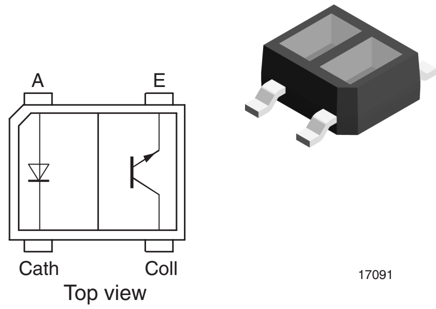
Subminiature Reflective Optical Sensor with Phototransistor Output

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.



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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)
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

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

Parts Table

Part	Sensing Distance
TCNT1000	1 mm

Absolute Maximum Ratings

Coupler

Parameter	Test condition	Symbol	Value	Unit
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 90	°C
Soldering temperature	t ≤ 5 s	T_{sd} 1)	260	°C

1) 1.6 mm distance from Body

Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	5	V
Forward current		I_F	50	mA
Pulse forward current	t_p = 0.1 ms; duty cycle = 1%	I_{FP}	1	A
Power dissipation		P_V	75	mW

Output (Detector)

Parameter	Test condition	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		P_V	75	mW

Electrical Characteristics

Coupler

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector current	V_{CE} = 5 V, I_F = 20 mA	I_C [1]	100			µA
Rise time	V_S = 2 V, I_C = 0.1 mA, R_L = 1 kΩ	t_r		20		µs
Fall time	V_S = 2 V, I_C = 0.1 mA, R_L = 1 kΩ	t_f		20		µs

[1] Working distance to object: d = 1 mm; object: Flat mirror (see figure 1)

Input (Emitter)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 20 mA	V_F		1.2	1.6	V
Reverse current	V_R = 5 V	I_R			10	µA

Output (Detector)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector emitter voltage	I_C = 1 mA	V_{CEO}	30			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	5			V
Collector-emitter cut-off current	V_{CE} = 20 V, I_F = 0, E = 0	I_{CEO}			100	nA
Cross talk current	V_{CE} = 5 V, I_F =10 mA	I_{CX} [2]			200	nA

[2] Without reflecting medium

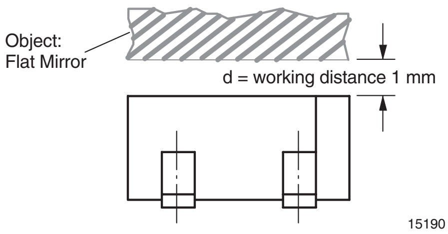


Figure 1. Pulse diagram

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

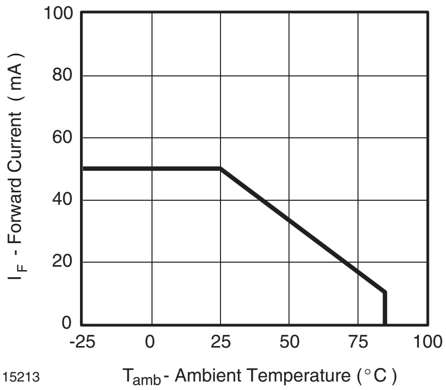


Figure 2. Forward Current vs. Ambient Temperature

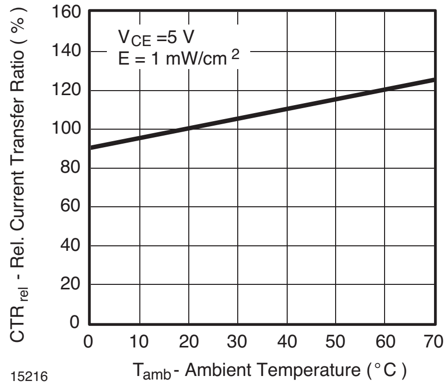


Figure 5. Relative Current Transfer Ratio vs. Ambient Temperature

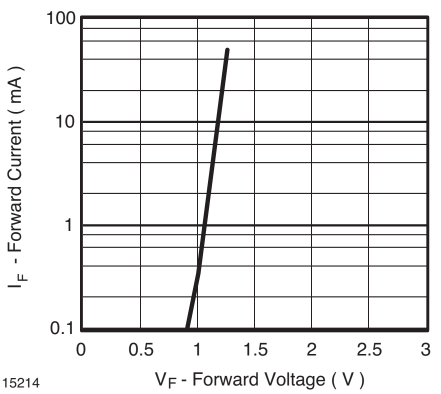


Figure 3. Forward Current vs. Forward Voltage

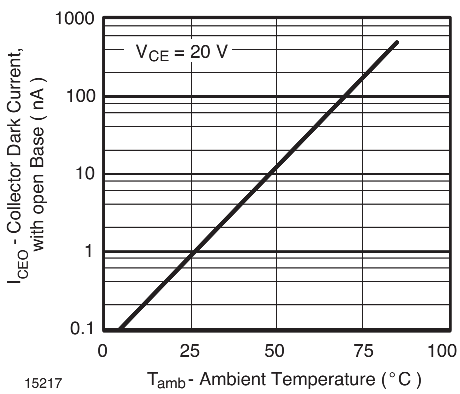


Figure 6. Collector Dark Current vs. Ambient Temperature

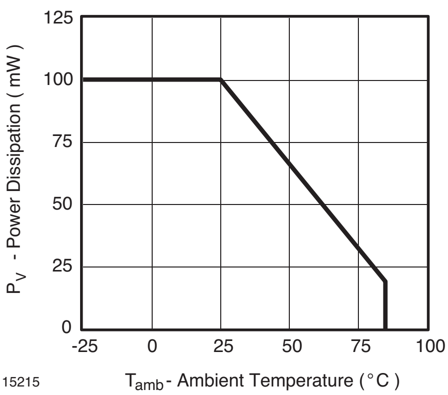


Figure 4. Power Dissipation vs. Ambient Temperature

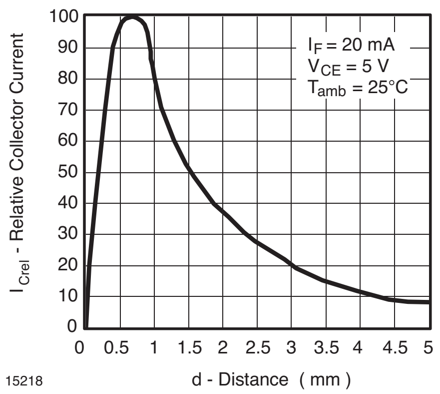


Figure 7. Relative Collector vs. Distance

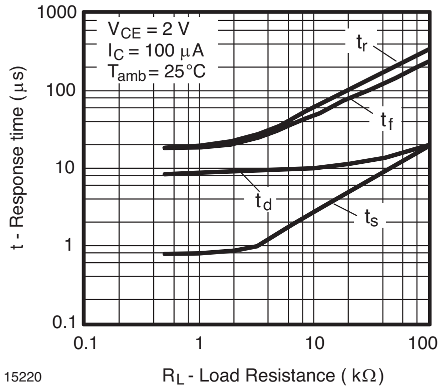


Figure 8. Response Time vs. Load Resistance

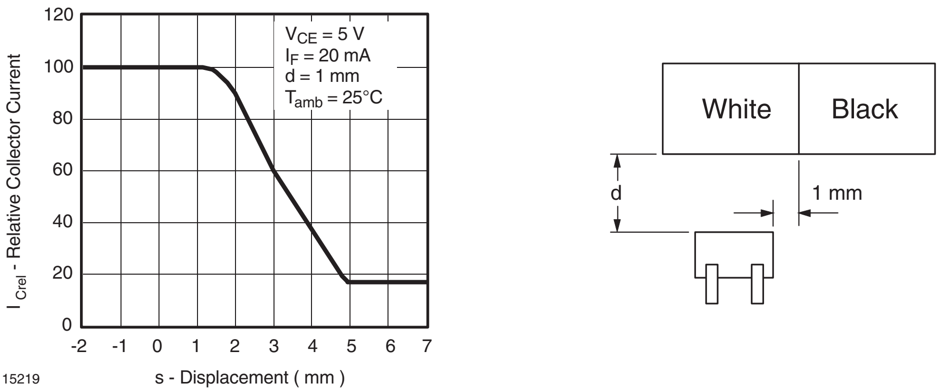
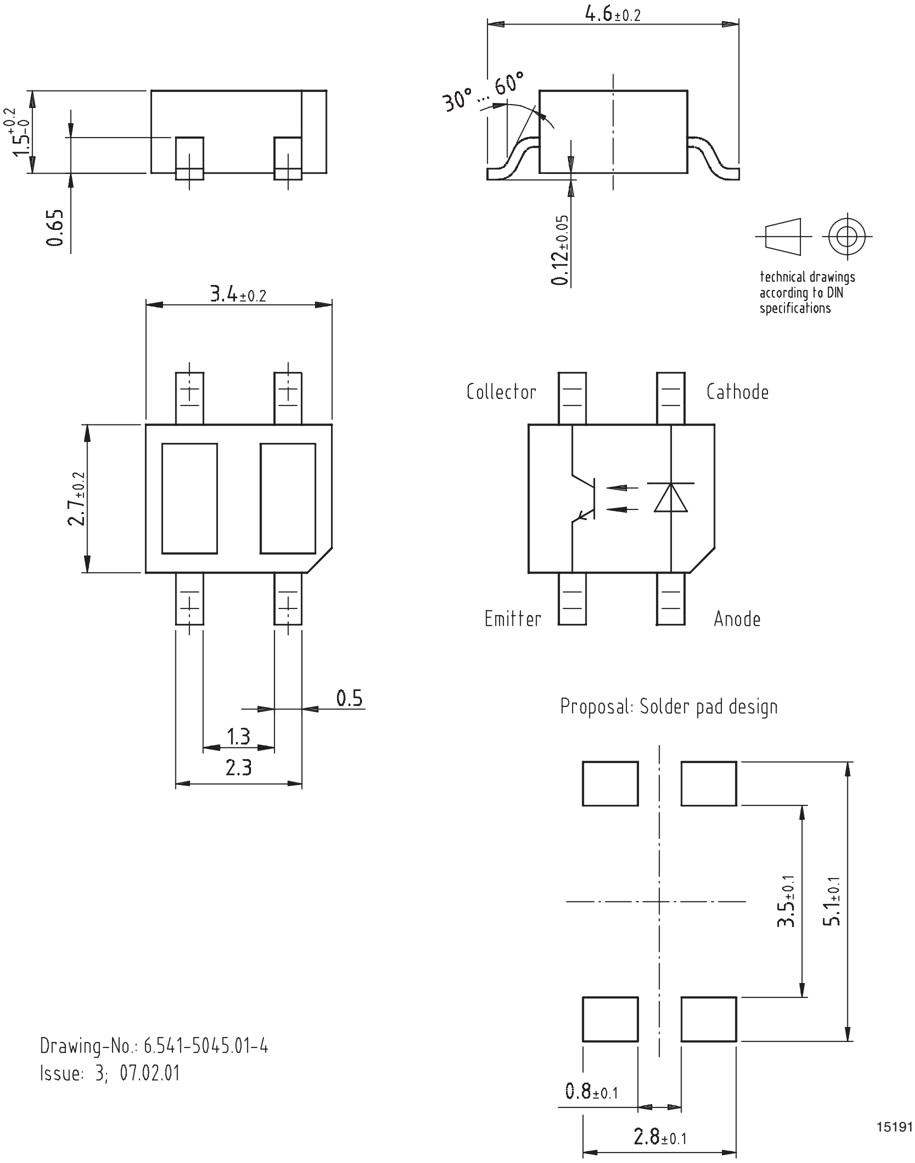
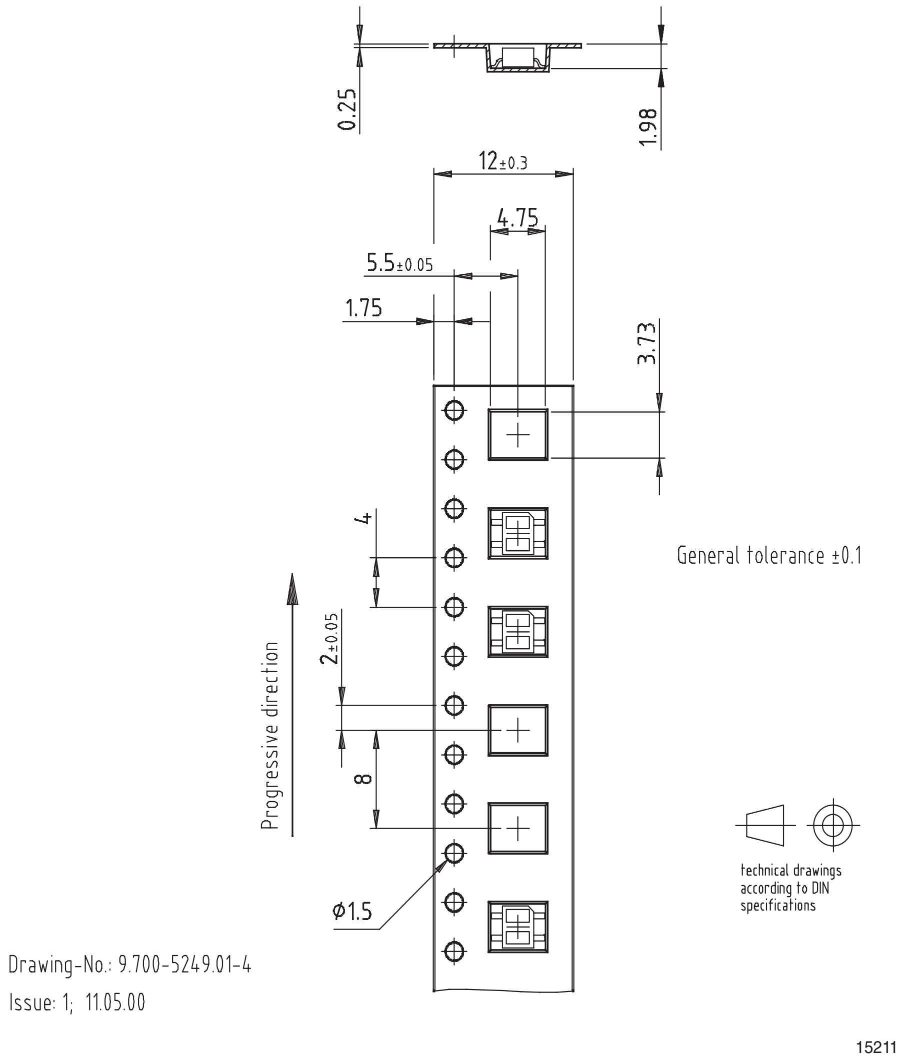


Figure 9. Relative Collector Current vs. Displacement

Package Dimensions in mm



Dimensions of Shape in mm



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 operatingsystems 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.

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