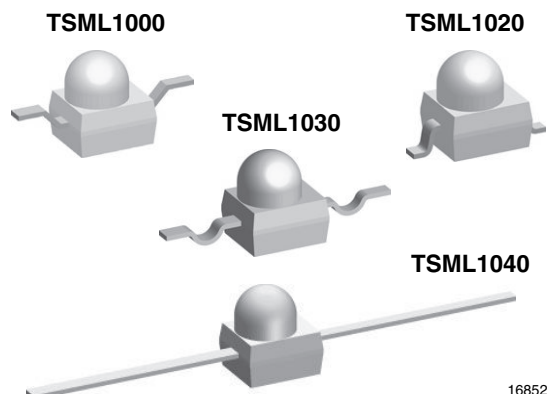


High Power Infrared Emitting Diode, 940 nm, GaAlAs, MQW



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: $\lambda_p = 940$ nm
- High radiant power
- High radiant intensity
- Angle of half intensity: $\phi = \pm 12^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Good spectral matching with Si photodetectors
- Versatile terminal configurations
- Package matches with detector TEMA1000
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

DESCRIPTION

TSML1000 is an infrared, 940 nm emitting diode in GaAlAs multi quantum well (MQW) technology with high radiant power and high speed molded in a clear, untinted plastic package (with lens) for surface mounting (SMD).

APPLICATIONS

- For remote control
- Encoder
- Photointerrupters

PRODUCT SUMMARY

| COMPONENT | I_e (mW/sr) at $I_F = 20$ mA | ϕ (°) | λ_p (nm) | t_r (ns) |
|-----------|--------------------------------|------------|------------------|------------|
| TSML1000 | 11 | ± 12 | 940 | 15 |
| TSML1020 | 11 | ± 12 | 940 | 15 |
| TSML1030 | 11 | ± 12 | 940 | 15 |
| TSML1040 | 11 | ± 12 | 940 | 15 |

Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|---------------|---------------|------------------------------|------------------|
| TSML1000 | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Reverse gullwing |
| TSML1020 | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Gullwing |
| TSML1030 | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Yoke |
| TSML1040 | Bulk | MOQ: 1000 pcs, 1000 pcs/bulk | Axial leads |

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} | 1.0 | A |
| Power dissipation | | P_V | 160 | 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 | According to Fig. 10, J-STD-020 | T_{sd} | 260 | $^{\circ}\text{C}$ |
| Thermal resistance junction to ambient | EIA / JESD51 | R_{thJA} | 400 | K/W |

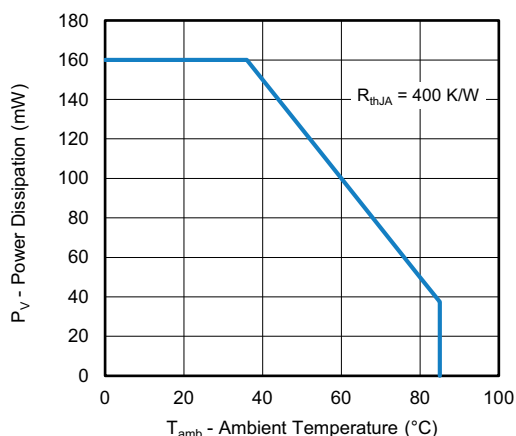


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

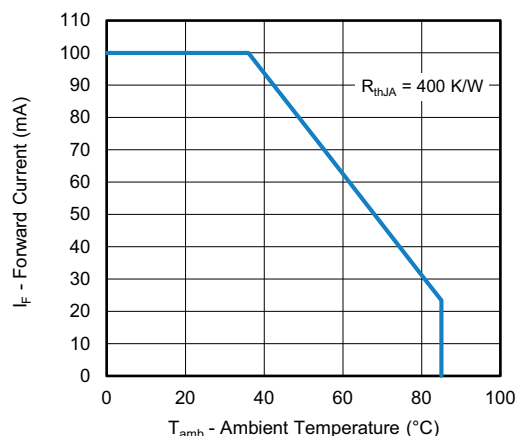


Fig. 2 - Forward Current vs. Ambient Temperature

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

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|---|------------------|------|----------|------|---------------|
| Forward voltage | $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$ | V_F | - | 1.2 | 1.5 | V |
| | $I_F = 1\text{ A}$, $t_p = 100\text{ }\mu\text{s}$ | V_F | - | 2.2 | - | 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 | μA |
| Junction capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$ | C_j | - | 40 | - | pF |
| Radiant intensity | $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$ | I_e | 3 | 11 | 15 | mW/sr |
| Radiant power | $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$ | ϕ_e | - | 40 | - | mW |
| Temperature coefficient of ϕ_e | $I_F = 20\text{ mA}$ | TK_{ϕ_e} | - | -0.6 | - | %/K |
| Angle of half intensity | | φ | - | ± 12 | - | $^{\circ}$ |
| Peak wavelength | $I_F = 100\text{ mA}$ | λ_p | - | 940 | - | nm |
| Spectral bandwidth | $I_F = 100\text{ mA}$ | $\Delta\lambda$ | - | 30 | - | nm |
| Temperature coefficient of λ_p | $I_F = 100\text{ mA}$ | TK_{λ_p} | - | 0.2 | - | nm/K |
| Rise time | $I_F = 100\text{ mA}$ | t_r | - | 15 | - | ns |
| Fall time | $I_F = 100\text{ mA}$ | t_f | - | 15 | - | ns |



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

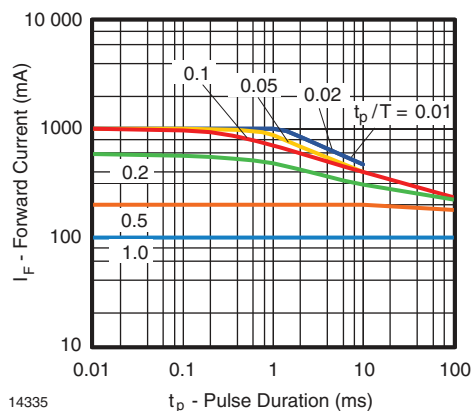


Fig. 3 - Pulse Forward Current vs. Pulse Duration

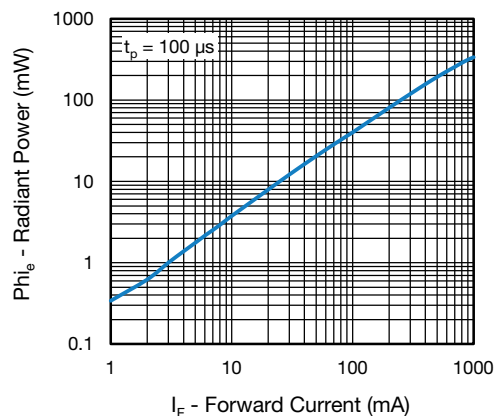


Fig. 6 - Radiant Power vs. Forward Current

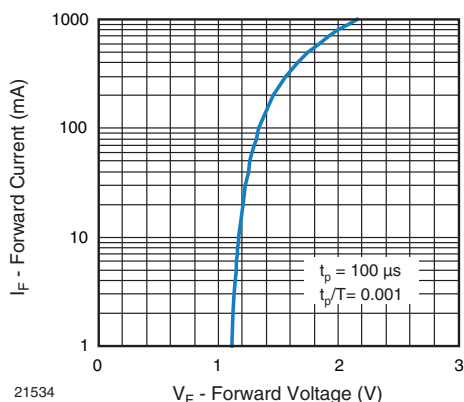


Fig. 4 - Forward Current vs. Forward Voltage

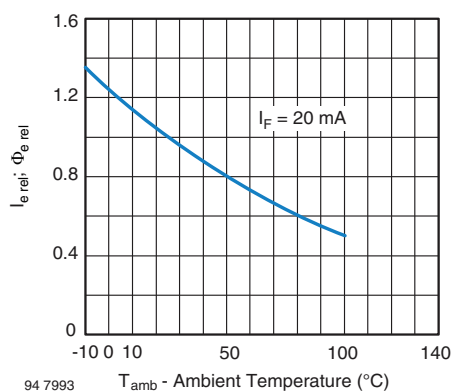


Fig. 7 - Relative Radiant Intensity/Power vs. Ambient Temperature

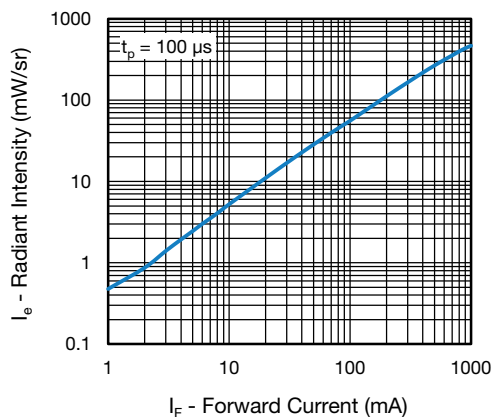


Fig. 5 - Radiant Intensity vs. Forward Current

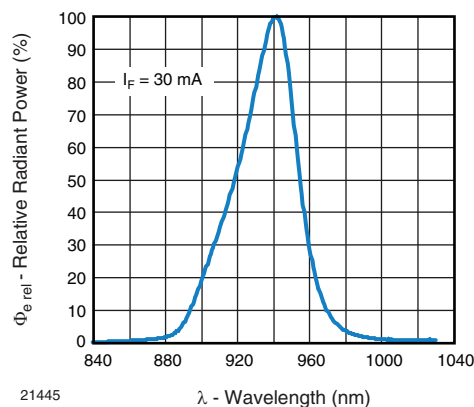


Fig. 8 - Relative Radiant Power vs. Wavelength

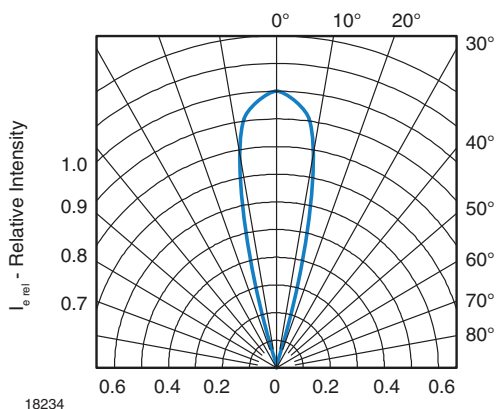


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

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

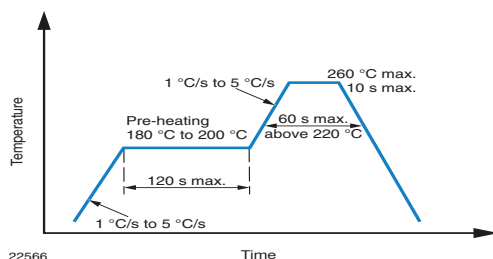
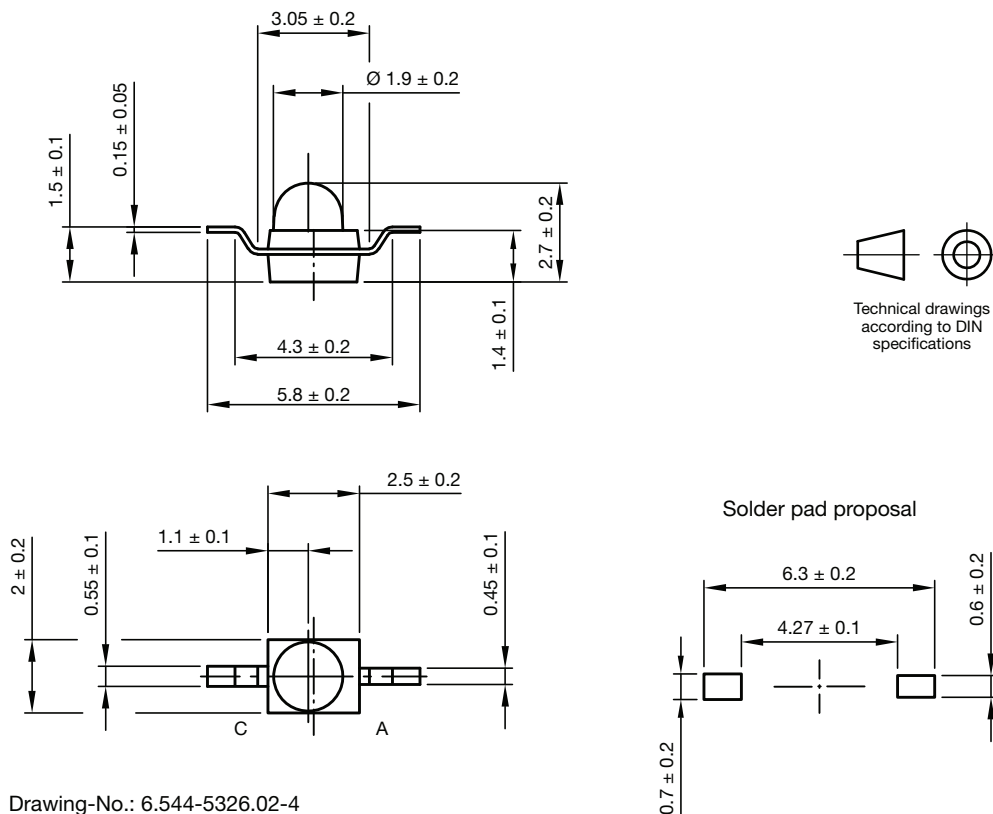


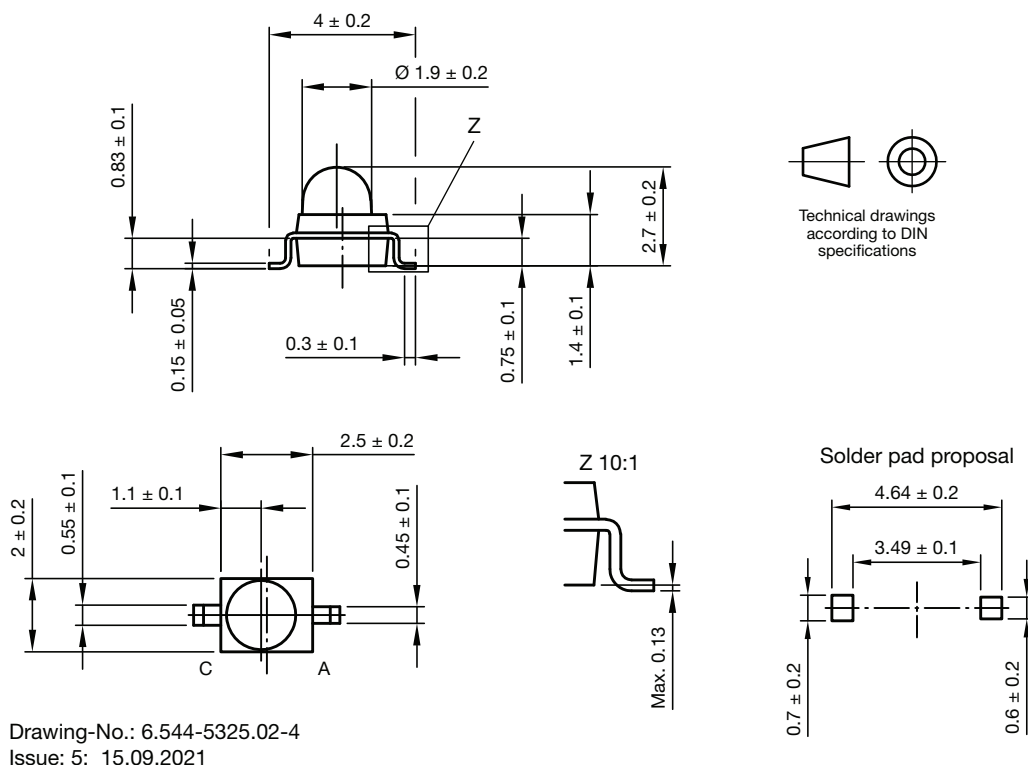
Fig. 10 - Lead (Pb)-Free Reflow Solder Profile
According to J-STD-020

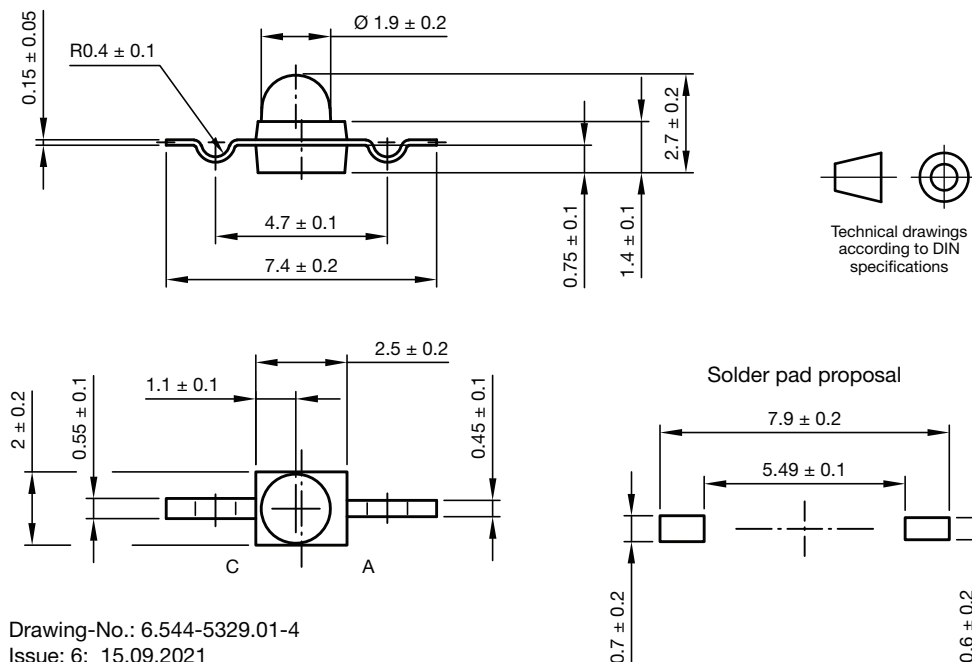
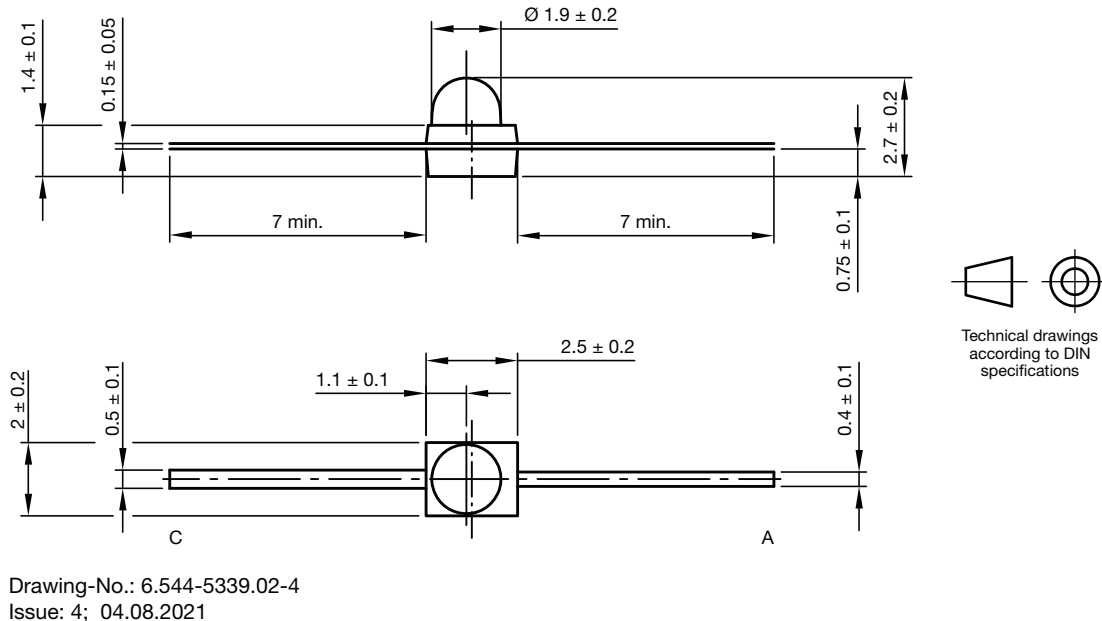


PACKAGE DIMENSIONS in millimeters: TSML1000

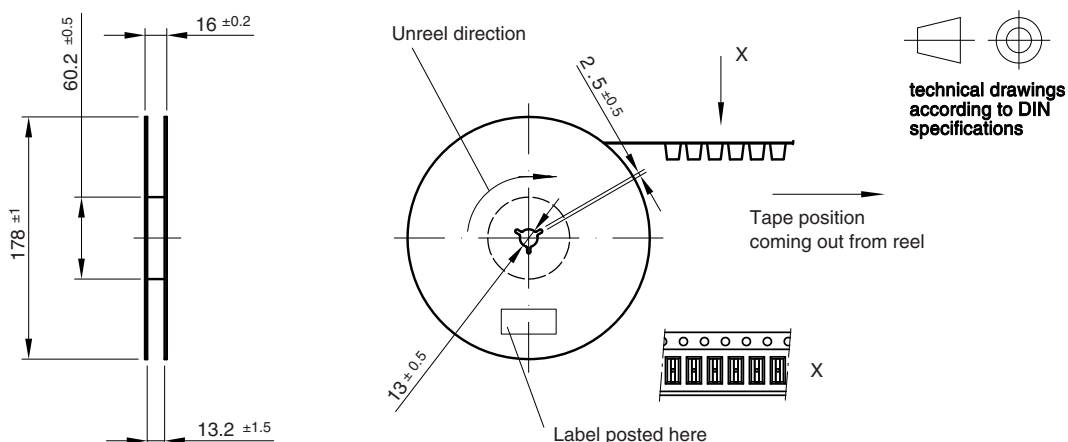


PACKAGE DIMENSIONS in millimeters: TSML1020

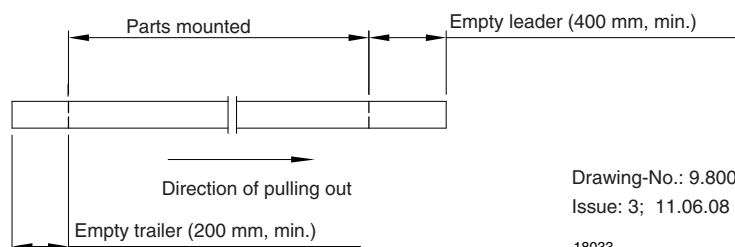


PACKAGE DIMENSIONS in millimeters: TSML1030

PACKAGE DIMENSIONS in millimeters: TSML1040


REEL DIMENSIONS in millimeters



Leader and trailer tape:



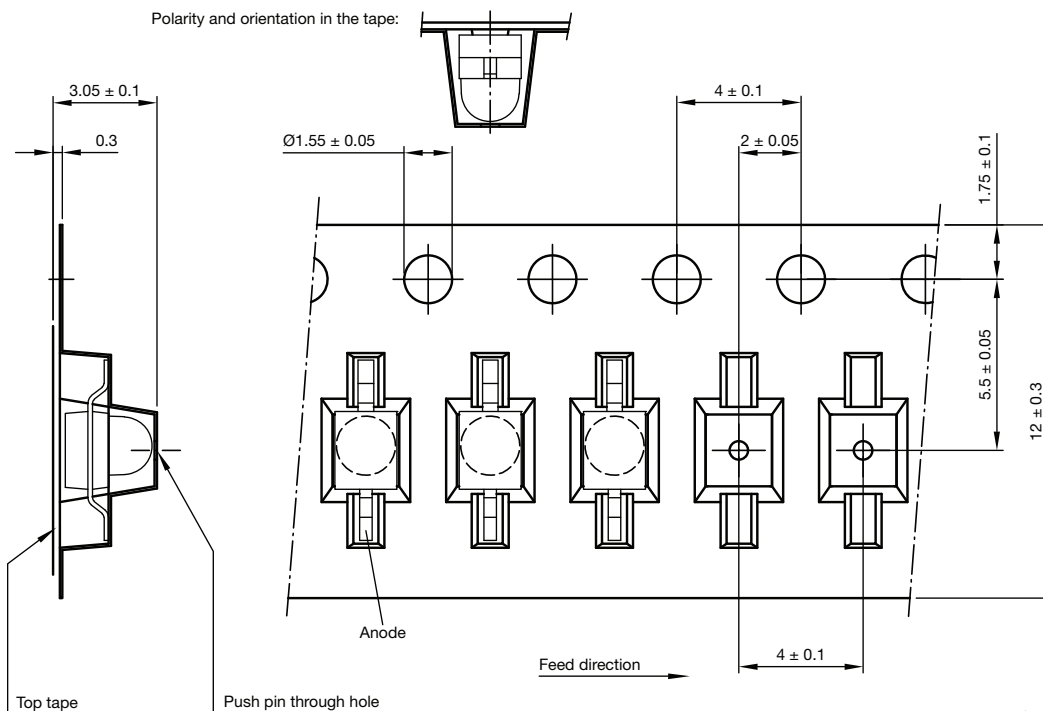
Drawing-No.: 9.800-5080.01-4

Issue: 3; 11.06.08

18033

TAPING DIMENSIONS in millimeters: TSML1000

Polarity and orientation in the tape:



Quantity per reel: 1000 pcs.

Drawing-No.: 9.700-5268.01-4

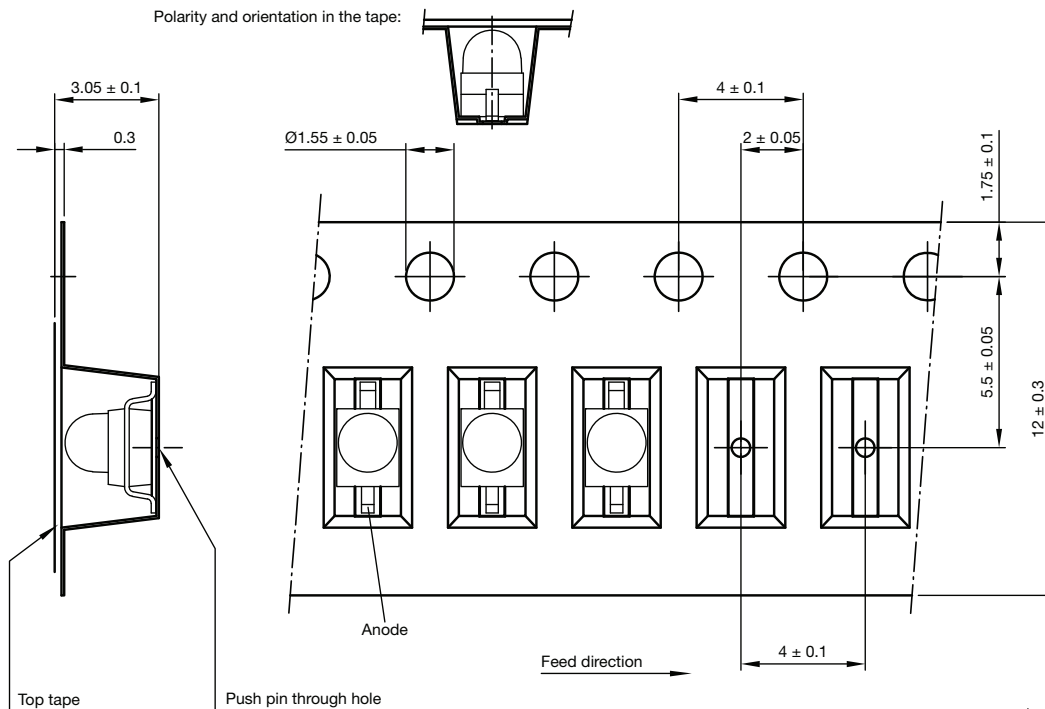
Issue: 3; 28.09.2021

Technical drawings
according to DIN
specifications



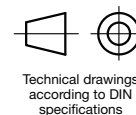
TAPING DIMENSIONS in millimeters: TSML1020

Polarity and orientation in the tape:



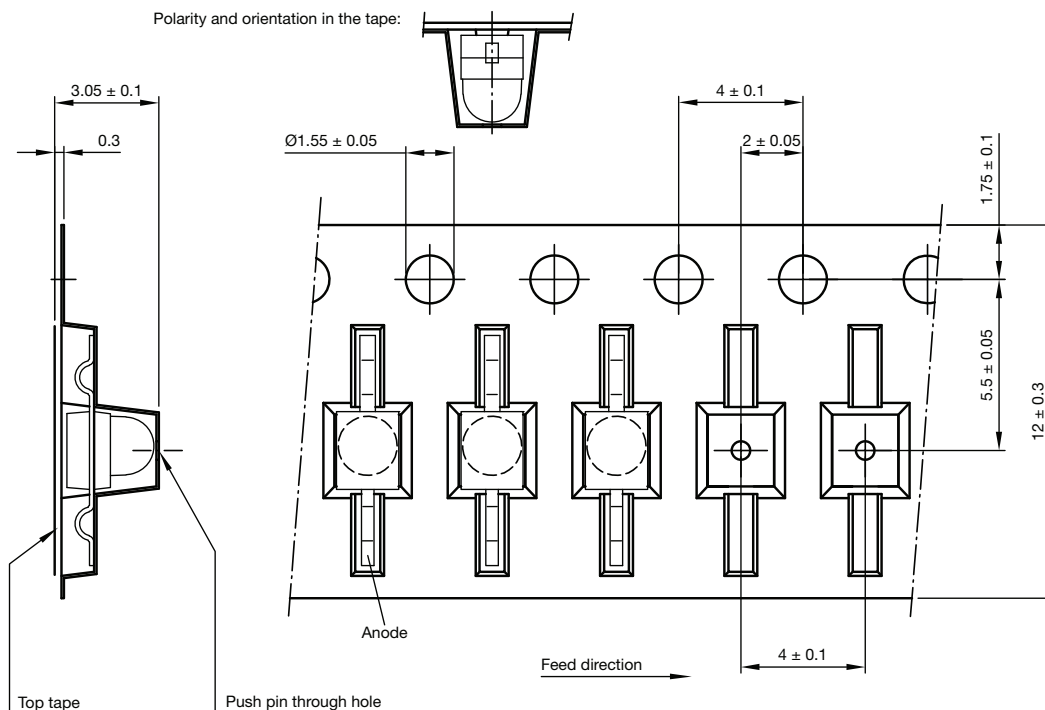
Quantity per reel: 1000 pcs.

Drawing-No.: 9.700-5269.01-4
Issue: 3; 28.09.2021



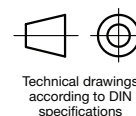
TAPING DIMENSIONS in millimeters: TSML1030

Polarity and orientation in the tape:



Quantity per reel: 1000 pcs.

Drawing-No.: 9.700-5270.01-4
Issue: 3; 28.09.2021





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