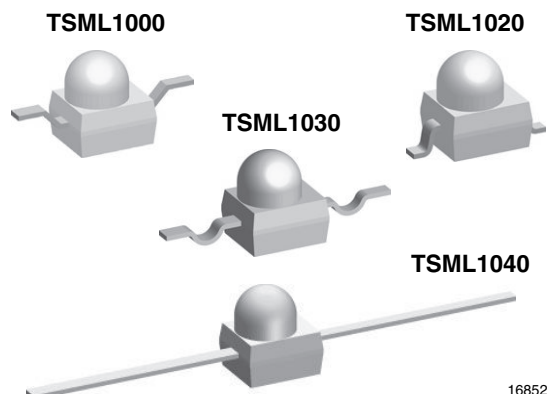


**High Power Infrared Emitting Diode, 940 nm, GaAlAs, MQW****FEATURES**

- 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, acc. 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
- Punched tape readers
- Encoder
- Photointerrupters

PRODUCT SUMMARY

COMPONENT	I_e (mW/sr)	ϕ (deg)	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	190	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: 4 mm x 4 mm	R_{thJA}	400	$^{\circ}\text{C}$

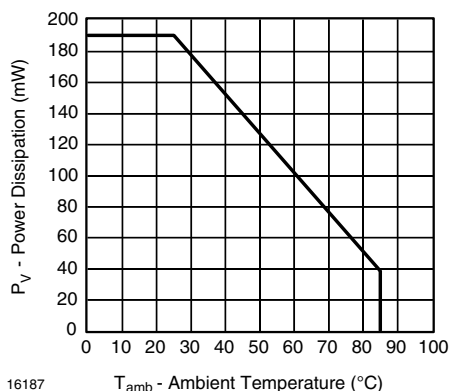


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

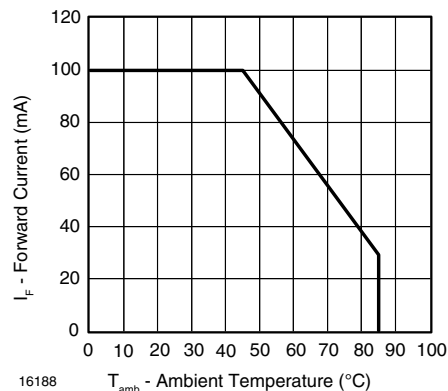


Fig. 2 - Forward Current vs. Ambient Temperature

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		deg
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)

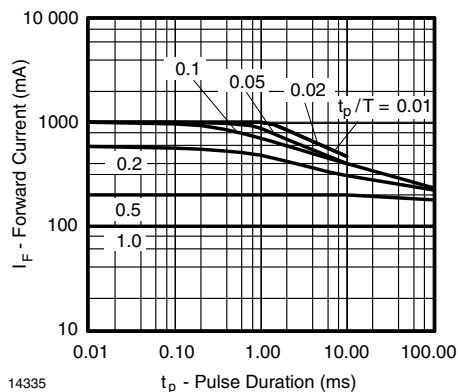


Fig. 3 - Pulse Forward Current vs. Pulse Duration

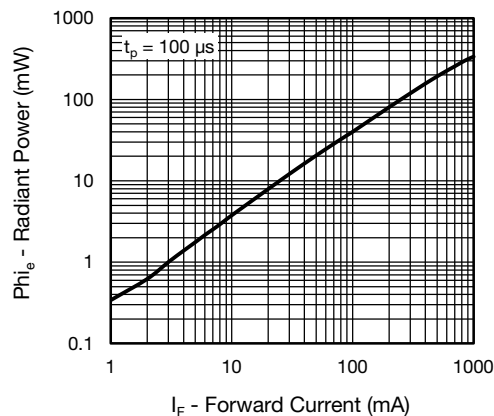


Fig. 6 - Radiant Power vs. Forward Current

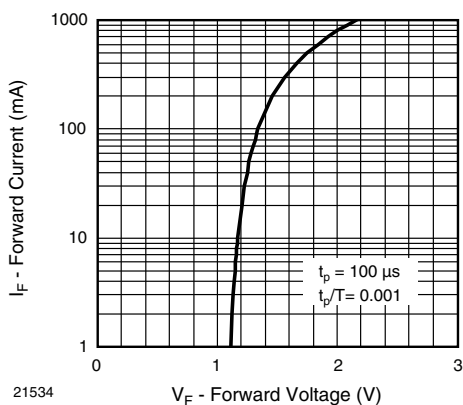


Fig. 4 - Forward Current vs. Forward Voltage

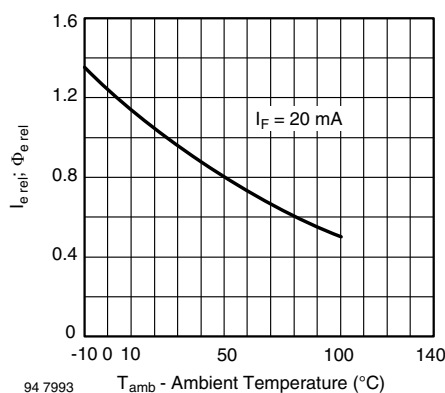


Fig. 7 - Relative Radiant Intensity/Power vs. Ambient Temperature

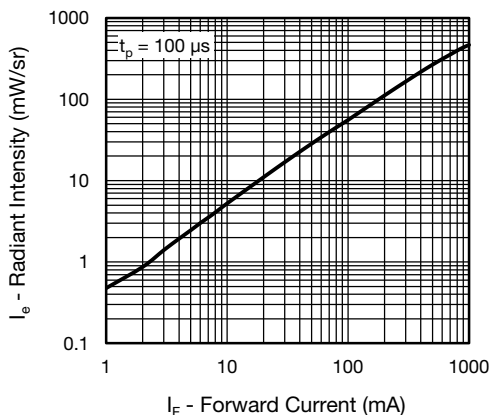


Fig. 5 - Radiant Intensity vs. Forward Current

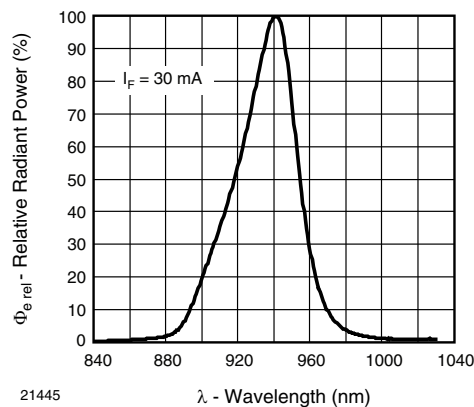


Fig. 8 - Relative Radiant Power vs. Wavelength

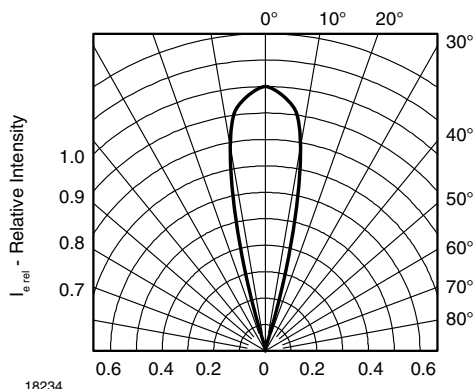
REFLOW SOLDER PROFILE


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

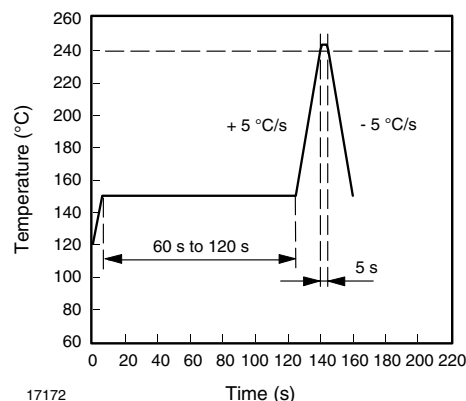


Fig. 10 - Lead Tin (SnPb) Reflow Solder Profile

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.

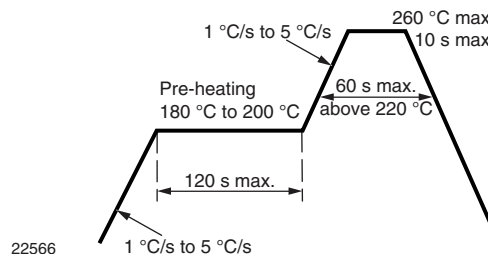
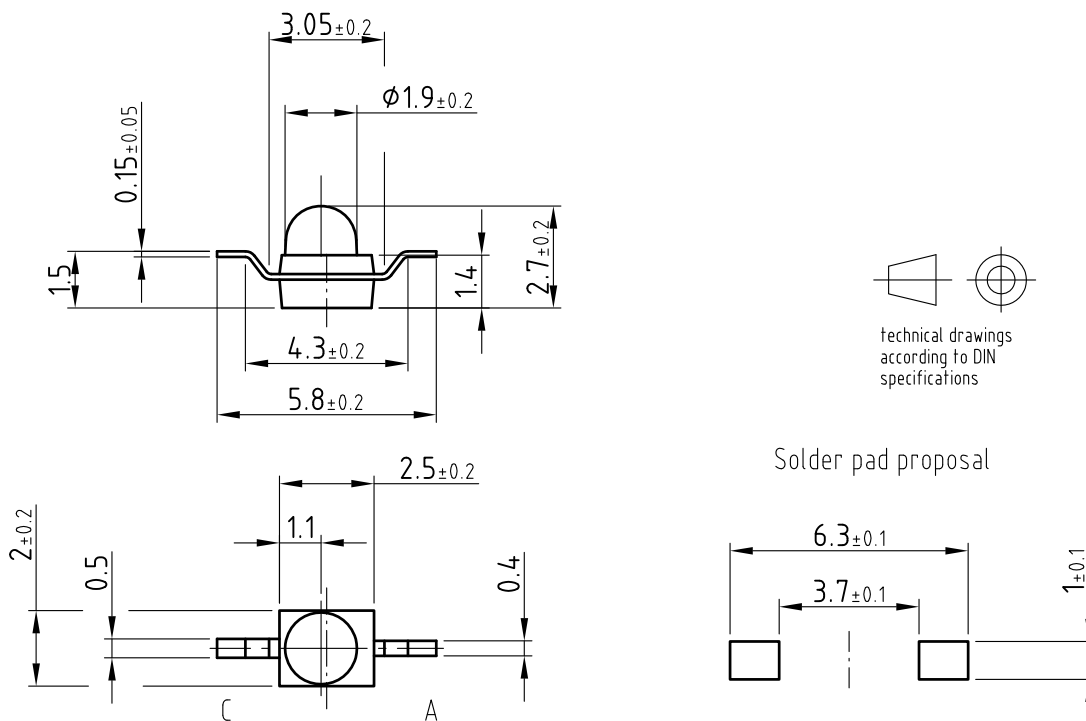


Fig. 11 - Lead (Pb)-Free Reflow Solder Profile acc. J-STD-020



PACKAGE DIMENSIONS in millimeters: TSML1000

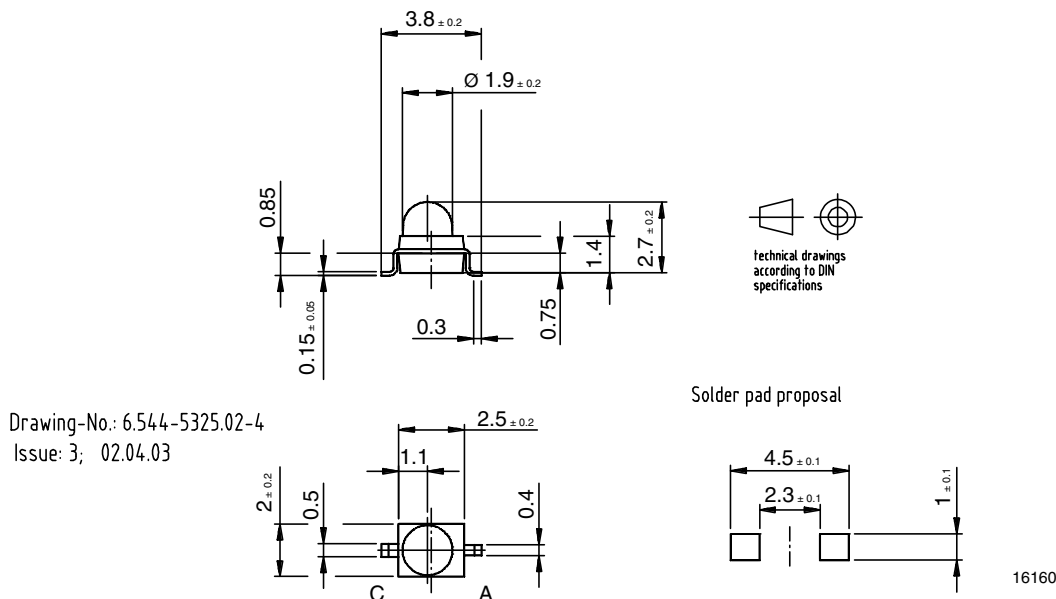


Drawing-No.: 6.544-5326.02-4

Issue: 3; 02.04.03

16159

PACKAGE DIMENSIONS in millimeters: TSML1020



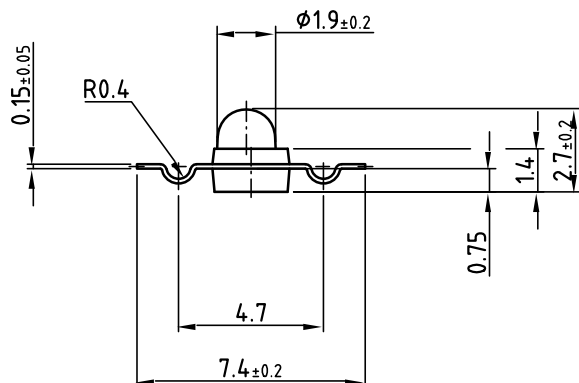
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Issue: 3; 02.04.03

16160

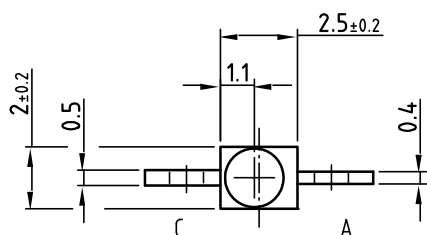
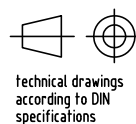


PACKAGE DIMENSIONS in millimeters: TSML1030

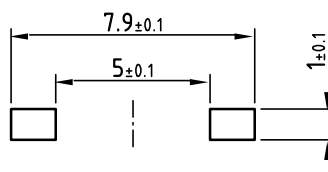


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Issue: 4; 08.05.03

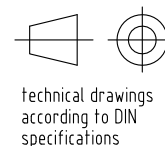
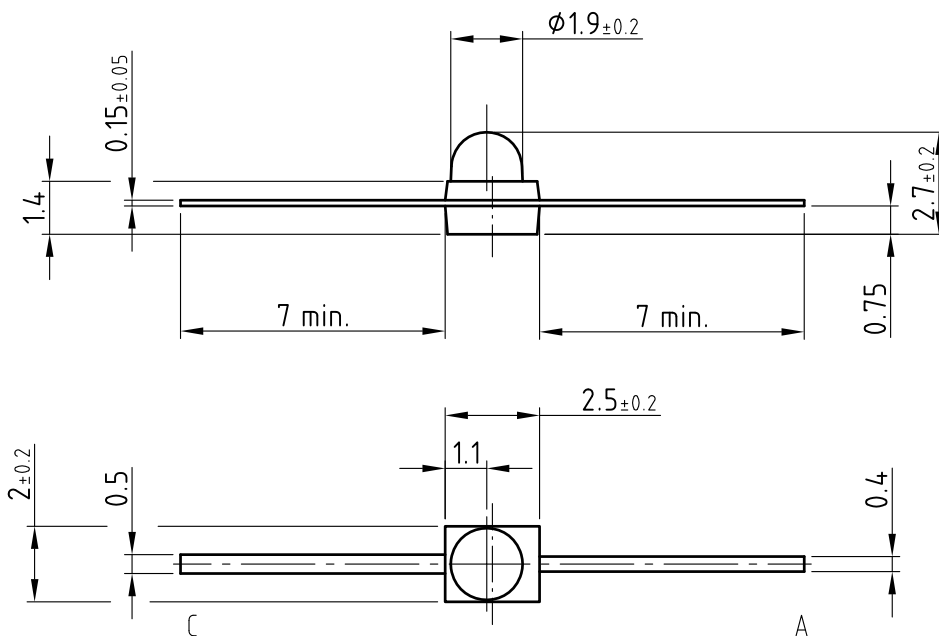


Solder pad proposal



16228

PACKAGE DIMENSIONS in millimeters: TSML1040



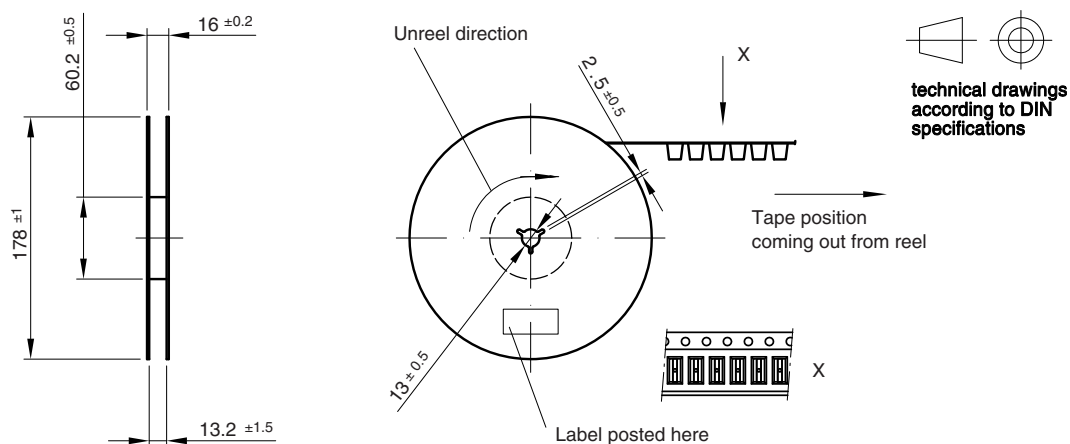
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Issue: 3; 02.04.03

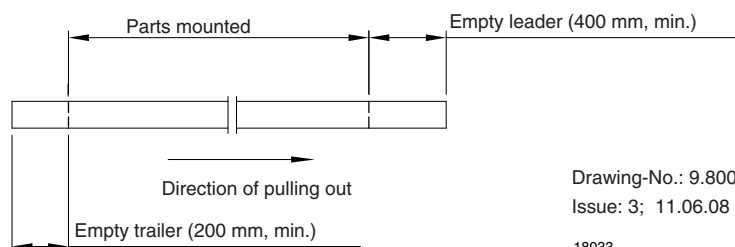
16760



REEL DIMENSIONS in millimeters



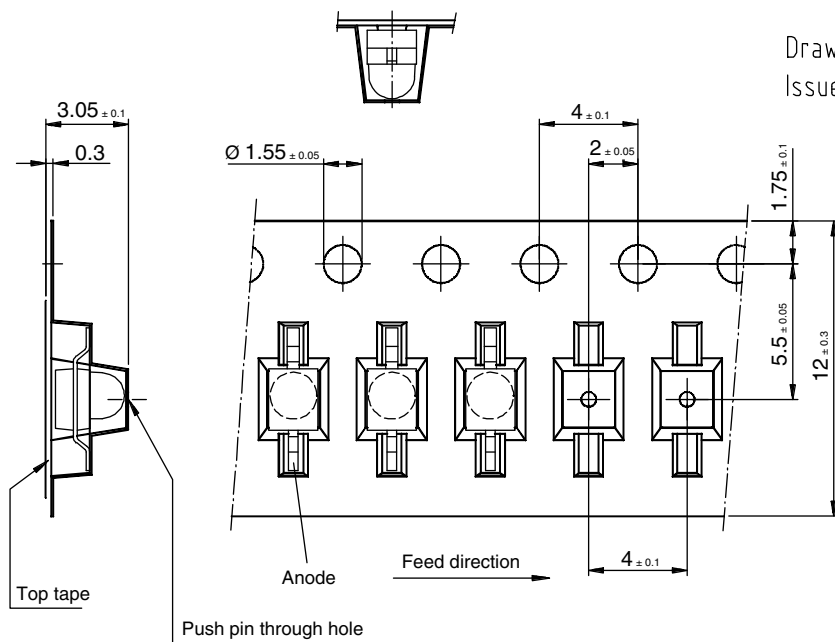
Leader and trailer tape:



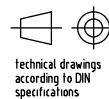
Drawing-No.: 9.800-5080.01-4
Issue: 3; 11.06.08

18033

TAPING DIMENSIONS in millimeters: TSML1000



Drawing-No.: 9.700-5268.01-4
Issue: 2; 22.11.02



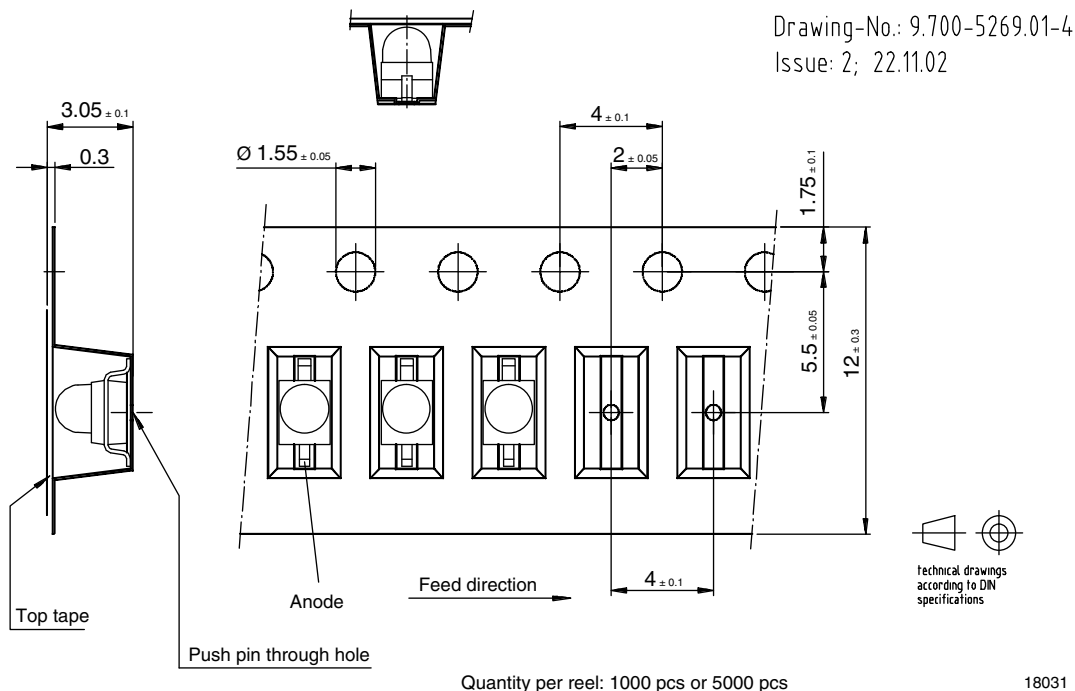
technical drawings
according to DIN
specifications

Quantity per reel: 1000 pcs or 5000 pcs

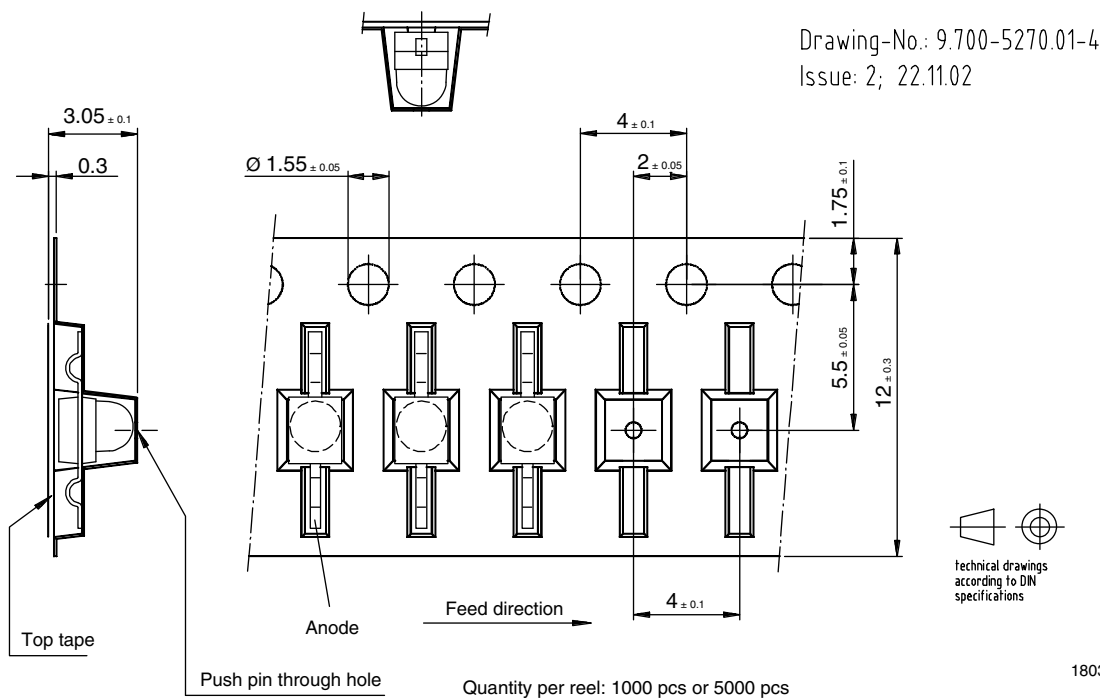
18030



TAPING DIMENSIONS in millimeters: TSML1020



TAPING DIMENSIONS in millimeters: TSML1030





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