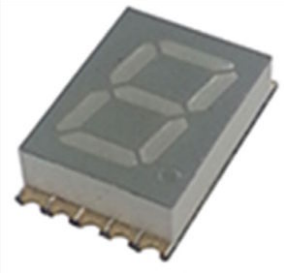
# Standard 7-Segment SMD Display 10 mm



## 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 | | | | |

**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 | $\lambda_d$ | - | 631 | - | nm |
| Peak emmision wavelength | $I_F$ = 20 mA | | $\lambda_p$ | - | 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 | $\lambda_d$ | - | 605 | - | nm |
| Peak emmision wavelength | $I_F$ = 20 mA | | $\lambda_p$ | - | 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 | $\lambda_d$ | - | 589 | - | nm |
| Peak emmision wavelength | $I_F$ = 20 mA | | $\lambda_p$ | - | 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 %.

## 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 | $\lambda_d$ | - | 572 | - | nm |
| Peak emmision wavelength | $I_F$ = 20 mA | | $\lambda_p$ | - | 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.

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

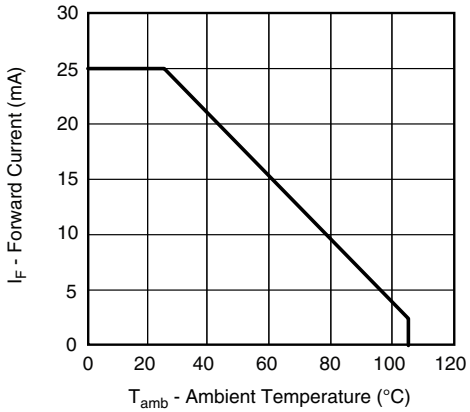



Fig. 1 - Forward Current vs. Ambient Temperature

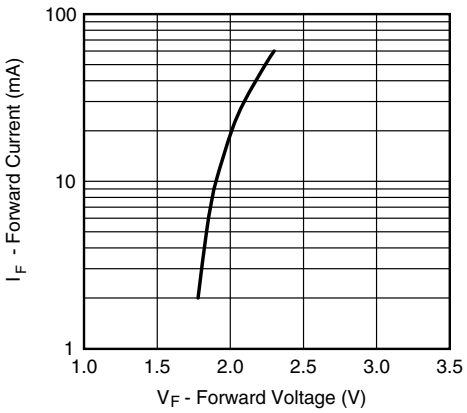



Fig. 4 - Forward Current vs. Forward Voltage

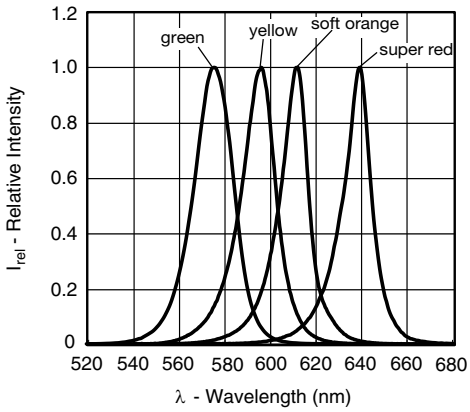



Fig. 2 - Relative Intensity vs. Wavelength

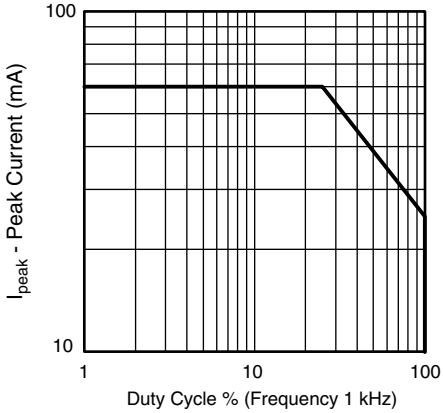



Fig. 5 - Peak Current vs. Duty Cycle

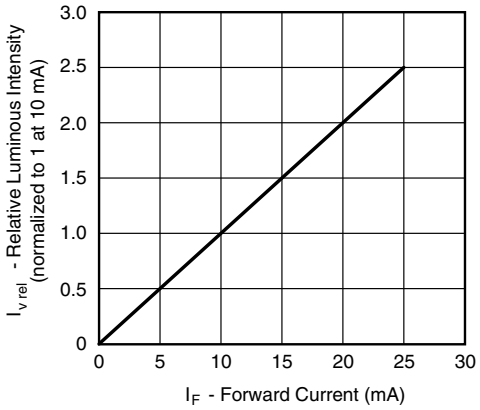
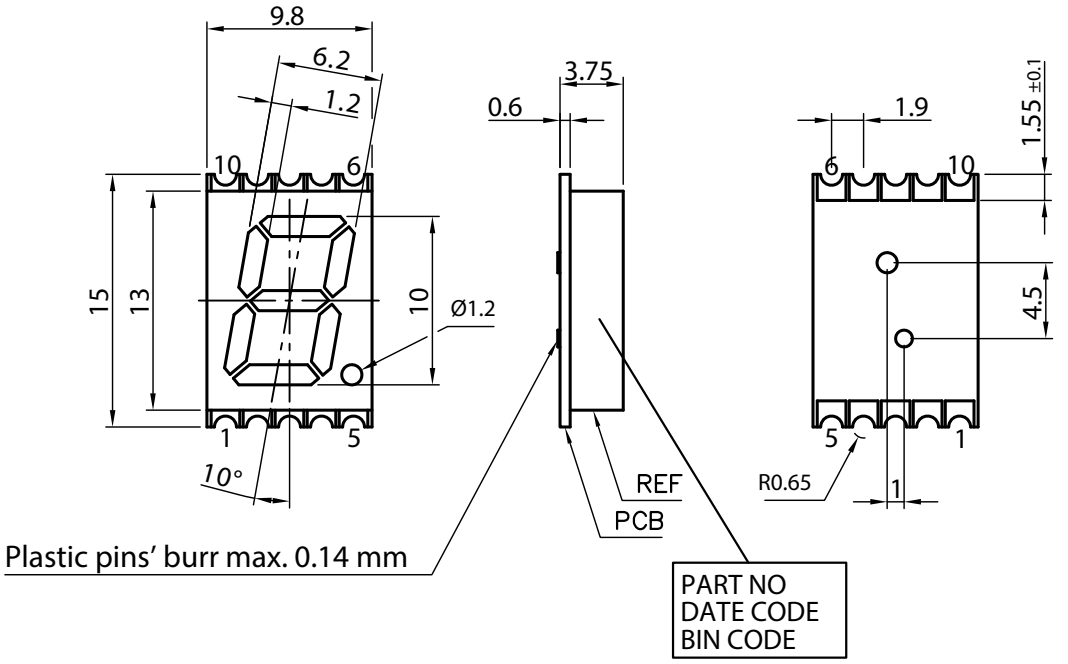
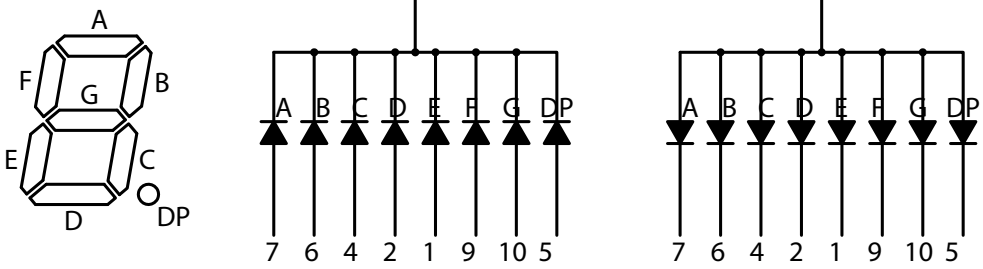



Fig. 3 - Relative Luminous Intensity vs. Forward Current

**PACKAGE DIMENSIONS** in millimeters



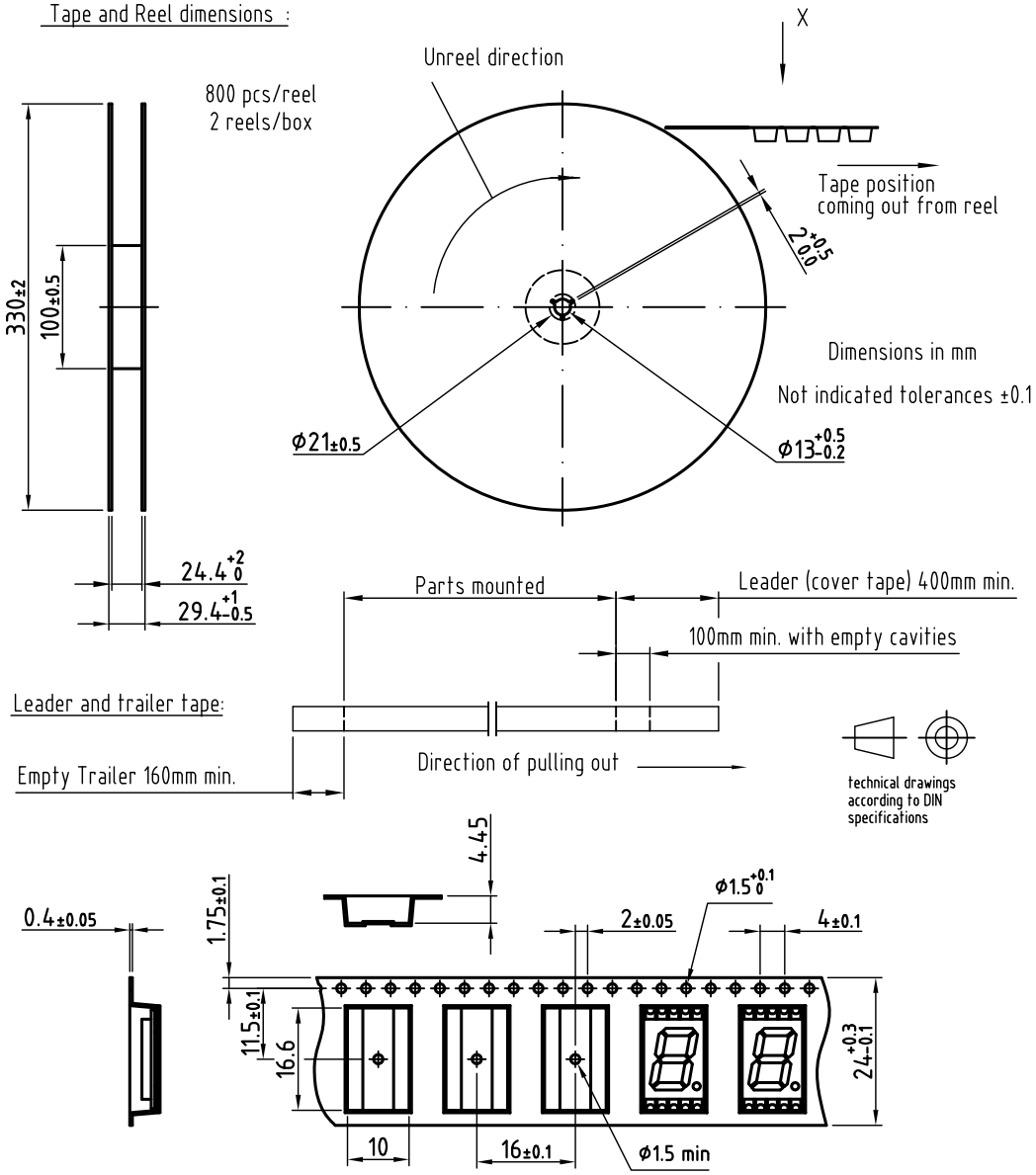




technical drawings
according to DIN
specifications

Tolerances are ± 0.25 mm unless otherwise mentioned

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

## TAPE AND REEL DIMENSIONS in millimeters

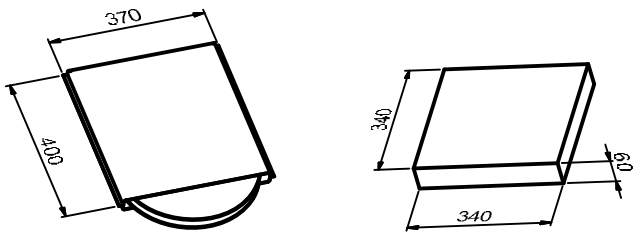



Drawing refers to following types: VDMx10x

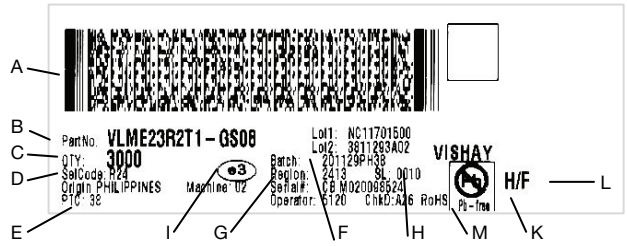
Reel dimensions and tape

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

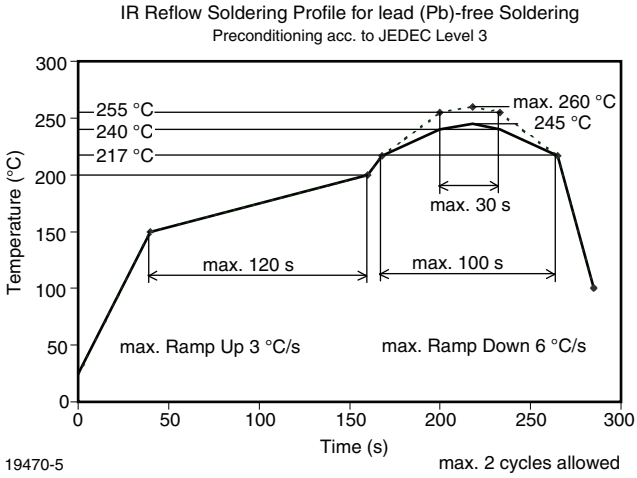
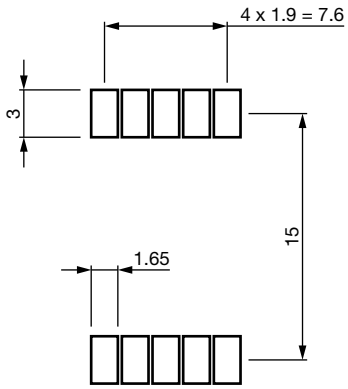


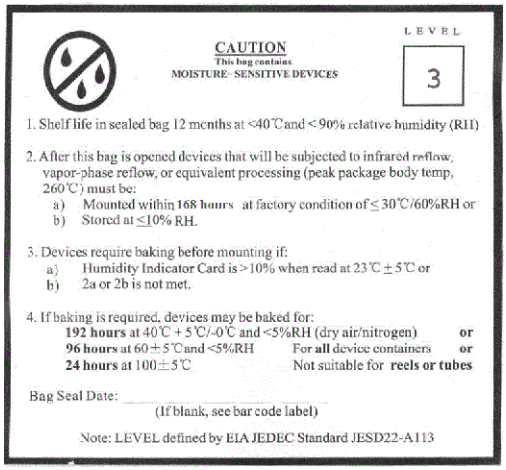

Fig. 6 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

| **SOLDERING IRON** (one time only) | |
|---|---|
| Temperature | 300 °C max. |
| Soldering time | 3 s max. |

## RECOMMENDED SOLDER PAD




## MSL LABEL



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