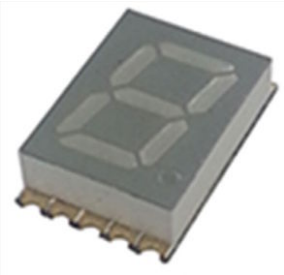
Standard 7-Segment SMD Display 10 mm



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

Pb-free

e4

RoHS COMPLIANT

DESCRIPTION

The VDM.10.0 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: ± 50°

APPLICATIONS

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

PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (µcd)			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.		
VDMR10A0	Super red	180	650	-	1	-	631	-	20	-	2.0	2.6	20	Common anode
VDMR10C0	Super red	180	650	-	1	-	631	-	20	-	2.0	2.6	20	Common cathode
VDMO10A0	Soft orange	180	650	-	1	-	605	-	20	-	2.0	2.6	20	Common anode
VDMO10C0	Soft orange	180	650	-	1	-	605	-	20	-	2.0	2.6	20	Common cathode
VDMY10A0	Yellow	1100	2750	-	1	-	589	-	20	-	2.0	2.6	20	Common anode
VDMY10C0	Yellow	1100	2750	-	1	-	589	-	20	-	2.0	2.6	20	Common cathode
VDMG10A0	Green	110	400	-	1	-	572	-	20	-	2.0	2.6	20	Common anode
VDMG10C0	Green	110	400	-	1	-	572	-	20	-	2.0	2.6	20	Common cathode

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)
VDMR10.0, VDMO10.0, VDMY10.0, VDMG10.0

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
Continous 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				

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OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VDMR10A0, VDMR10C0, SUPER RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity [1]	I_F = 1 mA	VDMR10A0	I_V	180	650	-	µcd
		VDMR10C0					
	I_F = 10 mA	VDMR10A0	I_V	-	8250	-	µcd
		VDMR10C0					
Dominant wavelength	I_F = 20 mA	VDMR10A0, VDMR10C0	λ_d	-	631	-	nm
Peak emmision wavelength	I_F = 20 mA		λ_p	-	639	-	nm
Spectral line half-width	I_F = 10 mA		$\Delta\lambda$	-	20	-	
Forward voltage per segment	I_F = 20 mA		V_F	-	2.0	2.6	V
Reverse current per segment [2]	V_R = 5 V		I_R	-	-	100	µA
Luminous intensity matching ratio	I_F = 10 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 ≤ 2.5 %.

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VDMO10A0, VDMO10C0, SOFT ORANGE

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity [1]	I_F = 1 mA	VDMO10A0	I_V	180	650	-	µcd
		VDMO10C0					
	I_F = 10 mA	VDMO10A0	I_V	-	8250	-	µcd
		VDMO10C0					
Dominant wavelength	I_F = 20 mA	VDMO10A0, VDMO10C0	λ_d	-	605	-	nm
Peak emmision wavelength	I_F = 20 mA		λ_p	-	611	-	nm
Spectral line half-width	I_F = 10 mA		$\Delta\lambda$	-	17	-	
Forward voltage per segment	I_F = 20 mA		V_F	-	2.0	2.6	V
Reverse current per segment [2]	V_R = 5 V		I_R	-	-	100	µA
Luminous intensity matching ratio	I_F = 10 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 ≤ 2.5 %.

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
VDMY10A0, VDMY10C0, YELLOW

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity [1]	I_F = 1 mA	VDMY10A0	I_V	1100	2750	-	µcd
		VDMY10C0					
	I_F = 10 mA	VDMY10A0	I_V	-	30 250	-	µcd
		VDMY10C0					
Dominant wavelength	I_F = 20 mA	VDMY10A0, VDMY10C0	λ_d	-	589	-	nm
Peak emmision wavelength	I_F = 20 mA		λ_p	-	588	-	nm
Spectral line half-width	I_F = 10 mA		$\Delta\lambda$	-	15	-	
Forward voltage per segment	I_F = 20 mA		V_F	-	2.0	2.6	V
Reverse current per segment [2]	V_R = 5 V		I_R	-	-	100	µA
Luminous intensity matching ratio	I_F = 10 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 ≤ 2.5 %.

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OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified) **VDMG10A0, VDMG10C0, GREEN**							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Luminous intensity (1)	I_F = 1 mA	VDMG10A0	I_V	110	400	-	µcd
		VDMG10C0					
	I_F = 10 mA	VDMG10A0	I_V	-	4400	-	µcd
		VDMG10C0					
Dominant wavelength	I_F = 20 mA	VDMG10A0, VDMG10C0	λ_d	-	572	-	nm
Peak emmision wavelength	I_F = 20 mA		λ_p	-	571	-	nm
Spectral line half-width	I_F = 10 mA		$\Delta\lambda$	-	15	-	
Forward voltage per segment	I_F = 20 mA		V_F	-	2.0	2.6	V
Reverse current per segment (2)	V_R = 5 V		I_R	-	-	100	µA
Luminous intensity matching ratio	I_F = 10 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 ≤ 2.5 %.

LUMINOUS INTENSITY CLASSIFICATION		
GROUP	**LIGHT INTENSITY (µcd)**	
STANDARD	**MIN.**	**MAX.**
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.

COLOR CLASSIFICATION						
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.

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

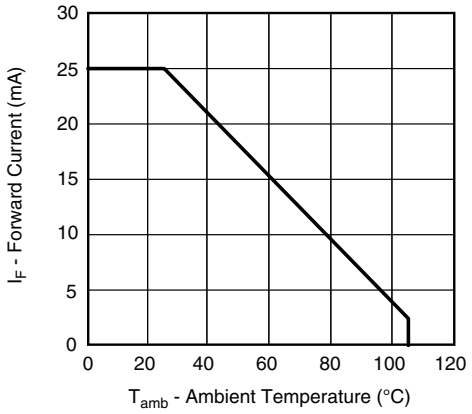

Fig. 1 - Forward Current vs. Ambient Temperature

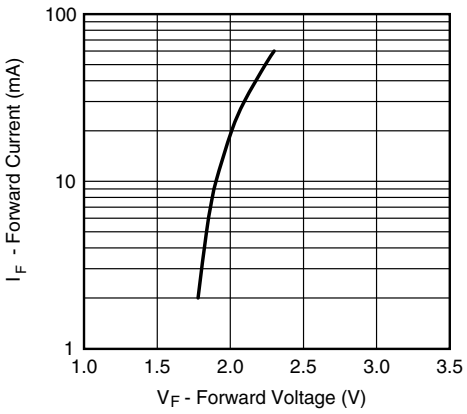

Fig. 4 - Forward Current vs. Forward Voltage

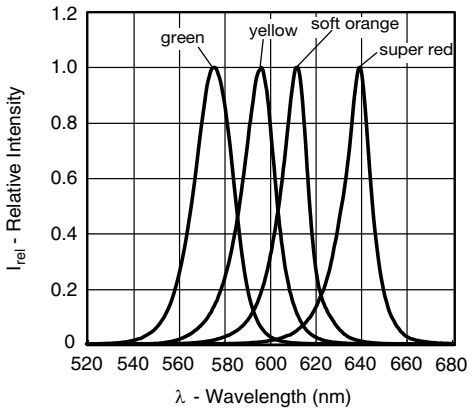

Fig. 2 - Relative Intensity vs. Wavelength

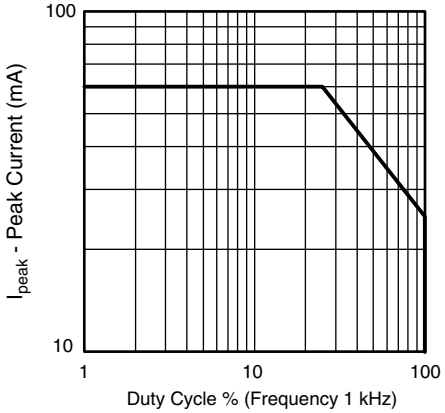

Fig. 5 - Peak Current vs. Duty Cycle

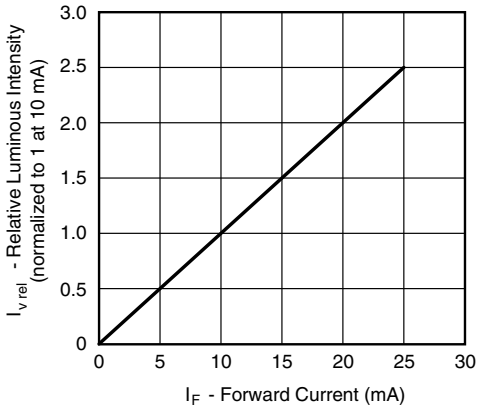

Fig. 3 - Relative Luminous Intensity vs. Forward Current

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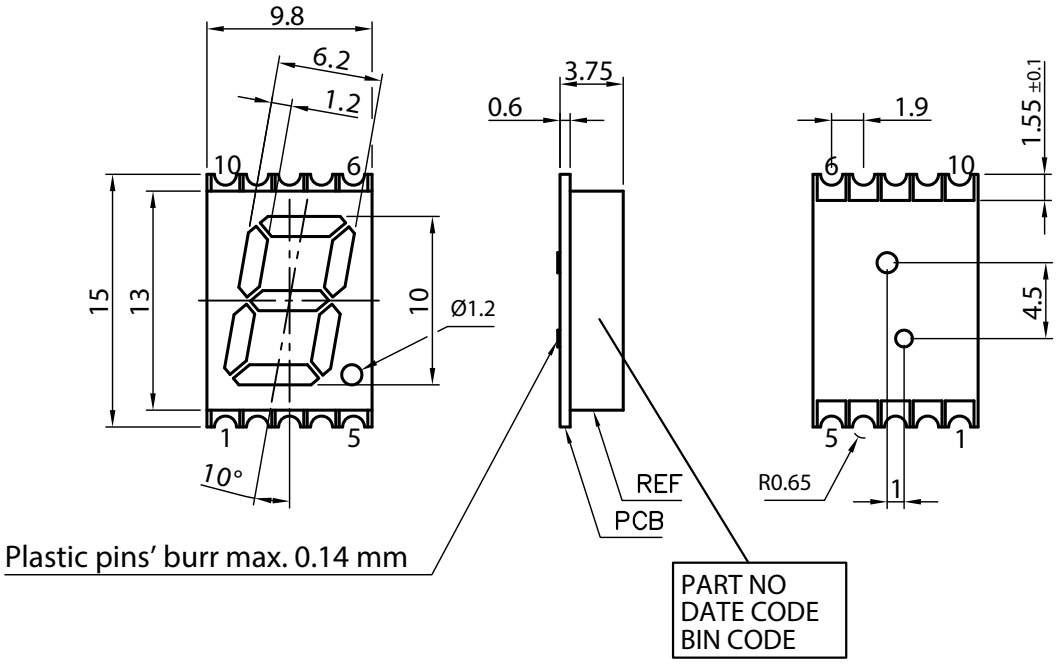
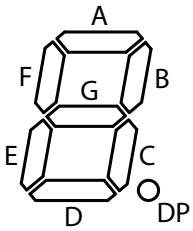
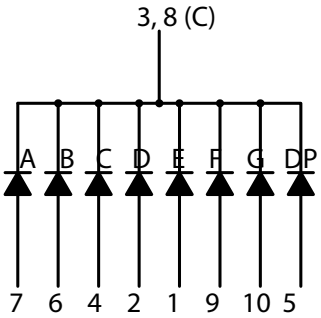
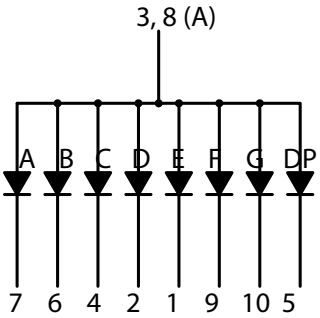
PACKAGE DIMENSIONS in millimeters

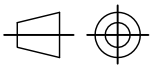








Tolerances are ± 0.25 mm unless otherwise mentioned



technical drawings according to DIN specifications

Drawing-No.: 6.544-5425.01-4
Issue: 2; 02.10.13

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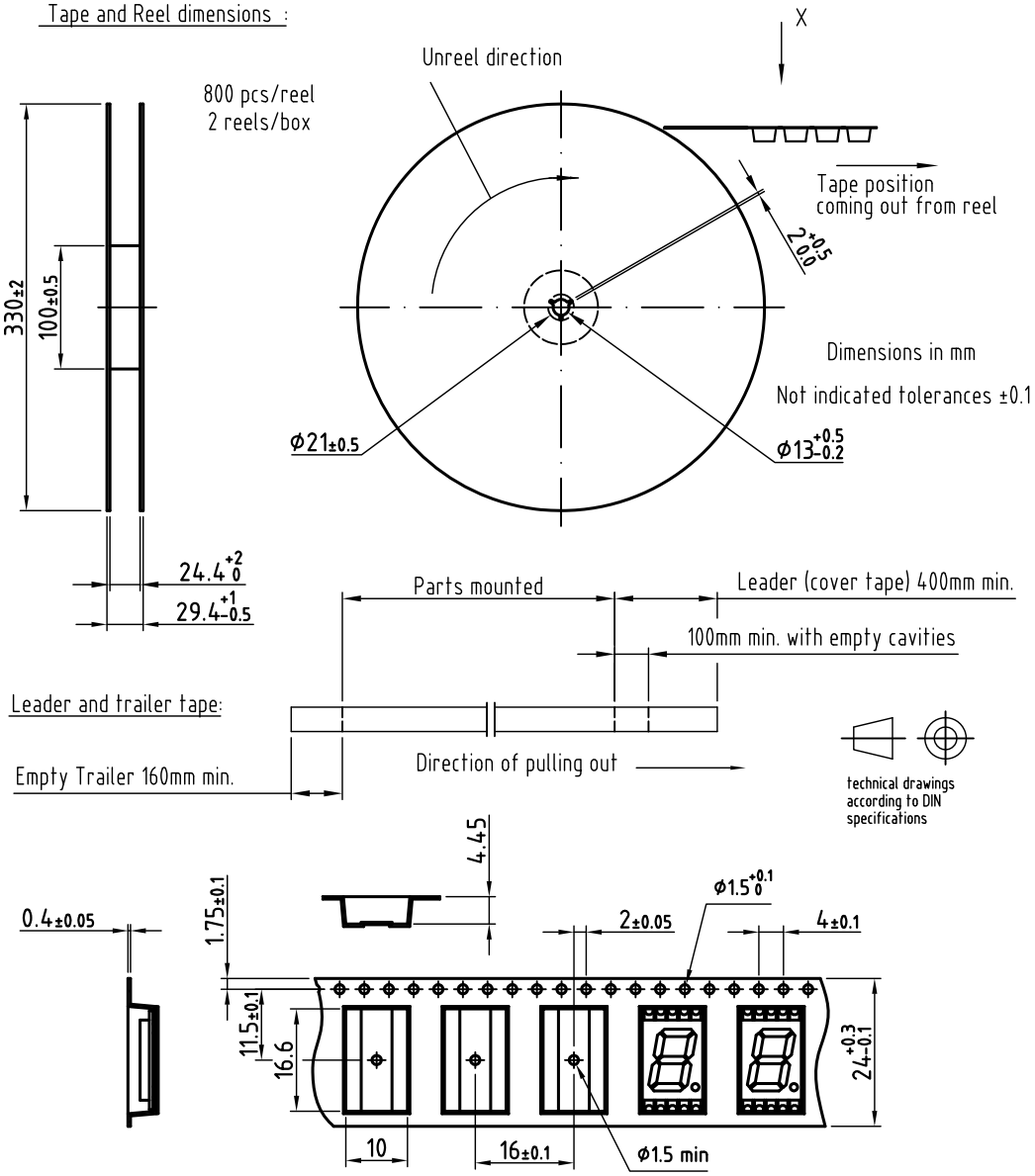
TAPE AND REEL DIMENSIONS in millimeters

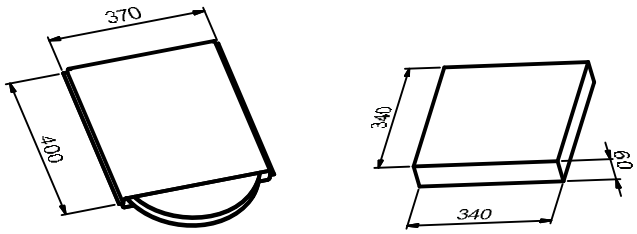


Drawing refers to following types: VDMx10x

Reel dimensions and tape

Drawing-No.: 9.800-5125.01-4
Issue: prel; 10.04.13

TAPE IN BOX



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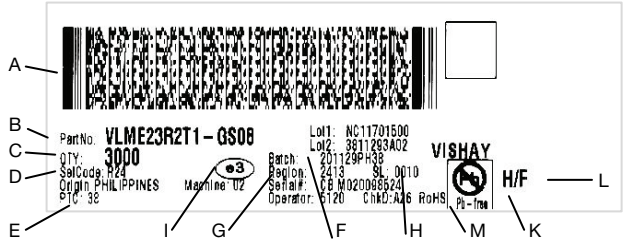
BAR CODE PRODUCT LABEL (example only)



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

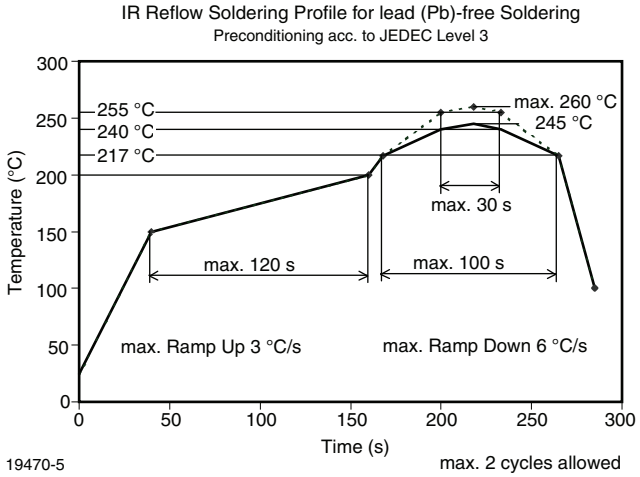
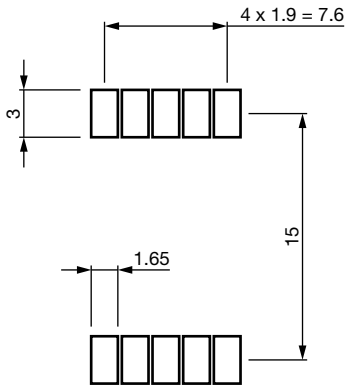


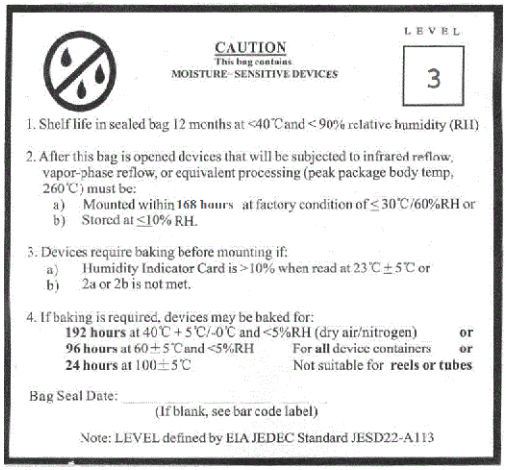
Fig. 6 - Vishay Lead (Pb)-free Reflow Soldering Profile
(acc. to J-STD-020C)

SOLDERING IRON (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 <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 168 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°C and <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

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