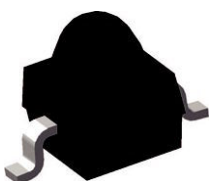
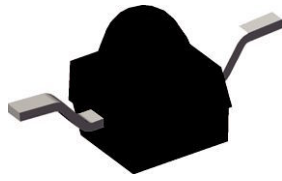


## Silicon NPN Phototransistor



21568

VENT2020X01



VENT2000X01

### DESCRIPTION

VENT2000X01 series are silicon NPN epitaxial planar phototransistors with daylight blocking filter in a miniature, black dome lens package for surface mounting. Filter bandwidth is matched with 830 nm to 950 nm IR emitters.

### 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
- AEC-Q101 qualified
- High radiant sensitivity
- Daylight blocking filter matched with 830 nm to 950 nm IR emitters
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 15^\circ$
- Package matched with IR emitter series VSMB2000X01
- Floor life: 4 weeks, MSL 2a, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

### Note

\*\* Please see document "Vishay Material Category Policy":  
[www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

### APPLICATIONS

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



### PRODUCT SUMMARY

| COMPONENT   | $I_{ca}$ (mA) | $\phi$ (deg) | $\lambda_{0.5}$ (nm) |
|-------------|---------------|--------------|----------------------|
| VENT2000X01 | 6             | $\pm 15$     | 790 to 970           |
| VENT2020X01 | 6             | $\pm 15$     | 790 to 970           |

### Note

- Test condition see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM     |
|---------------|---------------|------------------------------|------------------|
| VENT2000X01   | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VENT2020X01   | 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 |
|---------------------------|----------------|-----------|-------|------|
| Collector emitter voltage |                | $V_{CEO}$ | 20    | V    |
| Emitter collector voltage |                | $V_{ECO}$ | 7     | V    |
| Collector current         |                | $I_C$     | 50    | mA   |

| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                           |            |               |                    |
|--------------------------------------------------------------------------------------------------------|-------------------------------------------|------------|---------------|--------------------|
| PARAMETER                                                                                              | TEST CONDITION                            | SYMBOL     | VALUE         | UNIT               |
| 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                |

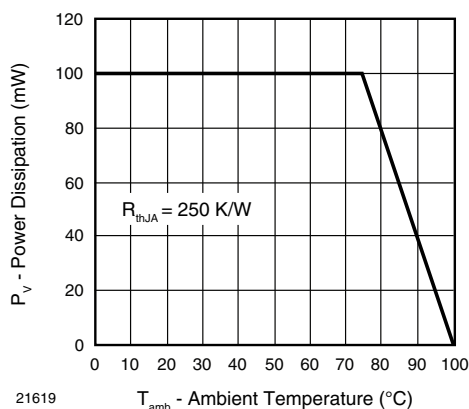


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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                                                                             | $E_e = 1\text{ mW/cm}^2, \lambda = 950\text{ nm}, V_{CE} = 5\text{ V}$ | $I_{ca}$        | 3    | 6          | 9    | mA   |
| Angle of half sensitivity                                                                           |                                                                        | $\phi$          |      | $\pm 15$   |      | deg  |
| Wavelength of peak sensitivity                                                                      |                                                                        | $\lambda_p$     |      | 860        |      | nm   |
| Range of spectral bandwidth                                                                         |                                                                        | $\lambda_{0.5}$ |      | 790 to 970 |      | 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  |

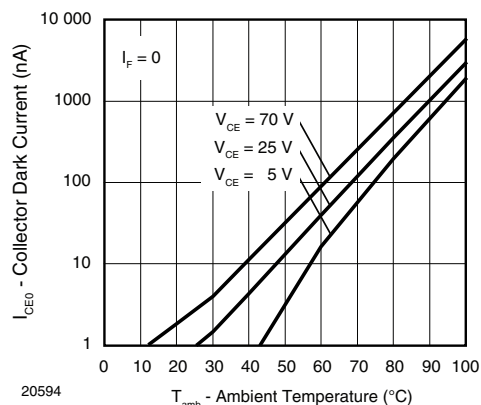
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 2 - Collector Dark Current vs. Ambient Temperature

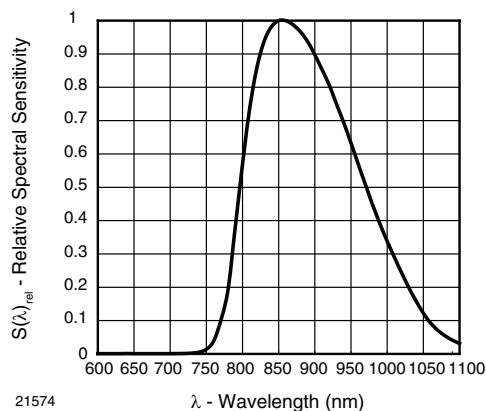


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

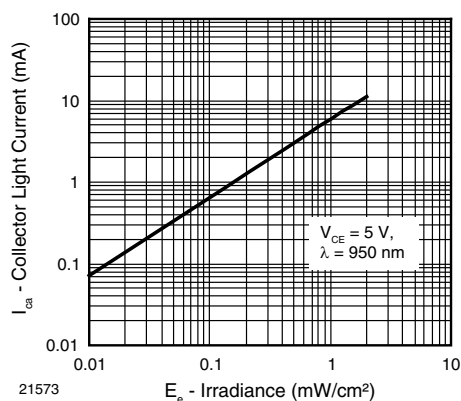


Fig. 3 - Collector Light Current vs. Irradiance

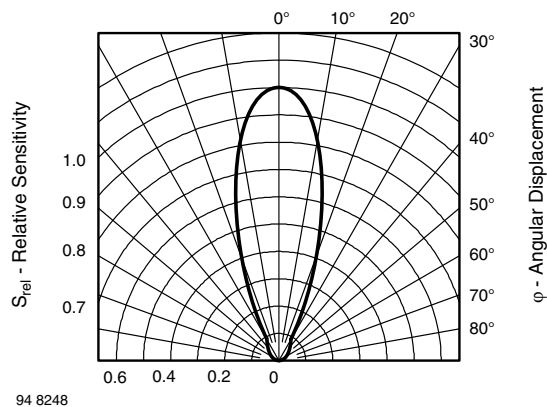


Fig. 6 - Relative Radiant Sensitivity vs. Angular Displacement

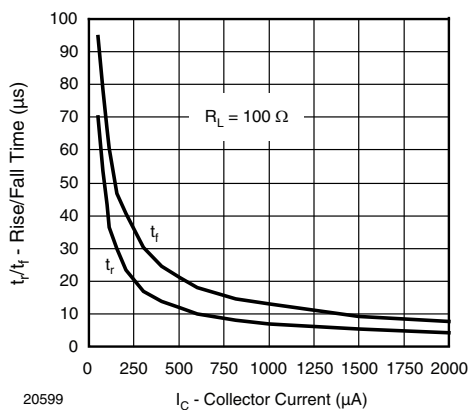


Fig. 4 - Rise/Fall Time vs. Collector Current

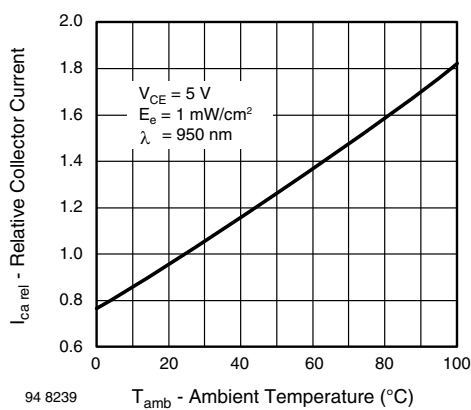


Fig. 7 - Relative Collector Current vs. Ambient Temperature

## REFLOW SOLDER PROFILE

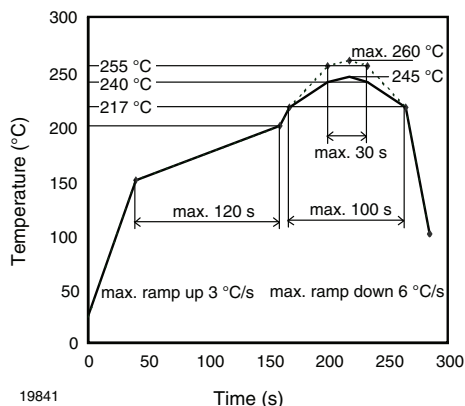
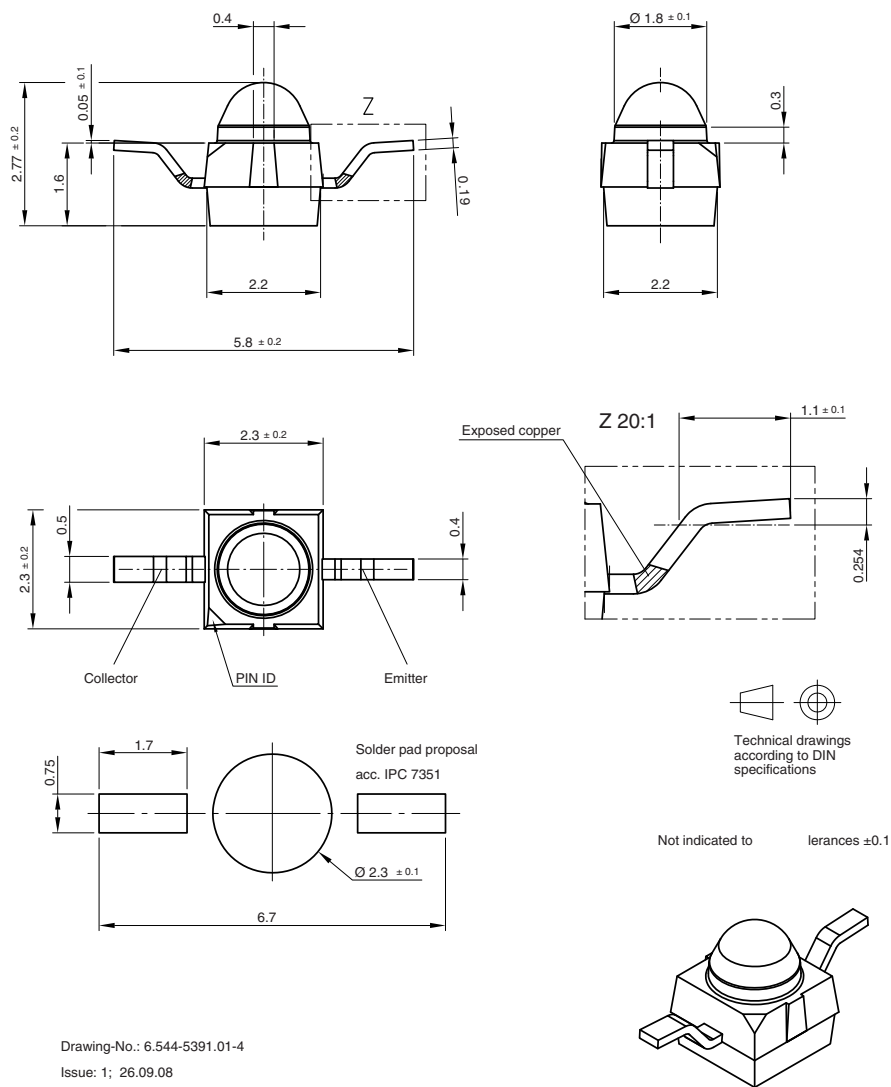


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## PACKAGE DIMENSIONS VENT2000X01 in millimeters



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

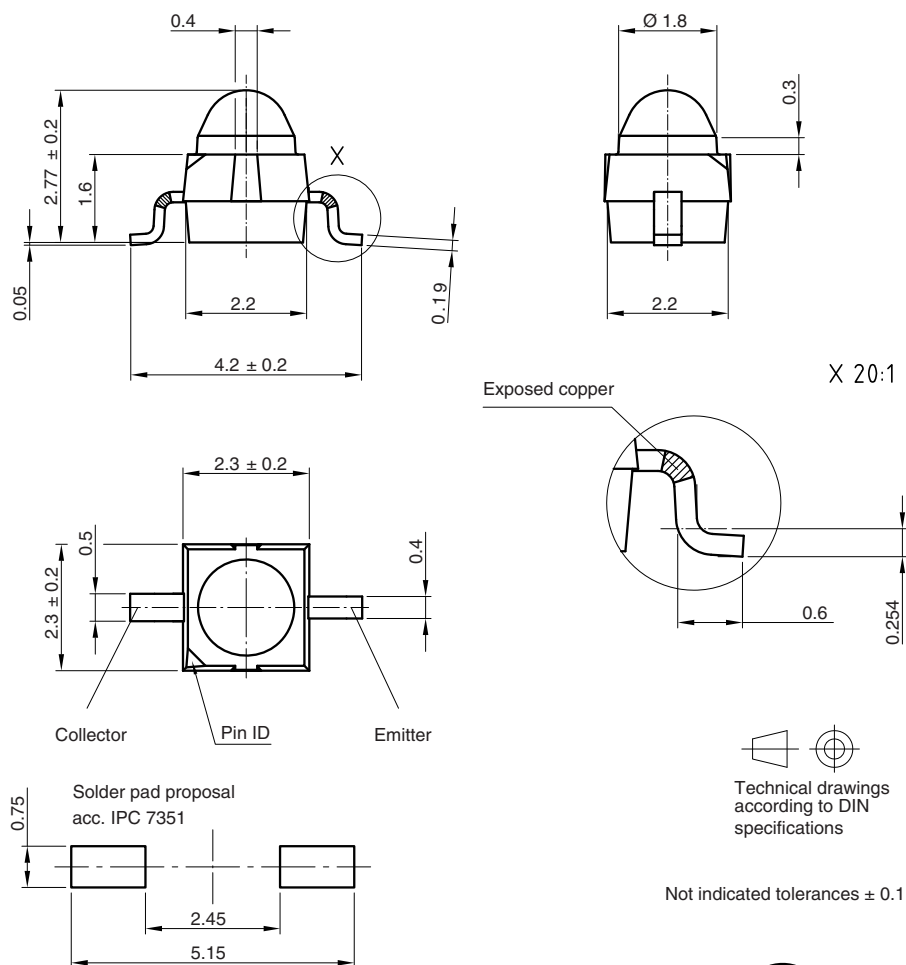
Moisture sensitivity level 2a, acc. to J-STD-020.

## DRYING

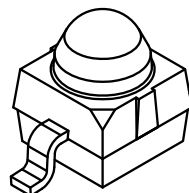
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at  $40^{\circ}\text{C}$  ( $+ 5^{\circ}\text{C}$ ),  $RH < 5\%$ .



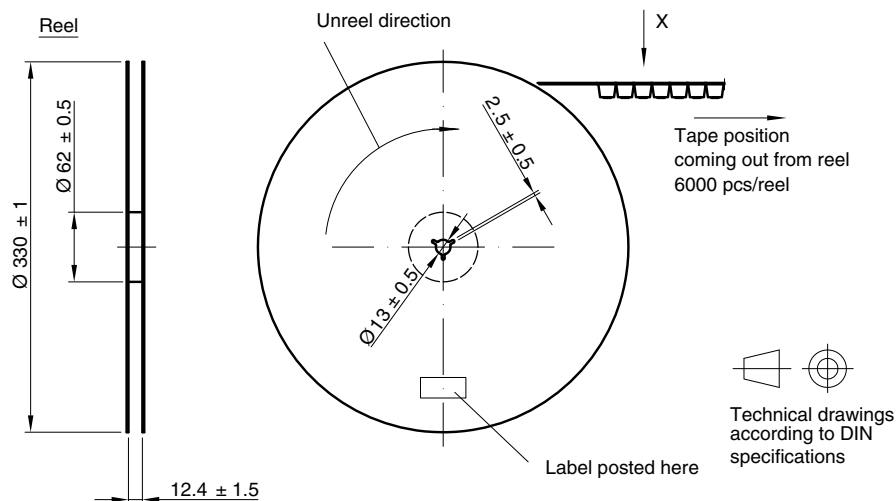
## PACKAGE DIMENSIONS VENT2020X01 in millimeters



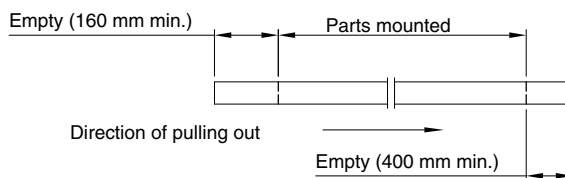
Drawing-No.: 6.544-5383.01-4  
Issue: 4; 28.01.09  
21569



## TAPE AND REEL DIMENSIONS VENT2000X01 in millimeters

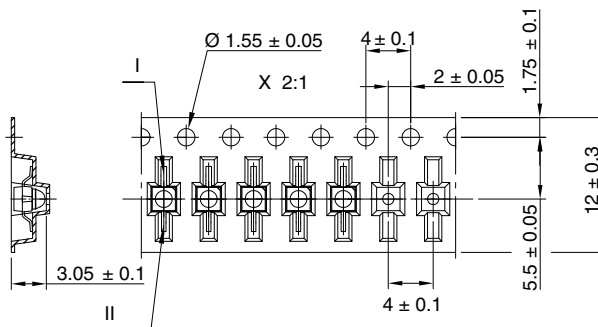


### Leader and trailer tape:



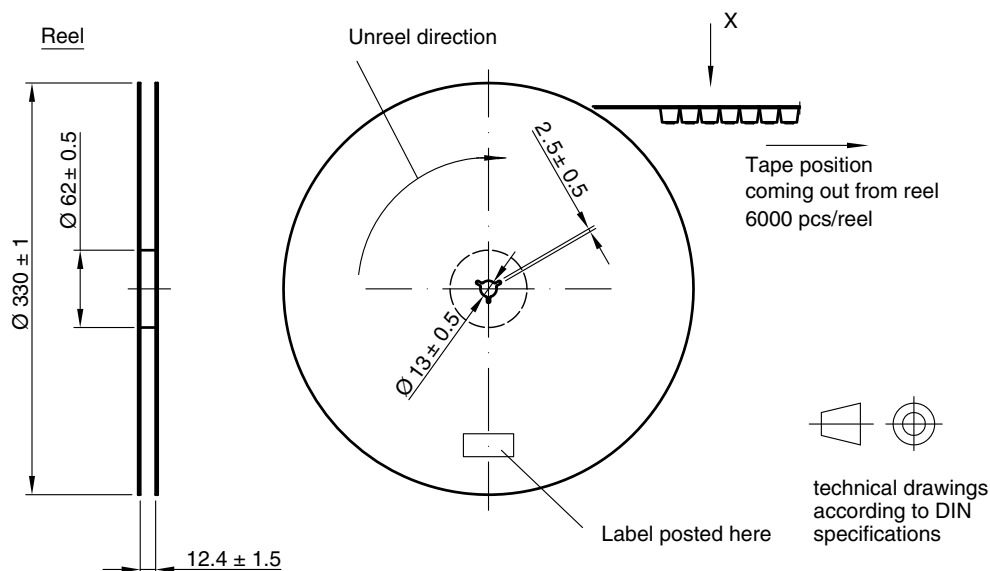
### Terminal position in tape

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

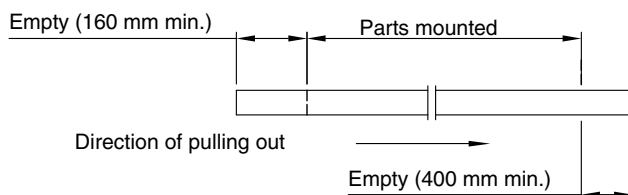


Drawing-No.: 9.800-5100.01-4  
Issue: 2; 18.03.10  
21572

### TAPE AND REEL DIMENSIONS VEMT2020X01 in millimeters

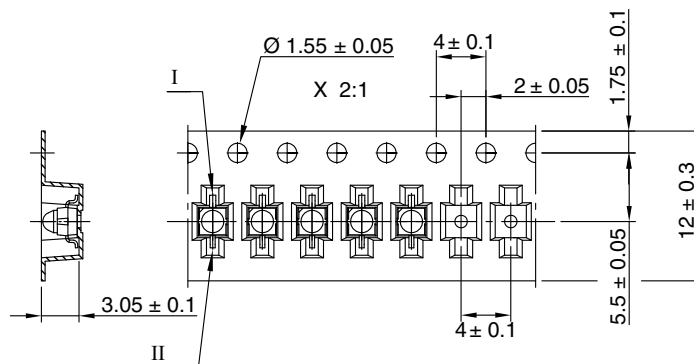


Leader and trailer tape:



## Terminal position in tape

|           |           |         |
|-----------|-----------|---------|
| Devicce   | Lead I    | Lead II |
| VENT2020  | Collector | Emitter |
| VENT2520  |           |         |
| VSMB2020  | Cathode   | Anode   |
| VSMG2020  |           |         |
| VMED2020  |           |         |
| VMED2520  |           |         |
| VSMT2850G | Anode     | Cathode |



Drawing-No.: 9.800-5091.01-4

Issue: 3; 18.03.10

21571



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