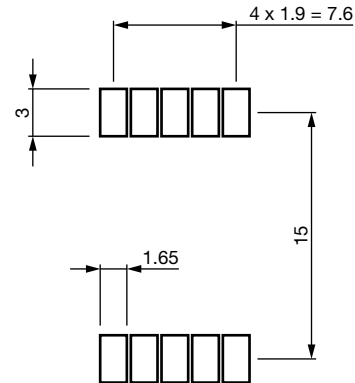


19470-5 max. 2 cycles allowed

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

<b>SOLDERING IRON</b> (one time only)	
Temperature	300 °C max.
Soldering time	3 s max.

**RECOMMENDED SOLDER PAD**



**MSL LABEL**

**CAUTION**  
This bag contains  
MOISTURE-SENSITIVE DEVICES

LEVEL

3

1. Shelf life in sealed bag 12 months at <math> < 40^{\circ}\text{C}</math> and <math> < 90\%</math> 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, <math> 260^{\circ}\text{C}</math>) must be:
  - a) Mounted within 168 hours at factory condition of <math> \le 30^{\circ}\text{C}/60\%</math>RH or
  - b) Stored at <math> \le 10\%</math> RH.
3. Devices require baking before mounting if:
  - a) Humidity Indicator Card is >10% when read at <math> 23^{\circ}\text{C} \pm 5^{\circ}\text{C}</math> or
  - b) 2a or 2b is not met.
4. If baking is required, devices may be baked for:
 

192 hours at <math> 40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}</math> and <math> < 5\%</math>RH (dry air/nitrogen)	or
96 hours at <math> 60 \pm 5^{\circ}\text{C}</math> and <math> < 5\%</math>RH	For all device containers
24 hours at <math> 100 \pm 5^{\circ}\text{C}</math>	Not suitable for reels or tubes

Bag Seal Date: \_\_\_\_\_ (If blank, see bar code label)

Note: LEVEL defined by EIA JEDEC Standard JESD22-A113



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