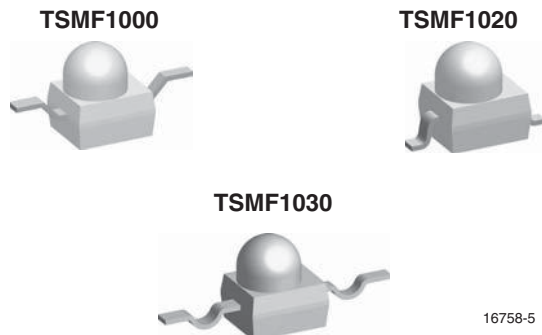


## High Speed Infrared Emitting Diode, RoHS Compliant, 890 nm, GaAlAs Double Hetero



### FEATURES

- Package type: surface mount
- Package form: GW, RGW, yoke, axial
- Dimensions (L x W x H in mm): 2.5 x 2 x 2.7
- Peak wavelength:  $\lambda_p = 890$  nm
- High radiant power
- Angle of half intensity:  $\phi = \pm 17^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Versatile terminal configurations
- Package matches with detector TEMD1000
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Compliant to RoHS Directive 2002/95/EC and in accordance with WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### DESCRIPTION

TSMF1000 series are infrared, 890 nm emitting diodes in GaAlAs double hetero (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
- Miniature light barrier
- Photointerrupters
- Optical switch
- Control and drive circuits
- Shaft encoders

### PRODUCT SUMMARY

| COMPONENT | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|-----------|---------------|--------------|------------------|------------|
| TSMF1000  | 5             | $\pm 17$     | 890              | 30         |
| TSMF1020  | 5             | $\pm 17$     | 890              | 30         |
| TSMF1030  | 5             | $\pm 17$     | 890              | 30         |

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM     |
|---------------|---------------|------------------------------|------------------|
| TSMF1000      | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Reverse gullwing |
| TSMF1020      | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Gullwing         |
| TSMF1030      | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Yoke             |

#### Note

- MOQ: minimum order quantity

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

| PARAMETER                           | TEST CONDITION                                  | SYMBOL     | VALUE         | UNIT               |
|-------------------------------------|-------------------------------------------------|------------|---------------|--------------------|
| Reverse voltage                     |                                                 | $V_R$      | 5             | V                  |
| Forward current                     |                                                 | $I_F$      | 100           | mA                 |
| Peak forward current                | $t_p/T = 0.5$ , $t_p = 100\text{ }\mu\text{s}$  | $I_{FM}$   | 200           | mA                 |
| Surge forward current               | $t_p = 100\text{ }\mu\text{s}$                  | $I_{FSM}$  | 0.8           | A                  |
| Power dissipation                   |                                                 | $P_V$      | 180           | mW                 |
| Junction temperature                |                                                 | $T_j$      | 100           | $^{\circ}\text{C}$ |
| Operating temperature range         |                                                 | $T_{amb}$  | - 40 to + 85  | $^{\circ}\text{C}$ |
| Storage temperature range           |                                                 | $T_{stg}$  | - 40 to + 100 | $^{\circ}\text{C}$ |
| Soldering temperature               | $t \leq 5\text{ s}$                             | $T_{sd}$   | 260           | $^{\circ}\text{C}$ |
| Thermal resistance junction/ambient | Soldered on PCB, pad dimensions:<br>4 mm x 4 mm | $R_{thJA}$ | 400           | K/W                |

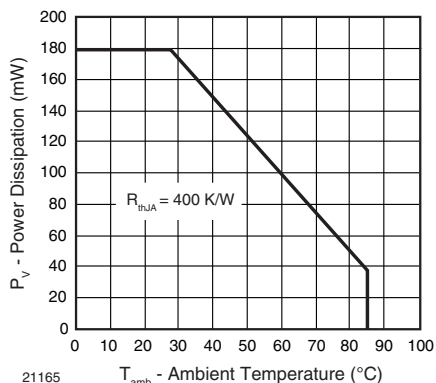


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

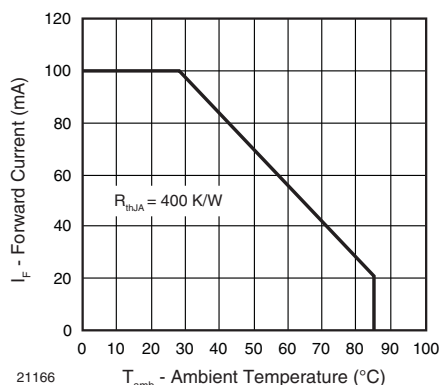


Fig. 2 - Forward Current Limit vs. Ambient Temperature

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

| PARAMETER                              | TEST CONDITION                                         | SYMBOL           | MIN. | TYP.     | MAX. | UNIT          |
|----------------------------------------|--------------------------------------------------------|------------------|------|----------|------|---------------|
| Forward voltage                        | $I_F = 20\text{ mA}$                                   | $V_F$            |      | 1.3      | 1.5  | V             |
|                                        | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$    | $V_F$            |      | 2.4      |      | V             |
| Temperature coefficient of $V_F$       | $I_F = 1\text{ mA}$                                    | $TK_{VF}$        |      | - 1.8    |      | mV/K          |
| Reverse current                        | $V_R = 5\text{ V}$                                     | $I_R$            |      |          | 10   | $\mu\text{A}$ |
| Junction capacitance                   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$      | $C_j$            |      | 160      |      | pF            |
| Radiant intensity                      | $I_F = 20\text{ mA}$                                   | $I_e$            | 2.5  | 5        | 13   | mW/sr         |
|                                        | $I_F = 100\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$            |      | 25       |      | mW/sr         |
| Radiant power                          | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$           | $\phi_e$         |      | 35       |      | mW            |
| Temperature coefficient of $\phi_e$    | $I_F = 20\text{ mA}$                                   | $TK_{\phi_e}$    |      | - 0.6    |      | %/K           |
| Angle of half intensity                |                                                        | $\phi$           |      | $\pm 17$ |      | deg           |
| Peak wavelength                        | $I_F = 20\text{ mA}$                                   | $\lambda_p$      |      | 890      |      | nm            |
| Spectral bandwidth                     | $I_F = 20\text{ mA}$                                   | $\Delta\lambda$  |      | 40       |      | nm            |
| Temperature coefficient of $\lambda_p$ | $I_F = 20\text{ mA}$                                   | $TK_{\lambda_p}$ |      | 0.2      |      | nm/K          |
| Rise time                              | $I_F = 20\text{ mA}$                                   | $t_r$            |      | 30       |      | ns            |
| Fall time                              | $I_F = 20\text{ mA}$                                   | $t_f$            |      | 30       |      | ns            |
| Cut-off frequency                      | $I_{DC} = 70\text{ mA}$ , $I_{AC} = 30\text{ mA pp}$   | $f_c$            |      | 12       |      | MHz           |
| Virtual source diameter                |                                                        | $d$              |      | 1.2      |      | mm            |

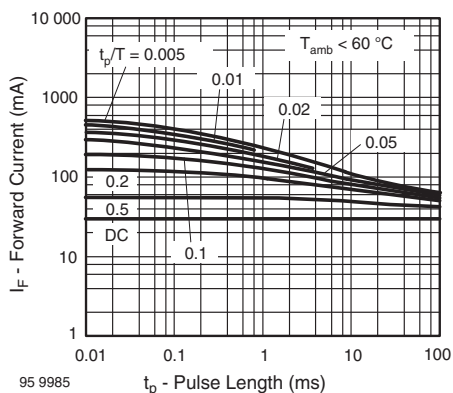
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 3 - Pulse Forward Current vs. Pulse Duration

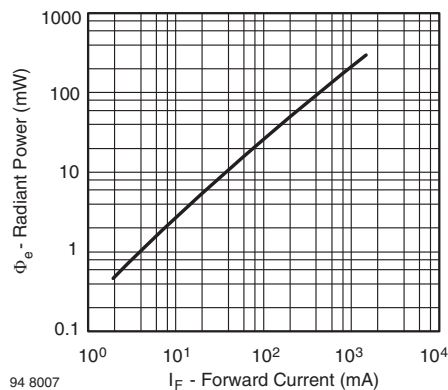


Fig. 6 - Radiant Power vs. Forward Current

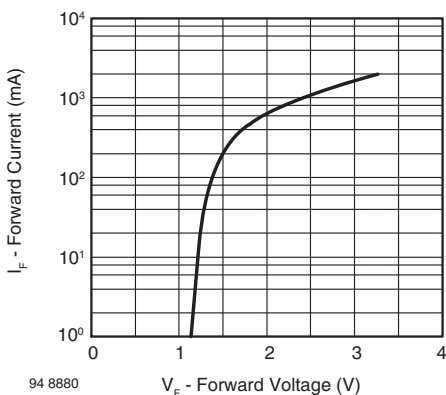


Fig. 4 - Forward Current vs. Forward Voltage

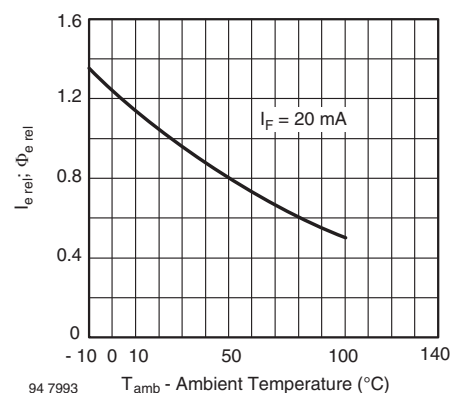


Fig. 7 - Rel. Radiant Intensity/Power vs. Ambient Temperature

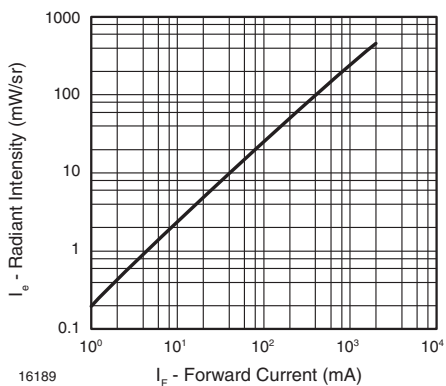


Fig. 5 - Radiant Intensity vs. Forward Current

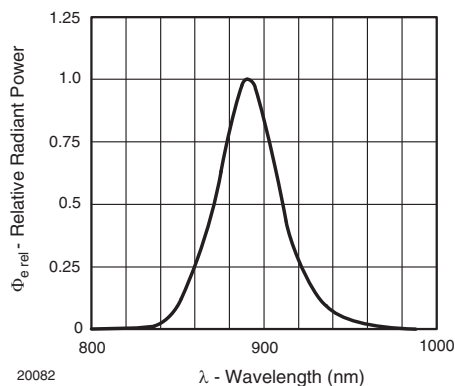


Fig. 8 - Relative Radiant Power vs. Wavelength

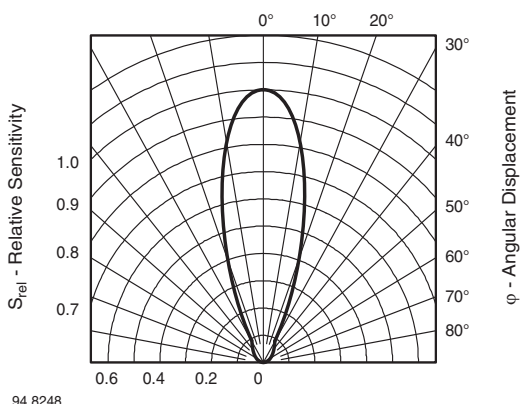
**REFLOW SOLDER PROFILE**


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

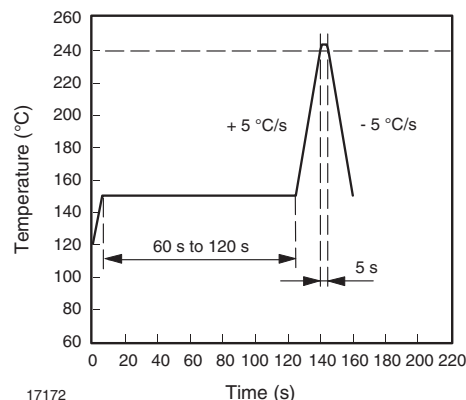


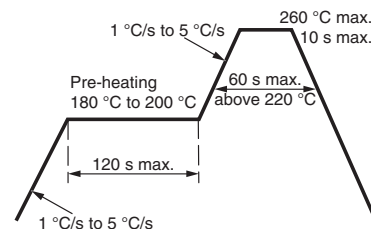
Fig. 10 - Lead Tin (SnPb) Reflow Solder Profile

**PRECAUTIONS FOR USE**
**1. Over-current-proof**

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (burn out will happen).

**2. Storage**

- Storage temperature and rel. humidity conditions are: 5 °C to 35 °C, R.H. 60 %.
- Floor life must not exceed 168 h, acc. to JEDEC level 3, J-STD-020.  
Once the package is opened, the products should be used within a week. Otherwise, they should be kept in a damp proof box with desiccant.  
Considering tape life, we suggest to use products within one year from production date.
- If opened more than one week in an atmosphere 5 °C to 35 °C, R.H. 60 %, devices should be treated at 60 °C  $\pm$  5 °C for 15 h.
- If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3.

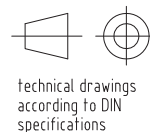
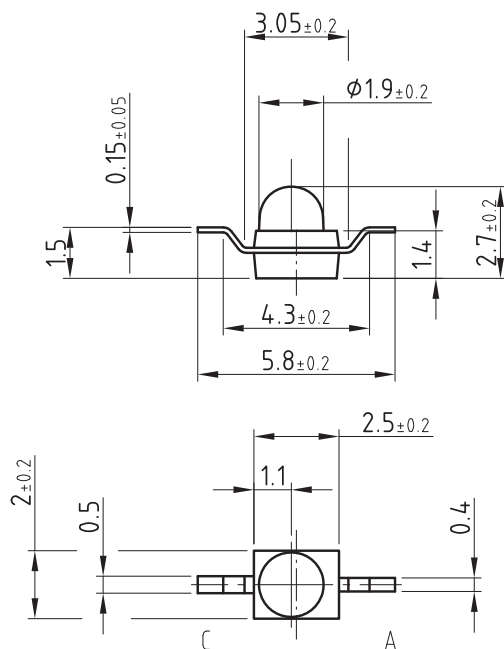


22566

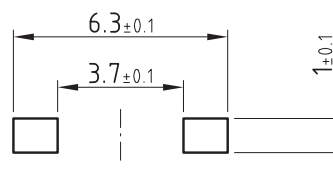
Fig. 11 - Lead (Pb)-Free Reflow Solder Profile acc. J-STD-020



## PACKAGE DIMENSIONS in millimeters: TSMF1000



Solder pad proposal

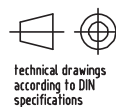
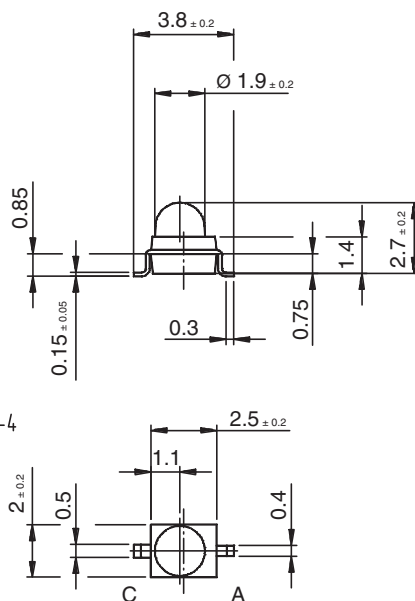


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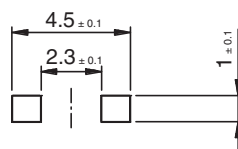
Issue: 3; 02.04.03

16159

## PACKAGE DIMENSIONS in millimeters: TSMF1020



Solder pad proposal



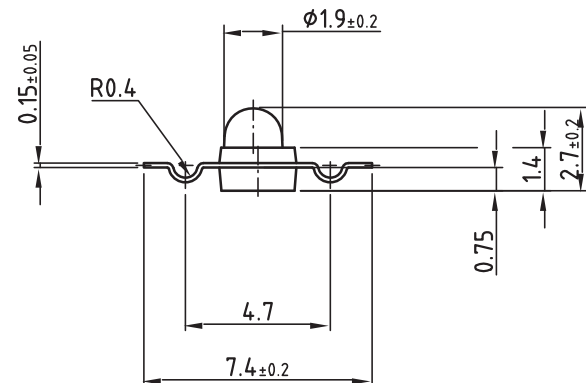
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Issue: 3; 02.04.03

16160

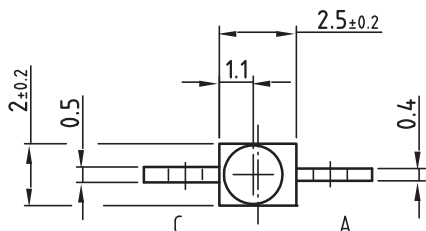
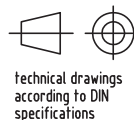


**PACKAGE DIMENSIONS** in millimeters: **TSMF1030**

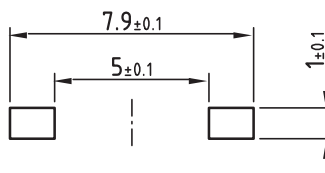


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Issue: 4; 08.05.03

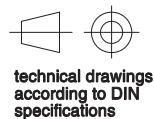
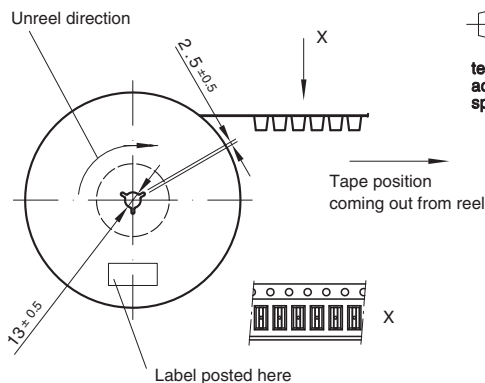
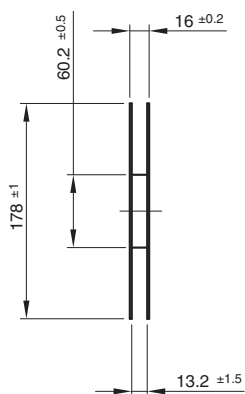


Solder pad proposal

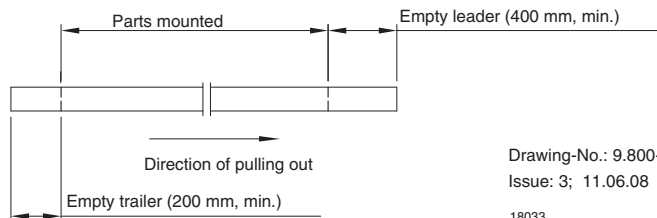


16228

**REEL DIMENSIONS** in millimeters



Leader and trailer tape:



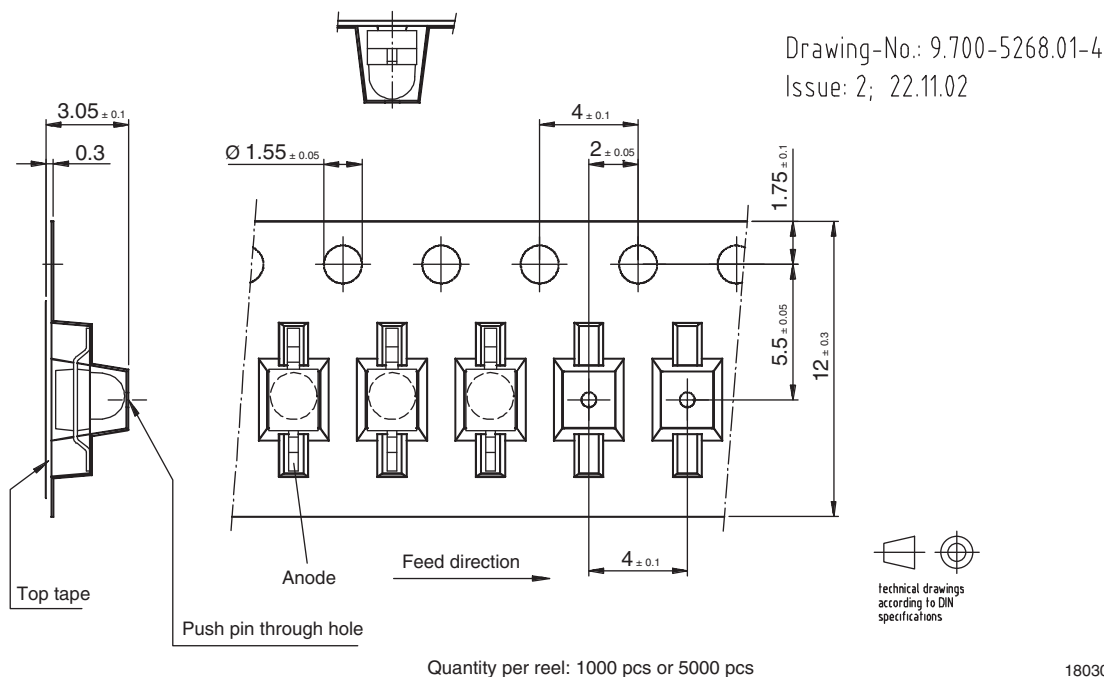
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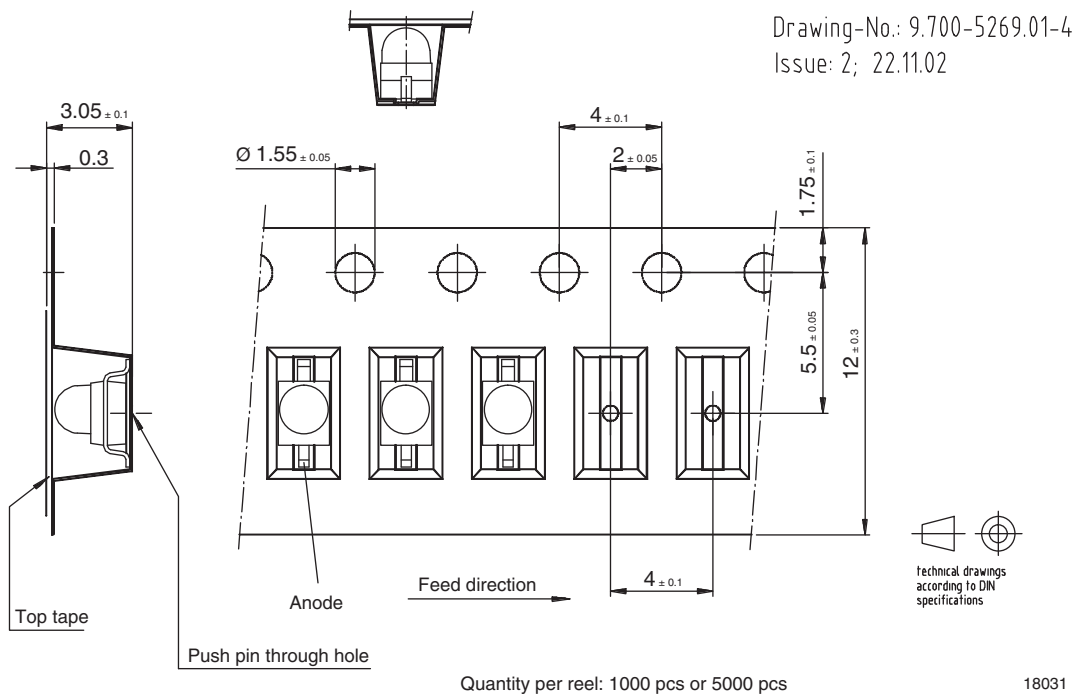
18033



## TAPING DIMENSIONS in millimeters: TSMF1000

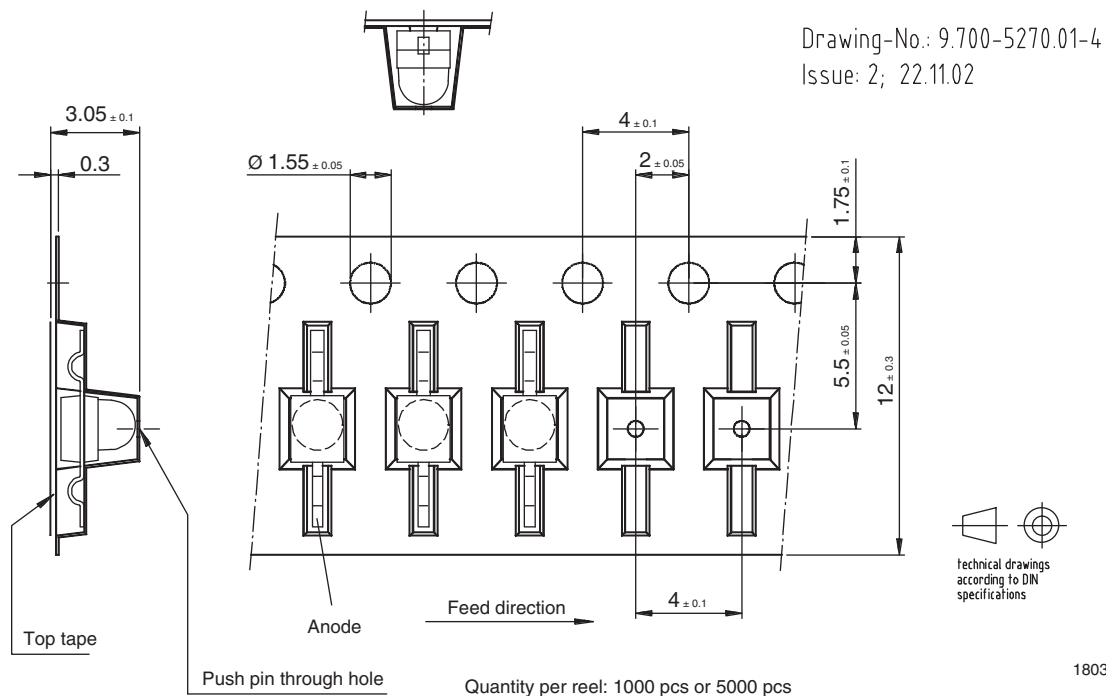


## TAPING DIMENSIONS in millimeters: TSMF1020





## TAPING DIMENSIONS in millimeters: TSMF1030





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