

## Silicon NPN Phototransistor



VENT2503X01



VENT2523X01

### DESCRIPTION

VENT2503X01 series are silicon NPN epitaxial planar phototransistors in a miniature dome lens, clear epoxy package for surface mounting. The device is sensitive to visible and near infrared radiation.

### FEATURES

- Package type: surface mount
- Package form: GW, RGW
- Dimensions (L x W x H in mm): 2.3 x 2.3 x 2.55
- AEC-Q101 qualified
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 35^\circ$
- Package matched with IR emitter series VSMB2943RGX01 and VSMB2943GX01
- Floor life: 4 weeks, MSL 2a, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Detector in automotive applications
- Photo interrupters
- Miniature switches
- Counters
- Encoders
- Position sensors

### PRODUCT SUMMARY

| COMPONENT   | $I_{ca}$ (mA) | $\phi$ (deg) | $\lambda_{0.1}$ (nm) |
|-------------|---------------|--------------|----------------------|
| VENT2503X01 | 2.7           | $\pm 35$     | 470 to 1090          |
| VENT2523X01 | 2.7           | $\pm 35$     | 470 to 1090          |

#### Note

- Test condition see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM     |
|---------------|---------------|------------------------------|------------------|
| VENT2503X01   | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VENT2523X01   | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Gullwing         |

#### Note

- MOQ: minimum order quantity

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

| PARAMETER                           | TEST CONDITION                            | SYMBOL     | VALUE         | UNIT               |
|-------------------------------------|-------------------------------------------|------------|---------------|--------------------|
| Collector emitter voltage           |                                           | $V_{CEO}$  | 20            | V                  |
| Emitter collector voltage           |                                           | $V_{ECO}$  | 7             | V                  |
| Collector current                   |                                           | $I_C$      | 50            | mA                 |
| Power power dissipation             | $T_{amb} \leq 75\text{ }^{\circ}\text{C}$ | $P_V$      | 100           | mW                 |
| Junction temperature                |                                           | $T_j$      | 100           | $^{\circ}\text{C}$ |
| Operating temperature range         |                                           | $T_{amb}$  | - 40 to + 100 | $^{\circ}\text{C}$ |
| Storage temperature range           |                                           | $T_{stg}$  | - 40 to + 100 | $^{\circ}\text{C}$ |
| Soldering temperature               | Acc. reflow profile fig. 8                | $T_{sd}$   | 260           | $^{\circ}\text{C}$ |
| Thermal resistance junction/ambient | Acc. J-STD-051                            | $R_{thJA}$ | 250           | K/W                |

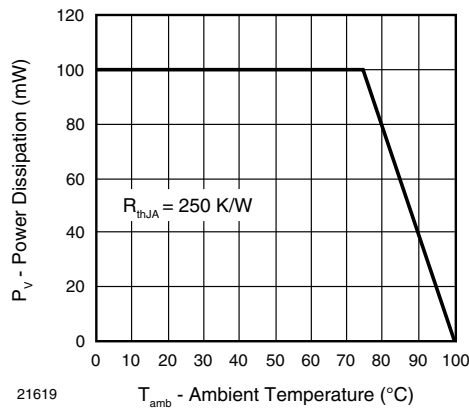


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

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

| PARAMETER                            | TEST CONDITION                                                               | SYMBOL          | MIN. | TYP.        | MAX. | UNIT |
|--------------------------------------|------------------------------------------------------------------------------|-----------------|------|-------------|------|------|
| Collector emitter breakdown voltage  | $I_C = 0.1\text{ mA}$                                                        | $V_{CEO}$       | 20   |             |      | V    |
| Collector dark current               | $V_{CE} = 5\text{ V}$ , $E = 0$                                              | $I_{CEO}$       |      | 1           | 100  | nA   |
| Collector emitter capacitance        | $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                         | $C_{CEO}$       |      | 25          |      | pF   |
| Collector light current              | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_{CE} = 5\text{ V}$ | $I_{ca}$        | 1.3  | 2.7         | 4.1  | mA   |
| Angle of half sensitivity            |                                                                              | $\phi$          |      | $\pm 35$    |      | deg  |
| Wavelength of peak sensitivity       |                                                                              | $\lambda_p$     |      | 850         |      | nm   |
| Range of spectral bandwidth          |                                                                              | $\lambda_{0.1}$ |      | 470 to 1090 |      | nm   |
| Collector emitter saturation voltage | $I_C = 0.05\text{ mA}$                                                       | $V_{CEsat}$     |      |             | 0.4  | V    |
| Temperature coefficient of $I_{ca}$  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_{CE} = 5\text{ V}$ | $Tk_{Ica}$      |      | 1.1         |      | %/K  |

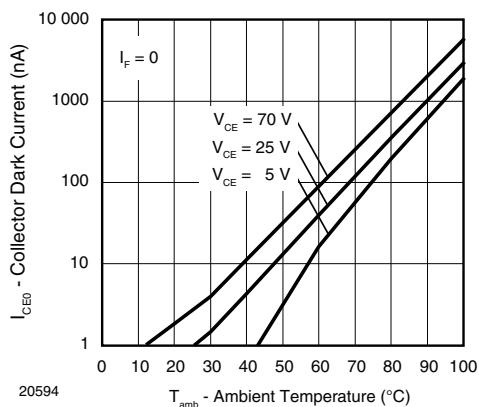
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 2 - Collector Dark Current vs. Ambient Temperature

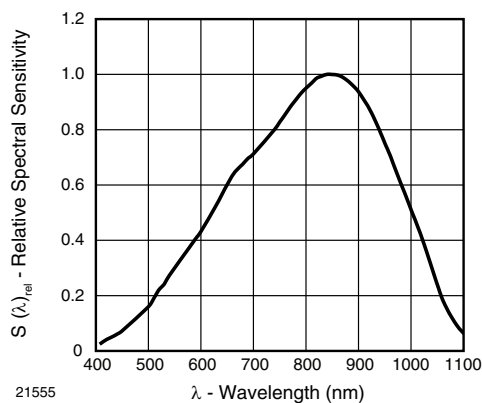


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

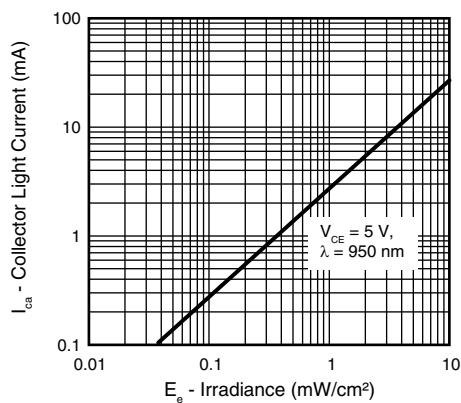


Fig. 3 - Collector Light Current vs. Irradiance

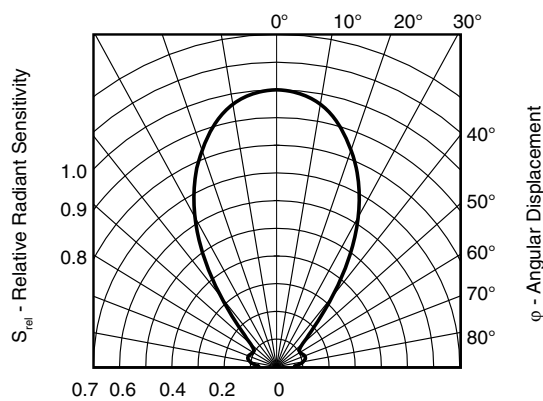


Fig. 6 - Relative Radiant Sensitivity vs. Angular Displacement

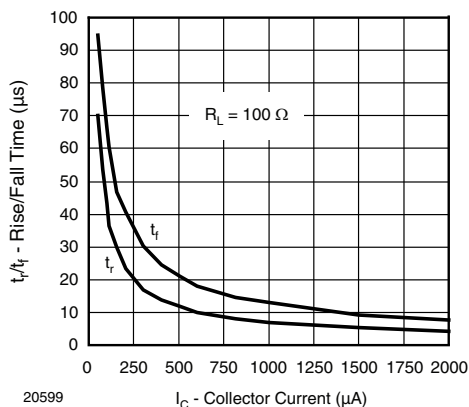


Fig. 4 - Rise/Fall Time vs. Collector Current

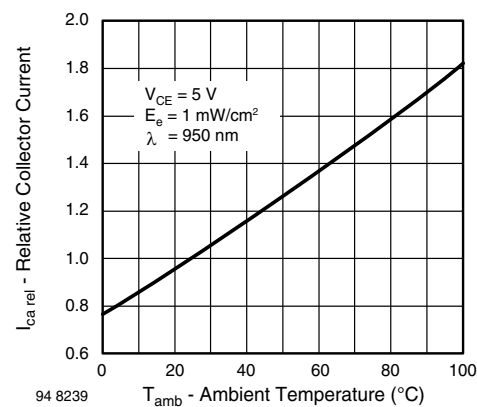


Fig. 7 - Relative Collector Current vs. Ambient Temperature

## REFLOW SOLDER PROFILE

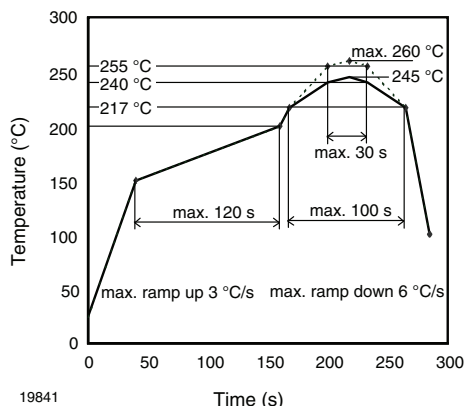


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## 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

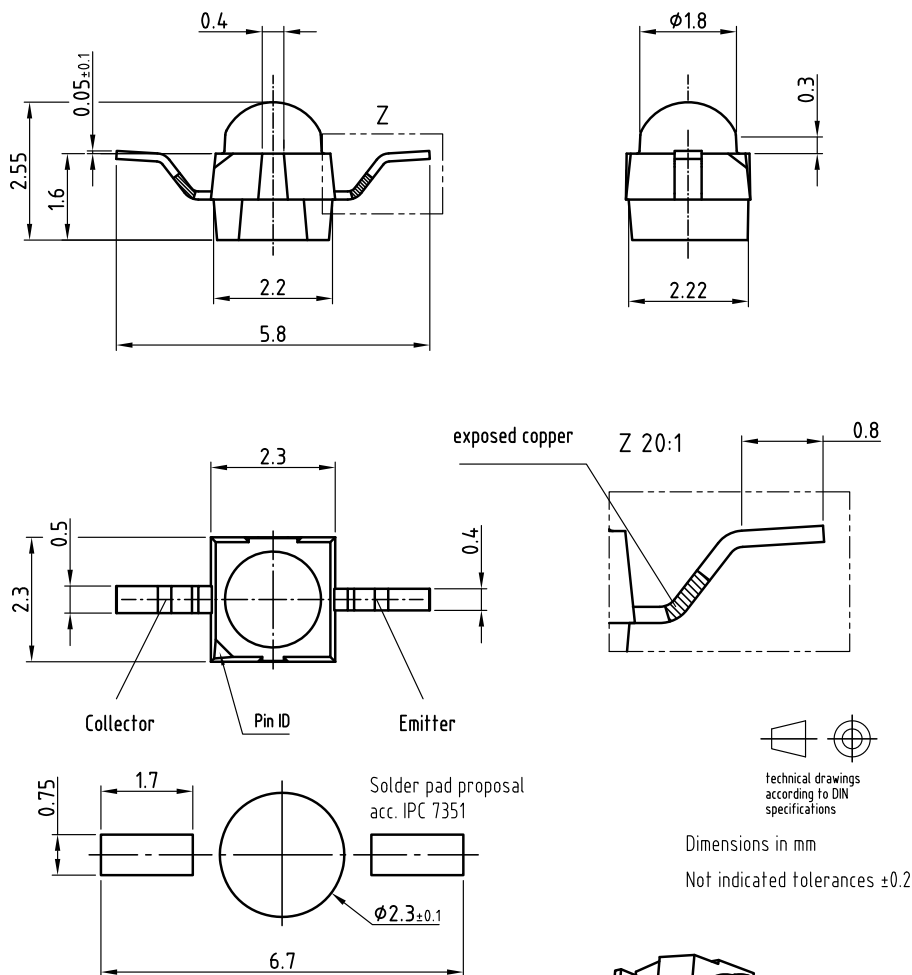
Conditions:  $T_{amb} < 30^{\circ}\text{C}$ , RH < 60 %

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  $40^{\circ}\text{C}$  (+  $5^{\circ}\text{C}$ ), RH < 5 %.

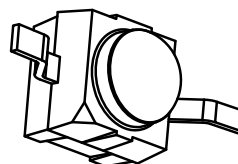
## PACKAGE DIMENSIONS VENT2503X01 in millimeters



Drawing refers to following types: VENT2x03X01

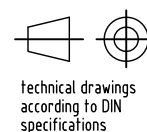
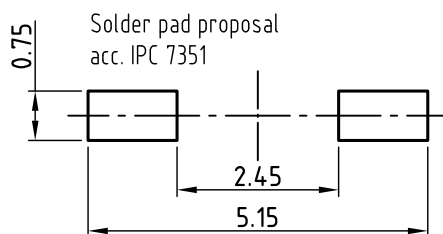
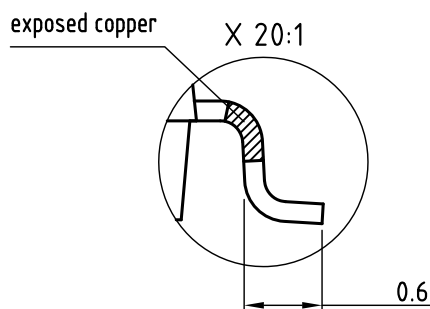
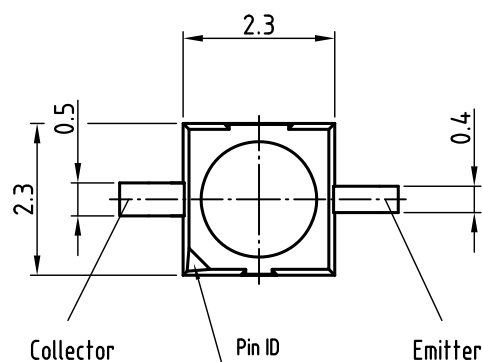
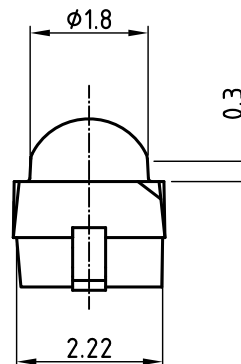
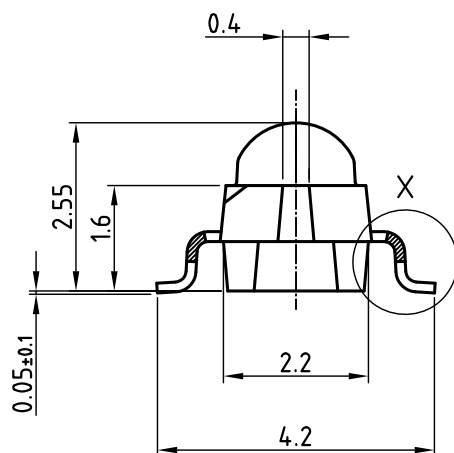
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Issue: prel. 03.08.12





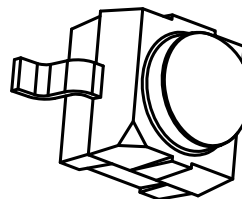
## PACKAGE DIMENSIONS VENT2523X01 in millimeters

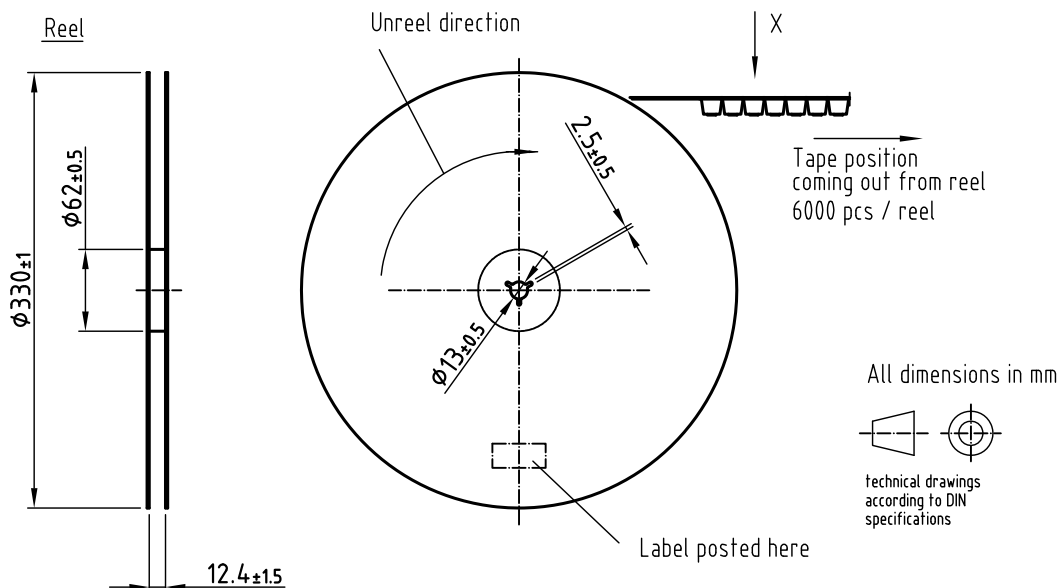
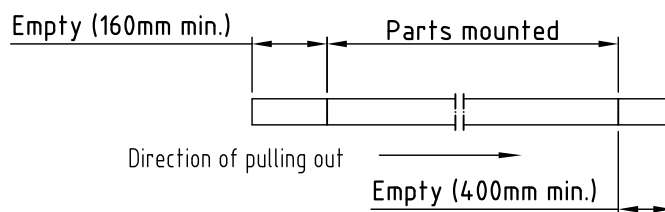


Dimensions in mm  
Not indicated tolerances  $\pm 0.2$

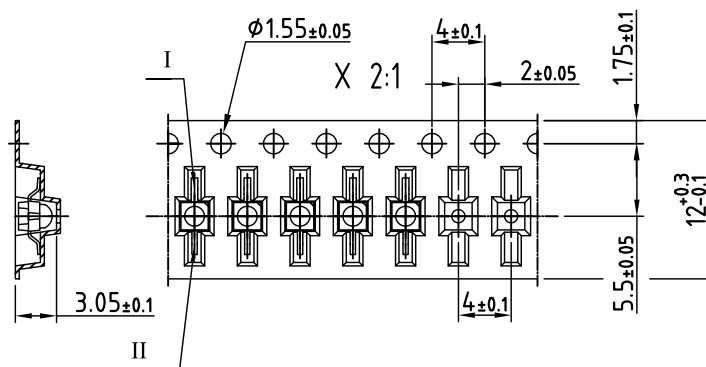
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Drawing-No.: 6.544-5408.02-4  
Issue: prel; 03.08.12



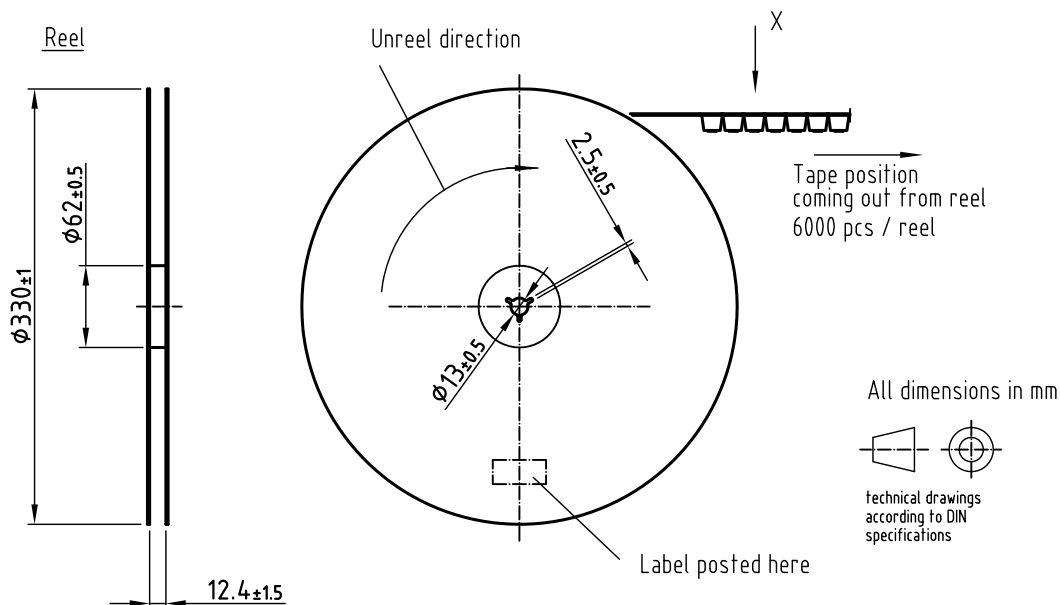
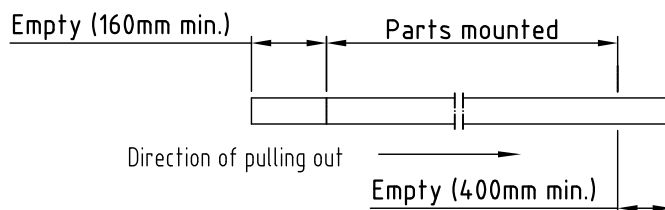
**TAPE AND REEL DIMENSIONS VENT2503X01** in millimeters

Leader and trailer tape:

Terminal position in tape

| Device         | Lead I    | Lead II |
|----------------|-----------|---------|
| V SMB2943RGX01 | Cathode   | Anode   |
| V SMF2893RGX01 |           |         |
| V EMD2x03X01   |           |         |
| V EMT2x03X01   | Collector | Emitter |
| V SMY2853RG    | Anode     | Cathode |

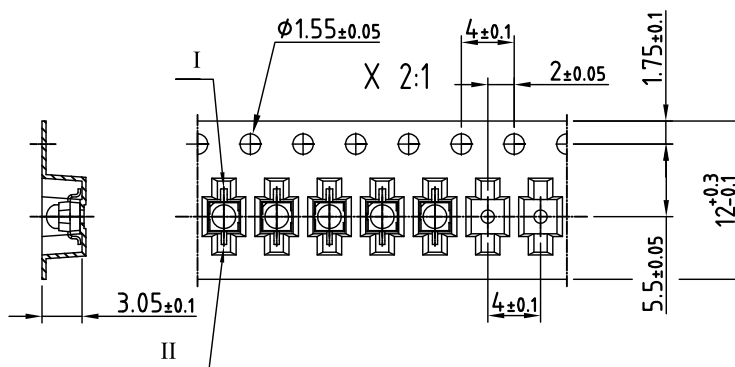


Drawing refers to following types: see table  
Reel dimensions and tape

Drawing-No.: 9.800-5100.02-4  
Issue: prel; 03.08.12

**TAPE AND REEL DIMENSIONS VENT2523X01** in millimeters

Leader and trailer tape:

Terminal position in tape

| Device       | Lead I    | Lead II |
|--------------|-----------|---------|
| VSMB2943GX01 | Cathode   | Anode   |
| VSMF2893GX01 |           |         |
| VEMD2x23X01  |           |         |
| VENT2x23X01  | Collector | Emitter |
| VSMY2853G    | Anode     | Cathode |



Drawing refers to following types: see table  
Reel dimensions and tape

Drawing-No.: 9.800-5091.21-4  
Issue: prel; 03.08.12



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