

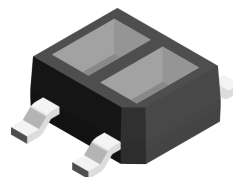
Subminiature Reflective Optical Sensor with Phototransistor Output

Description

The TCNT1000 has a compact construction where the emitting-light source and the detector are arranged in the same direction to sense the presence of an object by using the reflective IR-beam from the object. The operating wavelength is 950 nm. The detector consists of a phototransistor.

Applications

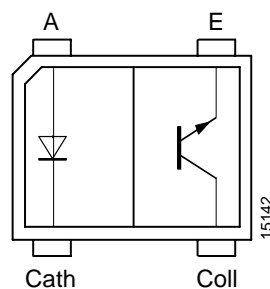
- Accurate position sensor for shaft encoder
- Detection of reflective material such as paper, IBM cards, magnetic tapes etc.
- Suitable for copy machines, printers, fax machines



15143

Features

- Package height: 1.5 mm
- Parts shipped taped and reeled 1000 pcs/ reel
- Soldering method according to CECC00802 table 1, class B or C
- Surface Mountable Technology (SMD)



Top view

Order Instruction

Ordering Code	Sensing Distance	Remarks
TCNT1000	1 mm	

Absolute Maximum Ratings

Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		V_R	5	V
Forward current		I_F	50	mA
Pulse forward current	$t_p = 0.1 \text{ ms}; t_p / T = 0.01$	I_{FP}	1	A
Power dissipation	$T_{amb} \leq 25^\circ \text{C}$	P_V	75	mW

Output (Detector)

Parameter	Test Conditions	Symbol	Value	Unit
Collector emitter voltage		V_{CEO}	30	V
Emitter collector voltage		V_{ECO}	5	V
Collector current		I_C	50	mA
Power dissipation	$T_{amb} \leq 25^\circ \text{C}$	P_V	100	mW

Coupler

Parameter	Test Conditions	Symbol	Value	Unit
Ambient temperature range		T_{amb}	-20 to +70	$^\circ \text{C}$
Storage temperature range		T_{stg}	-30 to +80	$^\circ \text{C}$
Soldering temperature	$t \leq 5 \text{ s}$	$T_{sd}^{1)}$	260	$^\circ \text{C}$

¹⁾ 1.6 mm distance from Body

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

Input (Emitter)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 20 \text{ mA}$	V_F		1.2	1.6	V
Reverse current	$V_R = 5 \text{ V}$	I_R			10	μA

Output (Detector)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector emitter voltage	$I_C = 1 \text{ mA}$	V_{CEO}	30			V
Emitter collector voltage	$I_E = 100 \mu\text{A}$	V_{ECO}	5			V
Collector emitter cut-off current	$V_{CE} = 20 \text{ V}$, $I_F = 0$, $E = 0$	I_{CEO}			100	nA
Cross talk current	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$ (see Figure 1)	$I_{CX}^{1)}$			200	nA

Coupler

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector current	$V_{CE} = 5 \text{ V}$, $I_F = 10 \text{ mA}$	$I_C^{1)}$	100			μA
Rise time	$V_S = 2 \text{ V}$, $I_C = 1 \text{ mA}$, $R_L = 1 \text{ k}\Omega$	t_r		20		μs
Fall time	$V_S = 2 \text{ V}$, $I_C = 1 \text{ mA}$, $R_L = 1 \text{ k}\Omega$	t_f		20		μs

¹⁾ Working distance to object: $d = 1 \text{ mm}$; object: Flat mirror

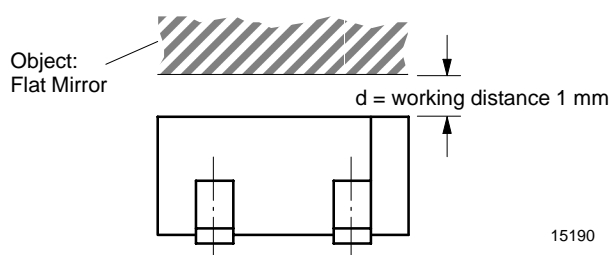


Figure 1. Test circuit

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

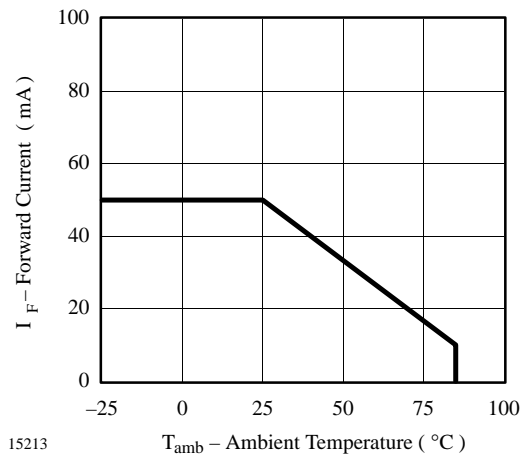


Figure 2. Forward Current vs. Ambient Temperature

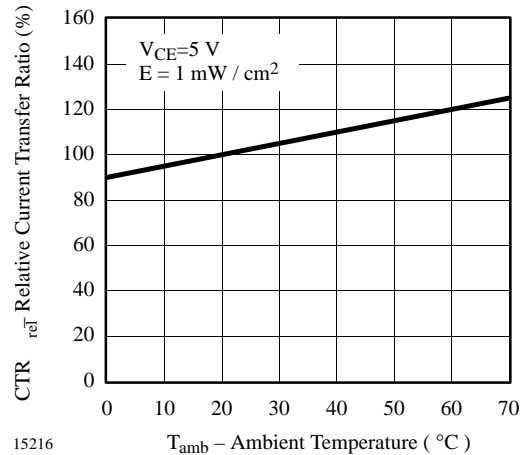


Figure 5. Relative Current Transfer Ratio vs. Ambient Temperature

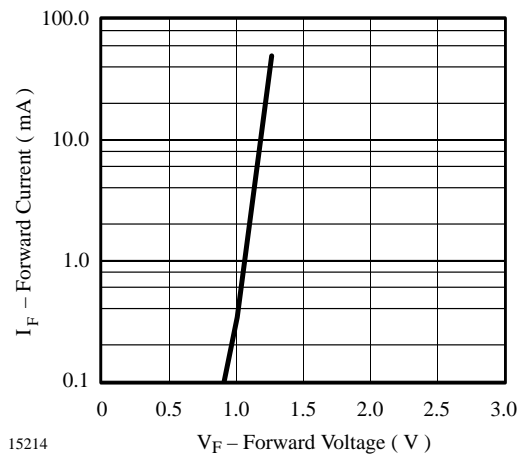


Figure 3. Forward Current vs. Forward Voltage

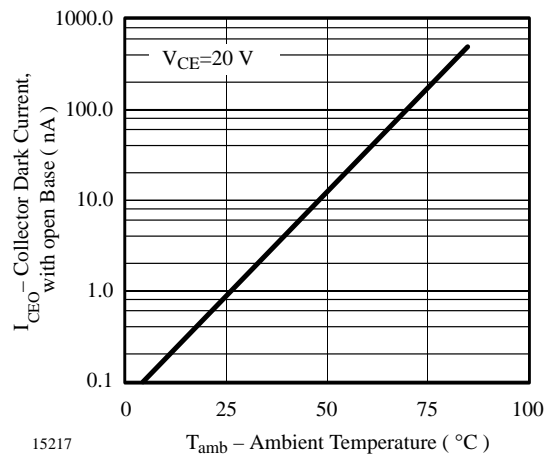


Figure 6. Collector Dark Current vs. Ambient Temperature

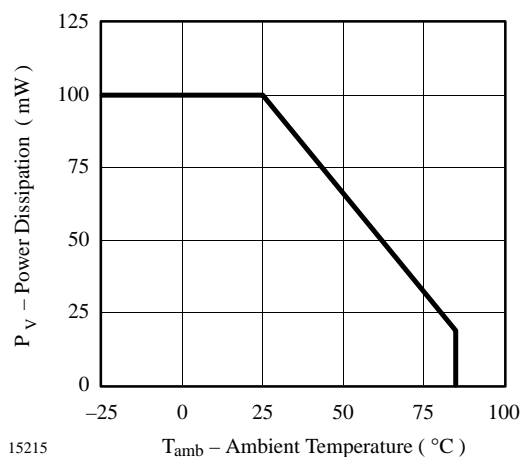


Figure 4. Power Dissipation vs. Ambient Temperature

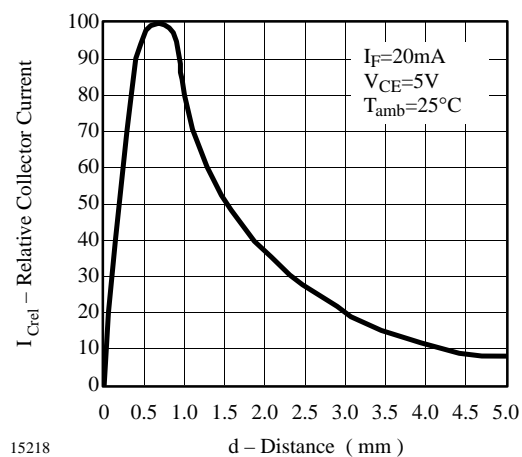


Figure 7. Relative Collector vs. Distance

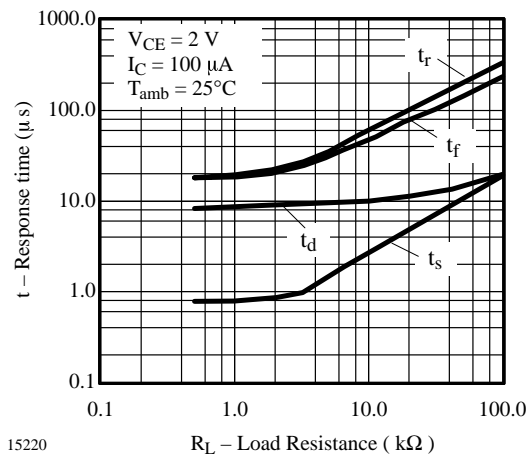


Figure 8. Response Time vs. Load Resistance

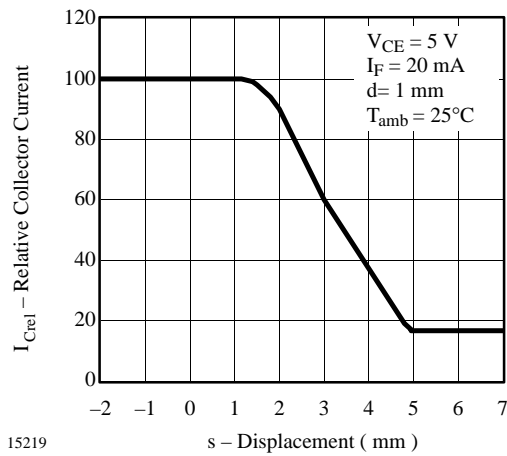
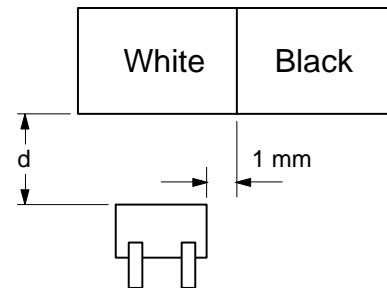
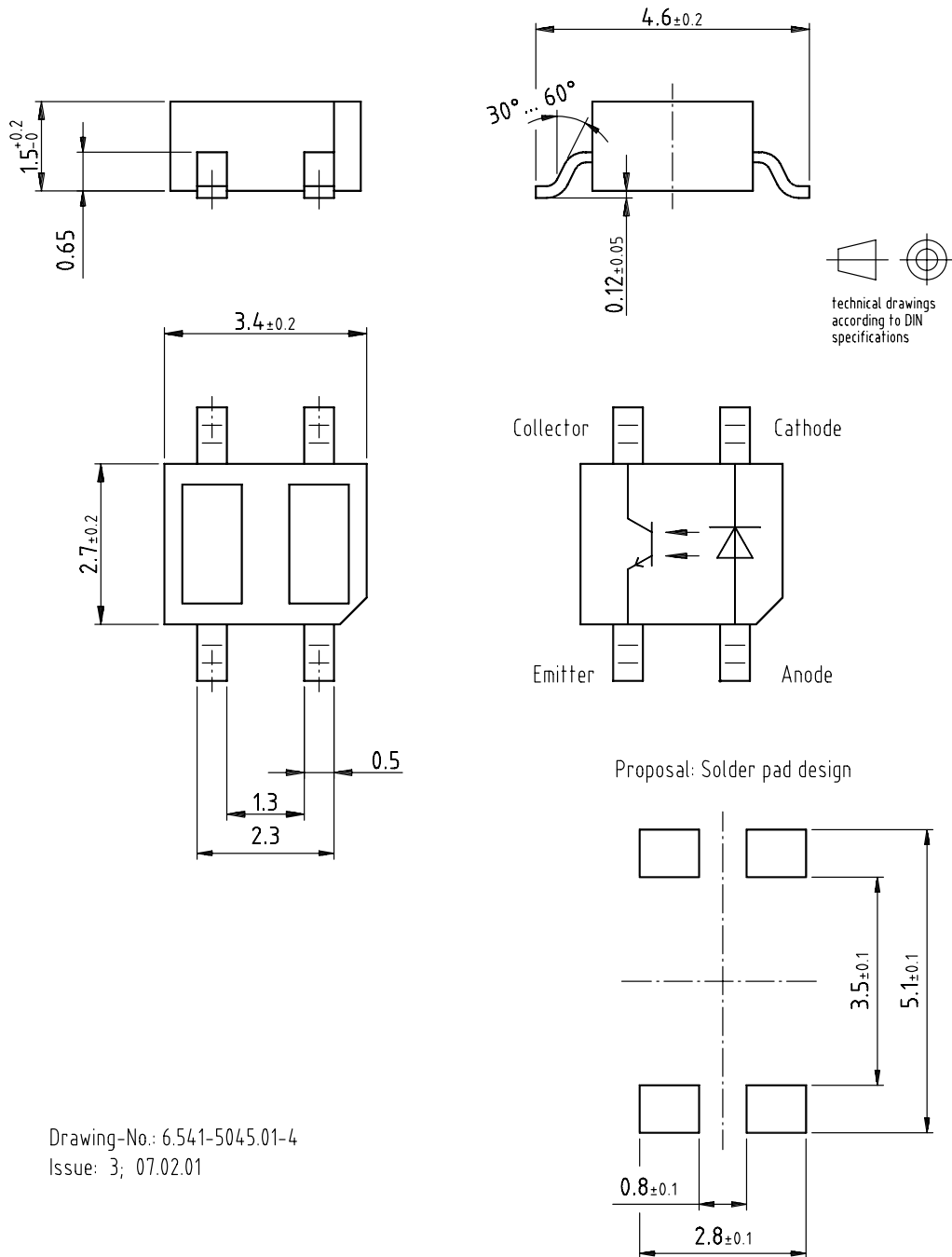


Figure 9. Relative Collector Current vs. Displacement



Dimensions of TCNT1000 in mm



Technical drawing of a progressive die. The drawing includes a cross-section at the top and a side view below. The side view shows a series of eight stations along a progressive direction (indicated by an arrow on the left). The stations are defined by a series of holes and features. Dimensions are provided for various features:

- Overall width: 12 ± 0.3
- Distance from left edge to first feature: 5.5 ± 0.05
- Distance from left edge to second feature: 1.75
- Distance from left edge to third feature: 4
- Distance from left edge to fourth feature: 2 ± 0.05
- Distance from left edge to fifth feature: 8
- Distance from left edge to sixth feature: 1.75
- Distance from left edge to seventh feature: 4.75
- Distance from left edge to eighth feature: 3.73
- Overall height: 1.98
- Top thickness: 0.25
- Bottom thickness: 3.73
- Station spacing: 2 ± 0.05
- Feature width: 4
- Feature height: 1.75
- Feature diameter: $\phi 1.5$

General tolerance ± 0.1

technical drawings according to DIN specifications

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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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