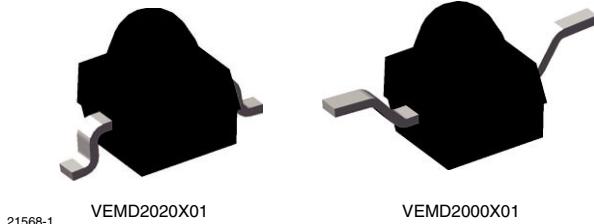


## Silicon PIN Photodiode



21568-1 VEMD2020X01

VEMD2000X01

### 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

AUTOMOTIVE GRADE



e3

**RoHS**  
COMPLIANT

**GREEN**  
*(S-2008)\*\*\**

### DESCRIPTION

VEMD2000X01 and VEMD2020X01 are high speed and high sensitive PIN photodiodes in a miniature surface mount package (SMD) with dome lens and daylight blocking filter. Filter is matched with IR emitters operating at wavelength of 830 nm to 950 nm. The photo sensitive area of the chip is 0.23 mm<sup>2</sup>.

### Note

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

### APPLICATIONS

- High speed photo detector
- Infrared remote control
- Infrared data transmission
- Photo interrupters
- Shaft encoders

### PRODUCT SUMMARY

| COMPONENT   | I <sub>ra</sub> ( $\mu$ A) | $\phi$ (deg) | $\lambda_{0.5}$ (nm) |
|-------------|----------------------------|--------------|----------------------|
| VEMD2000X01 | 12                         | $\pm 15$     | 750 to 1050          |
| VEMD2020X01 | 12                         | $\pm 15$     | 750 to 1050          |

### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM     |
|---------------|---------------|------------------------------|------------------|
| VEMD2000X01   | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VEMD2020X01   | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Gullwing         |

### Note

- MOQ: minimum order quantity

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

| PARAMETER                           | TEST CONDITION                    | SYMBOL            | VALUE         | UNIT |
|-------------------------------------|-----------------------------------|-------------------|---------------|------|
| Reverse voltage                     |                                   | V <sub>R</sub>    | 60            | V    |
| Power dissipation                   | $T_{amb} \leq 25^\circ C$         | P <sub>V</sub>    | 215           | mW   |
| Junction temperature                |                                   | T <sub>j</sub>    | 100           | °C   |
| Operating temperature range         |                                   | T <sub>amb</sub>  | - 40 to + 100 | °C   |
| Storage temperature range           |                                   | T <sub>stg</sub>  | - 40 to + 100 | °C   |
| Soldering temperature               | Acc. reflow solder profile fig. 7 | T <sub>sd</sub>   | 260           | °C   |
| Thermal resistance junction/ambient | Acc. J-STD-051                    | R <sub>thJA</sub> | 250           | K/W  |

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25^\circ C$ , unless otherwise specified) |   |                 |      |             |      |      |
|---|---|-----------------|------|-------------|------|------|
| PARAMETER   | TEST CONDITION  | SYMBOL          | MIN. | TYP.        | MAX. | UNIT |
| Forward voltage   | $I_F = 50 \text{ mA}$   | $V_F$           |      | 1           |      | V    |
| Breakdown voltage   | $I_R = 100 \mu\text{A}, E = 0$  | $V_{(BR)}$      | 32   |             |      | V    |
| Reverse dark current  | $V_R = 10 \text{ V}, E = 0$   | $I_{ro}$        |      | 1           | 10   | nA   |
| Diode capacitance   | $V_R = 0 \text{ V}, f = 1 \text{ MHz}, E = 0$                           | $C_D$           |      | 4           |      | pF   |
|   | $V_R = 5 \text{ V}, f = 1 \text{ MHz}, E = 0$                           | $C_D$           |      | 1.3         |      | pF   |
| Open circuit voltage  | $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$                     | $V_o$           |      | 350         |      | mV   |
| Temperature coefficient of $V_o$  | $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$                     | $TK_{Vo}$       |      | - 2.6       |      | mV/K |
| Short circuit current   | $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$                     | $I_k$           |      | 11          |      | μA   |
| Temperature coefficient of $I_k$  | $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$                     | $TK_{Ik}$       |      | 0.1         |      | %/K  |
| Reverse light current   | $E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}, V_R = 5 \text{ V}$  | $I_{ra}$        | 8.5  | 12          | 17   | μA   |
| Angle of half sensitivity   |   | $\phi$          |      | ± 15        |      | deg  |
| Wavelength of peak sensitivity  |   | $\lambda_p$     |      | 940         |      | nm   |
| Range of spectral bandwidth   |   | $\lambda_{0.5}$ |      | 750 to 1050 |      | nm   |
| Rise time   | $V_R = 10 \text{ V}, R_L = 1 \text{ k}\Omega, \lambda = 820 \text{ nm}$ | $t_r$           |      | 100         |      | ns   |
| Fall time   | $V_R = 10 \text{ V}, R_L = 1 \text{ k}\Omega, \lambda = 820 \text{ nm}$ | $t_f$           |      | 100         |      | ns   |

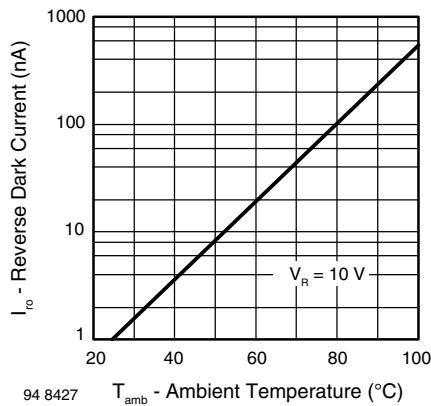
**BASIC CHARACTERISTICS** ( $T_{amb} = 25^\circ C$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

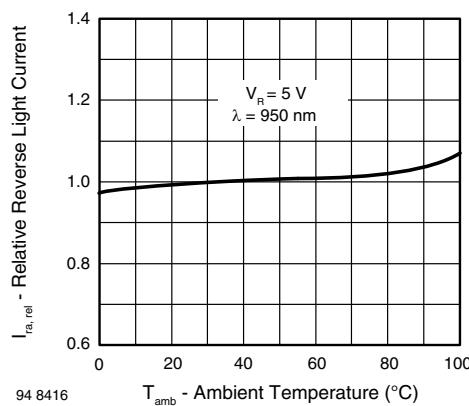


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

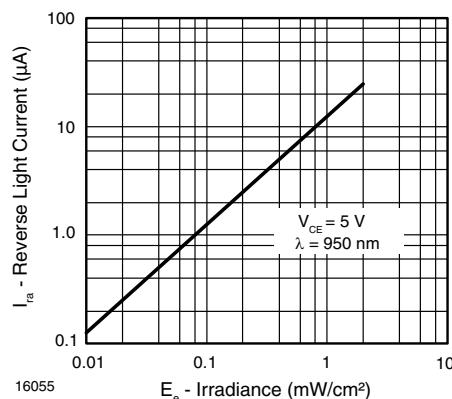


Fig. 3 - Reverse Light Current vs. Irradiance

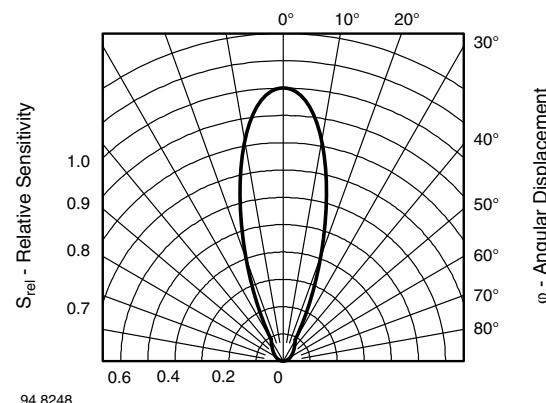


Fig. 6 - Relative Radiant Intensity vs. Angular Displacement

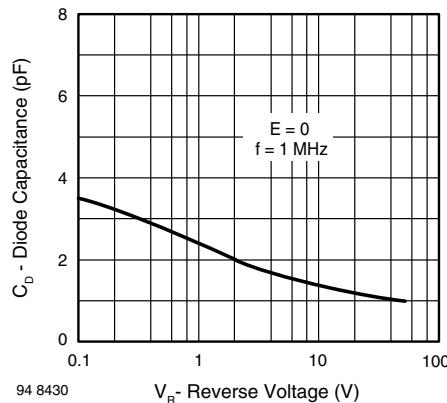


Fig. 4 - Diode Capacitance vs. Reverse Voltage

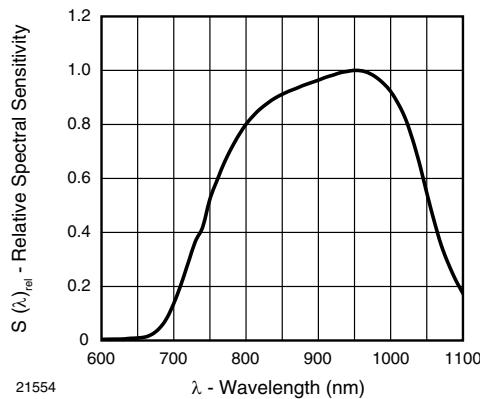


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

## REFLOW SOLDER PROFILE

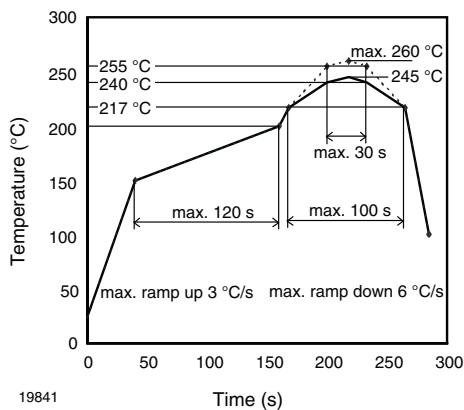
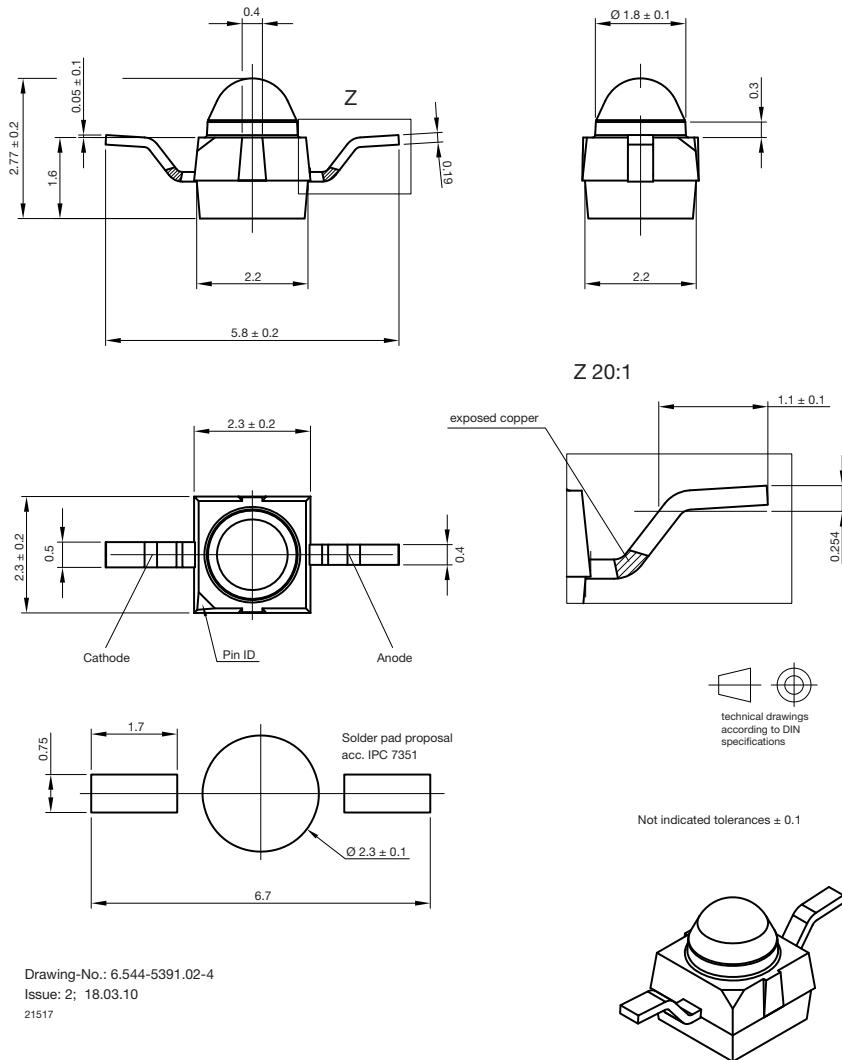
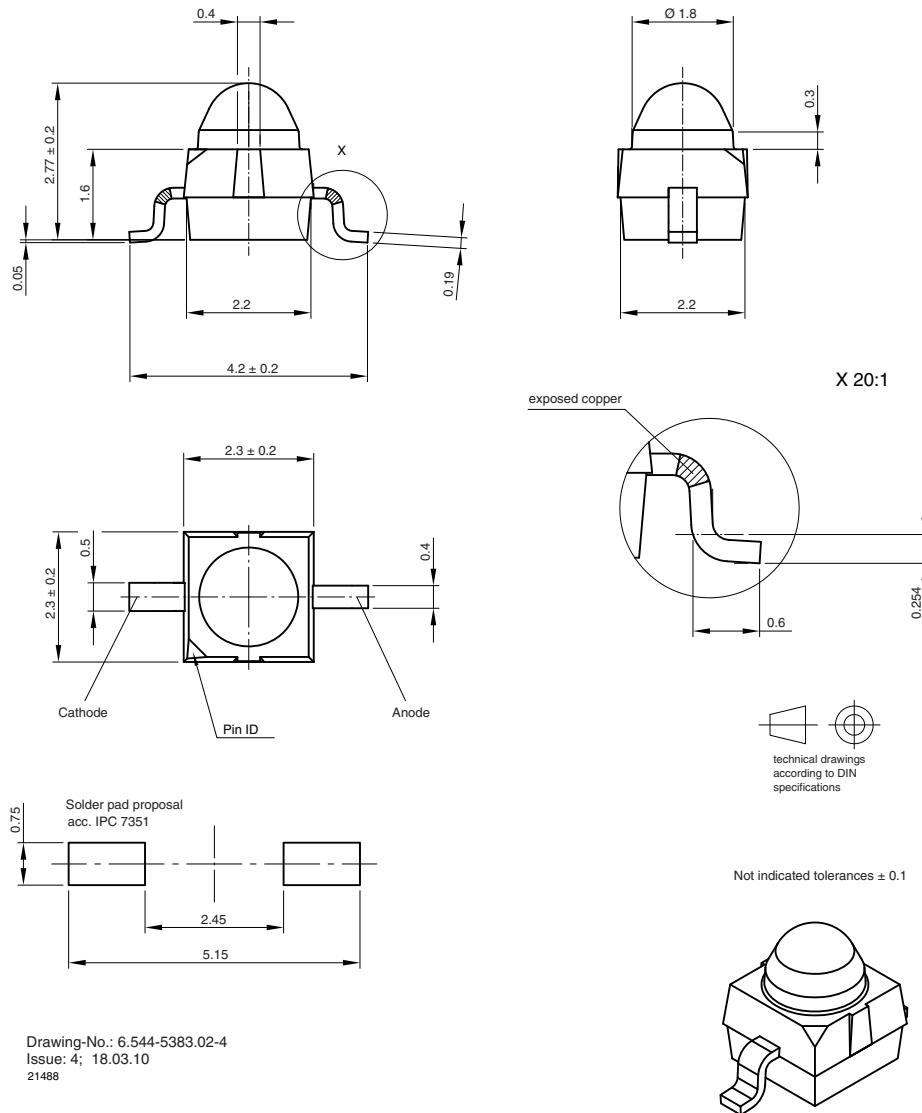
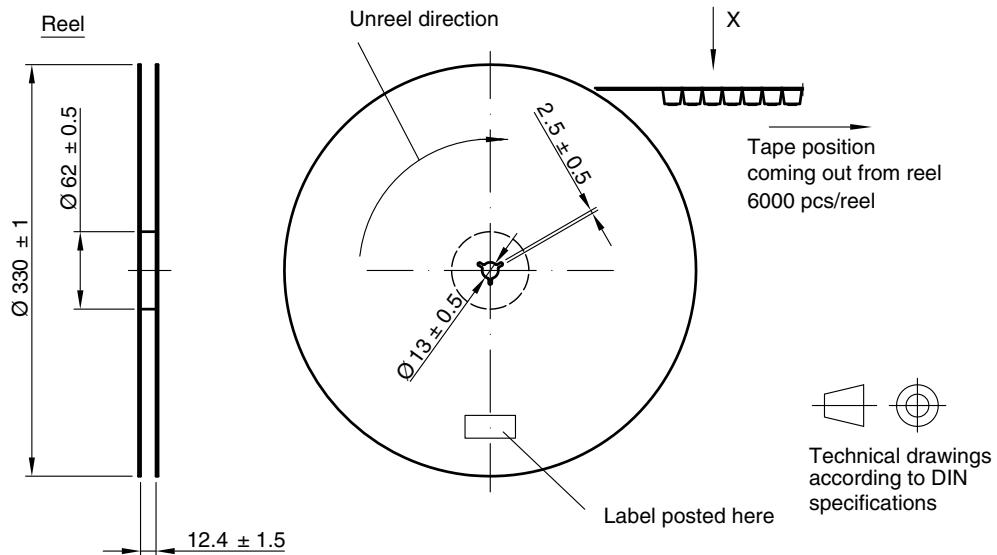
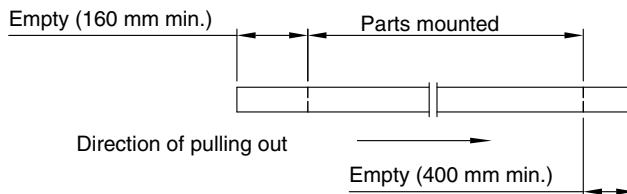


Fig. 7 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020D

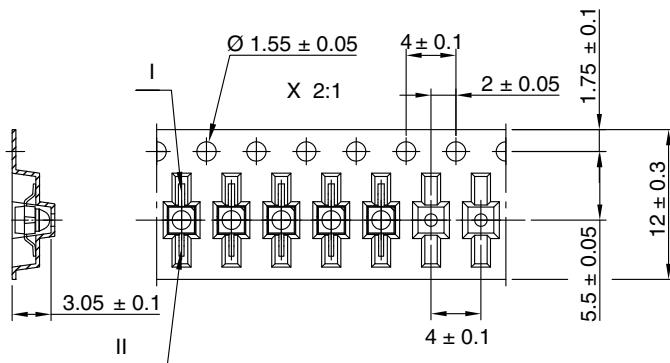
## PACKAGE DIMENSIONS in millimeters: **VEMD2000**



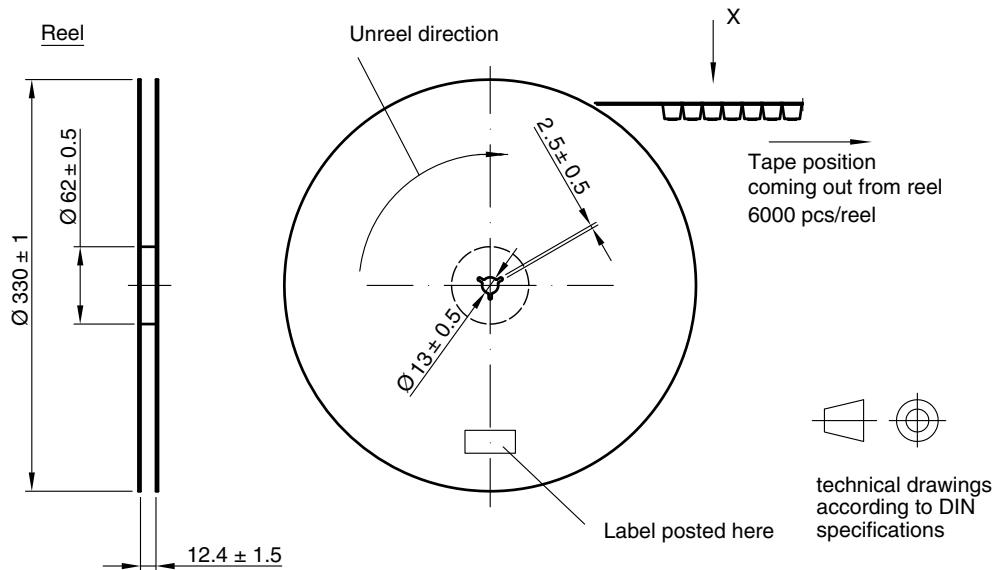
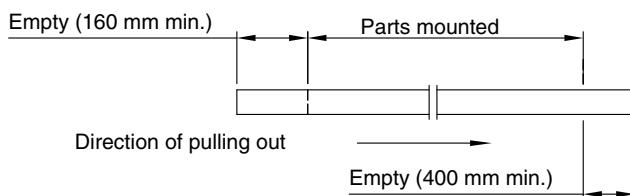
**PACKAGE DIMENSIONS** in millimeters: **VEMD2020**


**TAPING AND REEL DIMENSIONS** in millimeters: **VEMD2000**

Leader and trailer tape:

Terminal position in tape

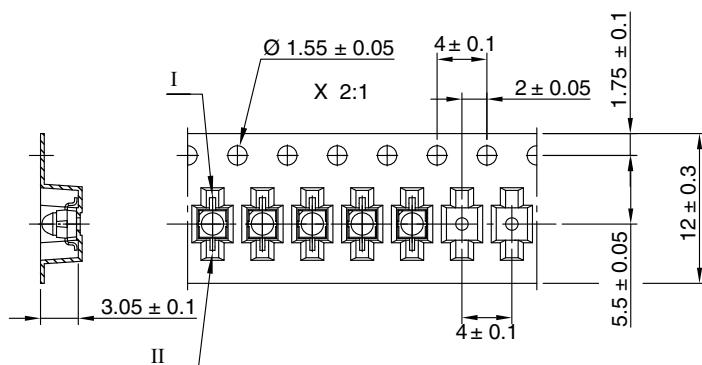
| Device      | Lead I    | Lead II |
|-------------|-----------|---------|
| VEMT2000    |           |         |
| VEMT2500    | Collector | Emitter |
| VEMD2000    |           |         |
| VEMD2500    |           |         |
| VSMB2000    | Cathode   | Anode   |
| VSMG2000    |           |         |
| VS MY2850RG | Anode     | Cathode |



Drawing-No.: 9.800-5100.01-4  
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**TAPING AND REEL DIMENSIONS** in millimeters: **VEMD2020**

Leader and trailer tape:

Terminal position in tape

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



Drawing-No.: 9.800-5091.01-4

Issue: 3; 18.03.10

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