



## Matched Pairs of Emitters and Detectors



96 12317\_1

### DESCRIPTION

The TCZT8020 include matched infrared emitters and phototransistors in leaded packages, used to assemble custom-designed transmissive sensors or reflective sensors. The phototransistor package blocks visible light.

### FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 4.4 x 2 x 3
- Typical output current under test:  $I_C = 0.5 \text{ mA}$
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Angle of half intensity:  $\phi = \pm 25^\circ$
- S420P: single detector component (dark epoxy)
- V420P: single emitter component (clear epoxy)
- 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  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Custom-design sensors for various distances
- Reflective sensors
- Transmissive sensors

### PRODUCT SUMMARY

PART NUMBER	GAP WIDTH (mm)	TYPICAL OUTPUT CURRENT UNDER TEST <sup>(1)</sup> (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCZT8020	Variable	0.5	Yes

#### Note

<sup>(1)</sup> Conditions like in table basic characteristics / coupler

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME <sup>(1)</sup>	REMARKS
TCZT8020	Bulk	MOQ: 2000 pairs, 1000 pcs/bulk	Detectors and emitters in separate bulk

#### Note

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



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Ambient temperature range		$T_{amb}$	-55 to +85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	Distance to package 2 mm, $t \leq 5\text{ s}$	$T_{sd}$	260	$^{\circ}\text{C}$
<b>INPUT (EMITTER)</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	1	A
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_V$	100	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
<b>OUTPUT (DETECTOR)</b>				
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
<b>OUTPUT (DETECTOR)</b>				
Collector current		$I_C$	50	mA
Collector peak current	$t_p/T = 0.5$ , $t \leq 10\text{ ms}$	$I_{CM}$	100	mA
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_V$	150	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$

### ABSOLUTE MAXIMUM RATINGS

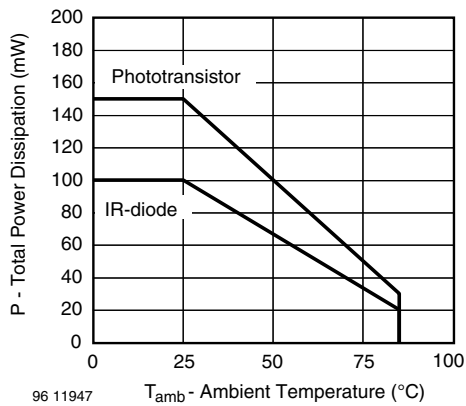


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature



<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>COUPLER</b>						
Collector current	$V_{CE} = 5\text{ V}$ , $I_F = 20\text{ mA}$ , $d = 4\text{ mm}$ <sup>(1)</sup>	$I_C$	0.25	0.5	-	mA
$I_C/I_F$	$V_{CE} = 5\text{ V}$ , $I_F = 20\text{ mA}$ , $d = 4\text{ mm}$	CTR	1.25	2.5	-	%
Collector emitter saturation voltage	$I_F = 20\text{ mA}$ , $I_C = 25\text{ }\mu\text{A}$	$V_{CEsat}$	-	-	0.4	V
Cut-off frequency	$I_F = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$	$f_C$	-	110	-	kHz
<b>INPUT (EMITTER)</b>						
Forward voltage	$I_F = 50\text{ mA}$	$V_F$	-	1.25	1.6	V
Radiant intensity	$I_F = 60\text{ mA}$ , $t_P = 20\text{ ms}$	$I_e$	-	-	7.8	mW/sr
Peak wavelength	$I_F = 100\text{ mA}$	$\lambda_P$	940	-	-	nm
Virtual source diameter	DIN EN ISO 1146/1:2005	$d$	-	1.1	-	mm
<b>OUTPUT (DETECTOR)</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	70	-	-	V
Emitter collector voltage	$I_E = 100\text{ }\mu\text{A}$	$V_{ECO}$	7	-	-	V
Collector dark current	$V_{CE} = 25\text{ V}$ , $I_F = 0\text{ A}$ , $E = 0\text{ lx}$	$I_{CEO}$	-	-	100	nA
<b>SWITCHING CHARACTERISTICS</b>						
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $R_L = 100\text{ }\Omega$ (see Fig. 10)	$t_{on}$	-	15	-	$\mu\text{s}$
Turn-off time	$V_S = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $R_L = 100\text{ }\Omega$ (see Fig. 10)	$t_{off}$	-	10	-	$\mu\text{s}$

**Note**

(1) Characteristics are measurement with  $d = 4\text{ mm}$  (0.55") distance between emitter and detector, within a common axis of  $0.5\text{ mm}$  (0.02") and with parallel alignment within  $5^{\circ}$

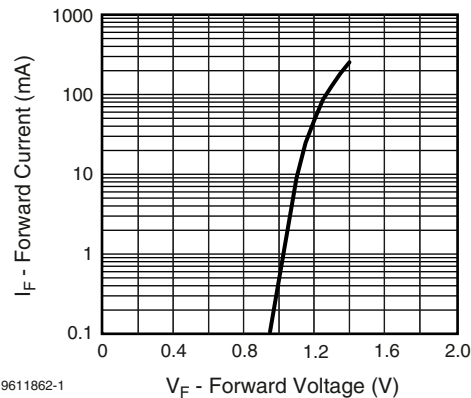
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 2 - Forward Current vs. Forward Voltage

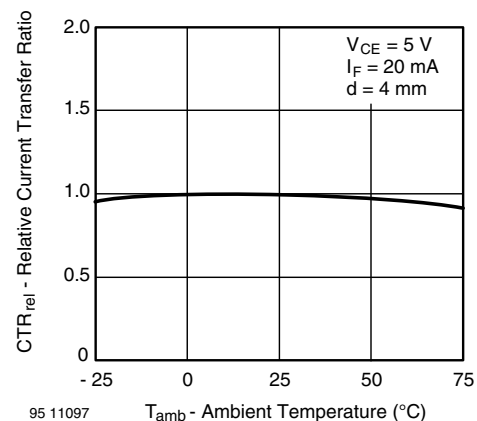


Fig. 3 - Relative Current Transfer Ratio vs. Ambient Temperature

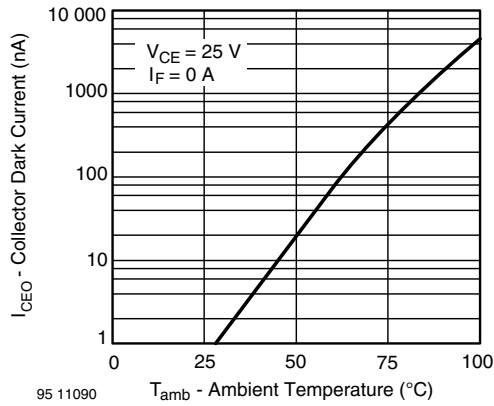


Fig. 4 - Collector Dark Current vs. Ambient Temperature

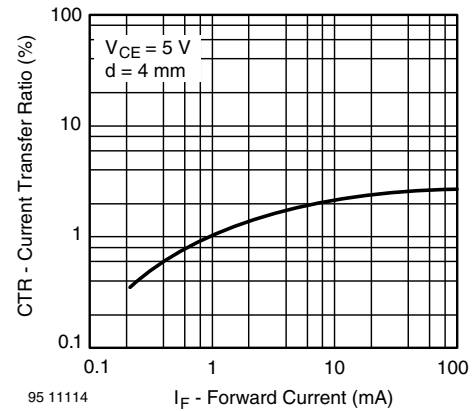


Fig. 7 - Current Transfer Ratio vs. Forward Current

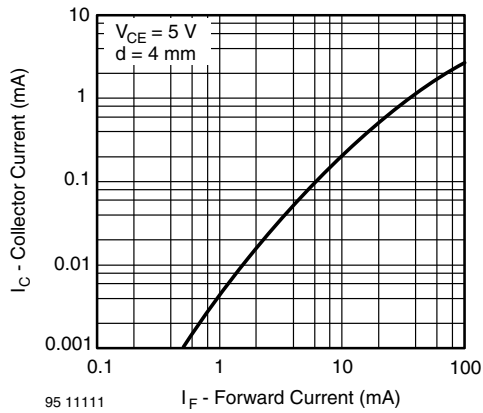


Fig. 5 - Collector Current vs. Forward Current

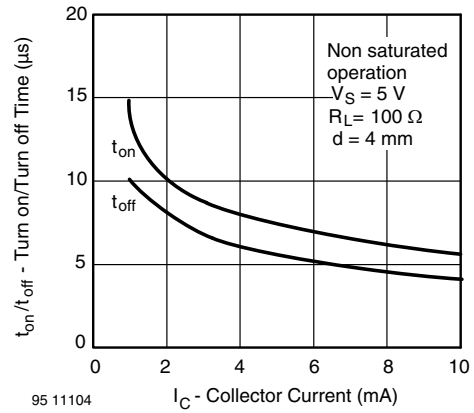


Fig. 8 - Turn on/off Time vs. Forward Current

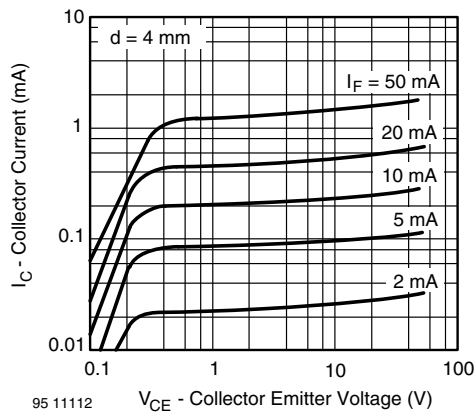


Fig. 6 - Collector Current vs. Collector Emitter Voltage

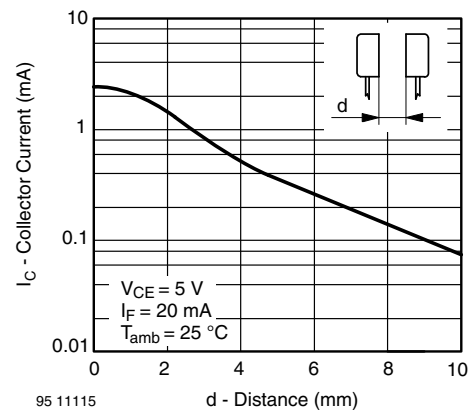


Fig. 9 - Collector Current vs. Distance

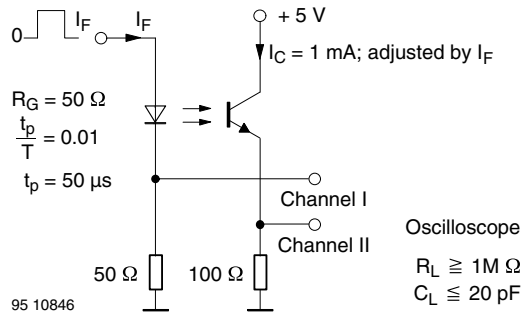


Fig. 10 - Pulse Diagram

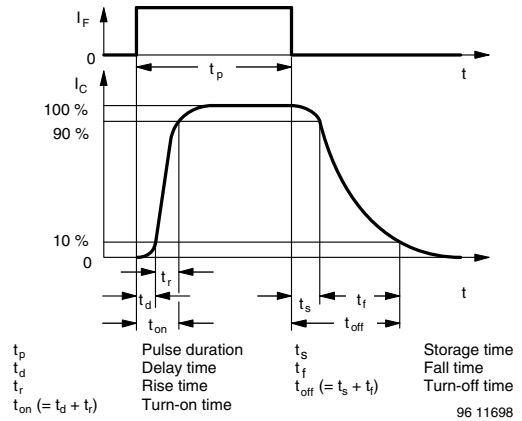
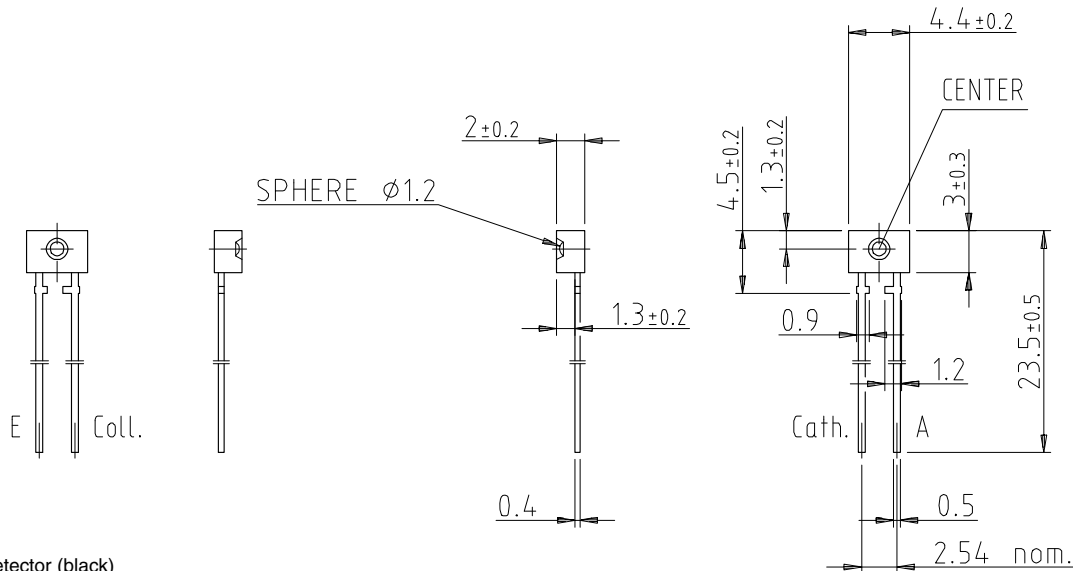


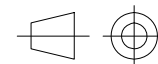
Fig. 11 - Switching Times

**PACKAGE DIMENSIONS** in millimeters



Detector (black)  
Dimensions like emitter package

EMITTER (CLEAR)



technical drawings  
according to DIN  
specifications

Drawing-No.: 6.544-5284.01-4  
Issue: 2; 10.11.98  
96 12106

weight: ca. 0.23g

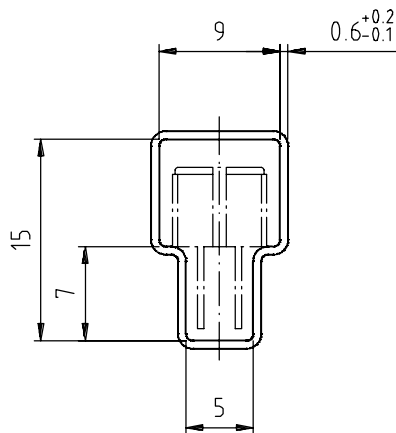
## Packaging and Ordering Information

PART NUMBER	MOQ <sup>(1)</sup>	PCS PER TUBE	TUBE SPEC. (FIGURE)	CONSTITUENTS (FORMS)
CNY70	4000	80	1	28
TCPT1300X01	2000	Reel	(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

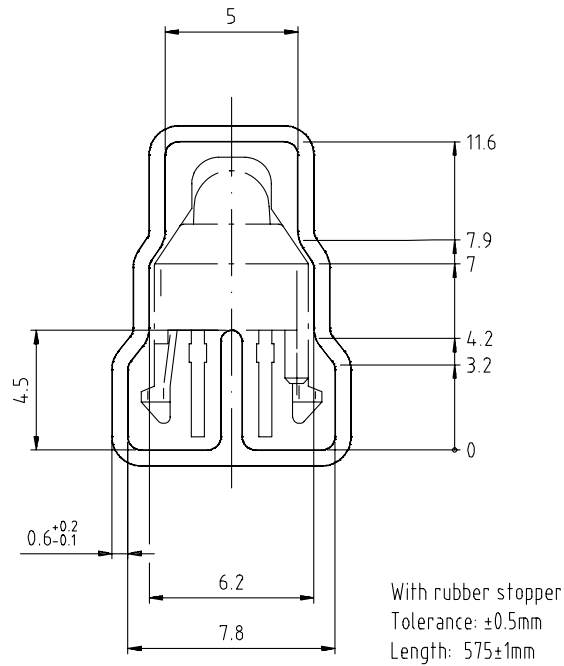
Drawing-No.: 9.700-5097.01-4  
Issue: 1; 25.02.00

15198

Fig. 1

# Packaging and Ordering Information

Vishay Semiconductors Packaging and Ordering Information



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

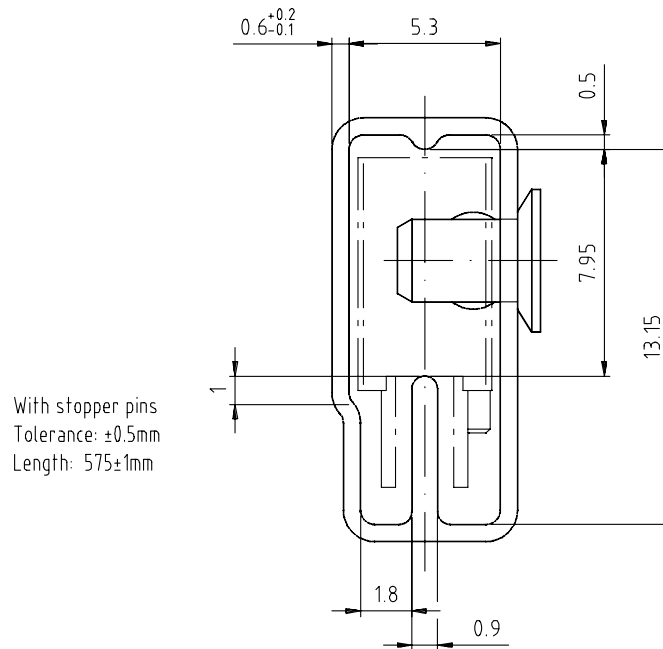


With rubber stopper  
Tolerance: ±0.5mm  
Length: 575±1mm

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

15199

Fig. 4



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

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



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

With stopper pins  
 Tolerance:  $\pm 0.5$ mm  
 Length:  $450 \pm 1$ mm  
 All dimensions in mm

Fig. 8



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