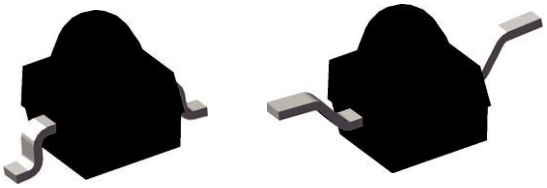
# Silicon NPN Phototransistor



21568 VEMT2020X01 VEMT2000X01

## 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: φ = ± 15°
- 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

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

GREEN (5-2008)**

**Note**

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

## DESCRIPTION

VEMT2000X01 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.

## APPLICATIONS

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

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| **COMPONENT** | **$I_{ca}$ (mA)** | **φ (deg)** | **$\lambda_{0.5}$ (nm)** |
| VEMT2000X01 | 6 | ± 15 | 790 to 970 |
| VEMT2020X01 | 6 | ± 15 | 790 to 970 |

**Note**

- Test condition see table “Basic Characteristics”

| ORDERING INFORMATION | | | |
|---|---|---|---|
| **ORDERING CODE** | **PACKAGING** | **REMARKS** | **PACKAGE FORM** |
| VEMT2000X01 | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VEMT2020X01 | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Gullwing |

**Note**

- MOQ: minimum order quantity

| ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °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 |

| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Power power dissipation | $T_{amb} \leq 75$ °C | $P_V$ | 100 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 100 | °C |
| Storage temperature range | | $T_{stg}$ | - 40 to + 100 | °C |
| Soldering temperature | Acc. reflow profile fig. 8 | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ambient | Acc. J-STD-051 | $R_{thJA}$ | 250 | K/W |

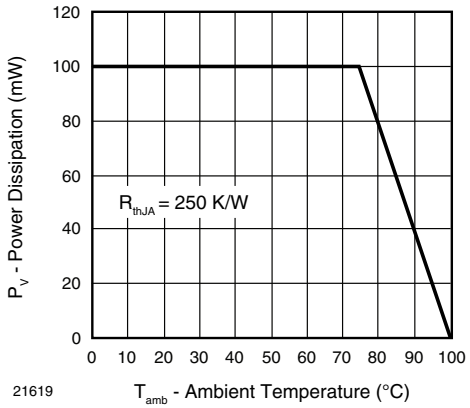



Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| **BASIC CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Collector emitter breakdown voltage | $I_C$ = 0.1 mA | $V_{CEO}$ | 20 | | | V |
| Collector dark current | $V_{CE}$ = 5 V, E = 0 | $I_{CEO}$ | | 1 | 100 | nA |
| Collector emitter capacitance | $V_{CE}$ = 0 V, f = 1 MHz, E = 0 | $C_{CEO}$ | | 25 | | pF |
| Collector light current | $E_e$ = 1 mW/cm², λ = 950 nm, $V_{CE}$ = 5 V | $I_{ca}$ | 3 | 6 | 9 | mA |
| Angle of half sensitivity | | φ | | ± 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 mA | $V_{CEsat}$ | | | 0.4 | V |
| Temperature coefficient of $I_{ca}$ | $E_e$ = 1 mW/cm², λ = 950 nm, $V_{CE}$ = 5 V | $Tk_{Ica}$ | | 1.1 | | %/K |

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

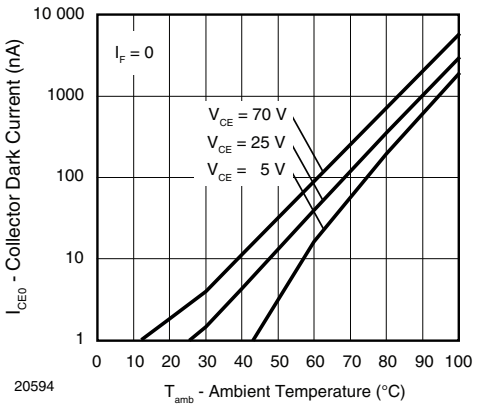



Fig. 2 - Collector Dark Current vs. Ambient Temperature

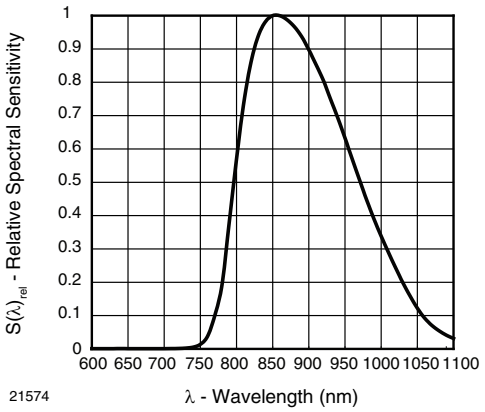



Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

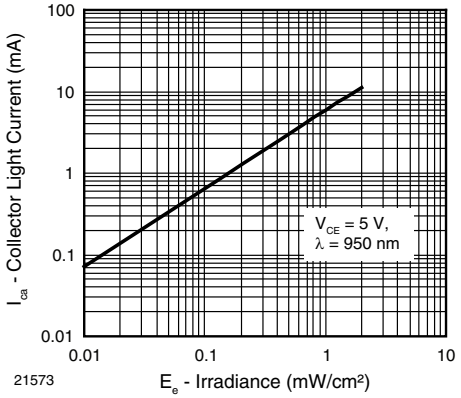



Fig. 3 - Collector Light Current vs. Irradiance

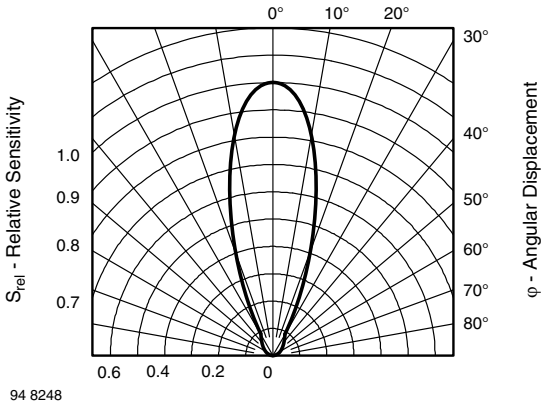



Fig. 6 - Relative Radiant Sensitivity vs. Angular Displacement

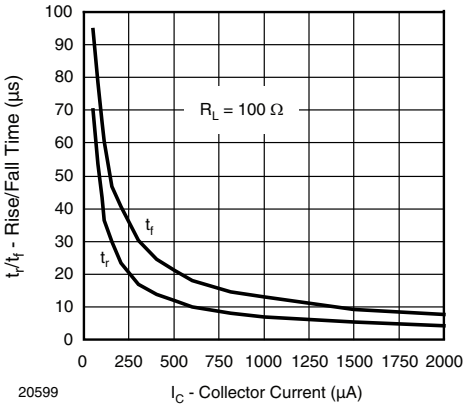



Fig. 4 - Rise/Fall Time vs. Collector Current

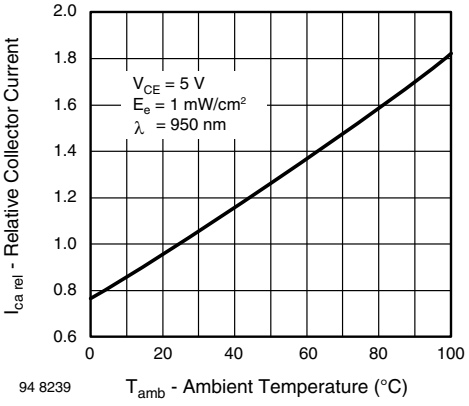



Fig. 7 - Relative Collector Current vs. Ambient Temperature

## REFLOW SOLDER PROFILE

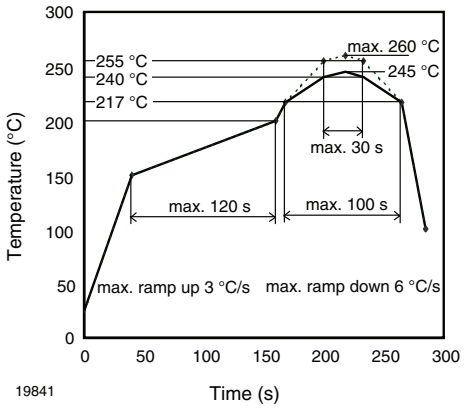



Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## 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.

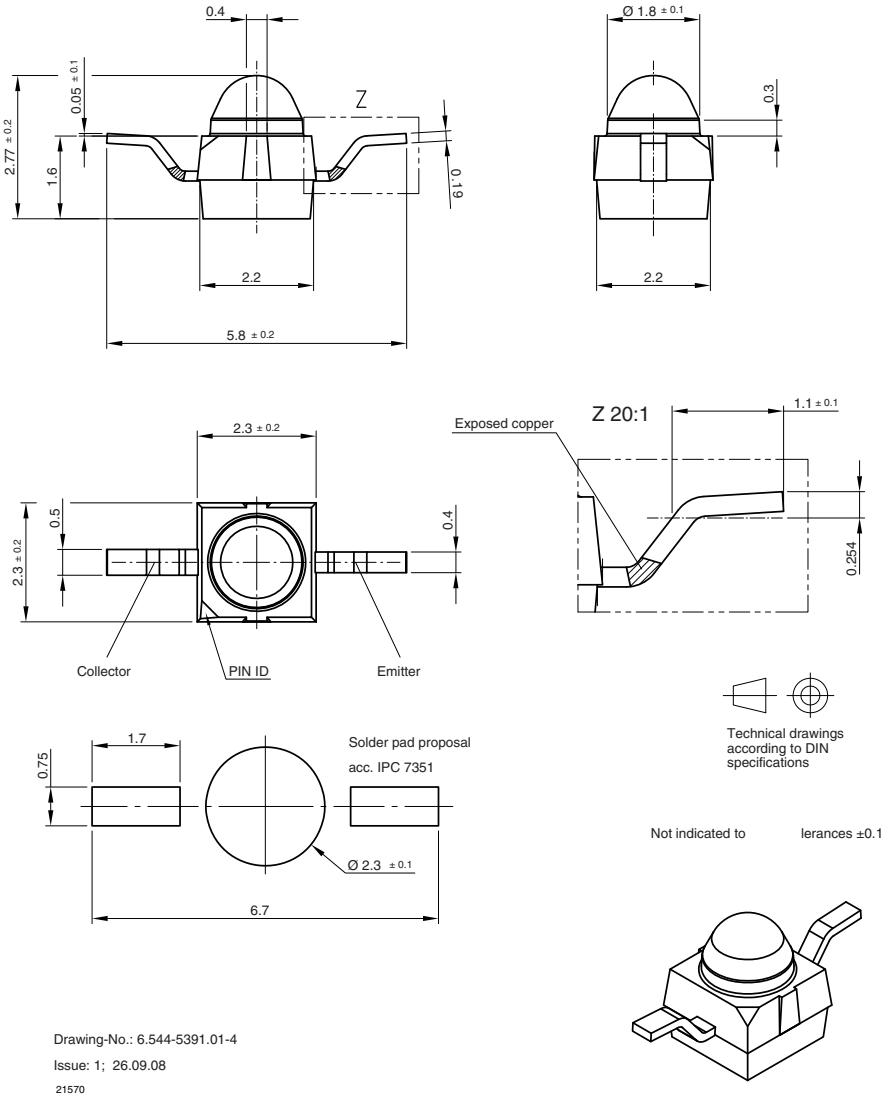
## FLOOR LIFE

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 °C, RH < 60 %
Moisture sensitivity level 2a, acc. to J-STD-020.

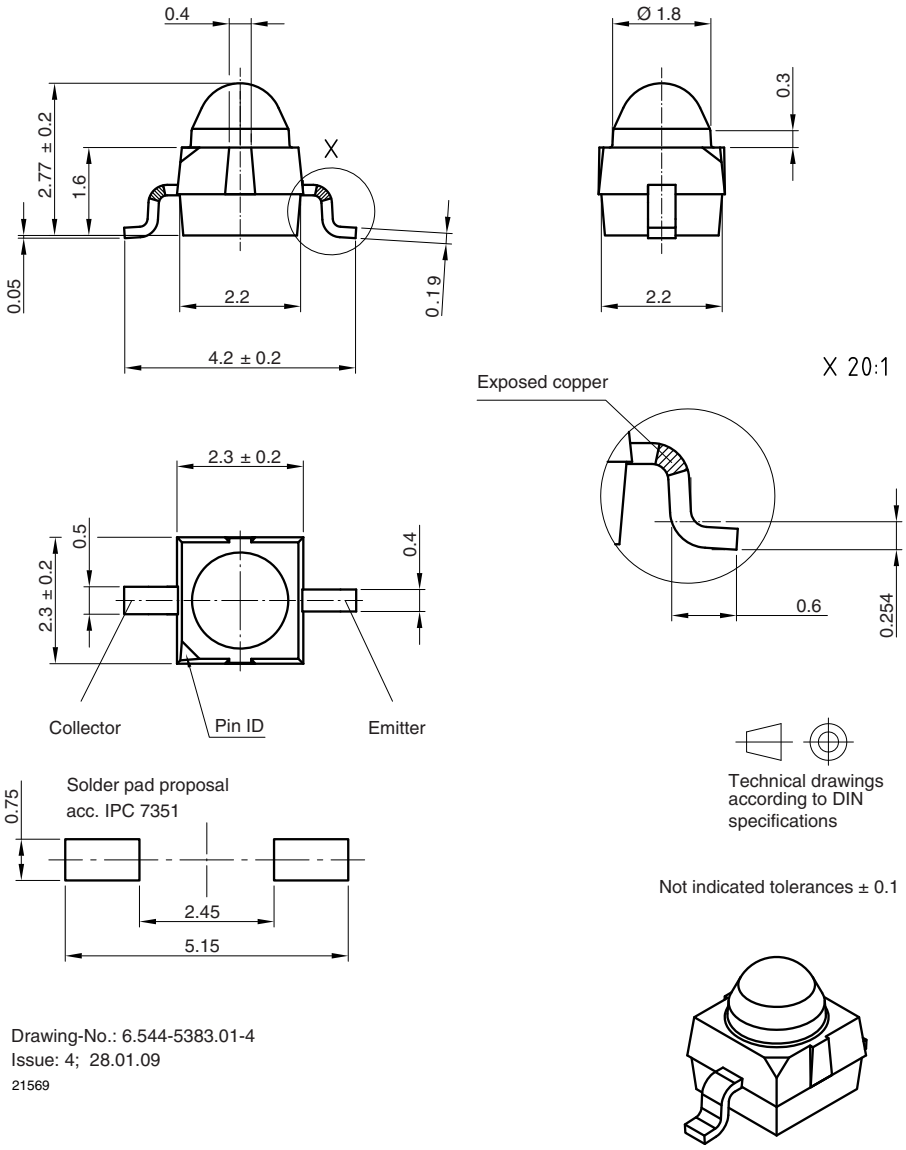
## DRYING

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 °C (+ 5 °C), RH < 5 %.

## PACKAGE DIMENSIONS VEMT2000X01 in millimeters

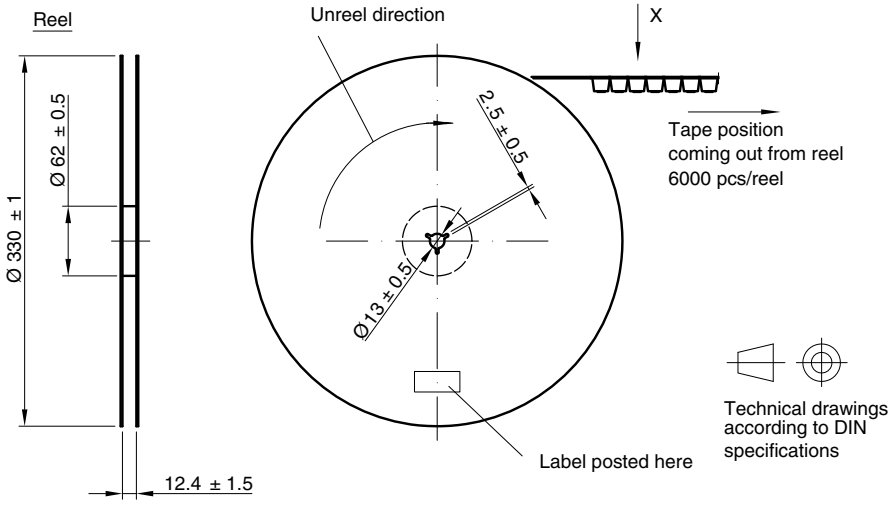


**PACKAGE DIMENSIONS VEMT2020X01** in millimeters

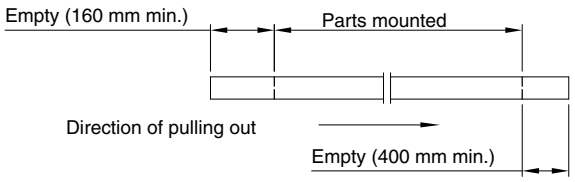



Drawing-No.: 6.544-5383.01-4
Issue: 4; 28.01.09
21569

## TAPE AND REEL DIMENSIONS VEMT2000X01 in millimeters

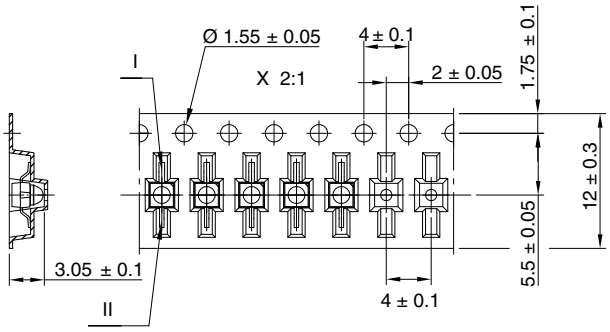



Leader and trailer tape:



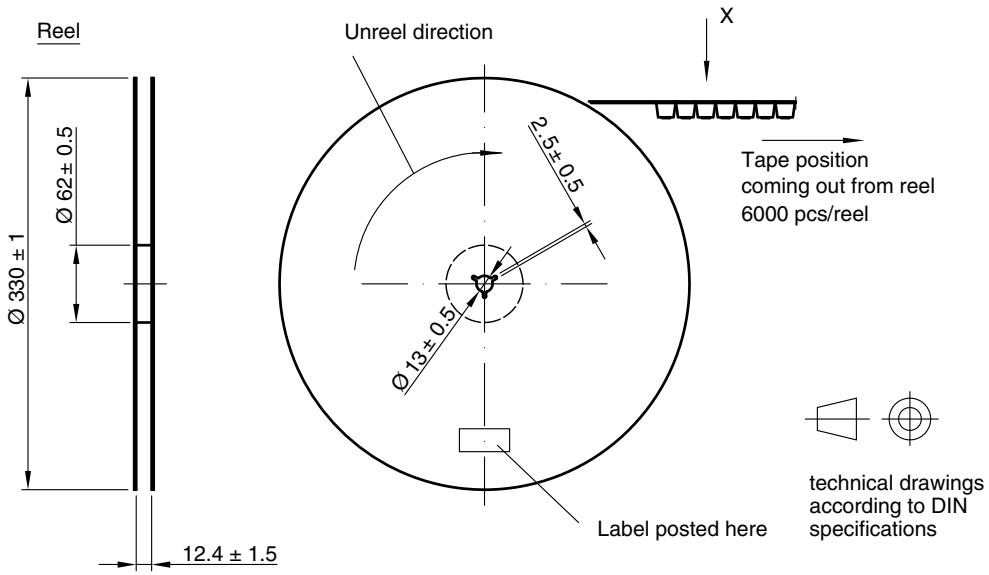

Terminal position in tape

| Devicce | Lead I | Lead II |
|---|---|---|
| VEMT2000 | Collector | Emitter |
| VEMT2500 | | |
| VEMD2000 | Cathode | Anode |
| VEMD2500 | | |
| VSMB2000 | | |
| VSMG2000 | | |
| VSMY2850RG | Anode | Cathode |

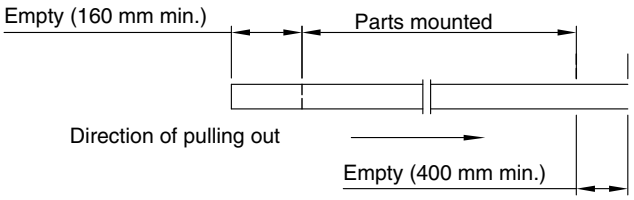



Drawing-No.: 9.800-5100.01-4
Issue: 2; 18.03.10
21572

## TAPE AND REEL DIMENSIONS VEMT2020X01 in millimeters

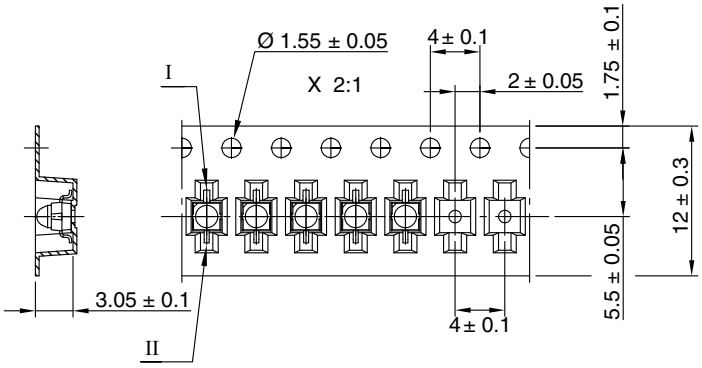



Leader and trailer tape:




Terminal position in tape

| Devicce | Lead I | Lead II |
|---|---|---|
| VEMT2020 | Collector | Emitter |
| VEMT2520 | | |
| VSMB2020 | Cathode | Anode |
| VSMG2020 | | |
| VEMD2020 | | |
| VEMD2520 | | |
| VSMY2850G | Anode | Cathode |

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Issue: 3; 18.03.10
21571

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