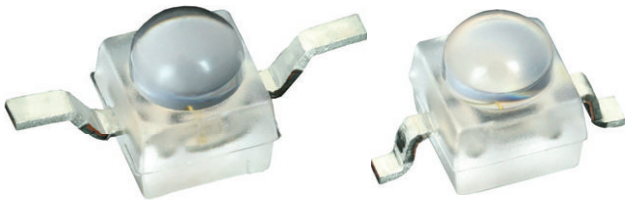
# High Speed Infrared Emitting Diodes, 940 nm, GaAlAs, MQW

VSMB2943RGX01 VSMB2943GX01



## DESCRIPTION

VSMB2943X01 series are infrared, 940 nm emitting diodes in GaAlAs multi quantum well (MQW) 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
- Miniature light barrier
- IR touch panels
- 3D TV
- Photointerrupters
- Optical switch
- Control and drive circuits
- Shaft encoders

## 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
- Peak wavelength: $\lambda_p$ = 940 nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: φ = ± 25°
- Low forward voltage
- Suitable for high pulse current operation
- Terminal configurations: gullwing or reserve gullwing
- Package matches with detector VEMD2xx3X01 and VEMT2xx3X01 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

HALOGEN FREE

GREEN (5-2008)

## PRODUCT SUMMARY

| COMPONENT | $I_e$ (mW/sr) | φ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|---|---|---|---|---|
| VSMB2943RGX01 | 20 | ± 25 | 940 | 15 |
| VSMB2943GX01 | 20 | ± 25 | 940 | 15 |

**Note**

- Test conditions see table “Basic Characteristics“

## ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|---|---|---|---|
| VSMB2943RGX01 | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VSMB2943GX01 | 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 | according 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 |

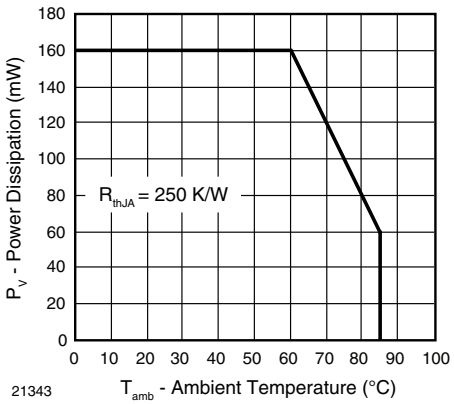



Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

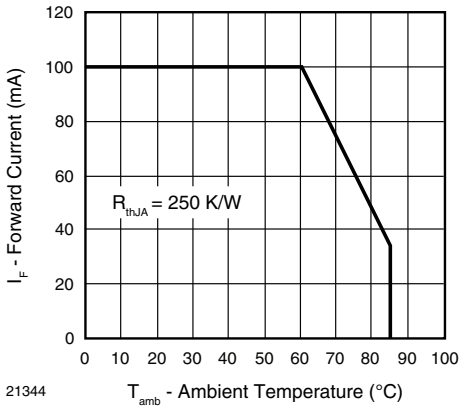



Fig. 2 - Forward Current Limit vs. Ambient Temperature

| **BASIC CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Forward voltage | $I_F$ = 100 mA, $t_p$ = 20 ms | $V_F$ | 1.15 | 1.35 | 1.6 | V |
| | $I_F$ = 1 A, $t_p$ = 100 µs | $V_F$ | | 2.2 | | 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 | | $I_R$ | Not designed for reverse operation | | | µA |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz, E = 0 mW/cm² | $C_J$ | | 70 | | pF |
| Radiant intensity | $I_F$ = 100 mA, $t_p$ = 20 ms | $I_e$ | 10 | 20 | 30 | mW/sr |
| | $I_F$ = 1 A, $t_p$ = 100 µs | $I_e$ | | 170 | | mW/sr |
| Radiant power | $I_F$ = 100 mA, $t_p$ = 20 ms | $\phi_e$ | | 40 | | mW |
| Temperature coefficient of radiant power | $I_F$ = 1 mA | $TK\phi_e$ | | -1.1 | | %/K |
| | $I_F$ = 100 mA | $TK\phi_e$ | | -0.51 | | %/K |
| Angle of half intensity | | $\varphi$ | | ± 25 | | deg |
| Peak wavelength | $I_F$ = 30 mA | $\lambda_p$ | 920 | 940 | 960 | nm |
| Spectral bandwidth | $I_F$ = 30 mA | $\Delta\lambda$ | | 25 | | 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 % | $t_r$ | | 15 | | ns |
| Fall time | $I_F$ = 100 mA, 20 % to 80 % | $t_f$ | | 15 | | ns |
| Cut-off frequency | $I_{DC}$ = 70 mA, $I_{AC}$ = 30 mA pp | $f_c$ | | 23 | | MHz |

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

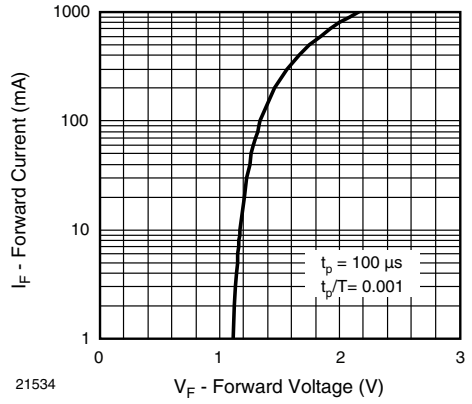



Fig. 3 - Forward Current vs. Forward Voltage

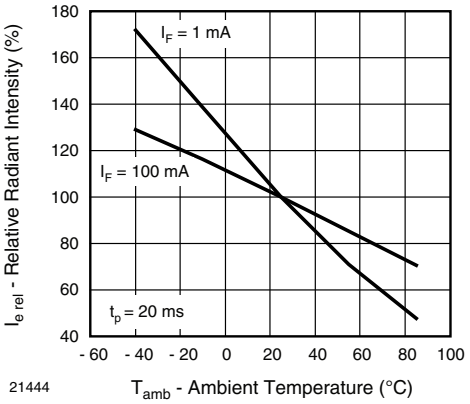



Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

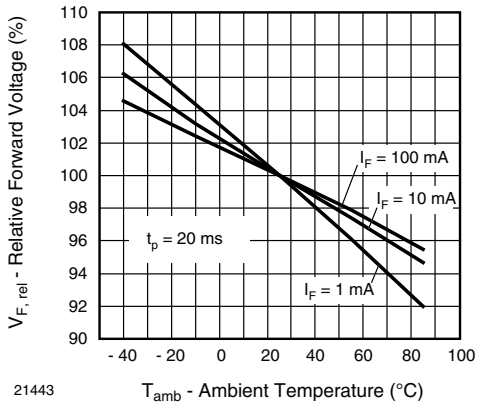



Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

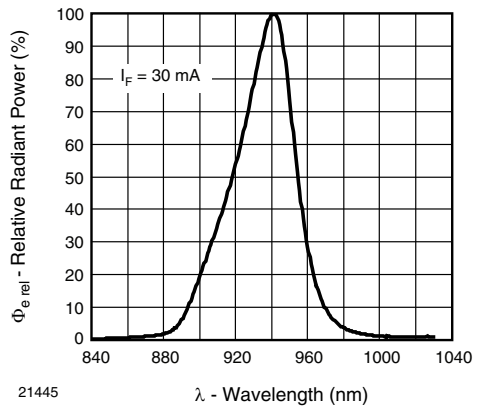



Fig. 7 - Relative Radiant Power vs. Wavelength

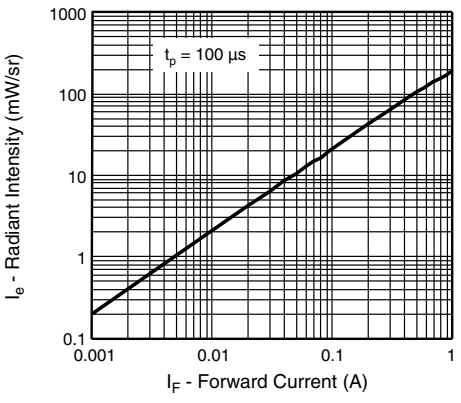



Fig. 5 - Radiant Intensity vs. Forward Current

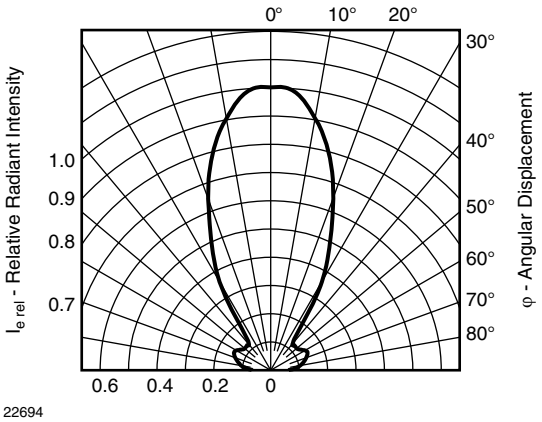



Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

## SOLDER PROFILE

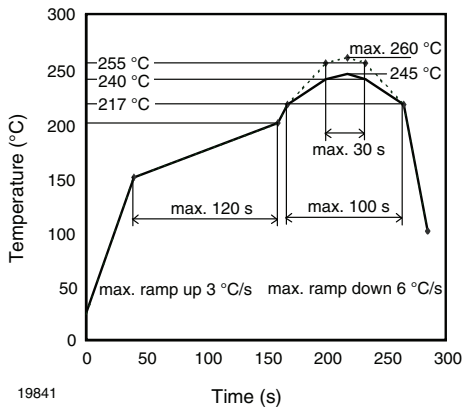



Fig. 9 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

## 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.

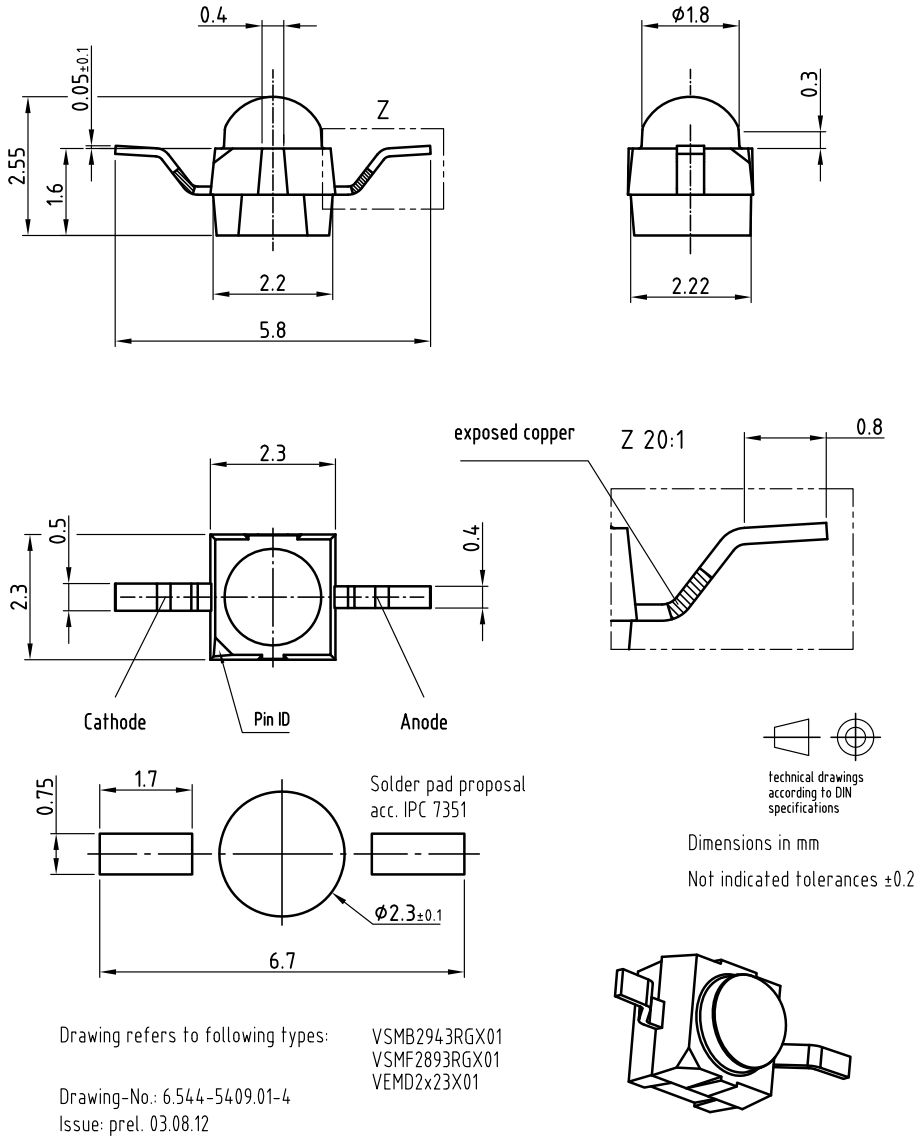
## FLOOR LIFE

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.

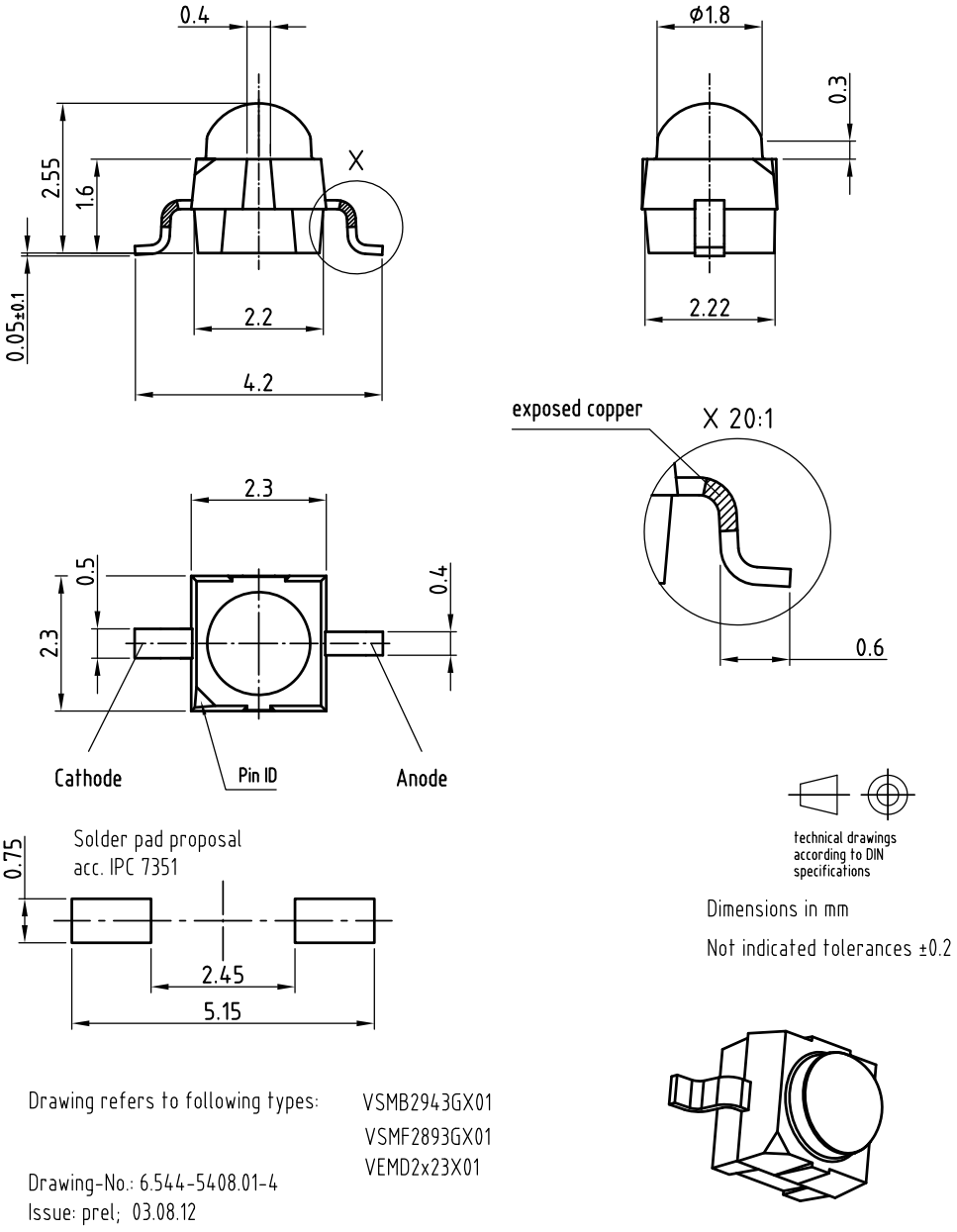
## DRYING

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: VSMB2943RG



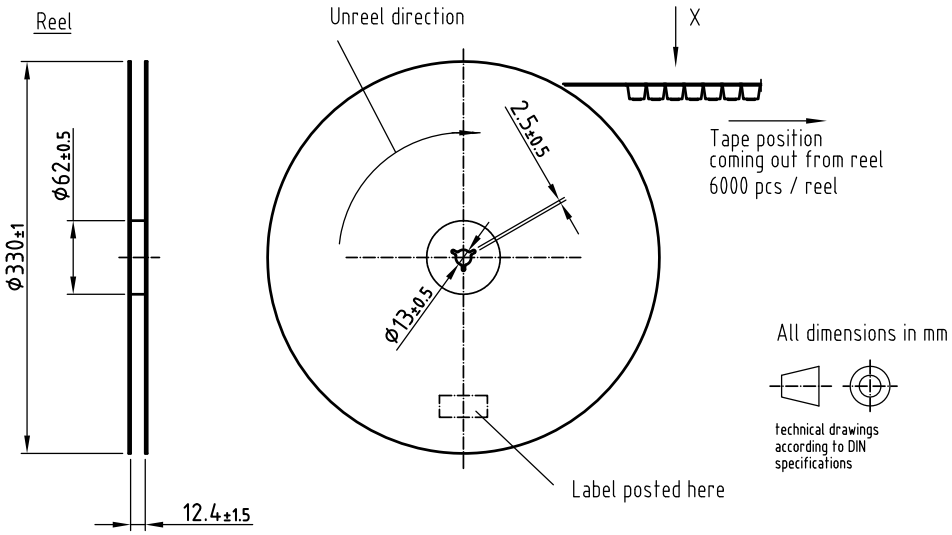
**PACKAGE DIMENSIONS** in millimeters: **VSMB2943G**



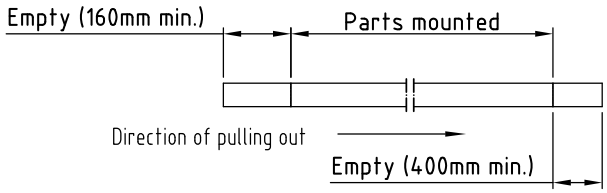

Drawing refers to following types: VSMB2943GX01
VSMF2893GX01
VEMD2x23X01

Drawing-No.: 6.544-5408.01-4
Issue: prel; 03.08.12

## TAPING AND REEL DIMENSIONS in millimeters: VSMB2943RG

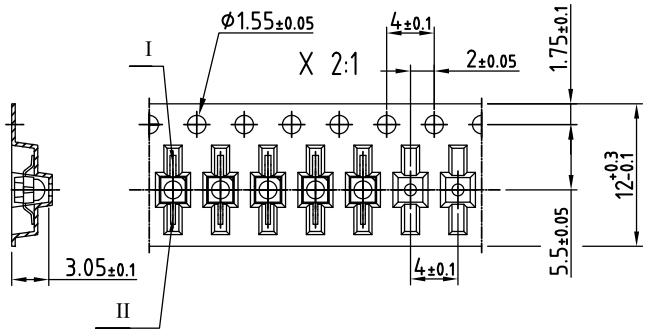



Leader and trailer tape:




Terminal position in tape

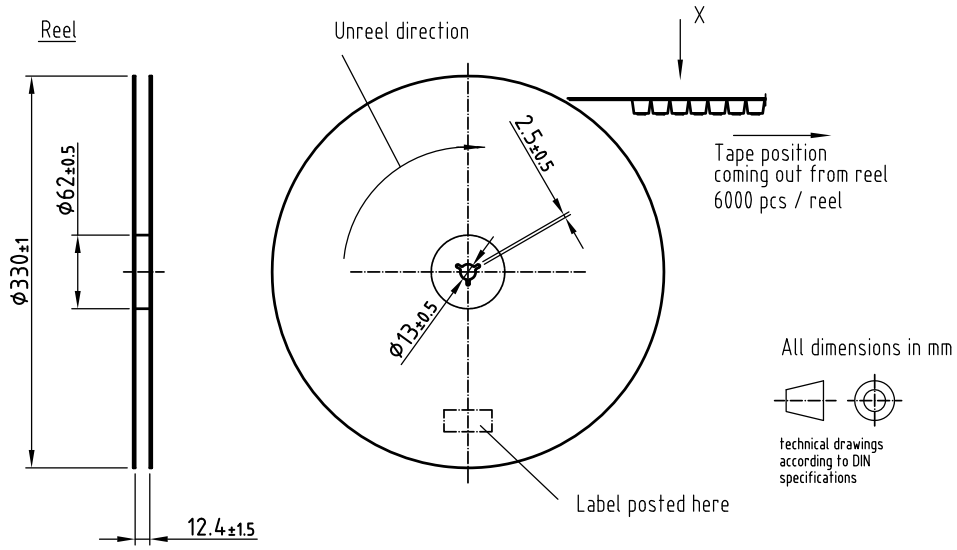
| Device | Lead I | Lead II |
|---|---|---|
| VSMB2943RGX01 | Cathode | Anode |
| VSMF2893RGX01 | | |
| VEMD2x03X01 | | |
| | | |
| | | |
| VEMT2x03X01 | Collector | Emitter |
| | | |
| VSMY2853RG | Anode | Cathode |



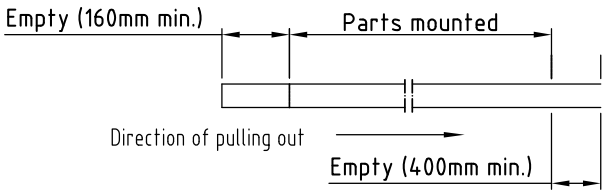

Drawing refers to following types: see table
Reel dimensions and tape

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

## TAPING AND REEL DIMENSIONS in millimeters: VSMB2943G

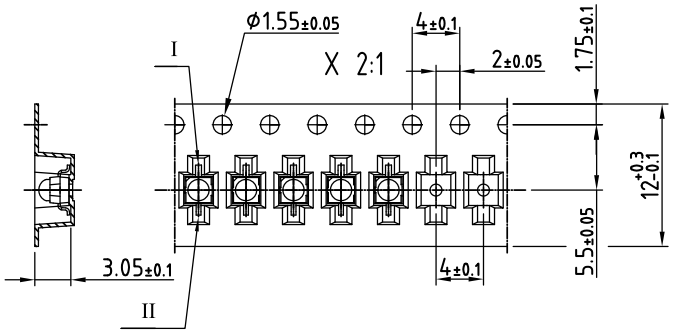



Leader and trailer tape:




Terminal position in tape

| Device | Lead I | Lead II |
|---|---|---|
| VSMB2943GX01 | Cathode | Anode |
| VSMF2893GX01 | | |
| VEMD2x23X01 | | |
| | | |
| | | |
| VEMT2x23X01 | 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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