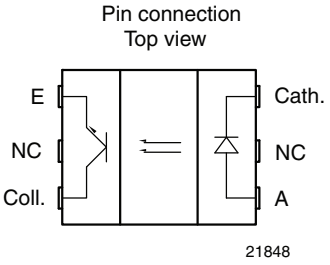
Subminiature Transmissive Optical Sensor with Transistor Output



19601



21848

FEATURES

- Package type: surface mount
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 5.5 x 4 x 4
- AEC-Q101 qualified
- Gap (in mm): 3
- Aperture (in mm): 0.3
- Typical output current under test: I_C = 1.6 mA
- Emitter wavelength: 950 nm
- Released for high operating temperatures up to 125 °C
- Moisture sensitivity level (MSL): 1
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

e4

RoHS COMPLIANT

GREEN (5-2008)

DESCRIPTION

The TCPT1350X01 is a compact transmissive sensor that includes an infrared emitter and a phototransistor detector, located face-to-face in a surface mount package. TCPT1350X01 is especially designed to meet high operating temperature requirements and is released for operating temperature ranges from - 40 °C to + 125 °C.

APPLICATIONS

- Automotive optical sensors
- Accurate position sensor for encoder
- Detection of motion speed

PRODUCT SUMMARY

PART NUMBER	GAP WIDTH (mm)	APERTURE WIDTH (mm)	TYPICAL OUTPUT CURRENT UNDER TEST (1) (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCPT1350X01	3	0.3	1.6	No

Note

- Conditions like in table basic characteristics/coupler

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
TCPT1350X01	Tape and reel	MOQ: 2000 pcs, 2000 pcs/reel	Drypack, MSL 1

Note

- MOQ: minimum order quantity

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Total power dissipation	$T_{amb} \leq 125$ °C	P_{tot}	37.5	mW
Junction temperature		T_j	140	°C
Ambient temperature range		T_{amb}	- 40 to + 125	°C
Storage temperature range		T_{stg}	- 40 to + 125	°C
Soldering temperature	In accordance with fig. 16	T_{sd}	260	°C
INPUT (EMITTER)				
Reverse voltage		V_R	5	V
Forward current	$T_{amb} \leq 125$ °C	I_F	25	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	200	mA
Power dissipation	$T_{amb} \leq 125$ °C	P_V	37.5	mW
OUTPUT (DETECTOR)				
Collector emitter voltage		V_{CEO}	20	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	20	mA
Collector dark current	T_{amb} = 85 °C, V_{CE} = 5 V	I_{CEO}	3.3	µA

ABSOLUTE MAXIMUM RATINGS

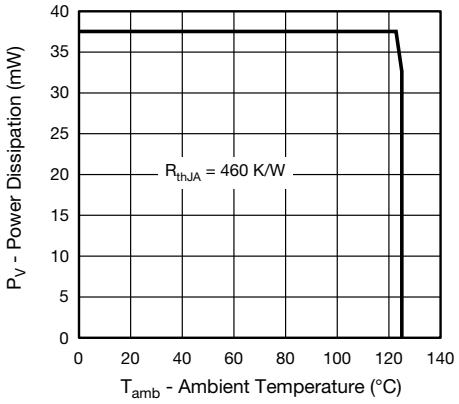


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

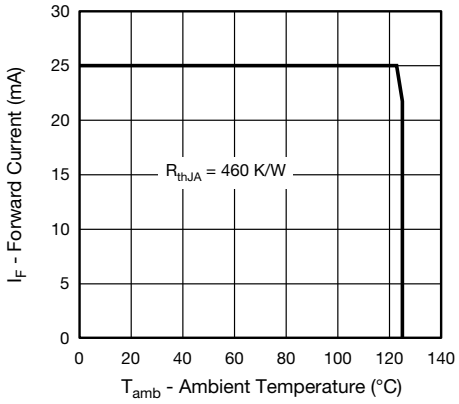


Fig. 2 - Forward Current Limit vs. Ambient Temperature

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BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
COUPLER						
Collector current	V_{CE} = 5 V, I_F = 15 mA	I_C	0.7	1.6		mA
Collector emitter saturation voltage	I_F = 15 mA, I_C = 0.2 mA	V_{CEsat}			0.4	V
INPUT (EMITTER)						
Forward voltage	I_F = 15 mA	V_F	1	1.2	1.4	V
Reverse current	V_R = 5 V	I_R			10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j		25		pF
OUTPUT (DETECTOR)						
Collector emitter voltage I_C	I_C = 1 mA	V_{CEO}	20			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector dark current	V_{CE} = 25 V, I_F = 0 A, E = 0 lx	I_{CEO}		1	100	nA
SWITCHING CHARACTERISTICS						
Rise time	I_C = 0.7 mA, V_{CE} = 5 V, R_L = 100 Ω (see figure 3)	t_r		9	150	µs
Fall time	I_C = 0.7 mA, V_{CE} = 5 V, R_L = 100 Ω (see figure 3)	t_f		16	150	µs

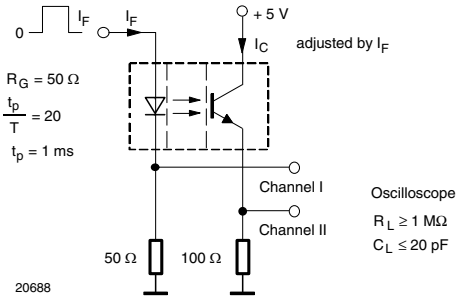


Fig. 3 - Test Circuit for t_r and t_f

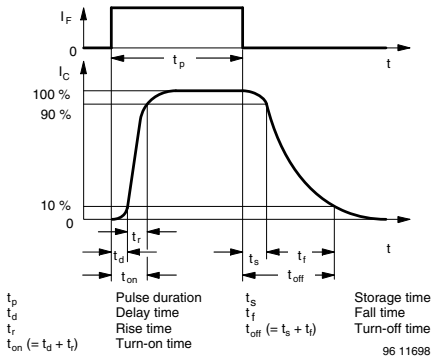


Fig. 4 - Switching Times

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

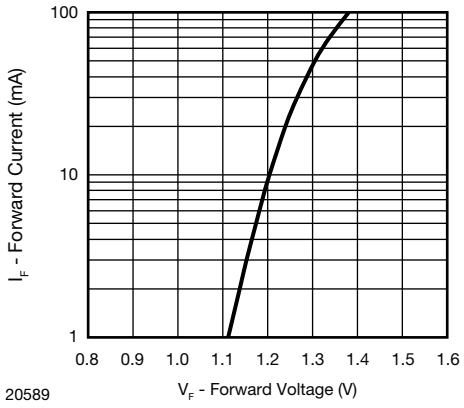


Fig. 5 - Forward Current vs. Forward Voltage

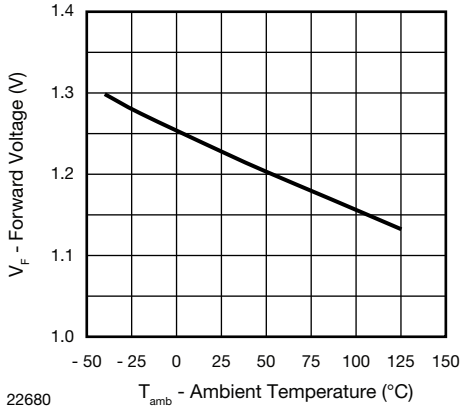


Fig. 6 - Forward Voltage vs. Ambient Temperature

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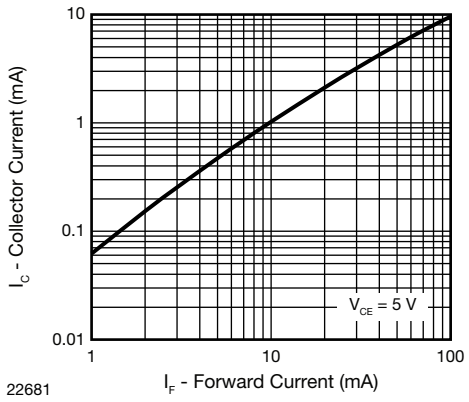


Fig. 7 - Collector Current vs. Forward Current

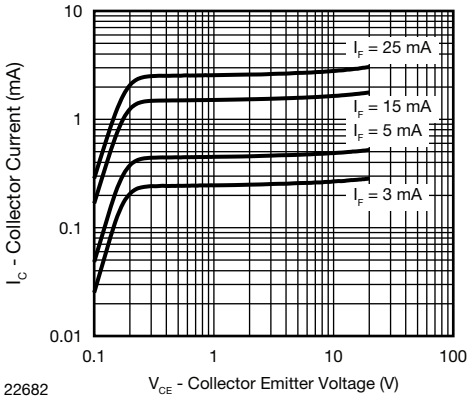


Fig. 8 - Collector Current vs. Collector Emitter Voltage

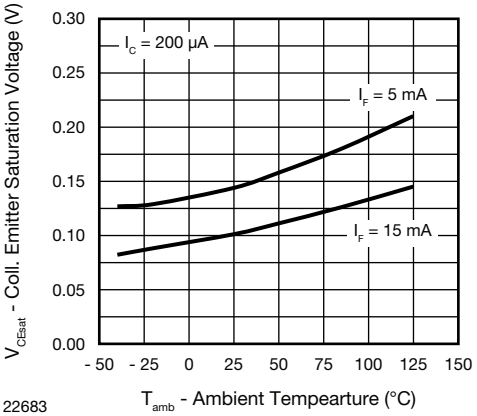


Fig. 9 - Collector Emitter Saturation Voltage vs. Ambient Temperature

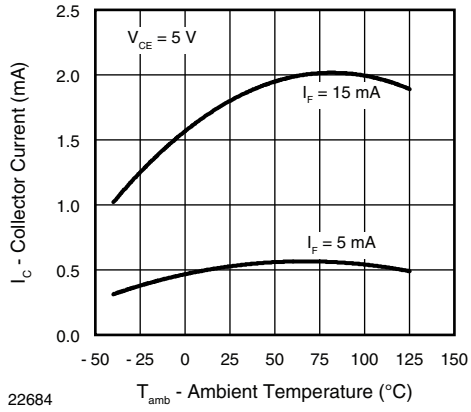


Fig. 10 - Collector Current vs. Ambient Temperature

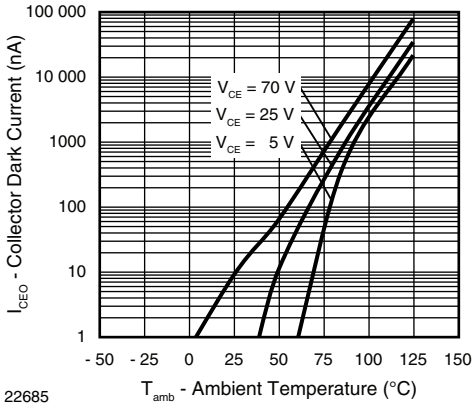


Fig. 11 - Collector Dark Current vs. Ambient Temperature

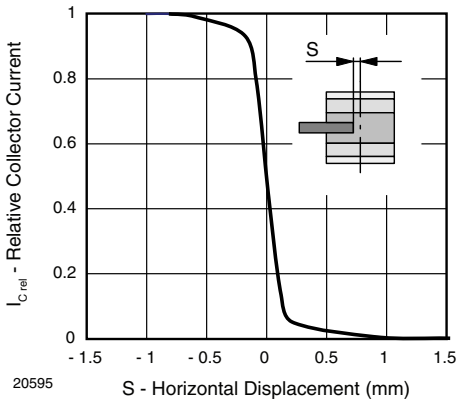


Fig. 12 - Relative Collector Current vs. Horizontal Displacement

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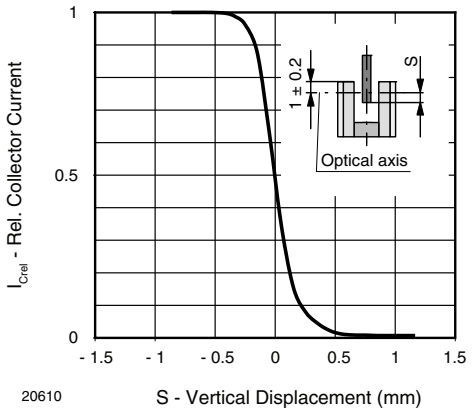


Fig. 13 - Relative Collector Current vs. Vertical Displacement

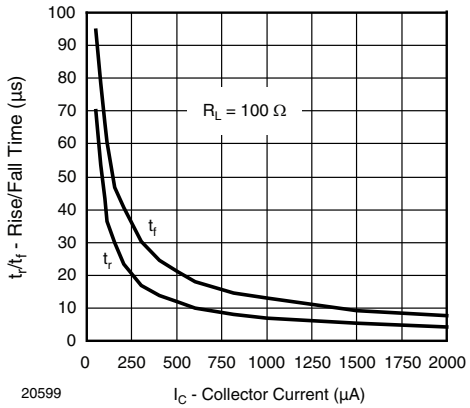


Fig. 14 - Rise/Fall Time vs. Collector Current

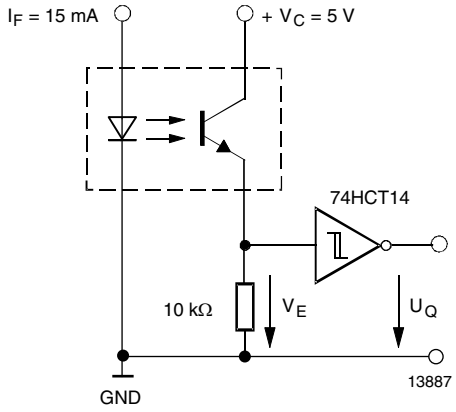


Fig. 15 - Application example

REFLOW SOLDER PROFILE

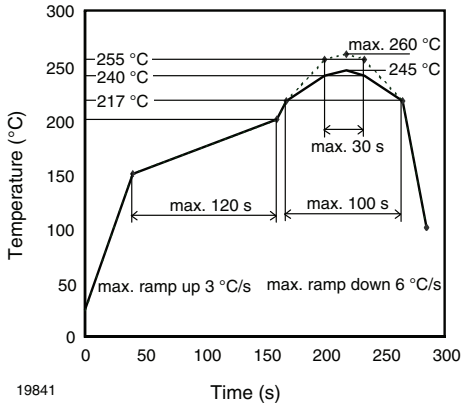


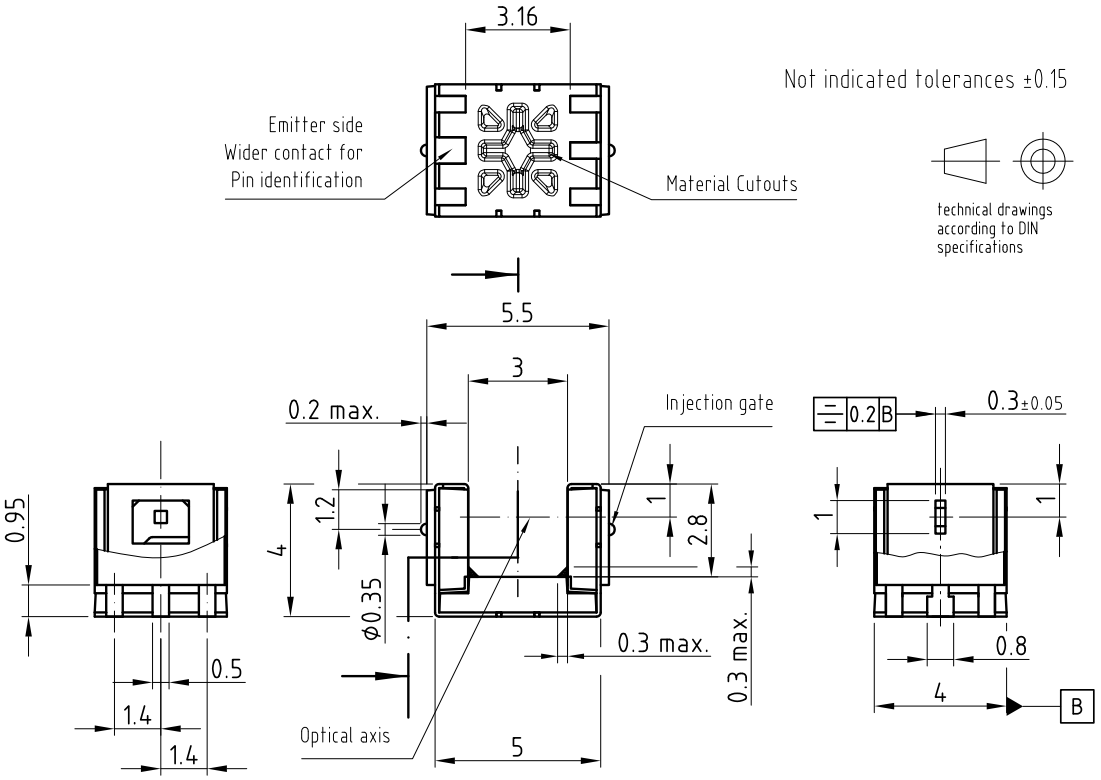
Fig. 16 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

FLOOR LIFE

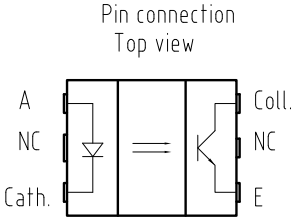
No time limit.
Moisture sensitivity level (MSL) 1, acc. JEDEC, J-STD-020.

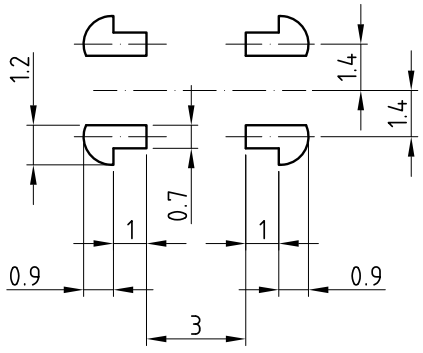
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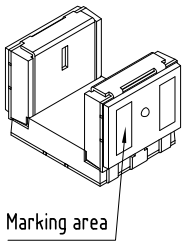
PACKAGE DIMENSIONS in millimeters

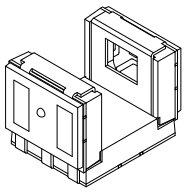


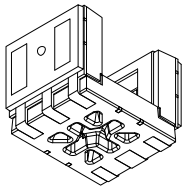
Proposed solderpad design









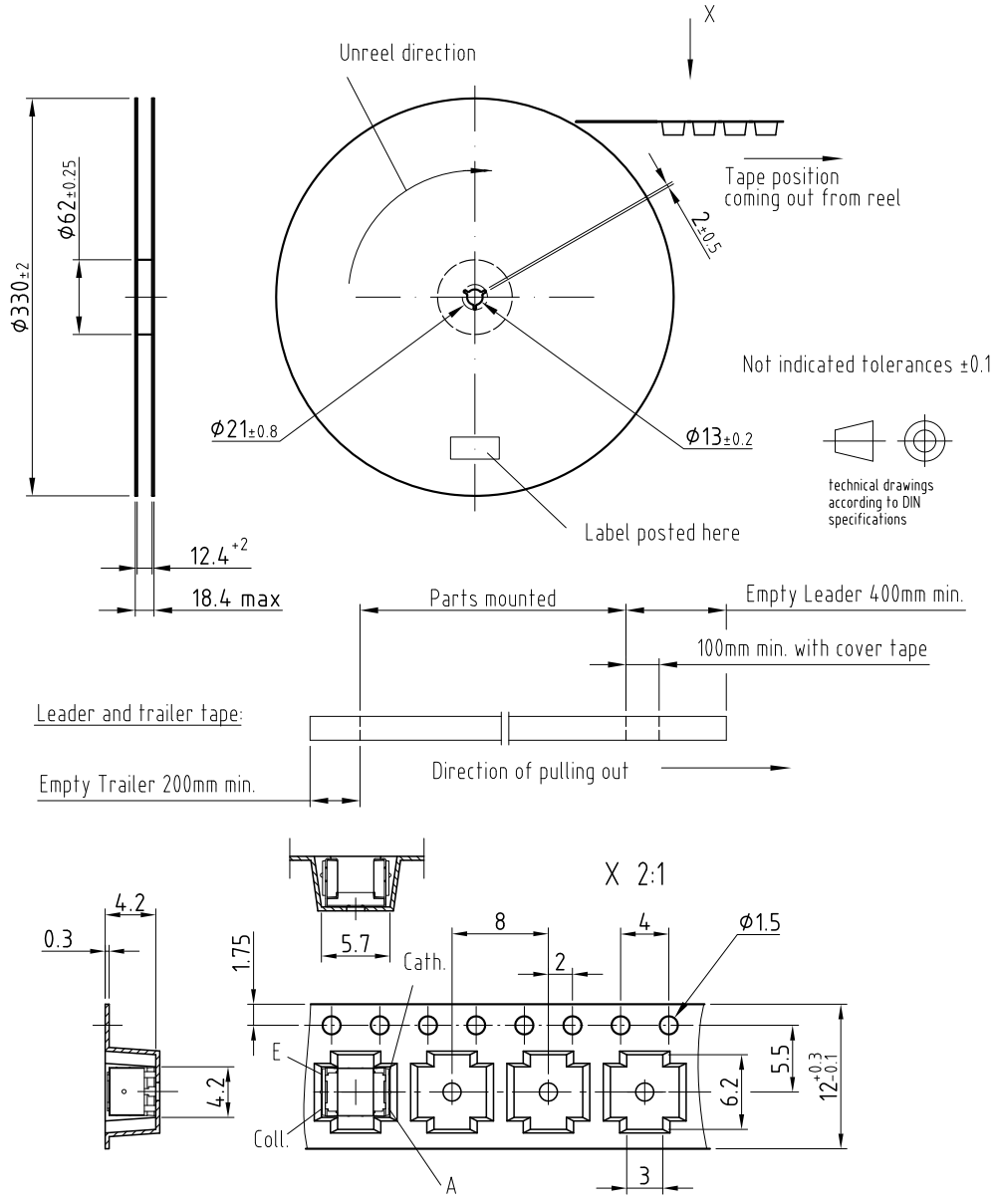


Drawing-No.: 6.541-5062.01-4
Issue: 6; 14.05.07
19591

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PACKAGE DIMENSIONS in millimeters

Volume/reel = 2000 pcs



Drawing-No.: 9.800-5092.02-4
Issue: 1; 14.05.07
20601

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Packaging and Ordering Information

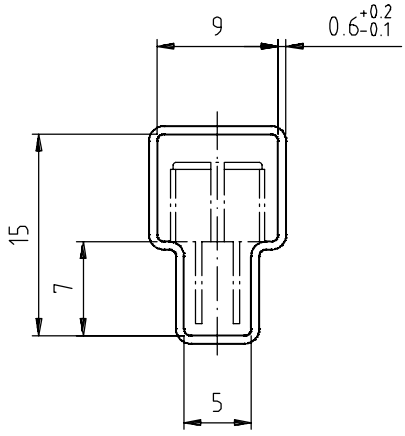
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TCPT1300X01	2000	Reel	(2)	29
TCRT1000	1000	Bulk	-	26
TCRT1010	1000	Bulk	-	26
TCRT5000	4500	50	2	27
TCRT5000L	2400	48	3	27
TCST1030	5200	65	5	24
TCST1030L	2600	65	6	24
TCST1103	1020	85	4	24
TCST1202	1020	85	4	24
TCST1230	4800	60	7	24
TCST1300	1020	85	4	24
TCST2103	1020	85	4	24
TCST2202	1020	85	4	24
TCST2300	1020	85	4	24
TCST5250	4860	30	8	24
TCUT1300X01	2000	Reel	(2)	29
TCZT8020-PAER	2500	Bulk	-	22

Notes

(1) MOQ: minimum order quantity

(2) Please refer to datasheets

TUBE SPECIFICATION FIGURES

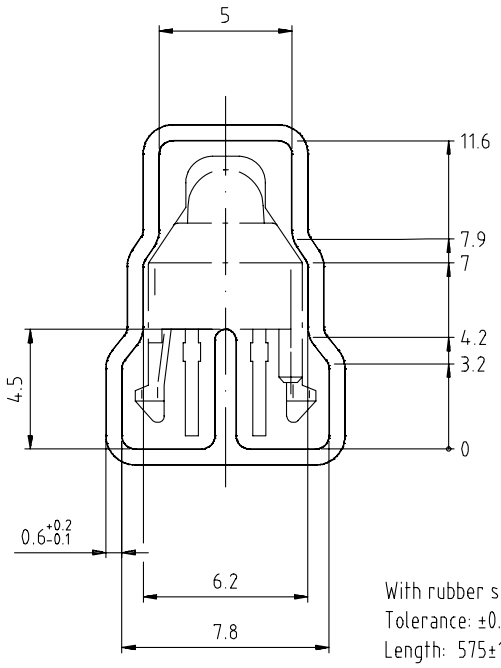


With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm

Drawing-No.: 9.700-5097.01-4
Issue: 1; 25.02.00

15198

Fig. 1



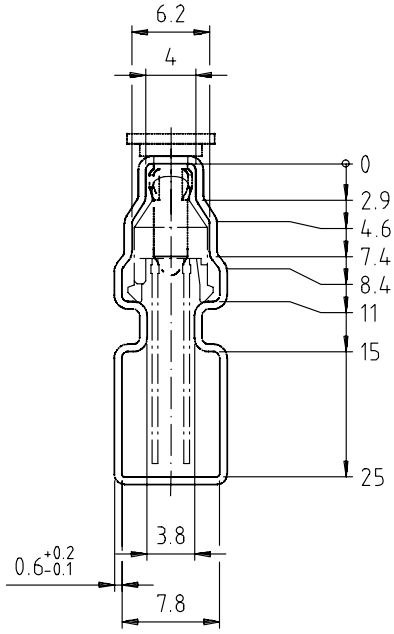
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Issue: 1; 10.05.00

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Length: 575±1mm

Drawing refers to following types: TCRT 5000

15210

Fig. 2

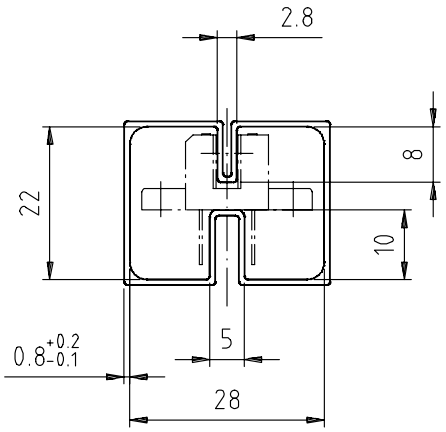


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15201

Fig. 3

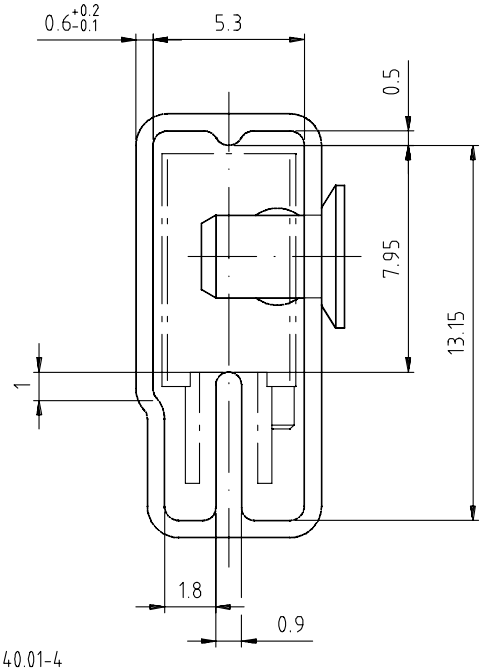


With rubber stopper
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Length: 575±1mm

Drawing-No.: 9.700-5100.01-4
Issue: 1; 25.02.00

15199

Fig. 4



With stopper pins
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Length: 575±1mm

Drawing-No.: 9.700-5140.01-4
Issue: 1; 25.02.00

15202

Fig. 5

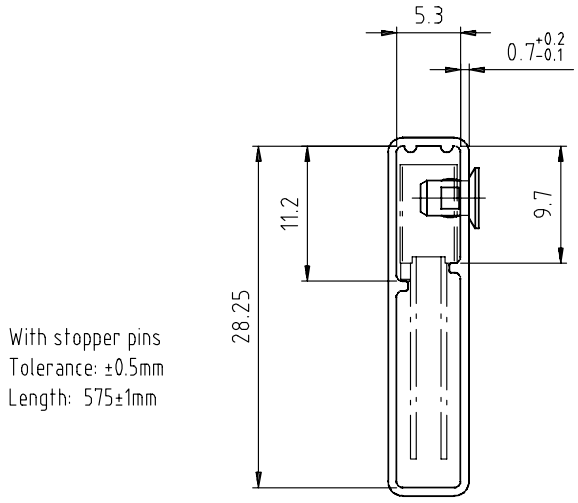

5.3
0.7+0.2-0.1
11.2
9.7
28.25
With stopper pins
Tolerance: ±0.5mm
Length: 575±1mm
Drawing-No.: 9.700-5205.01-4
Issue: 1; 25.02.00
15196

Fig. 6

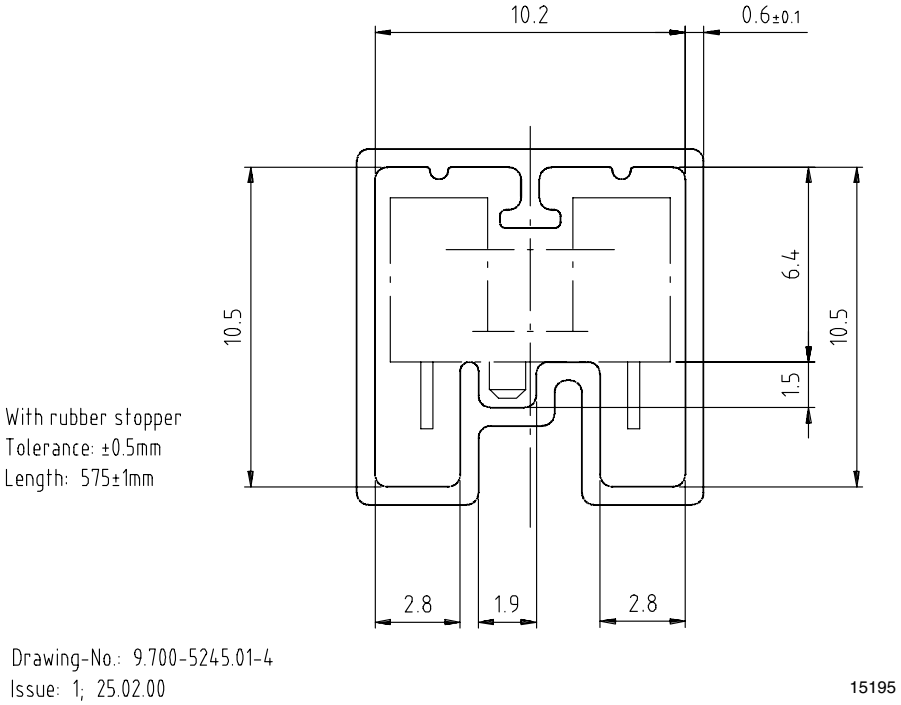
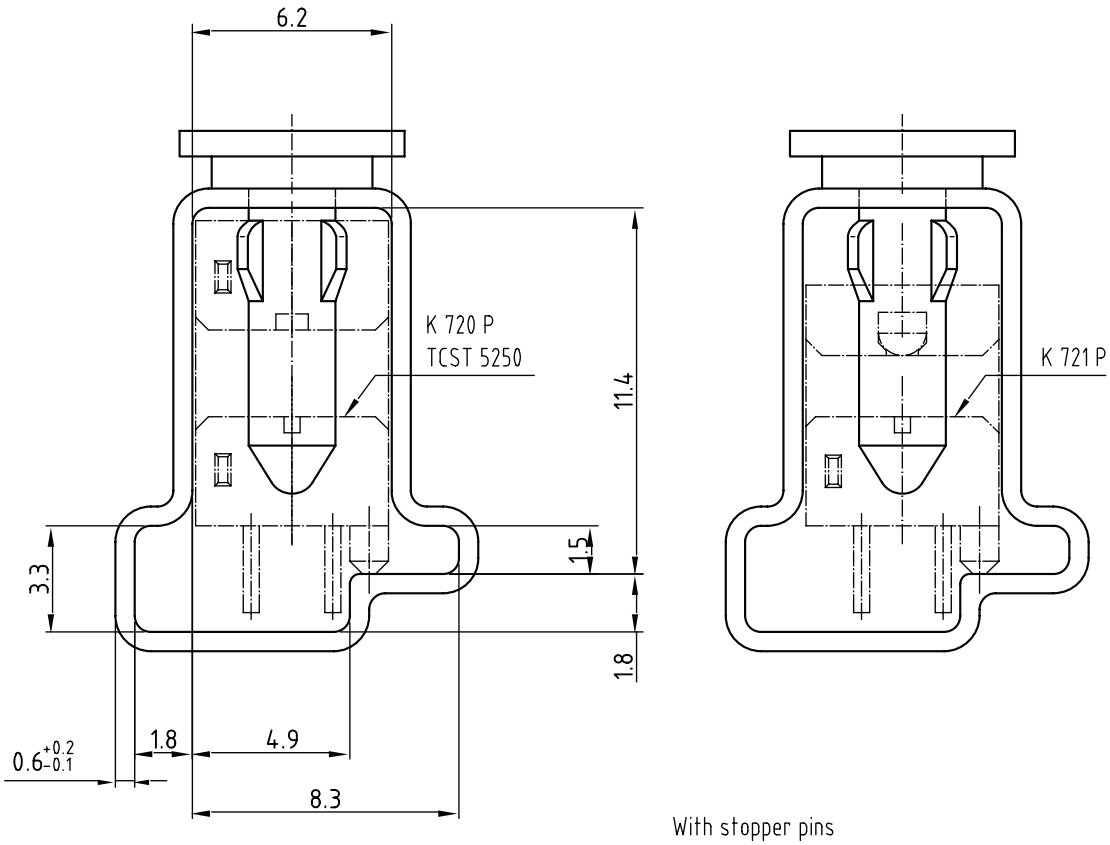

10.2
0.6±0.1
10.5
6.4
10.5
1.5
With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm
2.8
1.9
2.8
Drawing-No.: 9.700-5245.01-4
Issue: 1; 25.02.00
15195

Fig. 7



Drawing-No.: 9.700-5222.01-4
Issue: 2; 19.11.04
20257

With stopper pins
Tolerance: ±0.5mm
Length: 450±1mm
All dimensions in mm

Fig. 8

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