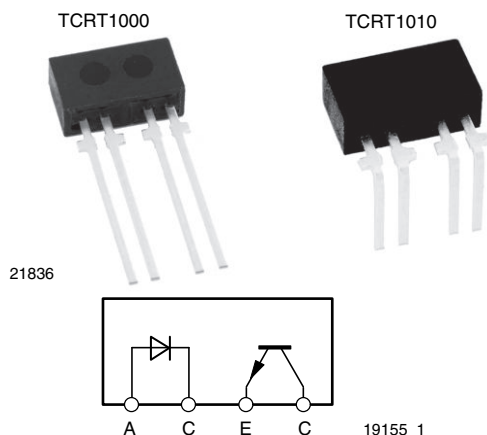


# Reflective Optical Sensor with Transistor Output



## FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 7 x 4 x 2.5
- Peak operating distance: 1 mm
- Operating range within > 20 % relative collector current: 0.2 mm to 4 mm
- Typical output current under test:  $I_C = 0.5$  mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## DESCRIPTION

The TCRT1000 and TCRT1010 are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light.

## APPLICATIONS

- Optoelectronic scanning and switching devices i.e., index sensing, coded disk scanning etc. (optoelectronic encoder assemblies for transmissive sensing).

## PRODUCT SUMMARY

PART NUMBER	DISTANCE FOR MAXIMUM CTR <sub>rel</sub> <sup>(1)</sup> (mm)	DISTANCE RANGE FOR RELATIVE $I_{out} > 20\%$ (mm)	TYPICAL OUTPUT CURRENT UNDER TEST <sup>(2)</sup> (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCRT1000	1	0.2 to 4	0.5	Yes
TCRT1010	1	0.2 to 4	0.5	Yes

### Notes

<sup>(1)</sup> CTR: current transference ratio,  $I_{out}/I_{in}$

<sup>(2)</sup> Conditions like in table basic characteristics/sensor

## ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME <sup>(1)</sup>	REMARKS
TCRT1000	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	Straight leads
TCRT1010	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	Bent leads

### Note

<sup>(1)</sup> MOQ: minimum order quantity

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>SENSOR</b>				
Total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_{tot}$	200	mW
Ambient temperature range		$T_{amb}$	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	- 40 to + 100	$^{\circ}\text{C}$
Soldering temperature	2 mm distance to package, $t \leq 5$ s	$T_{sd}$	260	$^{\circ}\text{C}$
<b>INPUT (EMITTER)</b>				
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	50	mA
Forward surge current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	3	A
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_V$	100	mW
Junction temperature		$T_J$	100	$^{\circ}\text{C}$

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>OUTPUT (DETECTOR)</b>				
Collector emitter voltage		$V_{CEO}$	32	V
Emitter collector voltage		$V_{ECO}$	5	V
Collector current		$I_C$	50	mA
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_V$	100	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$

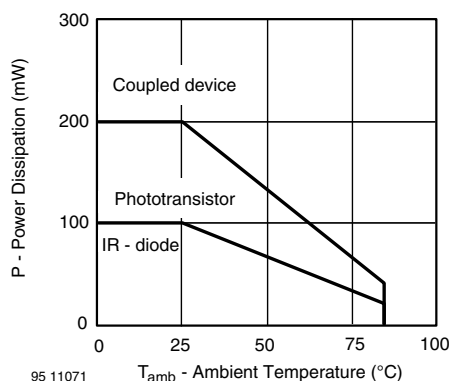
**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

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

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>SENSOR</b>						
Collector current	$V_{CE} = 5\text{ V}$ , $I_F = 20\text{ mA}$ , $d = 1\text{ mm}$ (figure 2)	$I_C^{(1)}$	0.3	0.5		mA
Cross talk current	$V_{CE} = 5\text{ V}$ , $I_F = 20\text{ mA}$ , (figure 1)	$I_{CX}^{(2)}$			1	$\mu\text{A}$
Collector emitter saturation voltage	$I_F = 20\text{ mA}$ , $I_C = 0.1\text{ mA}$ , $d = 1\text{ mm}$ (figure 2)	$V_{CEsat}^{(1)}$			0.3	V
<b>INPUT (EMITTER)</b>						
Forward voltage	$I_F = 50\text{ mA}$	$V_F$		1.25	1.6	V
Radiant intensity	$I_F = 50\text{ mA}$ , $t_p = 20\text{ ms}$	$I_e$			7.5	mW/sr
Peak wavelength	$I_F = 100\text{ mA}$	$\lambda_P$	940			nm
Virtual source diameter	Method: 63 % encircled energy	$d$		1.2		mm
<b>OUTPUT (DETECTOR)</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	32			V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	5			V
Collector dark current	$V_{CE} = 20\text{ V}$ , $I_F = 0\text{ A}$ , $E = 0\text{ lx}$	$I_{CEO}$			200	nA

**Notes**

(1) Measured with the "Kodak neutral test card", white side with 90 % diffuse reflectance

(2) Measured without reflecting medium

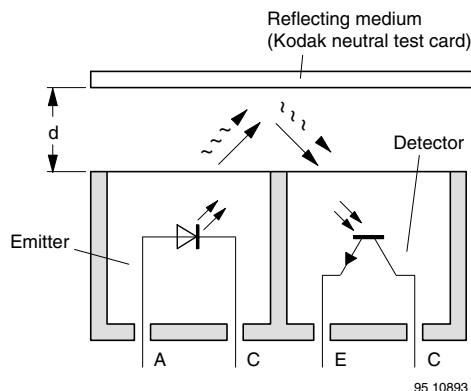


Fig. 2 - Test Condition

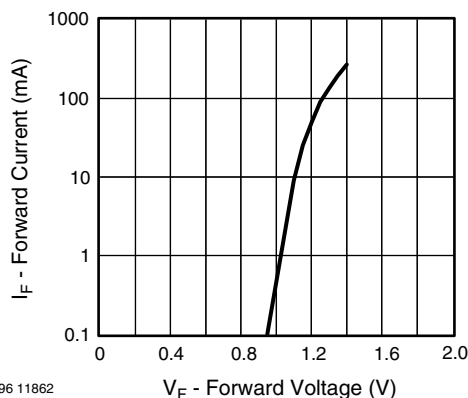
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 3 - Forward Current vs. Forward Voltage

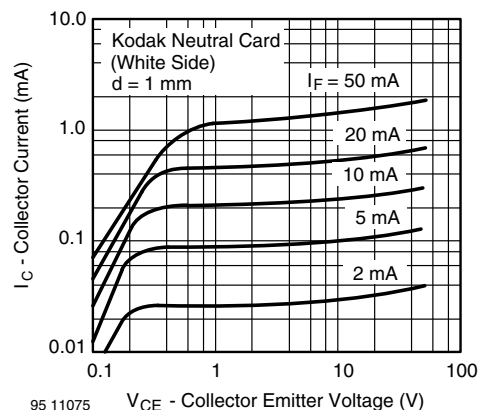


Fig. 5 - Collector Current vs. Collector Emitter Voltage

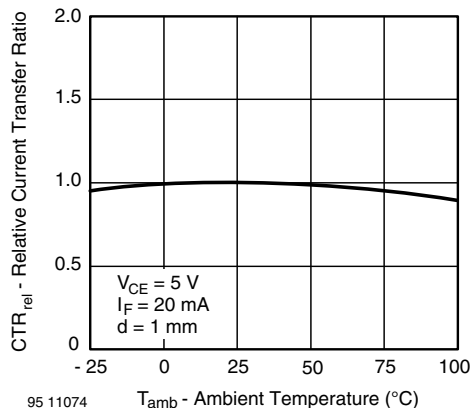


Fig. 4 - Relative Current Transfer Ratio vs. Ambient Temperature

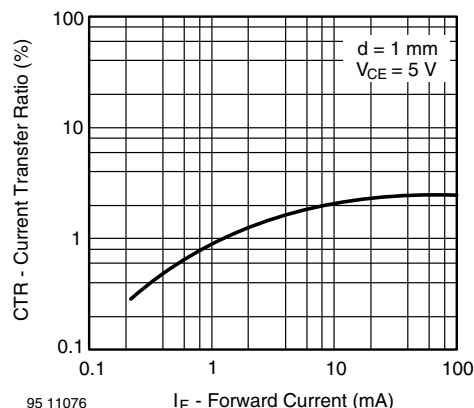


Fig. 6 - Current Transfer Ratio vs. Forward Current

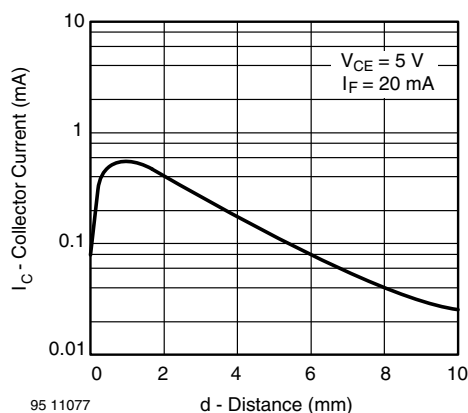


Fig. 7 - Collector Current vs. Distance

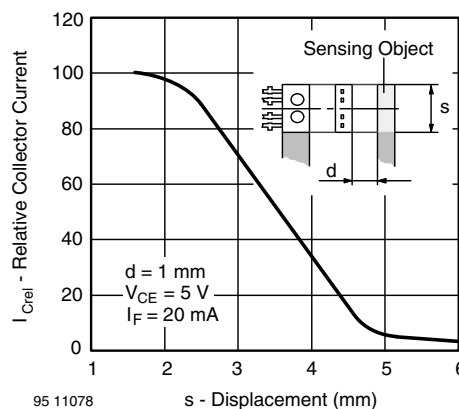
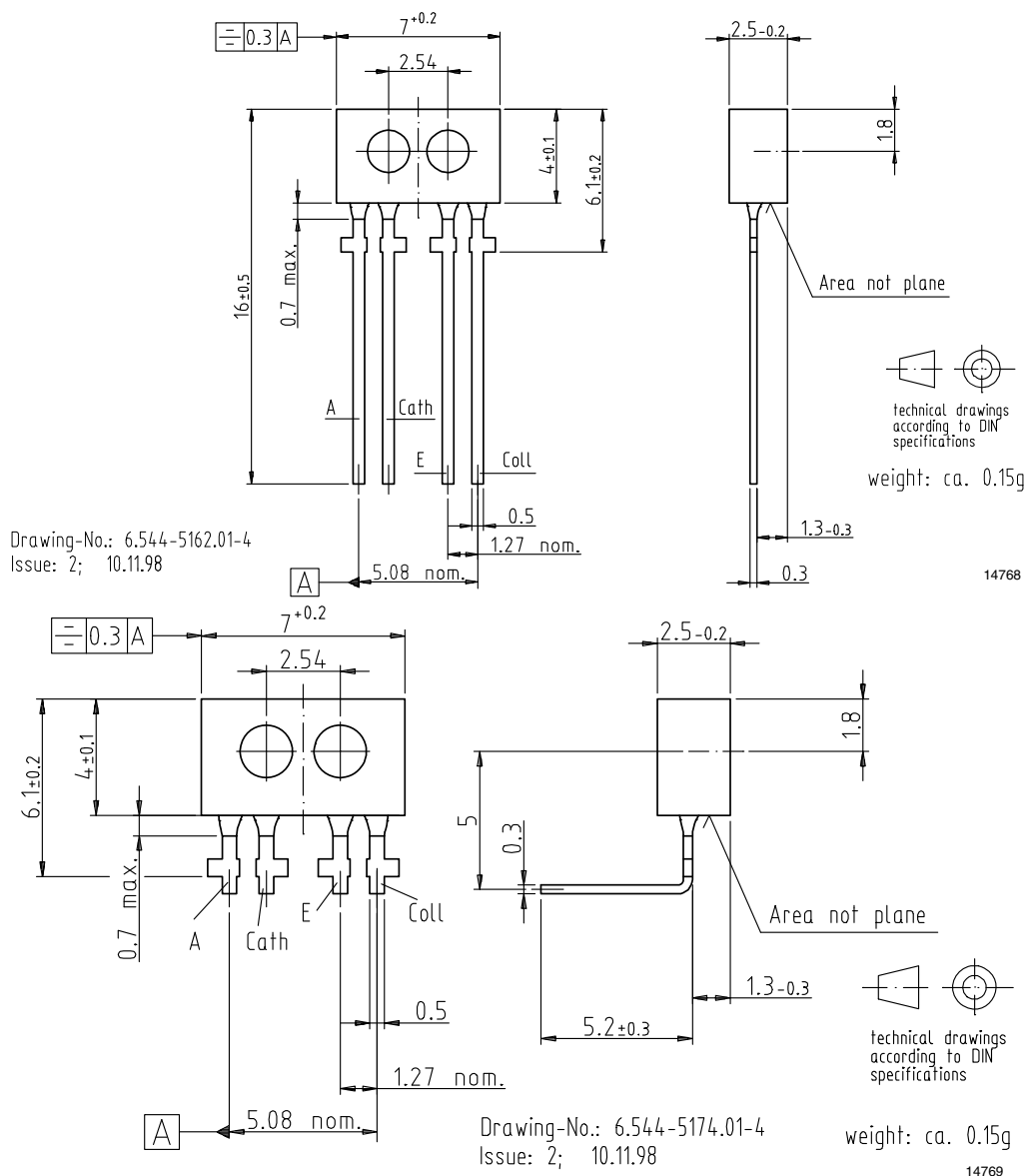


Fig. 8 - Relative Collector Current vs. Displacement

### PACKAGE DIMENSIONS in millimeters



## Packaging and Ordering Information

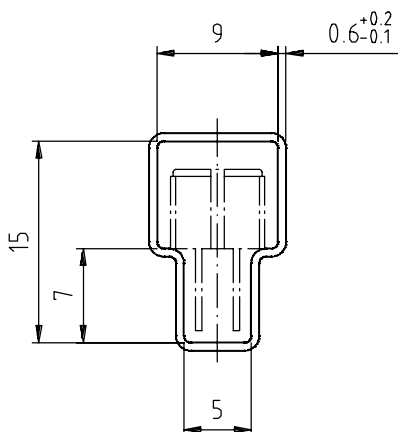
PART NUMBER	MOQ <sup>(1)</sup>	PCS PER TUBE	TUBE SPEC. (FIGURE)	CONSTITUENTS (FORMS)
CNY70	4000	80	1	28
TCPT1300X01	2000	Reel	<sup>(2)</sup>	29
TCRT1000	1000	Bulk	-	26
TCRT1010	1000	Bulk	-	26
TCRT5000	4500	50	2	27
TCRT5000L	2400	48	3	27
TCST1030	5200	65	5	24
TCST1030L	2600	65	6	24
TCST1103	1020	85	4	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	<sup>(2)</sup>	29
TCZT8020-PAER	2500	Bulk	-	22

### Notes

<sup>(1)</sup> MOQ: minimum order quantity

<sup>(2)</sup> Please refer to datasheets

### TUBE SPECIFICATION FIGURES



With rubber stopper

Tolerance:  $\pm 0.5\text{mm}$

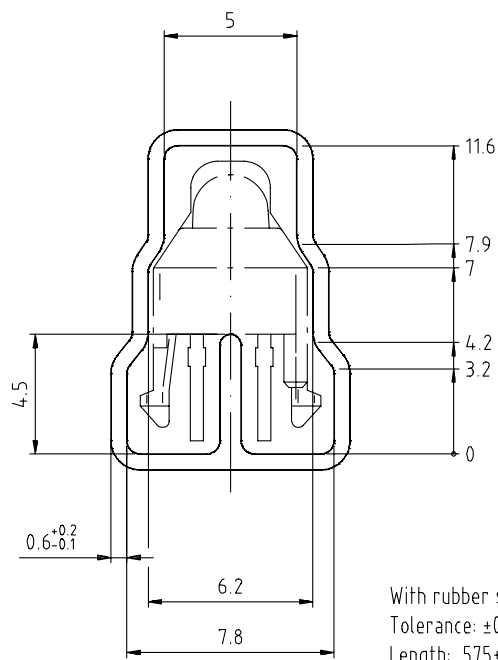
Length:  $575 \pm 1\text{mm}$

Drawing-No.: 9.700-5097.01-4

Issue: 1; 25.02.00

15198

Fig. 1

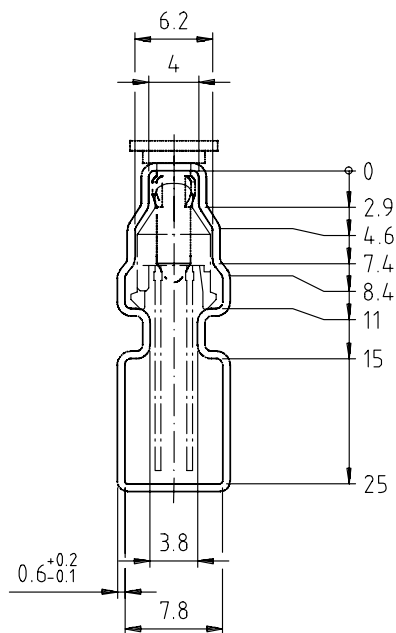


Drawing-No.: 9.700-5139.01-4  
Issue: 1; 10.05.00

Drawing refers to following types: TCRT 5000

15210

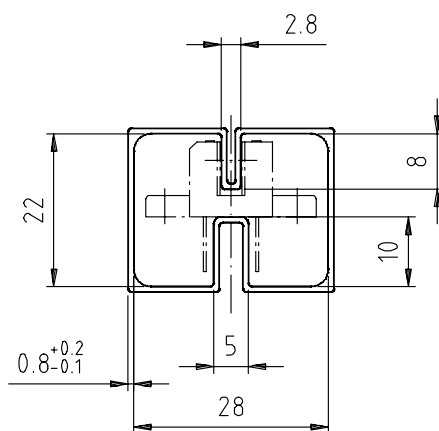
Fig. 2



Drawing-No.: 9.700-5178.01-4  
Issue: 1; 25.02.00

15201

Fig. 3

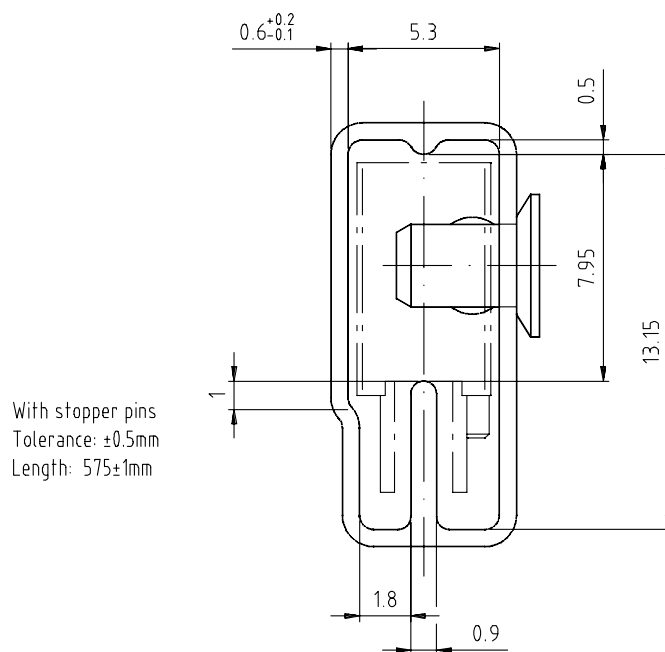


With rubber stopper  
Tolerance:  $\pm 0.5\text{mm}$   
Length:  $575 \pm 1\text{mm}$

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

15199

Fig. 4

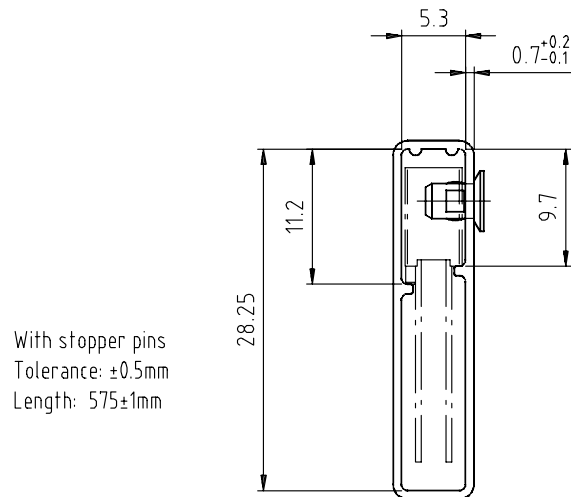


With stopper pins  
Tolerance:  $\pm 0.5\text{mm}$   
Length:  $575 \pm 1\text{mm}$

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

15202

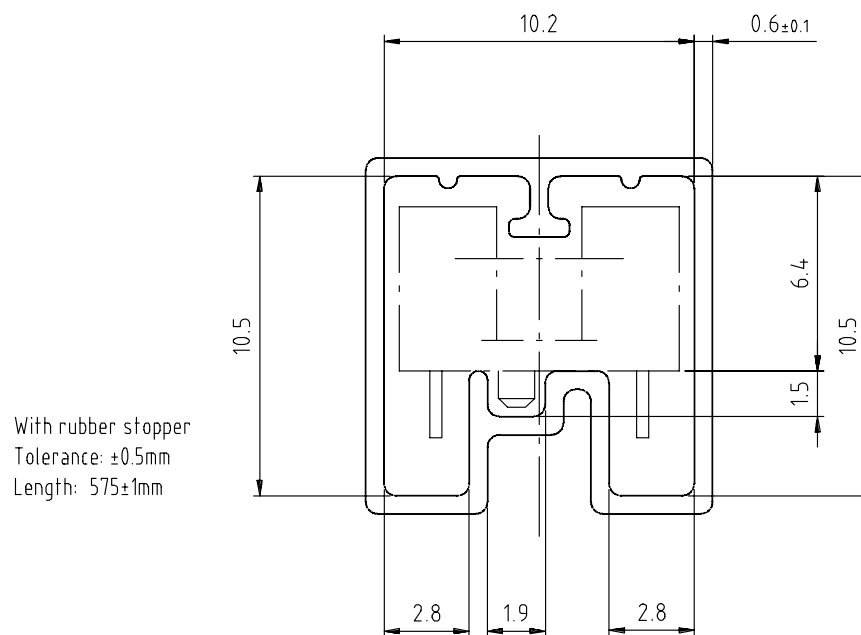
Fig. 5



Drawing-No.: 9.700-5205.01-4  
Issue: 1; 25.02.00

15196

Fig. 6



Drawing-No.: 9.700-5245.01-4  
Issue: 1; 25.02.00

15195

Fig. 7



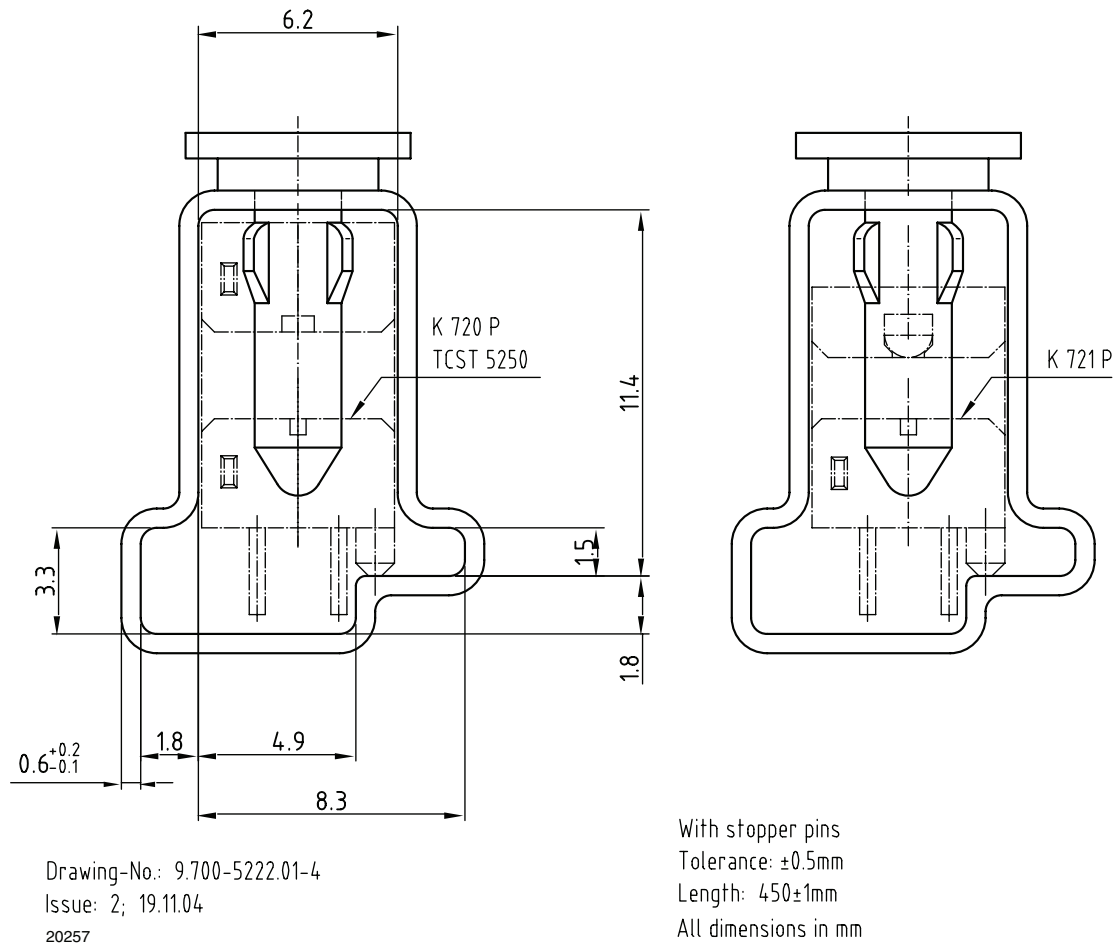


Fig. 8