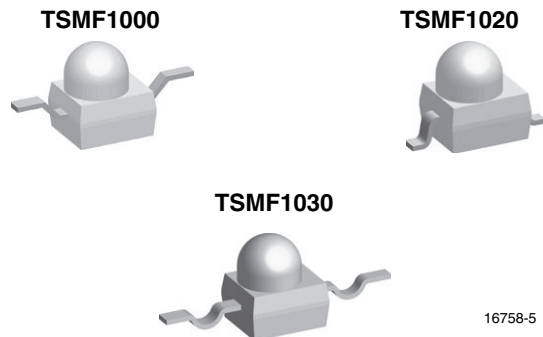


## High Speed Infrared Emitting Diode, RoHS-Compliant, 890 nm, Surface Emitter Technology



### FEATURES

- Package type: surface-mount
- Package form: GW, RGW, yoke
- 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:  $\phi = \pm 11^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Package matches with detector TEMD1000
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### DESCRIPTION

TSMF1000 series are infrared, 890 nm emitting diodes based on surface emitter chip 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) | $\phi$ (°) | $\lambda_p$ (nm) | $t_r$ (ns) |
|-----------|---------------|------------|------------------|------------|
| TSMF1000  | 27            | $\pm 11$   | 890              | 15         |
| TSMF1020  | 27            | $\pm 11$   | 890              | 15         |
| TSMF1030  | 27            | $\pm 11$   | 890              | 15         |

#### 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                  | $t_p = 100\text{ }\mu\text{s}$                 | $I_{FSM}$  | 1           | A                  |
| Power dissipation                      |                                                | $P_V$      | 190         | mW                 |
| Junction temperature                   |                                                | $T_J$      | 100         | $^{\circ}\text{C}$ |
| Ambient 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 to ambient | JESD51                                         | $R_{thJA}$ | 250         | K/W                |

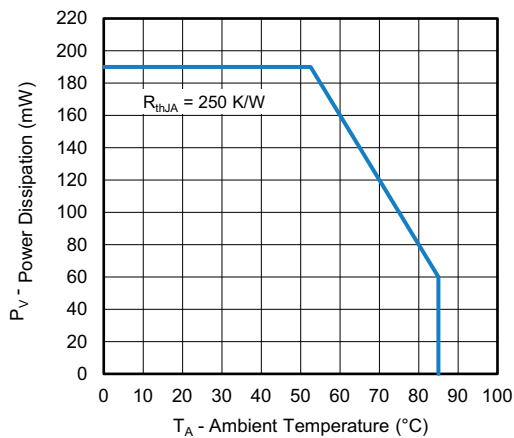


Fig. 1 - Power Dissipation vs. Ambient Temperature

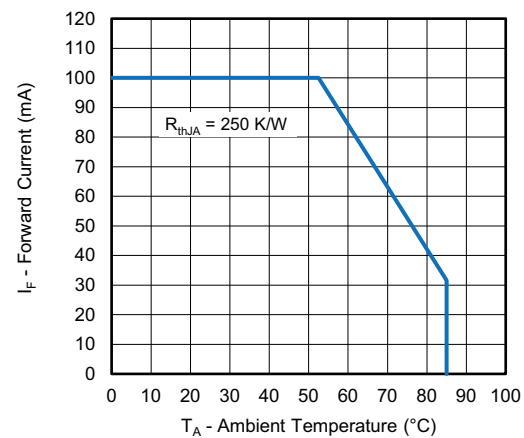


Fig. 2 - Forward Current vs. Ambient Temperature

**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             |
|                                        | $I_F = 100\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$ | $V_F$            | -                                  | 1.5      | -    | V             |
|                                        | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$    | $V_F$            | -                                  | 2.6      | -    | V             |
| Temperature coefficient of $V_F$       | $I_F = 20\text{ mA}$                                   | $TK_{VF}$        | -                                  | -1.4     | -    | mV/K          |
| Reverse current                        |                                                        | $I_R$            | Not designed for reverse operation |          |      | $\mu\text{A}$ |
| Junction capacitance                   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$      | $C_j$            | -                                  | 56       | -    | pF            |
| Radiant intensity                      | $I_F = 20\text{ mA}$                                   | $I_e$            | 15                                 | 27       | 40   | mW/sr         |
|                                        | $I_F = 100\text{ mA}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$            | -                                  | 155      | -    | mW/sr         |
| Radiant power                          | $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$            | $\phi_e$         | -                                  | 10       | -    | mW            |
| Temperature coefficient of $\phi_e$    | $I_F = 20\text{ mA}$                                   | $TK_{\phi_e}$    | -                                  | -0.3     | -    | %/K           |
| Angle of half intensity                |                                                        | $\phi$           | -                                  | $\pm 11$ | -    | $^{\circ}$    |
| Peak wavelength                        | $I_F = 20\text{ mA}$                                   | $\lambda_p$      | -                                  | 890      | -    | nm            |
| Spectral bandwidth                     | $I_F = 20\text{ mA}$                                   | $\Delta\lambda$  | -                                  | 35       | -    | nm            |
| Temperature coefficient of $\lambda_p$ | $I_F = 20\text{ mA}$                                   | $TK_{\lambda_p}$ | -                                  | 0.3      | -    | nm/K          |
| Rise time                              | $I_F = 20\text{ mA}$                                   | $t_r$            | -                                  | 15       | -    | ns            |
| Fall time                              | $I_F = 20\text{ mA}$                                   | $t_f$            | -                                  | 15       | -    | ns            |



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

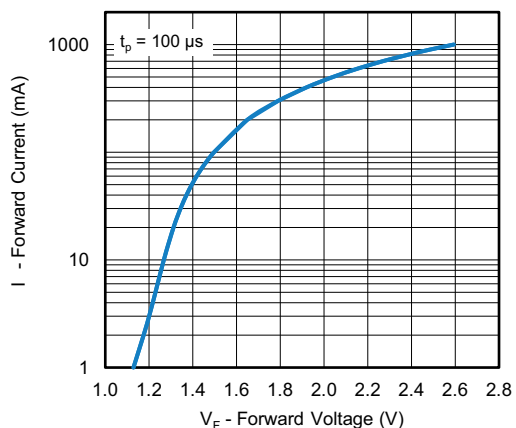


Fig. 3 - Forward Current vs. Forward Voltage

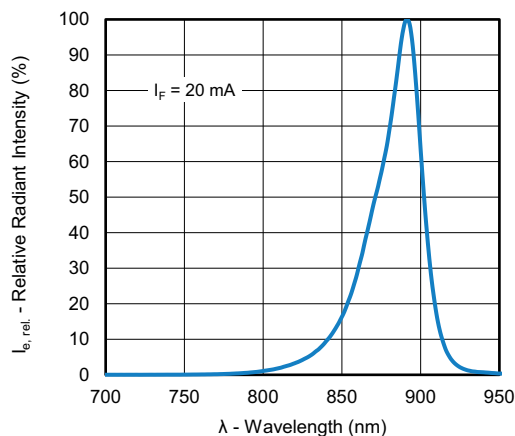


Fig. 6 - Relative Radiant Intensity vs. Wavelength

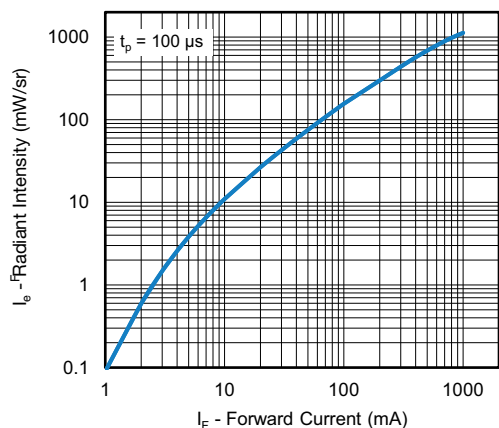


Fig. 4 - Radiant Intensity vs. Forward Current

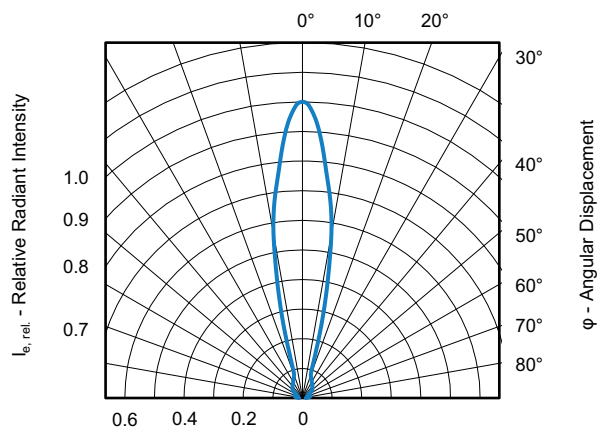


Fig. 7 - Relative Radiant Intensity vs. Angular Displacement

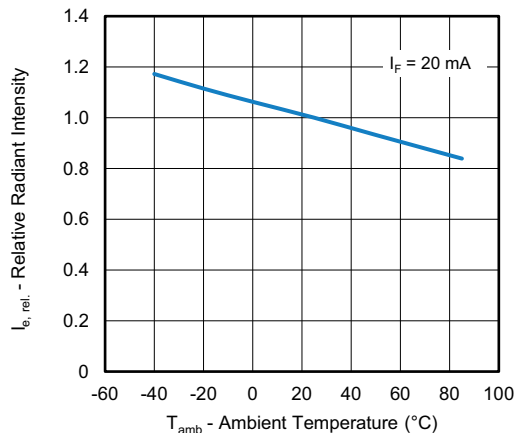


Fig. 5 - Relative Radiant Intensity vs. Ambient Temperature



## 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, according 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.

## REFLOW SOLDER PROFILE

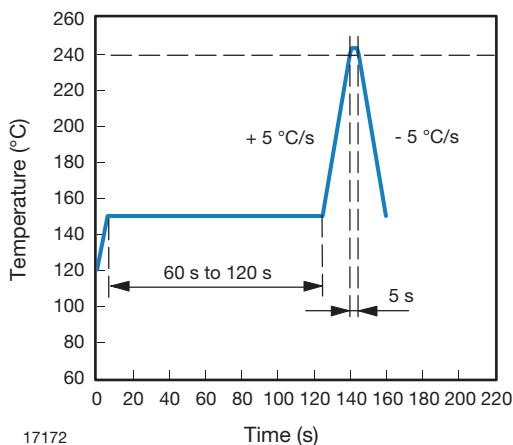


Fig. 8 - Lead Tin (SnPb) Reflow Solder Profile

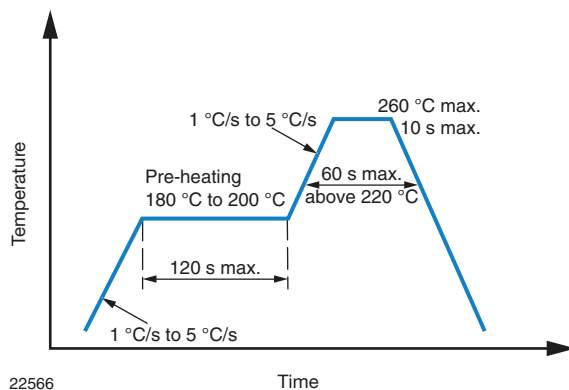
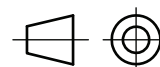
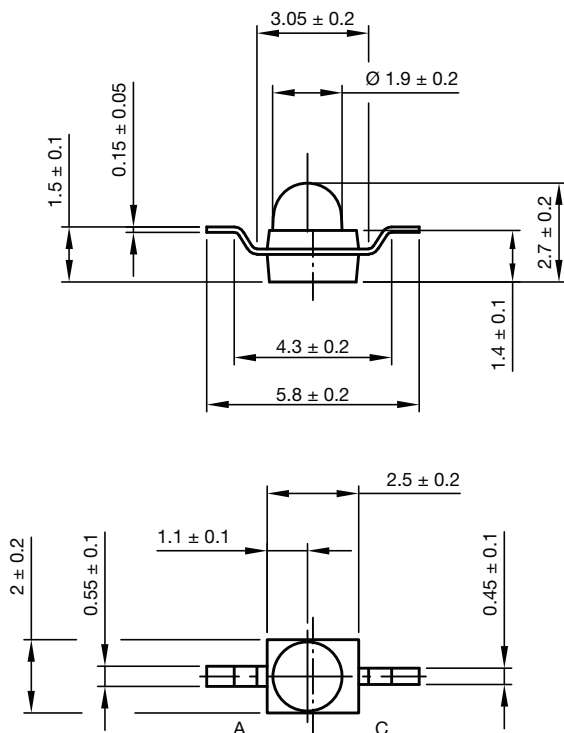


Fig. 9 - Lead (Pb)-Free Reflow Solder Profile  
According to J-STD-020

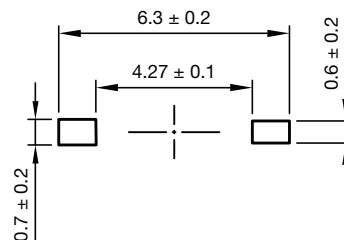


## PACKAGE DIMENSIONS in millimeters: TSMF1000



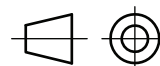
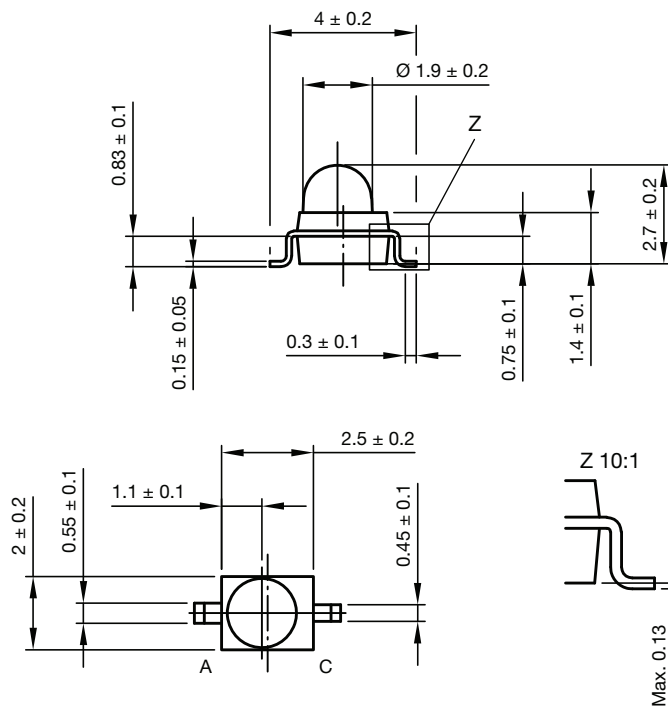
Technical drawings  
according to DIN  
specifications

### Solder pad proposal



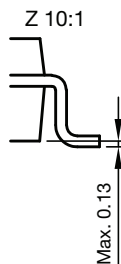
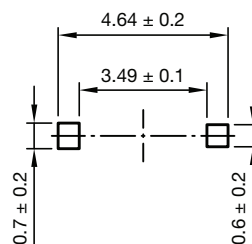
Drawing-No.: 6.544-5326.03-4  
Issue: 1; 15.09.2021

## PACKAGE DIMENSIONS in millimeters: TSMF1020



Technical drawings  
according to DIN  
specifications

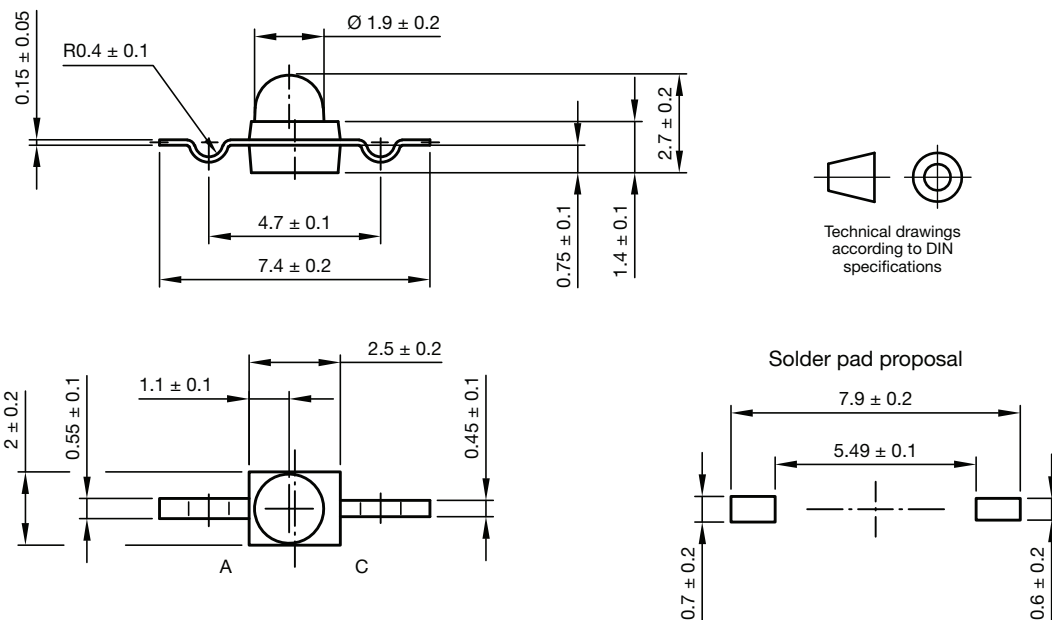
### Solder pad proposal



Drawing-No.: 6.544-5325.03-4  
Issue: 1; 15.09.2021

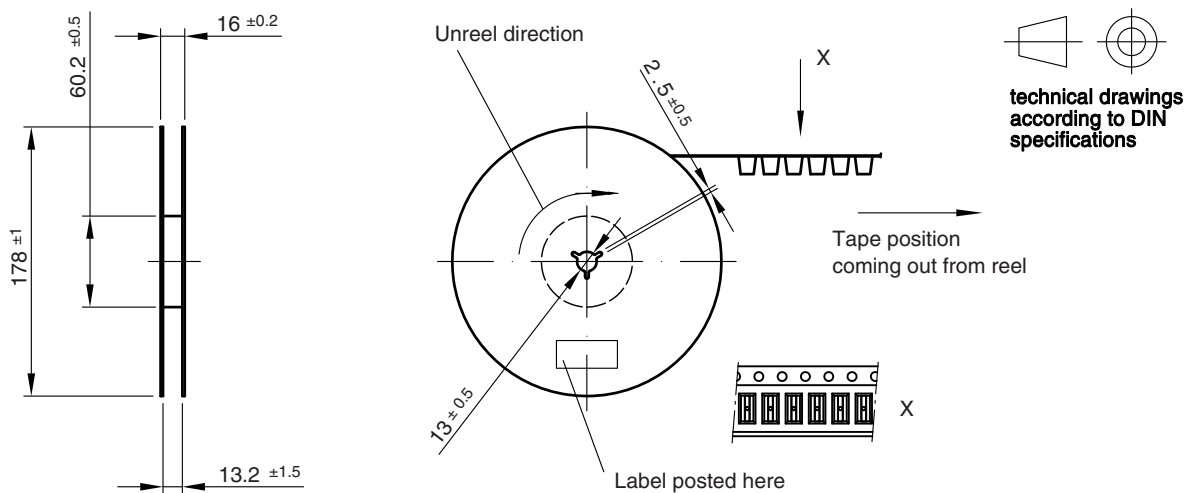


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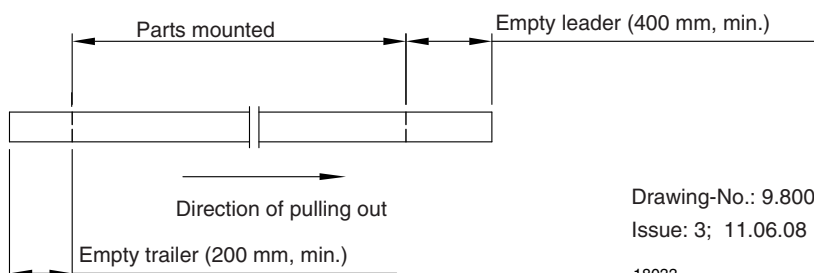


Drawing-No.: 6.544-5329.03-4  
Issue: 1; 15.09.2021

## REEL DIMENSIONS in millimeters



Leader and trailer tape:



Drawing-No.: 9.800-5080.01-4  
Issue: 3; 11.06.08

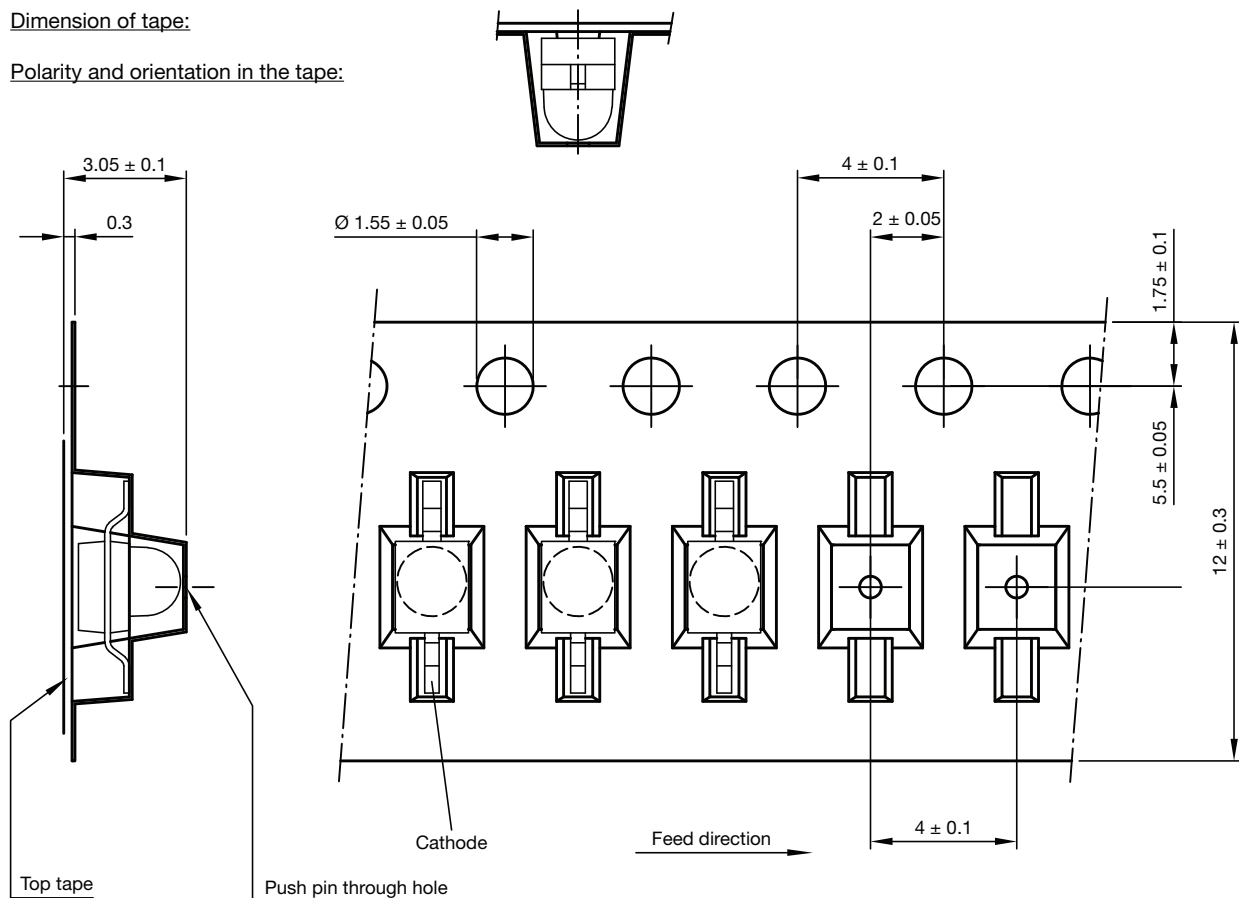
18033



## TAPING DIMENSIONS in millimeters: TSMF1000

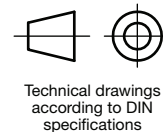
Dimension of tape:

Polarity and orientation in the tape:



Quantity per reel: 1000 pieces

Drawing-No.: 9.700-5268.02-4  
Issue: 1; 28.09.2021

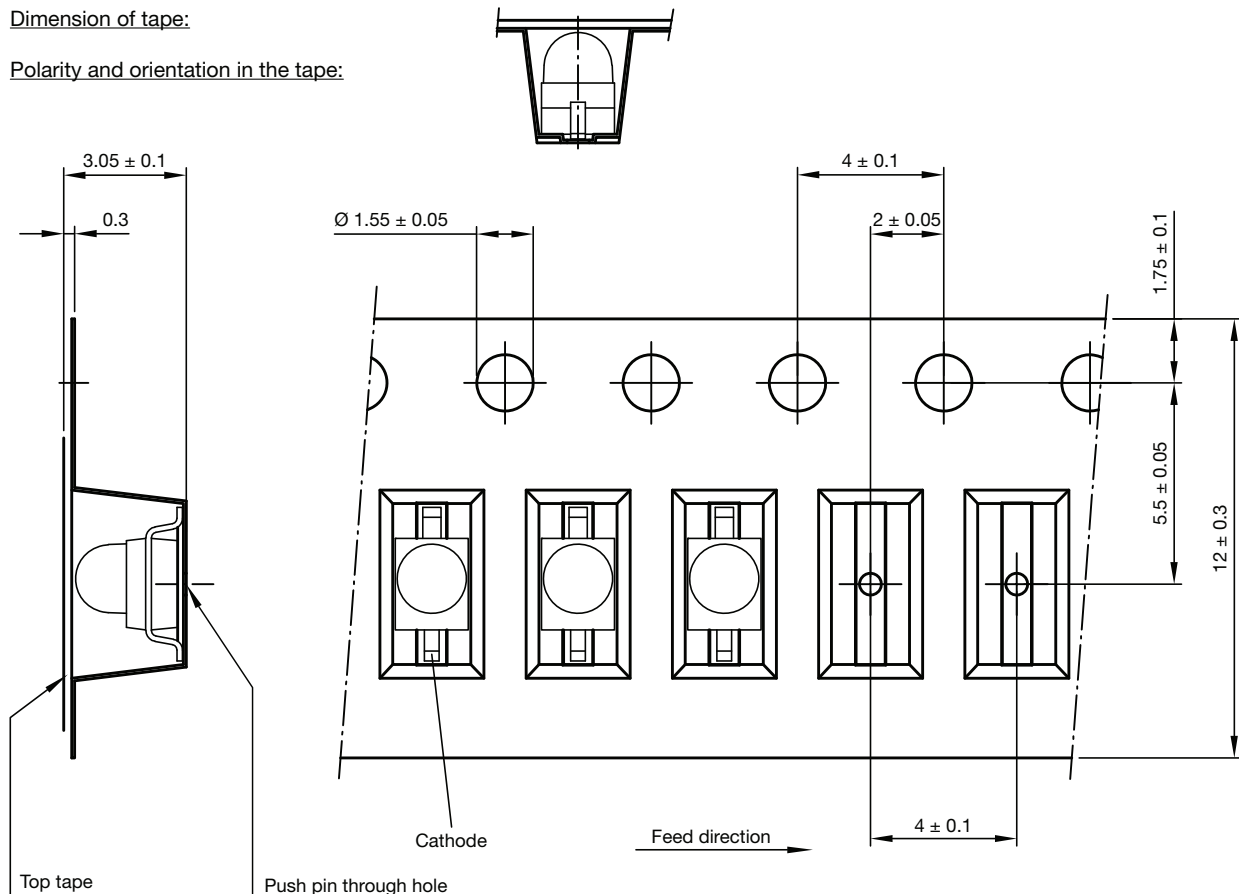




## TAPING DIMENSIONS in millimeters: TSMF1020

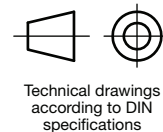
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Polarity and orientation in the tape:



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Issue: 1; 28.09.2021

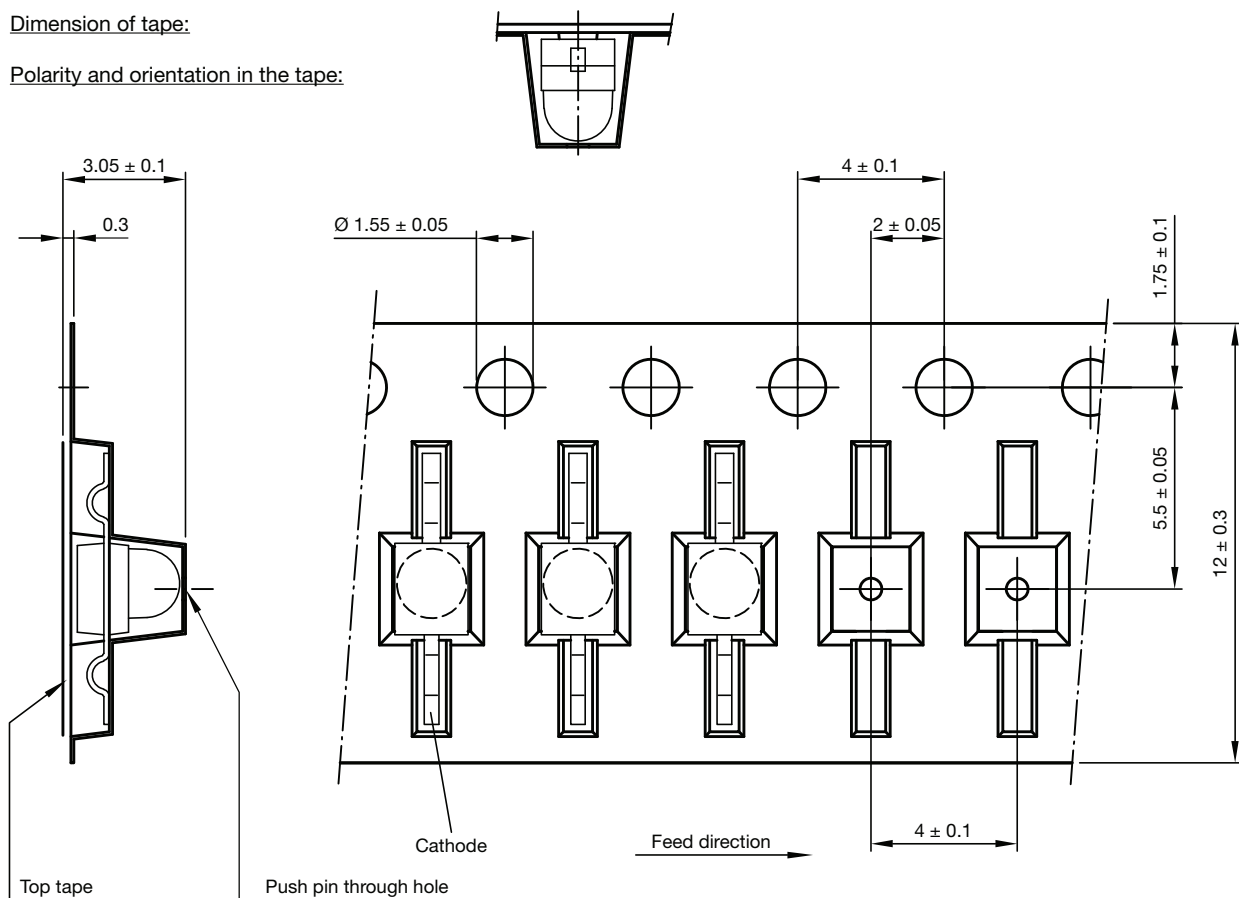


Technical drawings  
according to DIN  
specifications

## TAPING DIMENSIONS in millimeters: TSMF1030

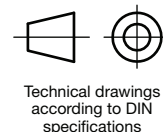
Dimension of tape:

Polarity and orientation in the tape:



Quantity per reel: 1000 pieces

Drawing-No.: 9.700-5270.02-4  
Issue: 1; 28.09.2021





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