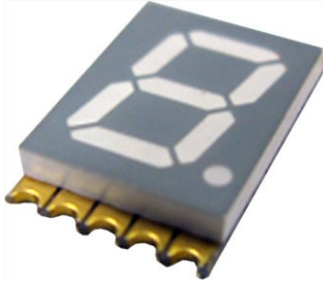


Standard 7-Segment SMD Display 10 mm



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: $\pm 50^\circ$

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



RoHS
COMPLIANT

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.		
VDMR10A1	Super red	450	1600	-	1	-	631	-	20	-	2.0	2.6	20	Common anode
VDMO10A1	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	Green	110	500	-	1	-	572	-	20	-	2.0	2.6	20	Common anode

ABSOLUTE MAXIMUM RATINGS ($T_{\text{amb}} = 25^\circ\text{C}$, 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 ⁽¹⁾	$I_F = 1\text{ mA}$	VDMR10A1	I_V	450	1600	-	μcd
	$I_F = 10\text{ mA}$	VDMR10A1	I_V	-	20 800	-	μcd
Dominant wavelength	$I_F = 20\text{ mA}$	VDMR10A1	λ_d	-	631	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		λ_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 ⁽²⁾	$V_R = 5\text{ V}$		I_R	-	-	100	μA
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)
VDMO10A1, SOFT ORANGE

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 1\text{ mA}$	VDMO10A1	I_V	180	650	-	μcd
	$I_F = 10\text{ mA}$	VDMO10A1	I_V	-	8250	-	μcd
Dominant wavelength	$I_F = 20\text{ mA}$	VDMO10A1	λ_d	-	605	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		λ_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 ⁽²⁾	$V_R = 5\text{ V}$		I_R	-	-	100	μA
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 ⁽¹⁾	$I_F = 1\text{ mA}$	VDMY10A1	I_V	450	1600	-	μcd
	$I_F = 10\text{ mA}$	VDMY10A1	I_V	-	17 600	-	μcd
Dominant wavelength	$I_F = 20\text{ mA}$	VDMY10A1	λ_d	-	587	-	nm
Peak emission wavelength	$I_F = 20\text{ mA}$		λ_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 ⁽²⁾	$V_R = 5\text{ V}$		I_R	-	-	100	μA
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 °C, unless otherwise specified)								
VDMG10A1, GREEN								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Luminous intensity (1)	I _F = 1 mA	VDMG10A1	I _V	110	500	-	μcd	
	I _F = 10 mA	VDMG10A1	I _V	-	5500	-	μcd	
Dominant wavelength	I _F = 20 mA	VDMG10A1	λ _d	-	572	-	nm	
Peak emission wavelength	I _F = 20 mA		λ _p	-	571	-	nm	
Spectral line half-width	I _F = 20 mA		Δλ	-	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)	
	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.

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

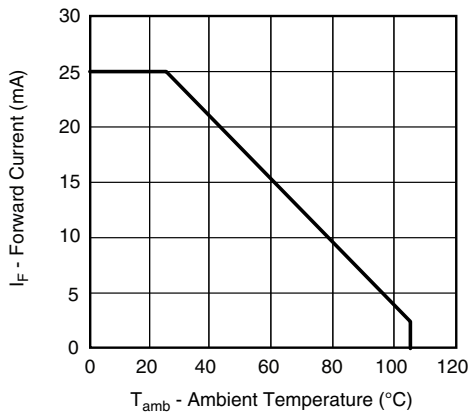


Fig. 1 - Forward Current vs. Ambient Temperature

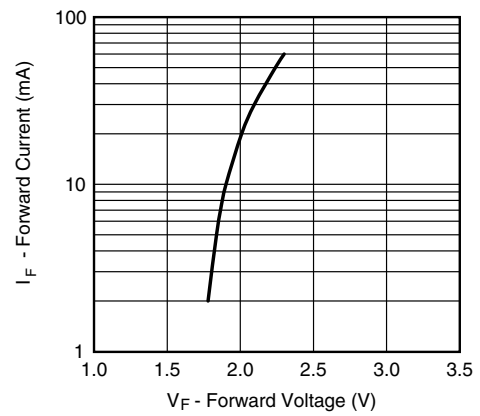


Fig. 4 - Forward Current vs. Forward Voltage

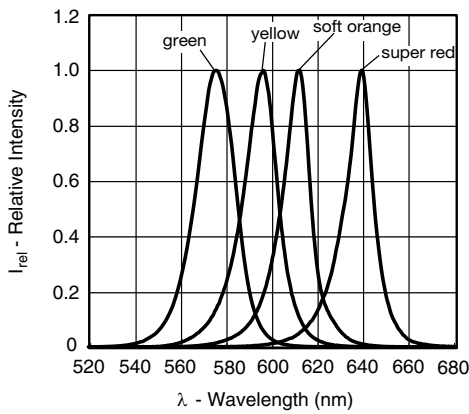


Fig. 2 - Relative Intensity vs. Wavelength

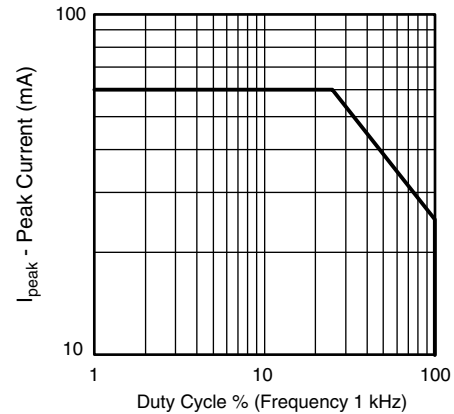


Fig. 5 - Peak Current vs. Duty Cycle

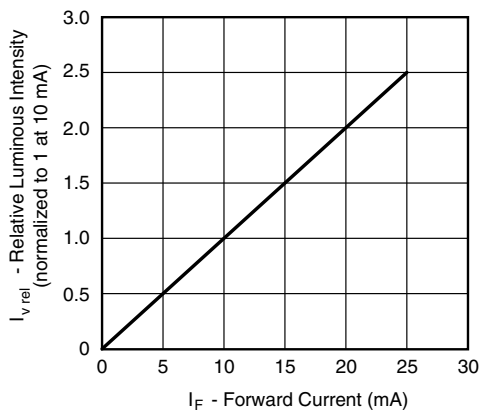
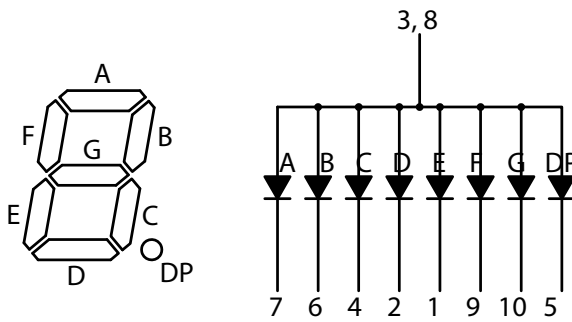
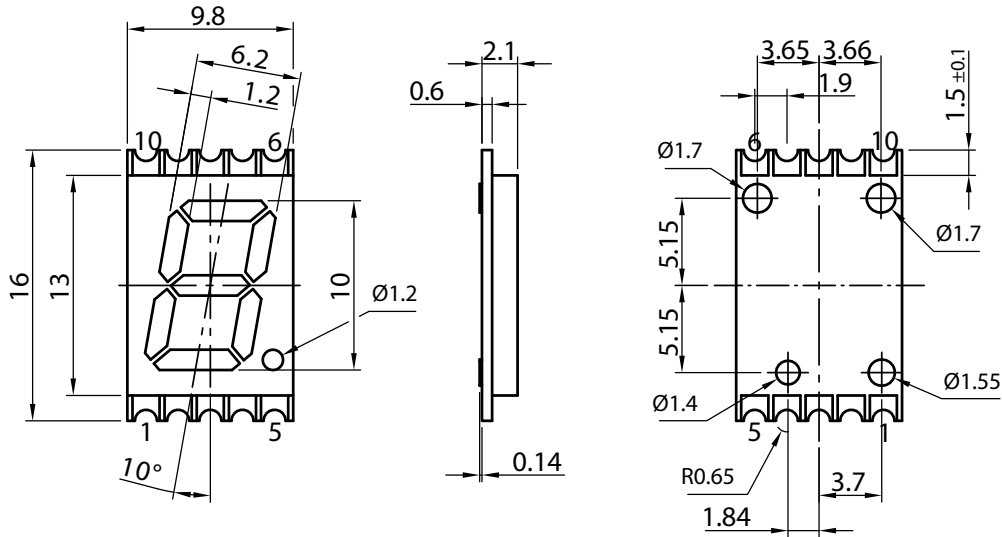


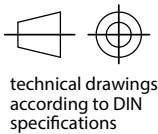
Fig. 3 - Relative Luminous Intensity vs. Forward Current



PACKAGE DIMENSIONS in millimeters



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



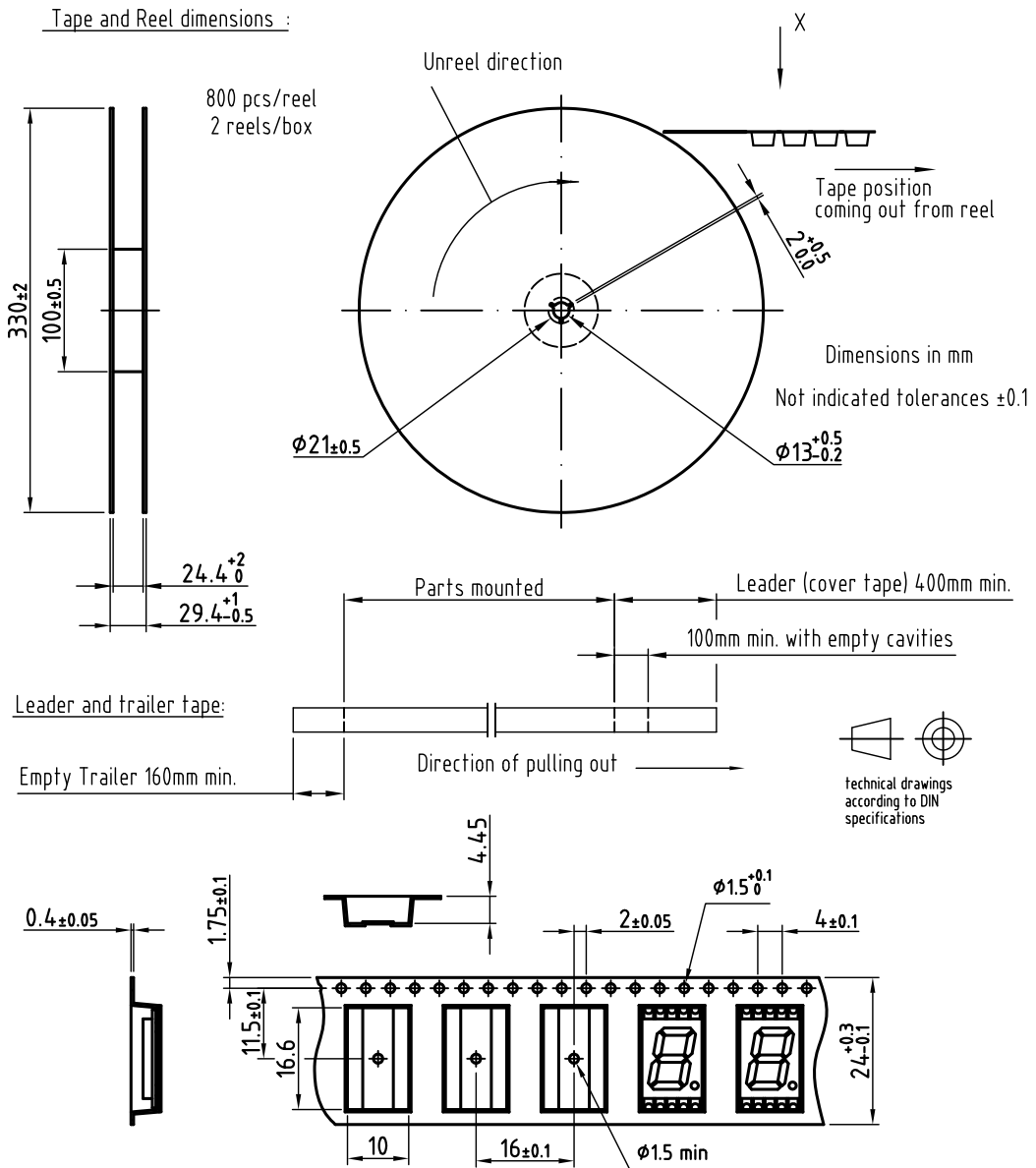
Dimensions in mm

Drawing refers to following types: VDMR 10A1
VDMO 10A1
VDMY 10A1
VDMG 10A1

Drawing-No.: 6.544-5426.01-4
Issue: 1; 22.03.13



TAPE AND REEL DIMENSIONS in millimeters



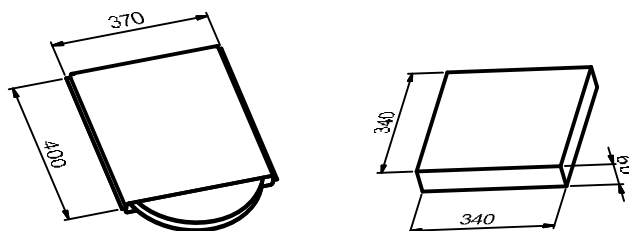
Drawing refers to following types: VDMx10x

Drawing-No.: 9.800-5125.01-4

Reel dimensions and tape

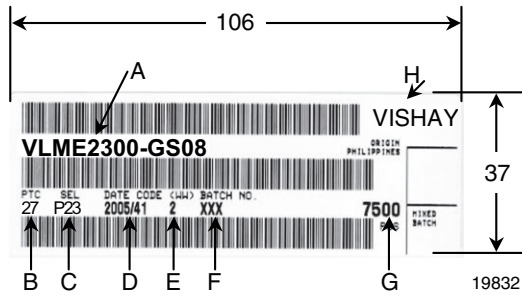
Issue: prel; 10.04.13

TAPE IN BOX





BAR CODE PRODUCT LABEL (example)



- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):
e.g.: J2 = code for luminous intensity group
4 = code for color group
- d. Date code year/week
- E. Day code (e.g. 2: Tuesday)
- F. Batch no.
- G. Total quantity
- H. Company code

SOLDERING PROFILE

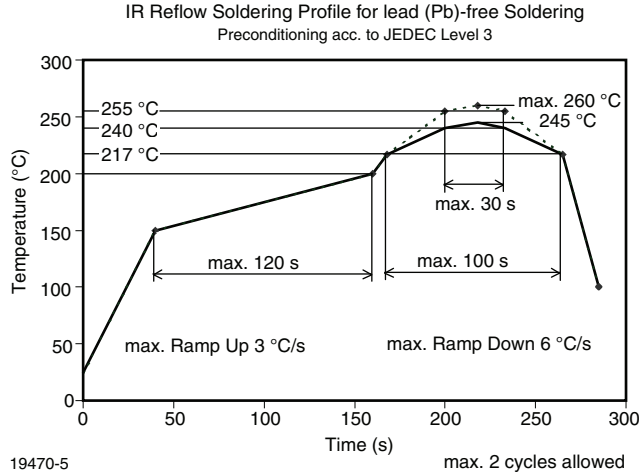
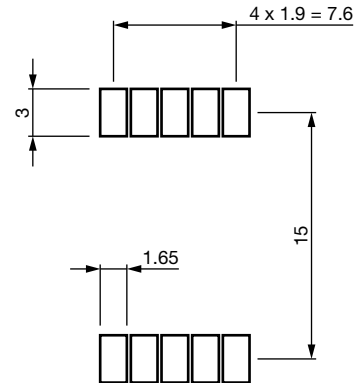


Fig. 6 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

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

L E V E L
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
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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