# High Speed Infrared Emitting Diodes, 890 nm, GaAlAs, DH

VSMF2890RGX01 VSMF2890GX01

## 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
- Peak wavelength: $\lambda_p$ = 890 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: $\varphi$ = ± 12°
- 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

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

GREEN (5-2008)

## DESCRIPTION

VSMF2890RG(G)X01 series are infrared, 890 nm emitting diodes in GaAlAs (DH) technology with high radiant power and high speed, molded in clear, untinted plastic packages (with lens) for surface mounting (SMD).

## APPLICATIONS

- IrDA compatible data transmission
- 3D TV
- Miniature light barrier
- Photointerrupters
- Optical switch
- Shaft encoders
- IR emitter source for proximity applications

**PRODUCT SUMMARY**

| COMPONENT | $I_e$ (mW/sr) | $\varphi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|---|---|---|---|---|
| VSMF2890RGX01 | 40 | ± 12 | 890 | 30 |
| VSMF2890GX01 | 40 | ± 12 | 890 | 30 |

**Note**

- Test conditions see table “Basic Characteristics“

**ORDERING INFORMATION**

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|---|---|---|---|
| VSMF2890RGX01 | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VSMF2890GX01 | 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** |
| Reverse voltage | | $V_R$ | 5 | V |
| Forward current | | $I_F$ | 100 | mA |
| Peak forward current | $t_p/T$ = 0.5, $t_p$ = 100 µs | $I_{FM}$ | 200 | mA |
| Surge forward current | $t_p$ = 100 µs | $I_{FSM}$ | 1 | A |
| Power dissipation | | $P_V$ | 160 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 85 | °C |
| Storage temperature range | | $T_{stg}$ | - 40 to + 100 | °C |
| Soldering temperature | Acc. figure 9, J-STD-020 | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ambient | J-STD-051, leads 7 mm, soldered on PCB | $R_{thJA}$ | 250 | K/W |

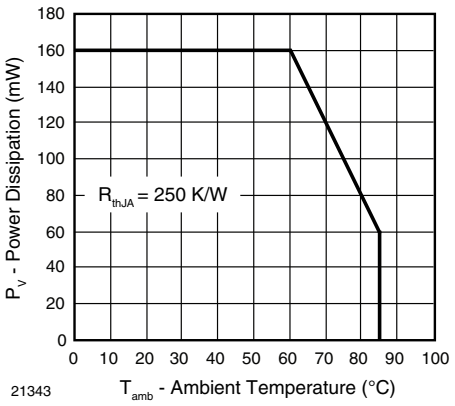



Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

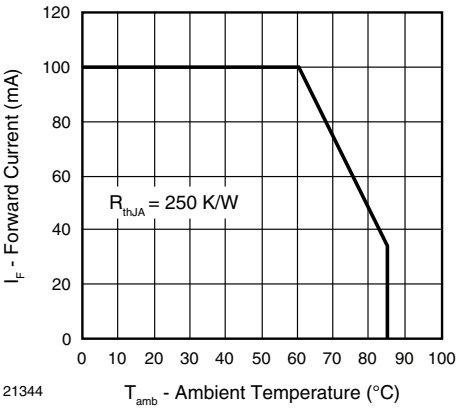



Fig. 2 - Forward Current Limit vs. Ambient Temperature

| **BASIC CHARACTERSITICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Forward voltage | $I_F$ = 100 mA, $t_p$ = 20 ms | $V_F$ | 1.25 | 1.4 | 1.6 | V |
| | $I_F$ = 1 A, $t_p$ = 100 µs | $V_F$ | | 2.3 | | V |
| Temperature coefficient of $V_F$ | $I_F$ = 1 mA | $TK_{VF}$ | | - 1.8 | | mV/K |
| | $I_F$ = 100 mA | $TK_{VF}$ | | - 1.1 | | mV/K |
| Reverse current | $V_R$ = 5 V | $I_R$ | | | 10 | µA |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz, E = 0 mW/cm$^2$ | $C_J$ | | 125 | | pF |
| Radiant intensity | $I_F$ = 100 mA, $t_p$ = 20 ms | $I_e$ | 20 | 40 | 60 | mW/sr |
| | $I_F$ = 1 A, $t_p$ = 100 µs | $I_e$ | | 350 | | mW/sr |
| Radiant power | $I_F$ = 100 mA, $t_p$ = 20 ms | $\phi_e$ | | 40 | | mW |
| Temperature coefficient of $\phi_e$ | $I_F$ = 100 mA | $TK\phi_e$ | | - 0.35 | | %/K |
| Angle of half intensity | | $\varphi$ | | ± 12 | | deg |
| Peak wavelength | $I_F$ = 30 mA | $\lambda_p$ | 870 | 890 | 910 | nm |
| Spectral bandwidth | $I_F$ = 30 mA | $\Delta\lambda$ | | 40 | | nm |
| Temperature coefficient of $\lambda_p$ | $I_F$ = 30 mA | $TK\lambda_p$ | | 0.25 | | nm/K |
| Rise time | $I_F$ = 100 mA, 20 % to 80 % | $t_r$ | | 30 | | ns |
| Fall time | $I_F$ = 100 mA, 20 % to 80 % | $t_f$ | | 30 | | ns |
| Cut-off frequency | $I_{DC}$ = 70 mA, $I_{AC}$ = 30 mA pp | $f_c$ | | 12 | | MHz |
| Virtual source diameter | | d | | 1.5 | | mm |

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

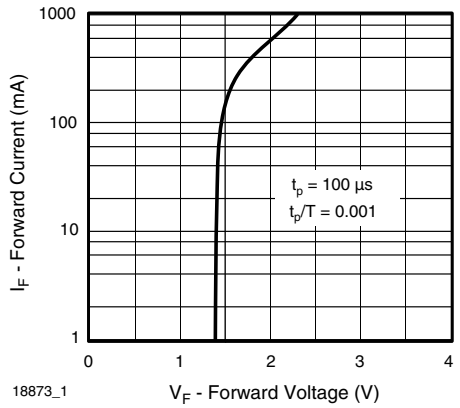



Fig. 3 - Forward Current vs. Forward Voltage

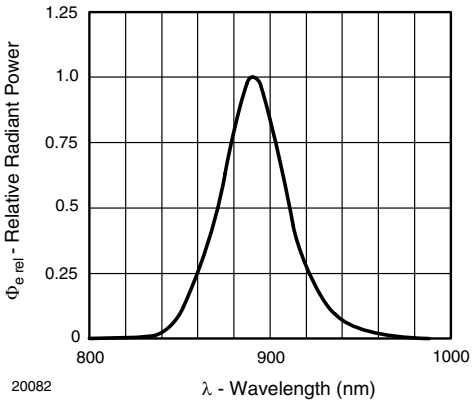



Fig. 6 - Relative Radiant Power vs. Wavelength

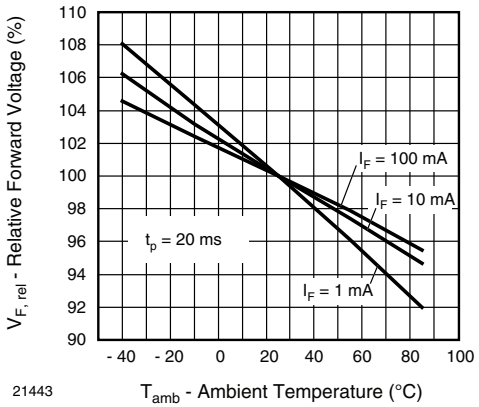



Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

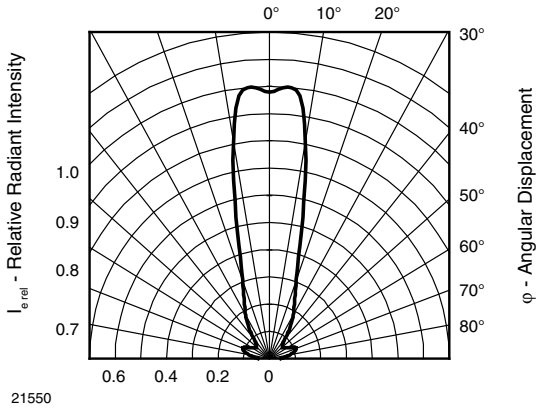



Fig. 7 - Relative Radiant Intensity vs. Angular Displacement

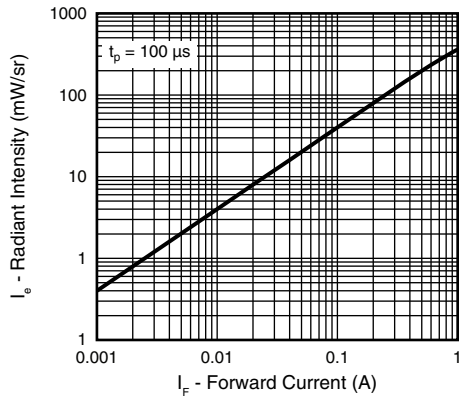



Fig. 5 - Radiant Intensity vs. Forward Current

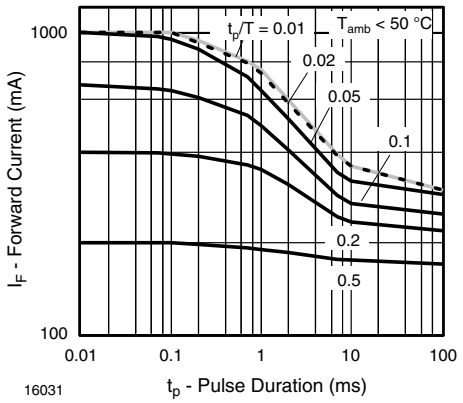



Fig. 8 - Pulse Forward Current vs. Pulse Duration

## SOLDER PROFILE

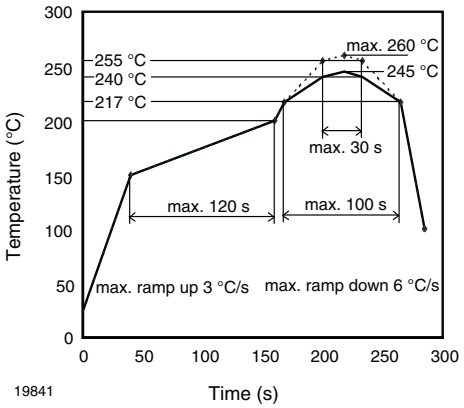



Fig. 9 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## 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

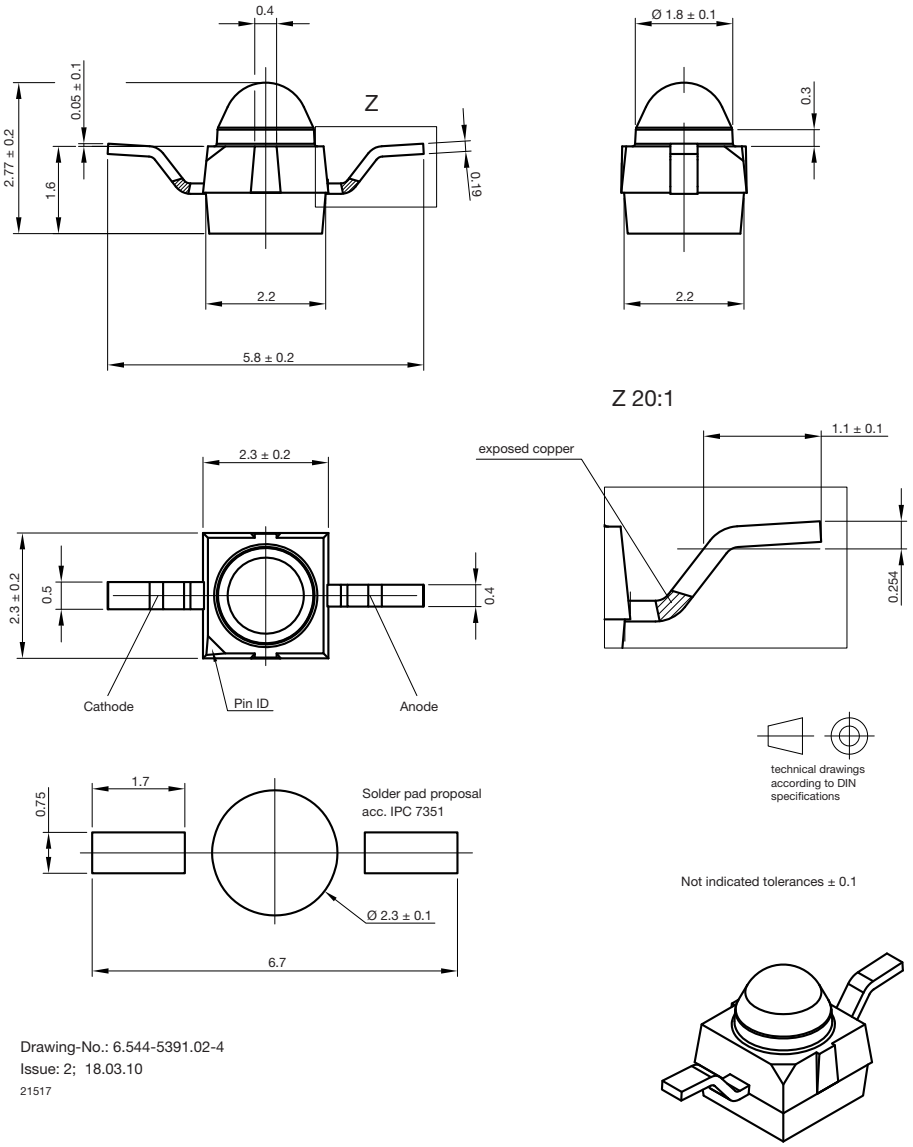
Conditions: $T_{amb}$ < 30 °C, RH < 60 %

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

## DRYING

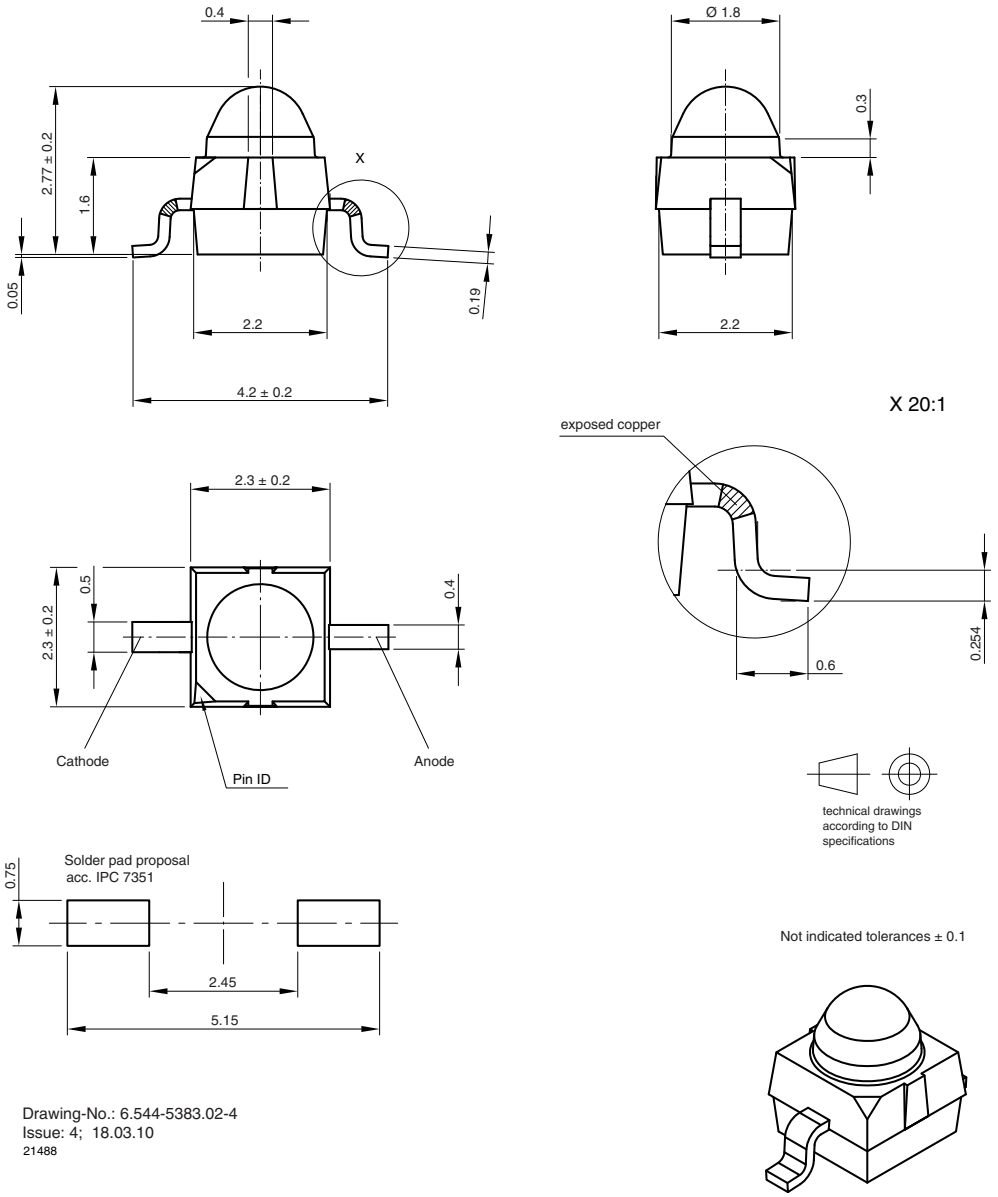
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at 40 °C (+ 5 °C), RH < 5 %.

## PACKAGE DIMENSIONS in millimeters: VSMF2890RGX01



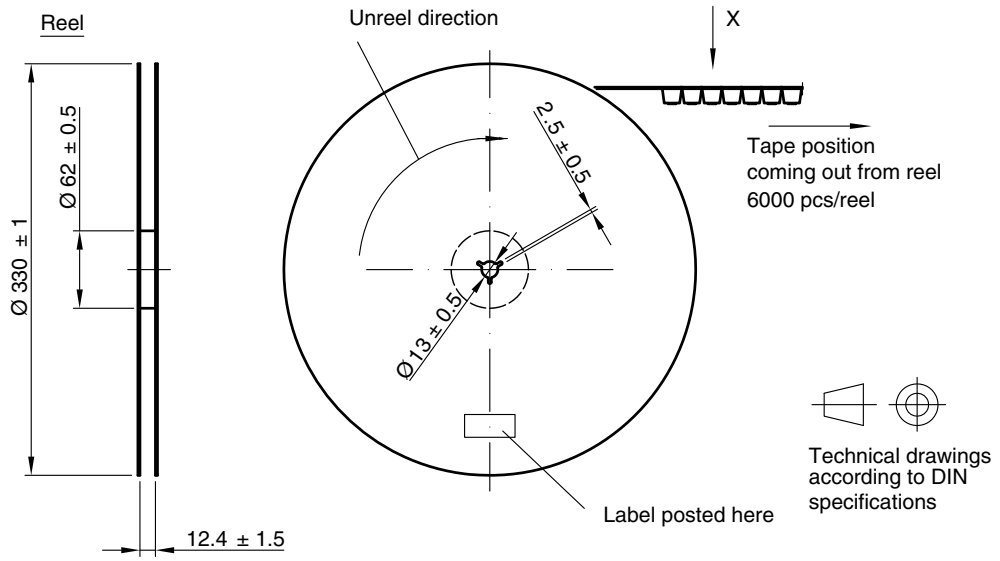

Drawing-No.: 6.544-5391.02-4
Issue: 2; 18.03.10
21517

**PACKAGE DIMENSIONS** in millimeters: **VSMF2890GX01**

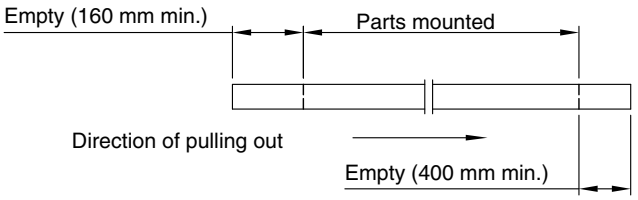



Drawing-No.: 6.544-5383.02-4
Issue: 4; 18.03.10
21488

## **TAPING AND REEL DIMENSIONS** in millimeters: **VSMF2890RGX01**

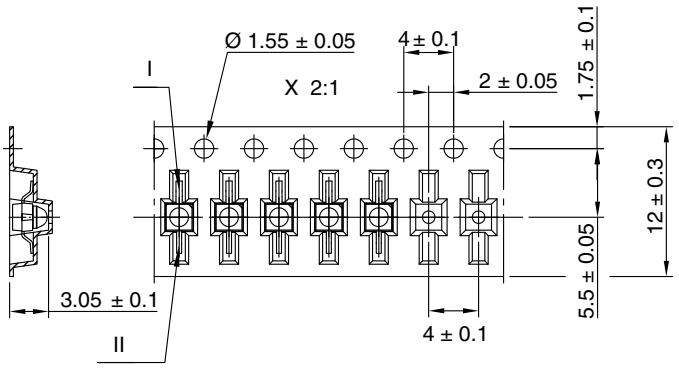



Leader and trailer tape:



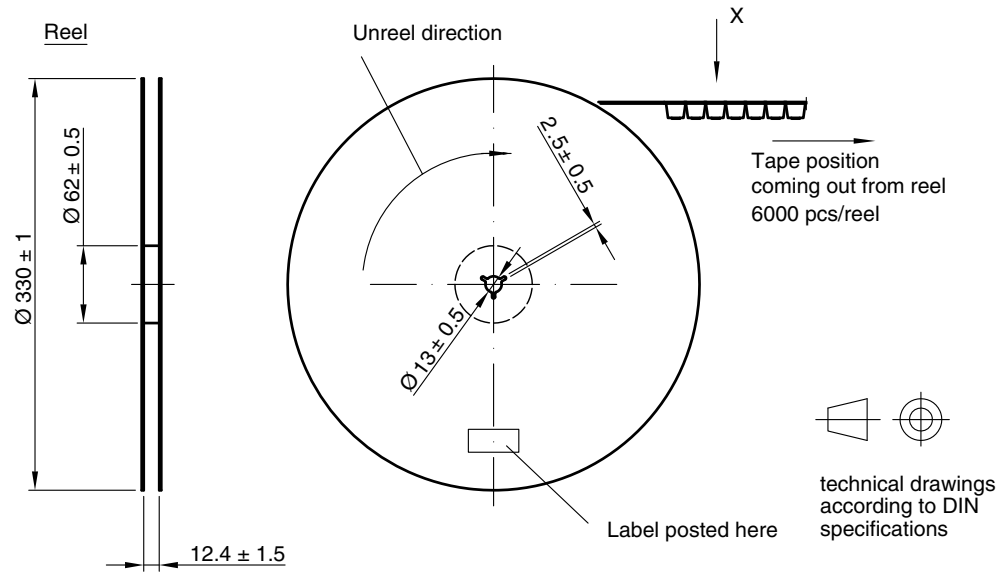

Terminal position in tape

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

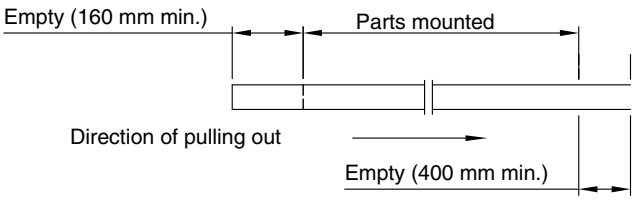



Drawing-No.: 9.800-5100.01-4
Issue: 2; 18.03.10
21572

## **TAPING AND REEL DIMENSIONS** in millimeters: **VSMF2890GX01**

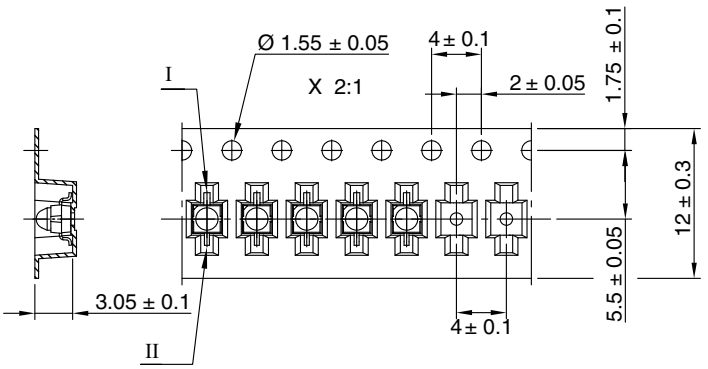



Leader and trailer tape:




Terminal position in tape

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




Drawing-No.: 9.800-5091.01-4
Issue: 3; 18.03.10
21571

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