

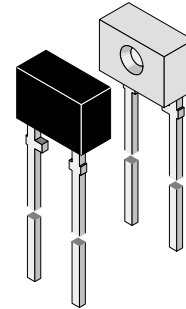
## Matchable Pairs – Emitter and Detector

### Description

Pairs of infrared-emitting diode and phototransistor, matched in their optical and electrical features. These pairs enable a lot of applications. They can be used both for transmissive or reflective sensor functions. The peak wavelength of the emitter is  $\lambda = 950 \text{ nm}$ .

### Applications

- Generally used for industrial processing and controlling, end of tape detector



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### Features

- Subminiature case with lens
- Detector with optical filter, protected against ambient light
- Detector case black for easy identification of the emitter and detector
- Emitter-angle of half intensity  $\pm \varphi = 25^\circ$
- Detector-angle of half sensitivity  $\pm \varphi = 25^\circ$
- Emitter and detector in sideview case

### Order Instruction

Ordering Code	Remarks
TCZT8020-PAER	

### Absolute Maximum Ratings

#### Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t \leq 10 \mu\text{s}$	$I_{FSM}$	1	A
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_V$	100	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$

#### Output (Detector)

Parameter	Test Conditions	Symbol	Value	Unit
Collector-emitter voltage		$V_{CEO}$	70	V
Emitter-collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
Peak collector current	$t_p/T = 0.5, t \leq 10 \text{ ms}$	$I_{CM}$	100	mA
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_V$	150	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$

#### Emitter and Detector matched

Parameter	Test Conditions	Symbol	Value	Unit
Ambient temperature range		$T_{amb}$	-55 to +85	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to +100	$^\circ\text{C}$
Soldering temperature	2 mm from case, $t \leq 5 \text{ s}$	$T_{sd}$	260	$^\circ\text{C}$

### Electrical Characteristics ( $T_{amb} = 25^\circ\text{C}$ )

#### Input (Emitter)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 50 \text{ mA}$	$V_F$		1.25	1.6	V

#### Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter voltage	$I_C = 1 \text{ mA}$	$V_{CEO}$	70			V
Emitter collector voltage	$I_E = 100 \mu\text{A}$	$V_{ECO}$	7			V
Collector dark current	$V_{CE} = 25 \text{ V}, I_F = 0, E = 0$	$I_{CEO}$			100	nA

#### Emitter and Detector matched <sup>1)</sup>

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector current	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$	$I_C$	0.25	0.5		mA
$I_C / I_F$	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}$	CTR	1.25	2.5		
Collector emitter saturation voltage	$I_F = 20 \text{ mA}, I_C = 25 \mu\text{A}$	$V_{CEsat}$			0.4	V
Cut-off frequency	$I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}, R_L = 100 \Omega$	$f_C$		110		kHz

<sup>1)</sup> Characteristics are measurement at a separation distance of 4 mm (0.55') within a common axis of 0.5 mm (0.02') and parallel within 5°

### Switching Characteristics

Parameter	Test Conditions	Symbol	Typ.	Unit
Turn-on time	$V_S = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $R_L = 100\ \Omega$ (see figure 1)	$t_{on}$	15.0	$\mu\text{s}$
Turn-off time		$t_{off}$	10.0	$\mu\text{s}$

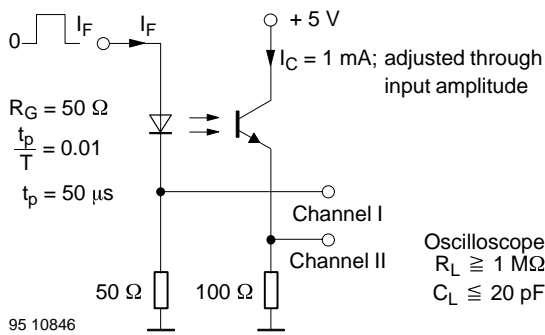


Figure 1. Test circuit

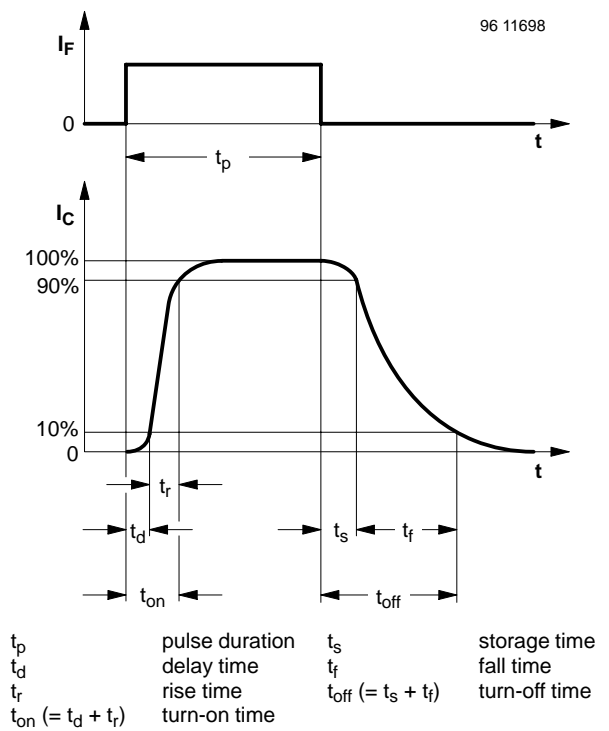


Figure 2. Switching times

Typical Characteristics ( $T_{amb} = 25^{\circ}C$ , unless otherwise specified)

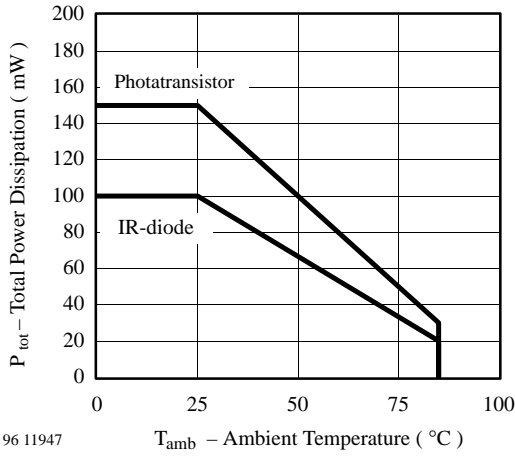


Figure 3. Total Power Dissipation vs. Ambient Temperature

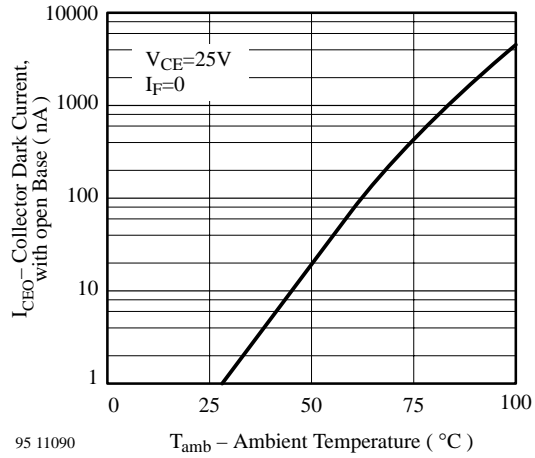


Figure 6. Collector Dark Current vs. Ambient Temperature

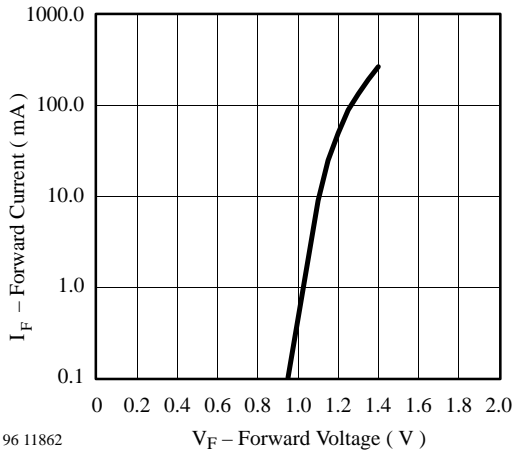


Figure 4. Forward Current vs. Forward Voltage

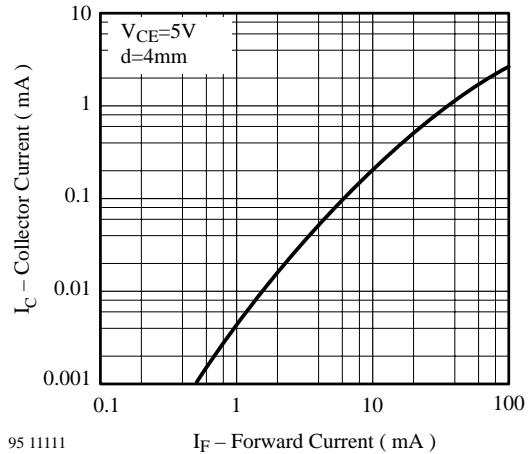


Figure 7. Collector Current vs. Forward Current

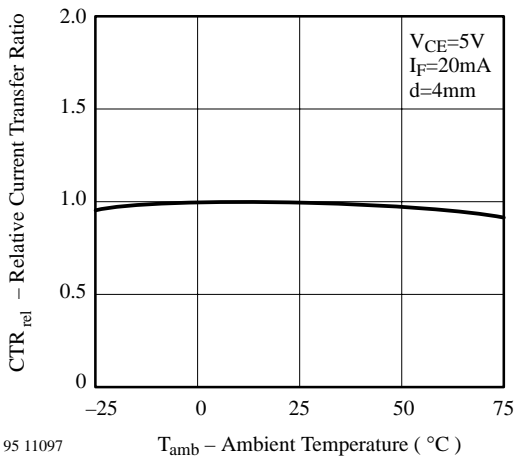


Figure 5. Relative Current Transfer Ratio vs. Ambient Temperature

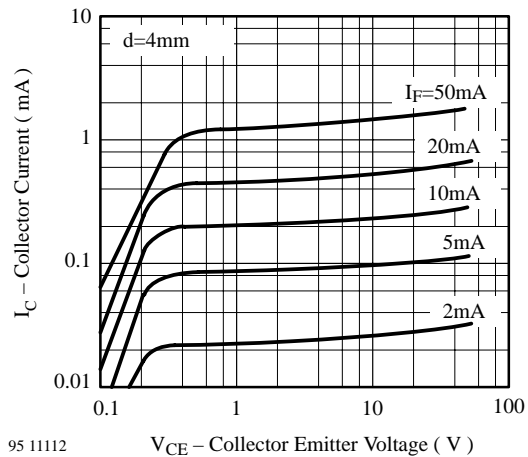


Figure 8. Collector Current vs. Collector Emitter Voltage

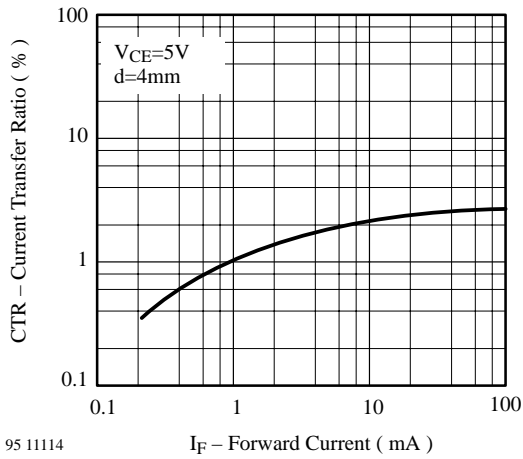


Figure 9. Current Transfer Ratio vs. Forward Current

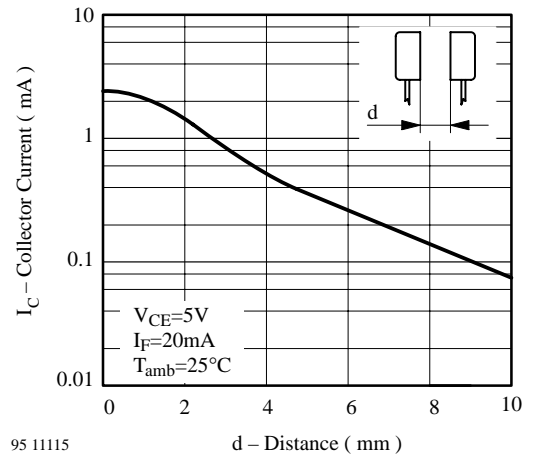


Figure 11. Collector Current vs. Distance

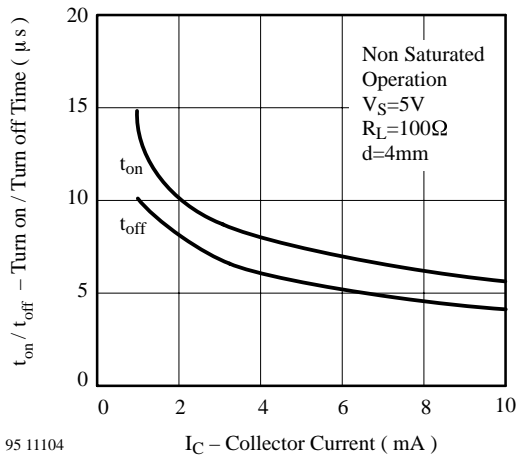
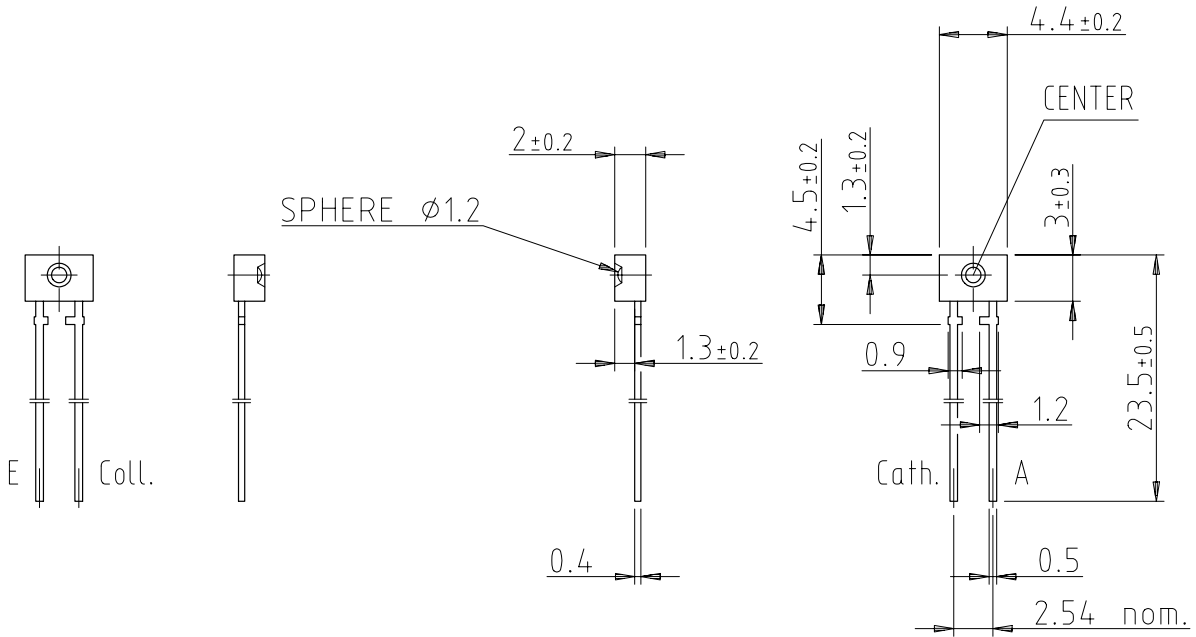


Figure 10. Turn on / off Time vs. Forward Current

## Dimensions of TCZT8020 in mm

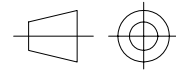


DETECTOR (BLACK)  
( MISSING DIM. SEE EMITTER )

EMITTER (CLEAR)

weight: ca. 0.23g

96 12106



technical drawings  
according to DIN  
specifications



## **Ozone Depleting Substances Policy Statement**

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay Telefunken against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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