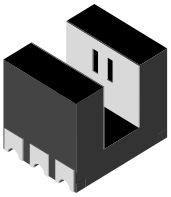
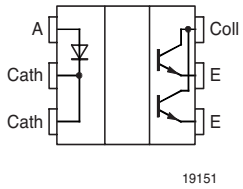
Subminiature Dual Channel Optical Sensor with Phototransistor Output

Description

This device has a compact construction where emitter and detector are located face to face.

The operating wavelength is 950 nm.





Features

- IR Emitter wavelength 950 nm
- Dual channel with 0.3 mm aperture
- Channel 1 to channel 2 distance 0.8 mm (optical center)
- Gap 2 mm
- Package height: 4 mm
- Surface Mountable Device (SMD)
- Parts shipped taped and reeled 2000 pcs/ reel
- Option X01:
  High rel. devices for advanced applications
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Applications

Accurate position sensor for encoder,

Detection for motion direction,

Detection of motor speed and direction where high reliability performance is required

Parts Table

Part	Ordering code	Remarks
TCUT1200X01	TCUT1200X01	Tape and Reel, MOQ: 2000 pc

Absolute Maximum Ratings

Coupler

Parameter	Test condition	Symbol	Value	Unit
Total power dissipation	$T_{amb} \leq 25°C$	P_{tot}	150	mW
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	$t \leq 5$ s	T_{sd}	230	°C

Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	5	V
Forward current		I_F	25	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	100	mA
Power dissipation	$T_{amb} \leq 25°C$	P_V	75	mW

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Output (Detector)

Parameter	Test condition	Symbol	Value	Unit
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	20	mA
Power dissipation	$T_{amb} \leq 25°C$	P_V	75	mW

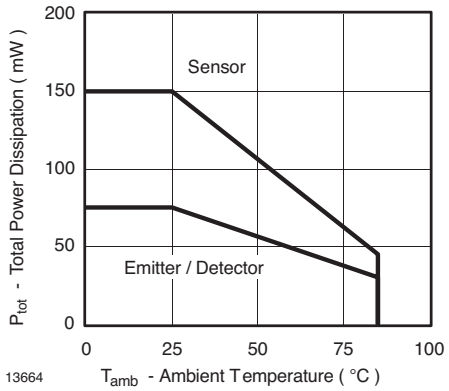

Figure 1. Derating diagram

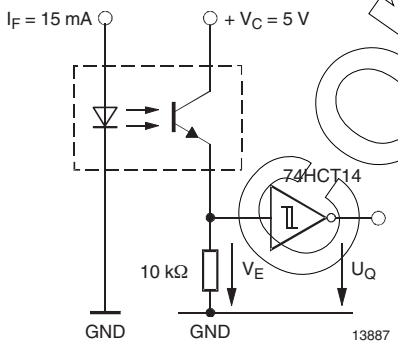

Figure 2. Application example

Electrical Characteristics

Coupler

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

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector current per channel	V_{CE} = 5 V, I_F = 15 mA	I_C	300	500		µA
Collector emitter saturation voltage	I_F = 15 mA, I_C = 0.05 mA	V_{CEsat}			0.4	V

Input (Emitter)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 15 mA	V_F		1.2	1.5	V
Reverse current	V_R = 5 V	I_R			10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j		50		pF

Output (Detector)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector emitter voltage	I_C = 1 mA	V_{CEO}	70			V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7			V
Collector-emitter cut-off current	V_{CE} = 25 V, I_F = 0, E = 0	I_{CEO}		10	100	nA

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

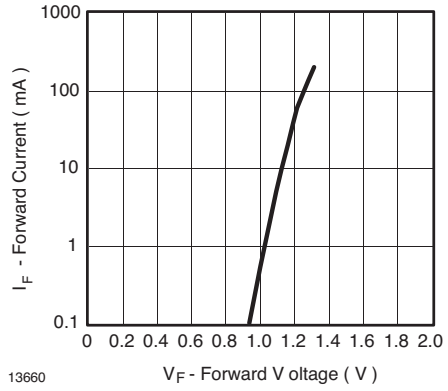

Figure 3. Forward Current vs. Forward Voltage

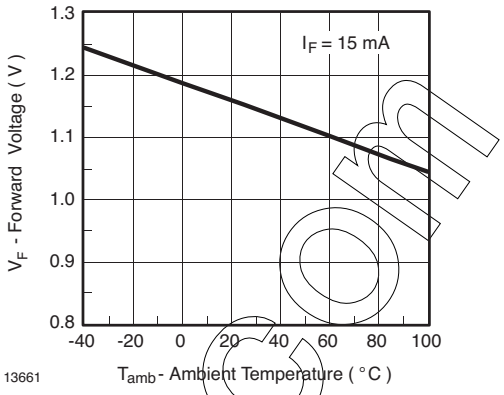

Figure 6. Forward Voltage vs. Ambient Temperature

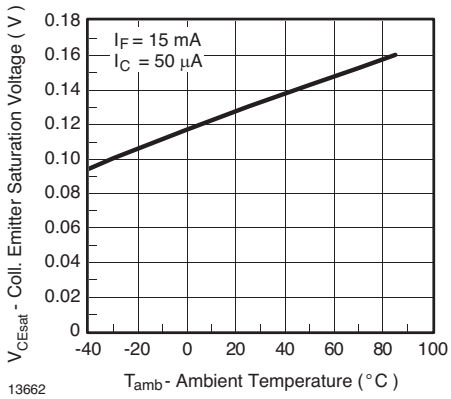

Figure 4. Collector Emitter Saturation Voltage vs. Ambient Temperature

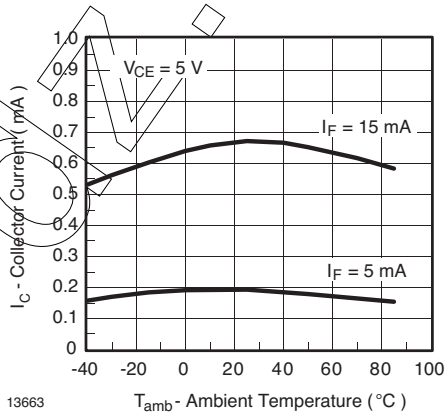

Figure 7. Collector Current vs. Ambient Temperature

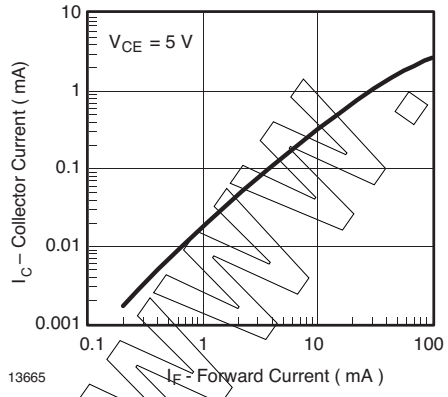

Figure 5. Collector Current vs. Forward Current

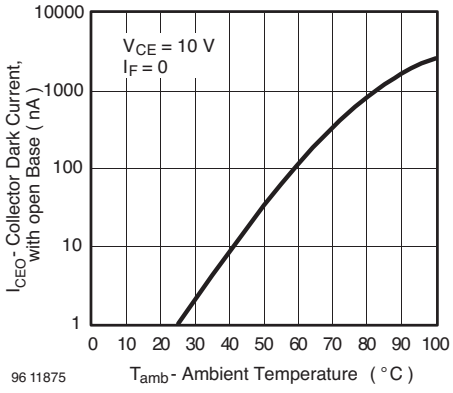

Figure 8. Collector Dark Current vs. Ambient Temperature

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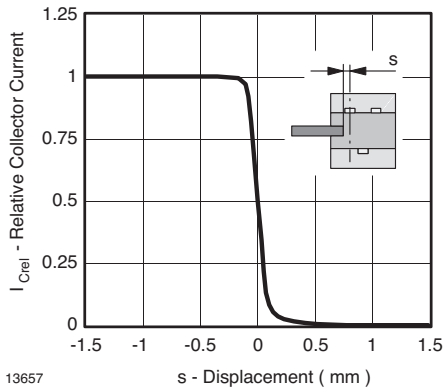

Figure 9. Relative Collector Current vs. Displacement

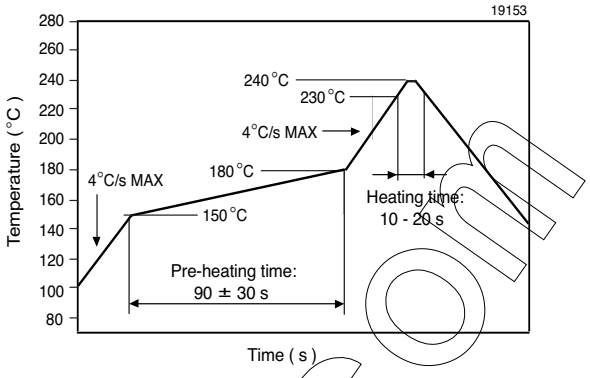

Figure 11. Lead Tin (SnPb) Reflow Solder Profile

Reflow Solder Profiles

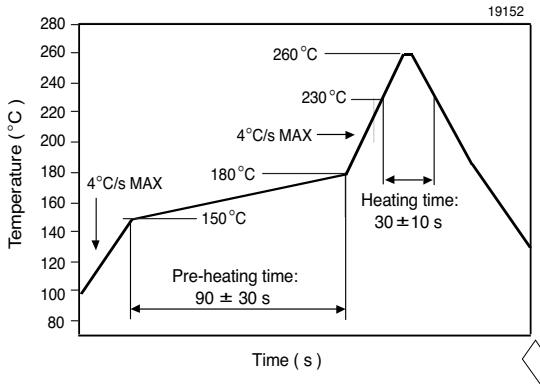

Figure 10. Lead-Free (Sn) Reflow Solder Profile

Drypack

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

Floor Life

Floor life (time between soldering and removing from MBB) must not exceed the time indicated in J-STD-020. Acc. JEDEC, J-STD-020, TCUT1200X01 is released to Moisture Sensitivity Level 2, for use of Lead Tin (SnPb) Reflow Solder Profile (figure 11) or Level 3, for use of Lead-free (Sn) Reflow Solder Profile (figure 10)
Floor Life: 12 month (level 2) or 168 hours (level 3)
Floor Conditions: T_{amb} < 30 °C, RH < 60 %

Drying

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or Label. Devices taped on reel dry using recommended conditions 192 h @ 40 °C (± 5 °C), RH < 5 %
or 96 h @ 60 °C (± 5 °C), RH < 5 %

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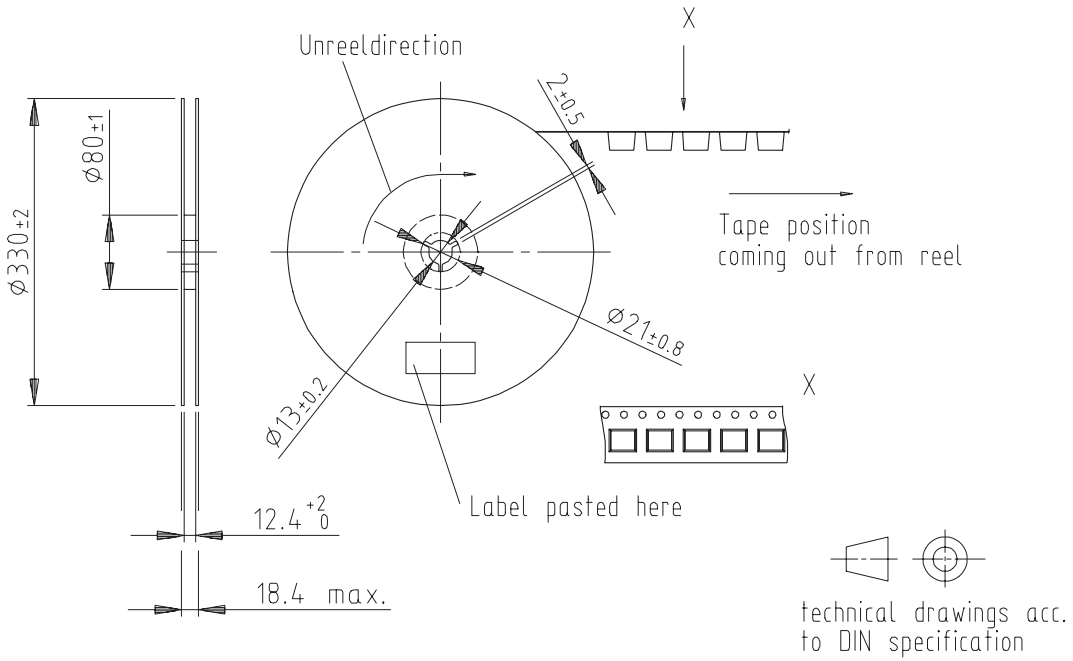
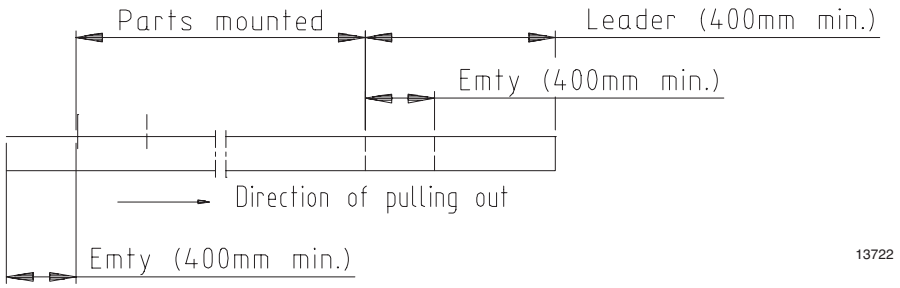
Dimensions of Reel and Tape

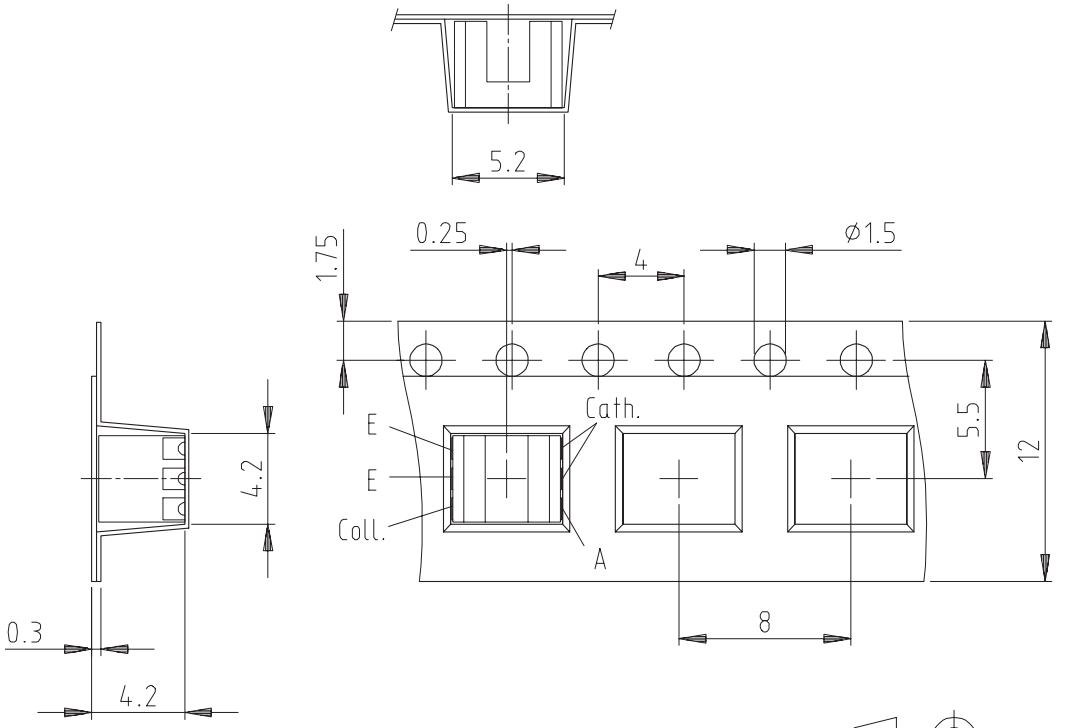
Reel-dimension and shape:



Leader and trailer tape:

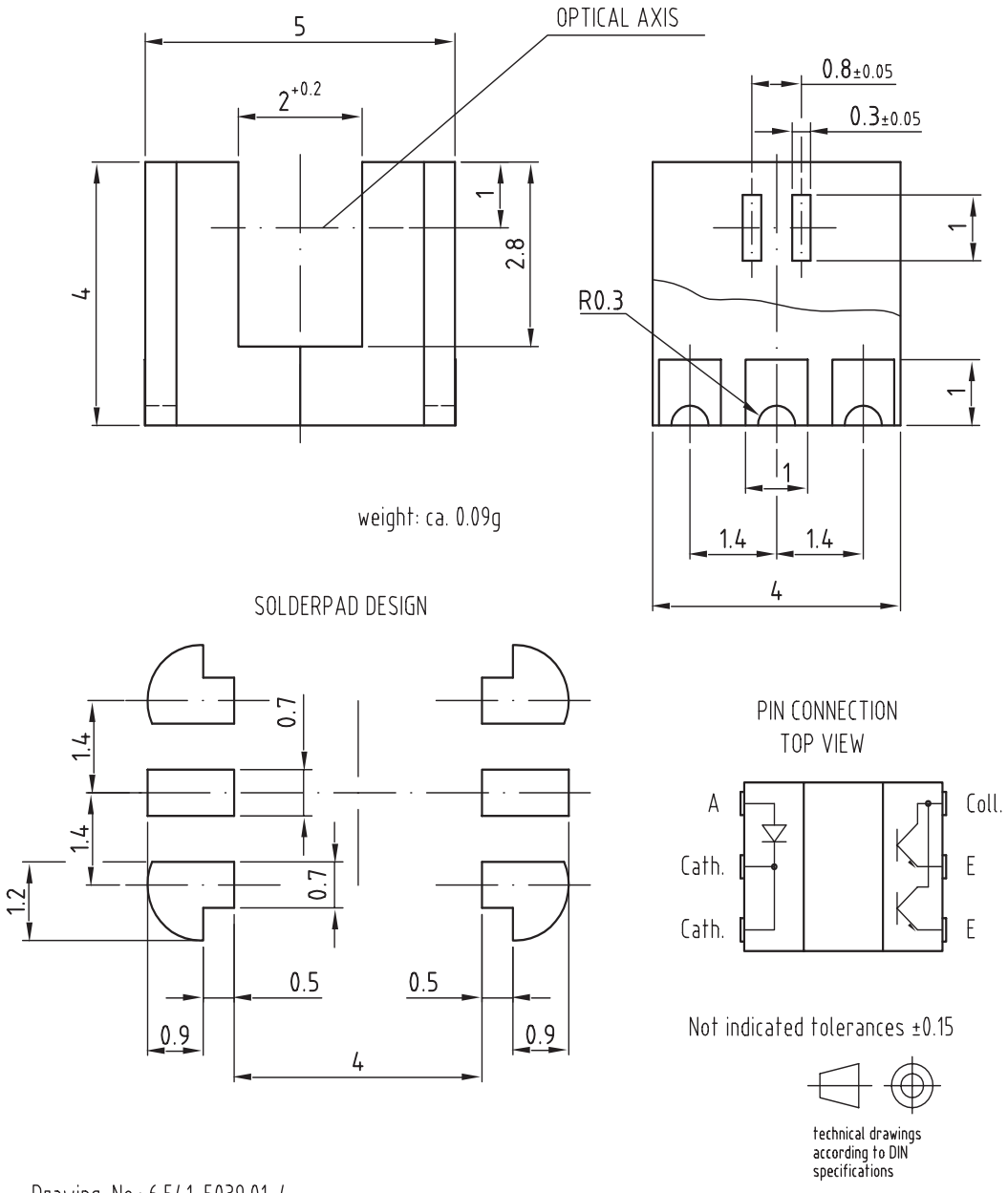


Dimensions of Tape



Quantity per reel: 2000 pcs.

Package Dimensions 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.

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 Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors 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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