



## High Speed Infrared Emitting Diodes, 940 nm, GaAlAs, MQW

VSMB294008RG



VSMB294008G



## DESCRIPTION

VSMB294008 series are infrared, 940 nm emitting diodes in GaAlAs multi quantum well (MQW) technology with high radiant power and high speed, molded in clear, untinted plastic packages (with lens) for surface mounting (SMD).

## APPLICATIONS

- Data transmission
- Miniature light barrier
- Photointerrupters
- Optical switch
- Control and drive circuits
- Shaft encoders

## FEATURES

- Package type: surface mount
- Package form: GW, RGW
- Dimensions (L x W x H in mm): 2.3 x 2.3 x 2.8
- Peak wavelength:  $\lambda_p = 940$  nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity:  $\phi = \pm 7^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Terminal configurations: gullwing or reserve gullwing
- Package matches with detector VEMD2000X01 series
- Floor life: 4 weeks, MSL 2a, acc. J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## PRODUCT SUMMARY

COMPONENT	$I_e$ (mW/sr)	$\phi$ (deg)	$\lambda_p$ (nm)	$t_r$ (ns)
VSMB294008RG	70	$\pm 7$	940	15
VSMB294008G	70	$\pm 7$	940	15

## Note

- Test conditions see table "Basic Characteristics"

## ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VSMB294008RG	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Reverse gullwing
VSMB294008G	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Gullwing

## Note

- MOQ: minimum order quantity

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	100	mA
Surge forward current	$t_p = 100 \mu\text{s}$	$I_{FSM}$	500	mA
Power dissipation		$P_V$	160	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$
Operating temperature range		$T_{amb}$	-40 to +85	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-40 to +100	$^\circ\text{C}$
Soldering temperature	according to fig. 10, J-STD-020	$T_{sd}$	260	$^\circ\text{C}$
Thermal resistance junction/ambient	J-STD-051, leads 7 mm, soldered on PCB	$R_{thJA}$	250	K/W

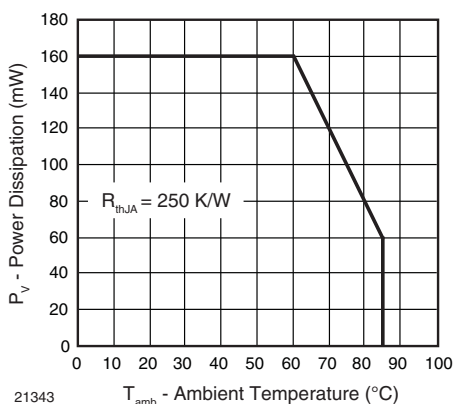


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

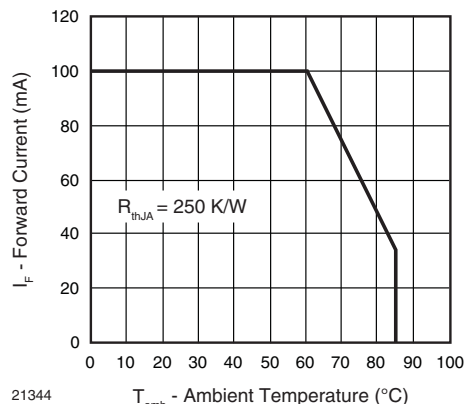


Fig. 2 - Forward Current Limit vs. Ambient Temperature

<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$	$V_F$	1.15	1.45	1.75	V
	$I_F = 500\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$	$V_F$	-	1.8	-	V
Temperature coefficient of $V_F$	$I_F = 100\text{ mA}$	$TK_{VF}$	-	-0.64	-	mV/K
Reverse current	$V_R = 5\text{ V}$	$I_R$	-	-	10	$\mu\text{A}$
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0\text{ mW/cm}^2$	$C_J$	-	38	-	pF
Radiant intensity	$I_F = 100\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$	$I_e$	30	70	115	mW/sr
	$I_F = 500\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$	$I_e$	-	260	-	mW/sr
Radiant power	$I_F = 100\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$	$\phi_e$	-	40	-	mW
Temperature coefficient of radiant power	$I_F = 100\text{ mA}$	$TK_{\phi_e}$	-	-0.43	-	%/K
Angle of half intensity		$\varphi$	-	$\pm 7$	-	deg
Peak wavelength	$I_F = 30\text{ mA}$	$\lambda_p$	920	940	960	nm
Spectral bandwidth	$I_F = 30\text{ mA}$	$\Delta\lambda$	-	25	-	nm
Temperature coefficient of $\lambda_p$	$I_F = 30\text{ mA}$	$TK_{\lambda_p}$	-	0.25	-	nm/K
Rise time	$I_F = 100\text{ mA}$ , 20 % to 80 %	$t_r$	-	15	-	ns
Fall time	$I_F = 100\text{ mA}$ , 20 % to 80 %	$t_f$	-	15	-	ns
Cut-off frequency	$I_{DC} = 70\text{ mA}$ , $I_{AC} = 30\text{ mA pp}$	$f_c$	-	23	-	MHz



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

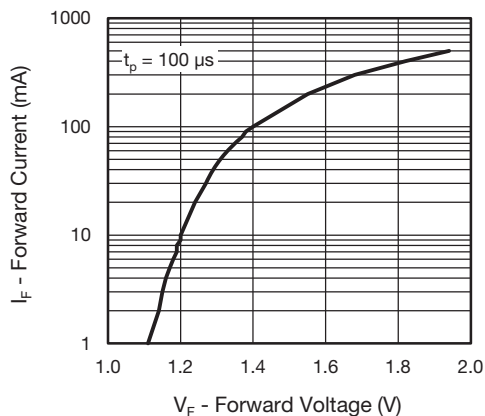


Fig. 3 - Forward Current vs. Forward Voltage

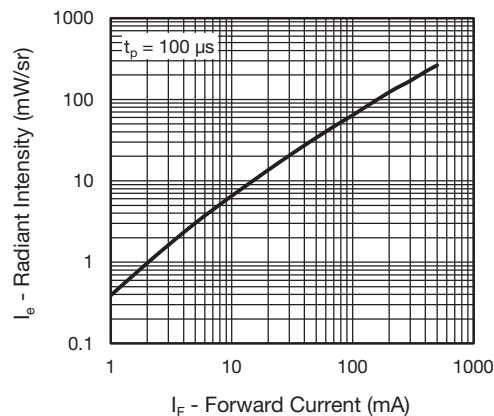


Fig. 6 - Radiant Intensity vs. Forward Current

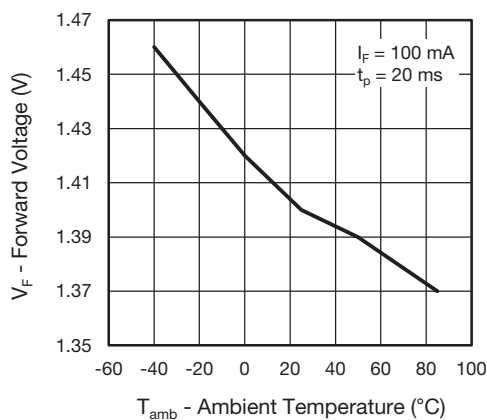


Fig. 4 - Forward Voltage vs. Ambient Temperature

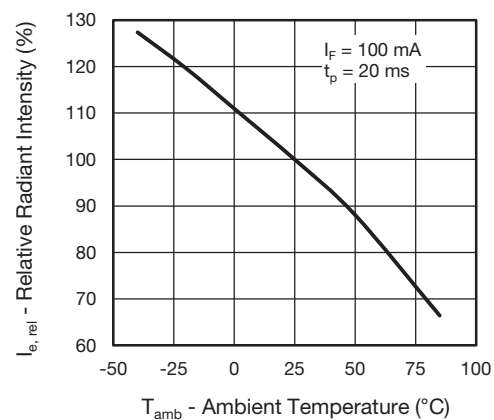


Fig. 7 - Radiant Intensity vs. Ambient Temperature

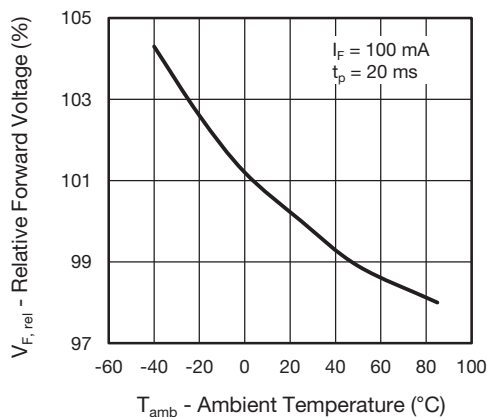


Fig. 5 - Relative Forward Voltage vs. Ambient Temperature

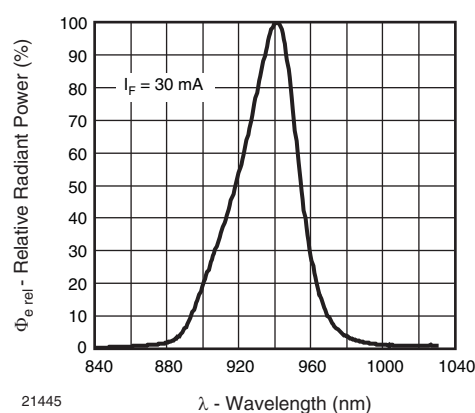


Fig. 8 - Relative Radiant Power vs. Wavelength

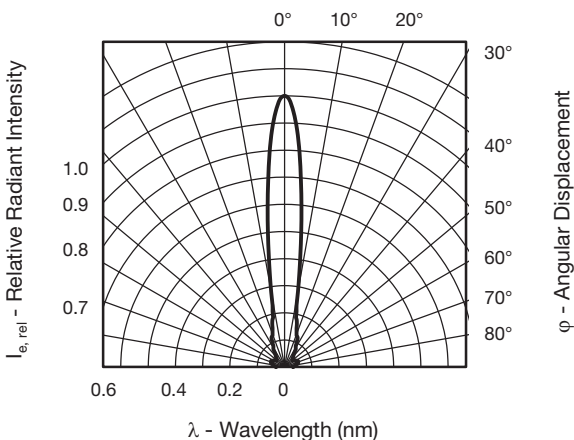


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

## SOLDER PROFILE

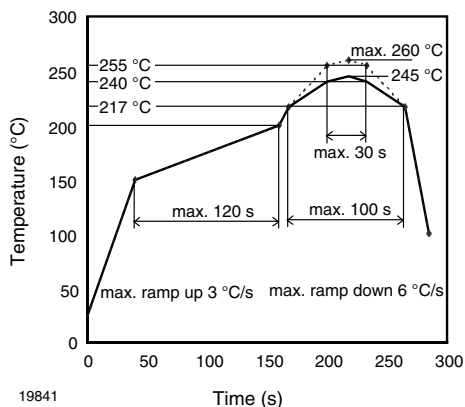


Fig. 10 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

## FLOOR LIFE

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 4 weeks

Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ ,  $RH < 60\%$

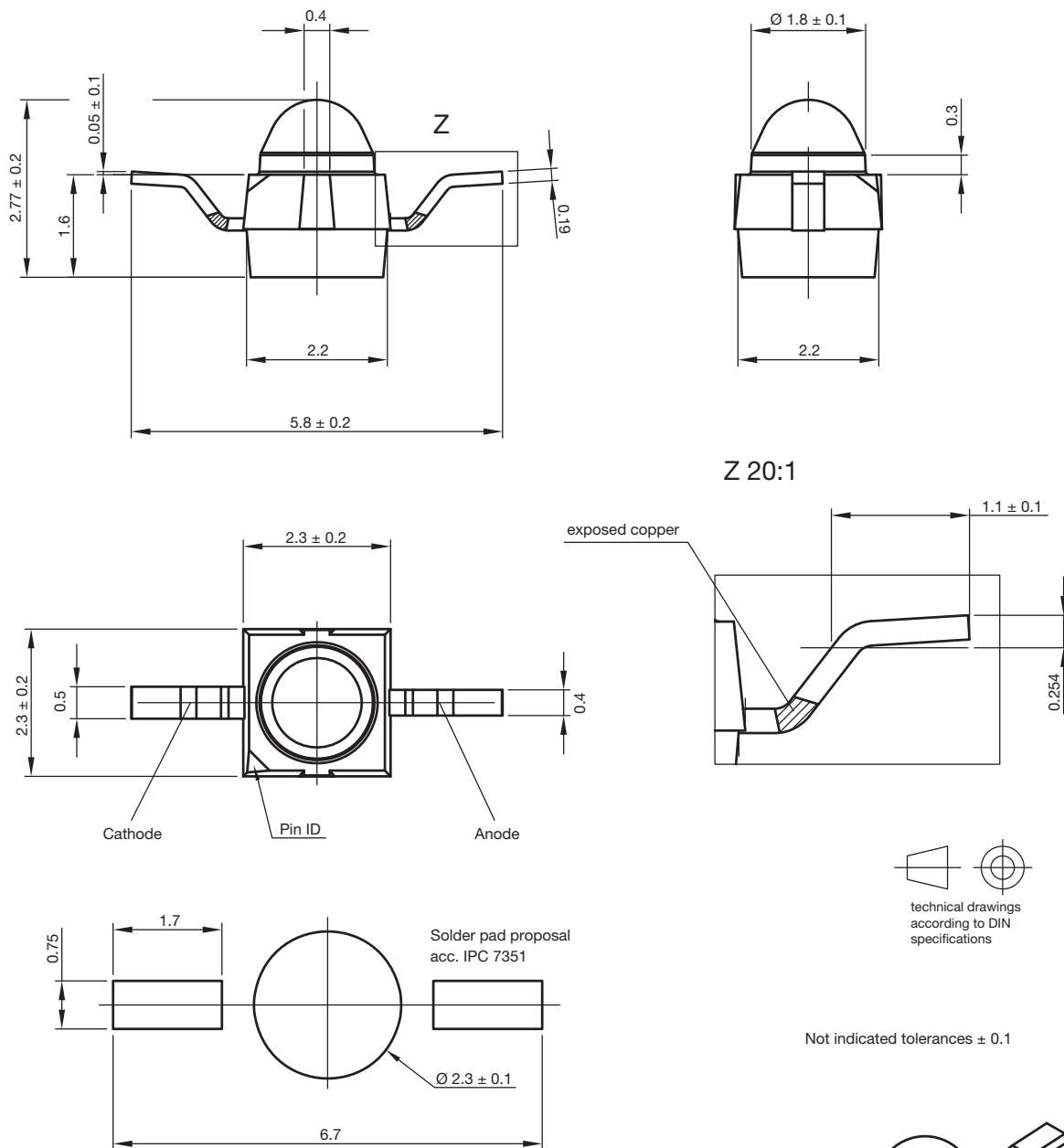
Moisture sensitivity level 2a, acc. to J-STD-020.

## DRYING

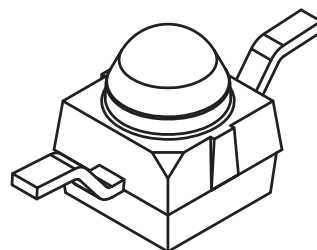
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at  $40\text{ }^{\circ}\text{C}$  (+  $5\text{ }^{\circ}\text{C}$ ),  $RH < 5\%$ .



**PACKAGE DIMENSIONS** in millimeters: **VSMB294008RG**

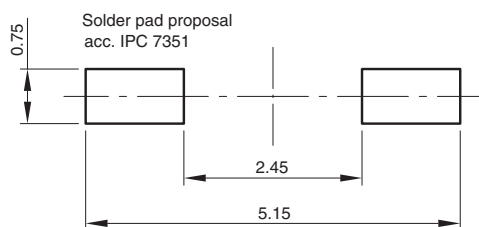
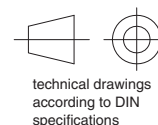
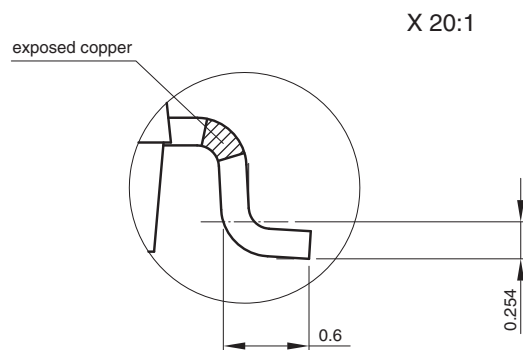
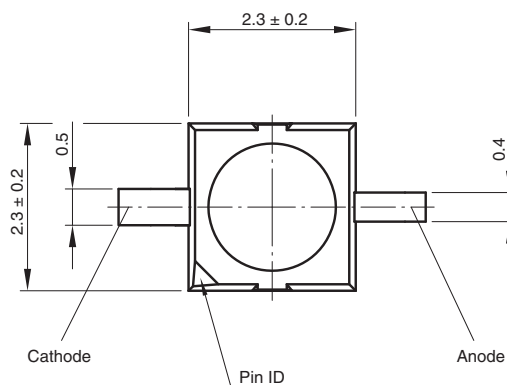
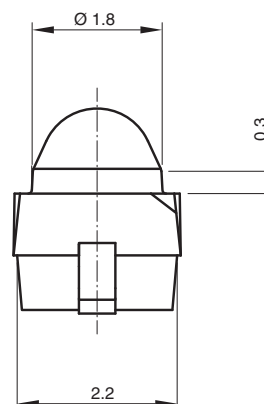
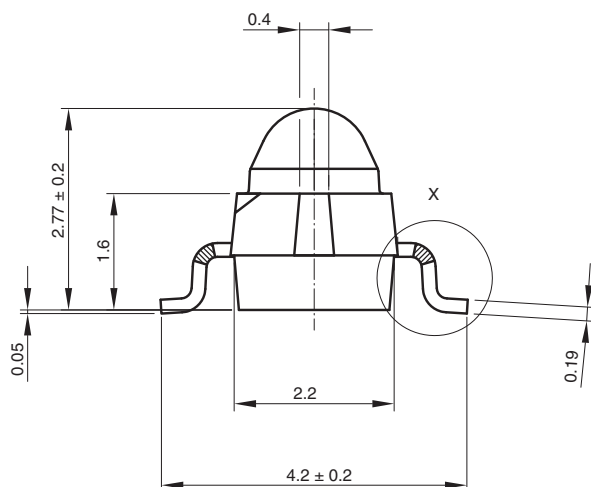


Drawing-No.: 6.544-5391.02-4  
Issue: 2; 18.03.10  
21517



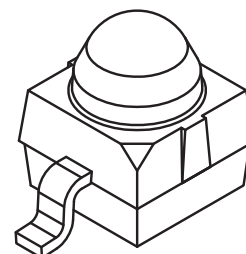


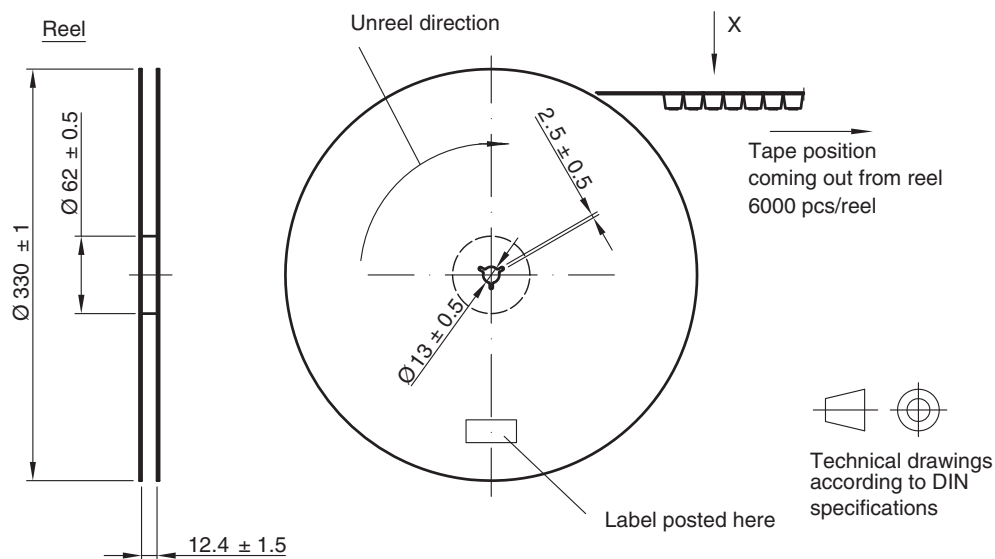
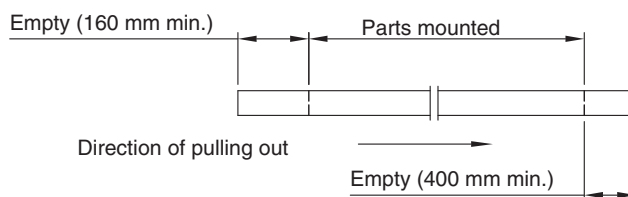
**PACKAGE DIMENSIONS** in millimeters: **VSMB294008G**



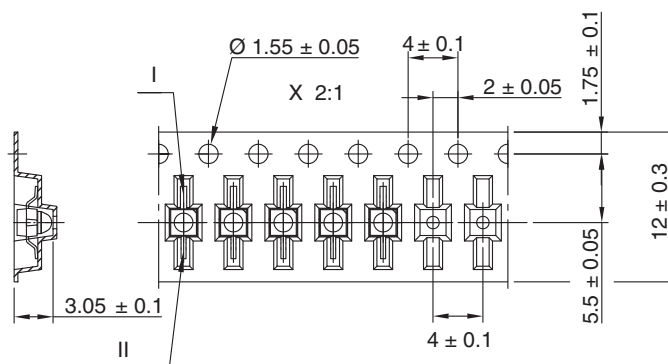
Not indicated tolerances  $\pm 0.1$

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Issue: 4; 18.03.10  
21488

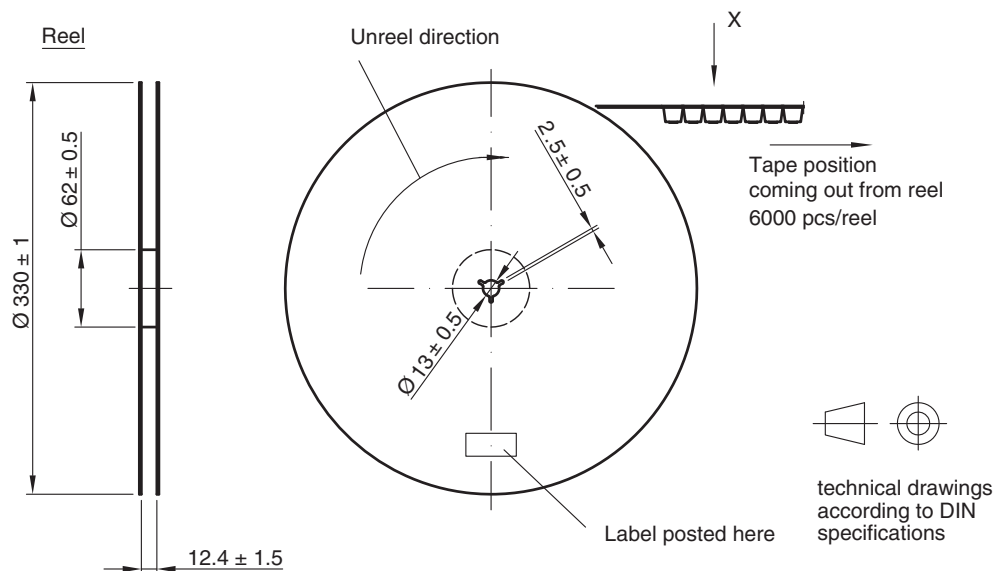
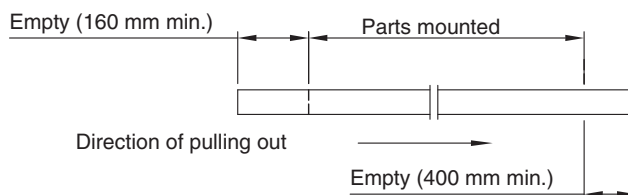


**TAPING AND REEL DIMENSIONS** in millimeters: **VSMB294008RG**

Leader and trailer tape:

Terminal position in tape

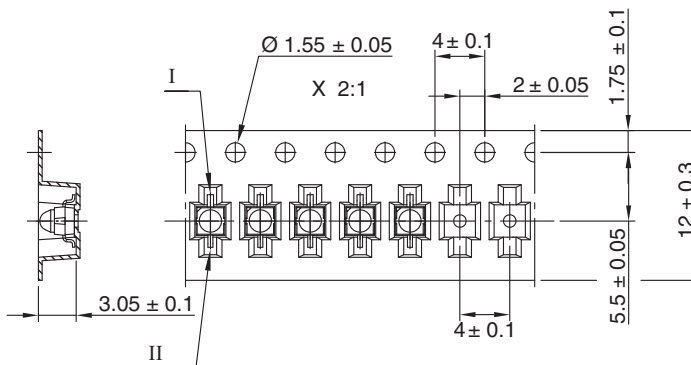
Device	Lead I	Lead II
VENT2000	Collector	Emitter
VENT2500		
VEMD2000	Cathode	Anode
VEMD2500		
VSMB2000		
VSMG2000	Anode	Cathode
VSMY2850RG		



Drawing-No.: 9.800-5100.01-4  
Issue: 2; 18.03.10  
21572

**TAPING AND REEL DIMENSIONS** in millimeters: **VSMB294008G**

Leader and trailer tape:

Terminal position in tape

Device	Lead I	Lead II
VENT2020	Collector	Emitter
VENT2520		
VSMB2020	Cathode	Anode
VSMG2020		
VEMD2020		
VEMD2520		
VSMY2850G	Anode	Cathode



Drawing-No.: 9.800-5091.01-4

Issue: 3; 18.03.10

21571





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