

Reflective Optical Sensor with Transistor Output



DESCRIPTION

The VCNT2020 is a reflective sensor in a miniature SMD package. It has a compact construction where the emitting light source and the detector are arranged in the same plane. The operating infrared wavelength is 940 nm. The detector consists of a silicon phototransistor. The sensor analog output signal (photo current) is triggered by detection of reflected infrared light from a close by object.

The sensor has a built in daylight blocking filter, which greatly suppresses disturbing ambient light and therefore increases signal to noise ratio.

FEATURES

- Package type: SMD
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 2.5 x 2 x 0.8
- Operating range within > 20 % relative collector current: 0.2 mm to 2.5 mm
- Emitter wavelength: 940 nm
- Moisture sensitivity level (MSL): 4
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Position sensor
- Optical switch
- Optical encoder (e.g. disc and tape drives for DVD and / or camera applications)
- Object detection (e.g. paper presence in printer and copy machines)

PRODUCT SUMMARY				
PART NUMBER	DISTANCE FOR MAXIMUM CTR _{rel} ⁽¹⁾ (mm)	DISTANCE RANGE FOR RELATIVE I _{out} > 20 % (mm)	TYPICAL OUTPUT CURRENT UNDER TEST ⁽²⁾ (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
VCNT2020	0.5	0.2 to 2.5	1.6	Yes

Notes

⁽¹⁾ CTR: current transfer ratio, I_{out}/I_{in}

⁽²⁾ Conditions like in table basic characteristics/sensors

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
VCNT2020	Tape and reel	MOQ: 3000 pcs	Drypack, MSL 4

Note

⁽¹⁾ MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V _R	5	V
Forward current		I _F	100	mA
Forward surge current	t _p ≤ 100 μs	I _{FSM}	500	mA
OUTPUT (DETECTOR)				
Collector emitter breakdown voltage		V _{(BR)CEO}	20	V
Emitter collector voltage		V _{ECO}	7	V
Collector current		I _C	20	mA
SENSOR				
Total power dissipation	T _{amb} ≤ 25 °C	P _{tot}	170	mW
Ambient temperature range		T _{amb}	-25 to +85	°C
Storage temperature range		T _{stg}	-25 to +85	°C
Soldering temperature	In accordance with fig. 11	T _{sd}	260	°C

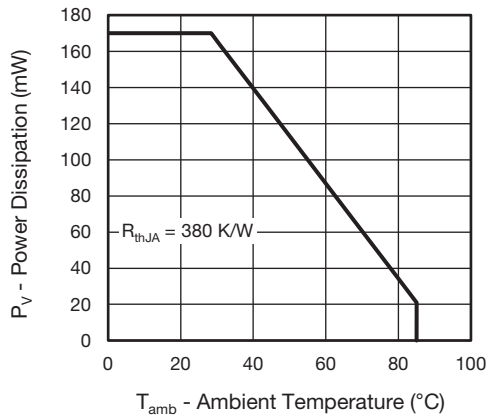
ABSOLUTE MAXIMUM RATINGS


Fig. 1 - Power Dissipation vs. Ambient Temperature

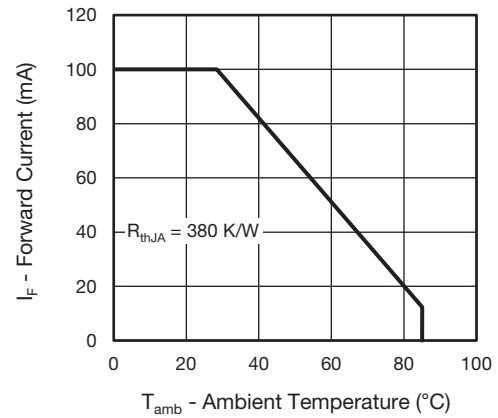


Fig. 2 - Forward Current vs. Ambient Temperature

BASIC CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	I _F = 20 mA	V _F	-	1.25	1.4	V
	I _F = 100 mA		-	1.5	1.7	
Temperature coefficient of V _F	I _F = 20 mA	TKV _F	-	-1.0	-	mV/K
Peak wavelength	I _F = 100 mA	λ _P	-	940	-	nm
Reverse current	V _R = 5 V	I _R	-	-	10	μA
OUTPUT (DETECTOR)						
Collector emitter breakdown voltage	I _C = 0.1 mA, E = 0	V _{(BR)CEO}	20	-	-	V
Emitter collector voltage	I _E = 100 μA, E = 0	V _{ECO}	7	-	-	V
Collector emitter dark current	V _{CE} = 5 V, E = 0	I _{CEO}	-	1	100	nA
SENSOR						
Collector current	V _{CE} = 5 V, I _F = 20 mA, d = 1 mm	I _C	0.5	1.6	3.5	mA
Current transfer ratio	I _C /I _F , d = 1 mm, V _{CE} = 5 V	CTR	-	8	-	%
Rise time	I _C = 0.8 mA, V _{CE} = 5 V, R _L = 100 Ω	t _r	-	10	70	μs
Fall time	I _C = 0.8 mA, V _{CE} = 5 V, R _L = 100 Ω	t _f	-	15	70	μs

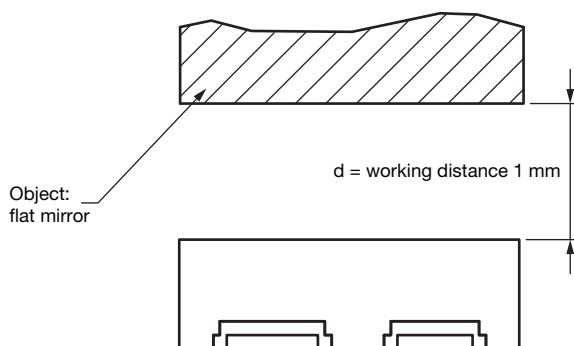


Fig. 3 - Test Circuit



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

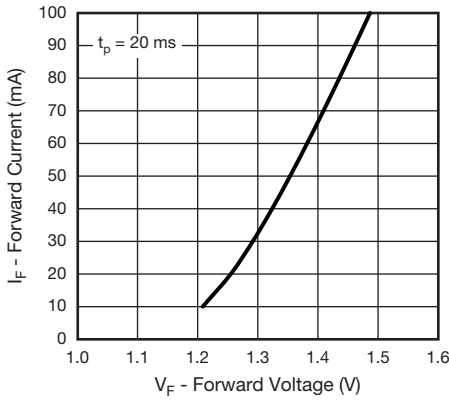


Fig. 4 - Forward Current vs. Forward Voltage

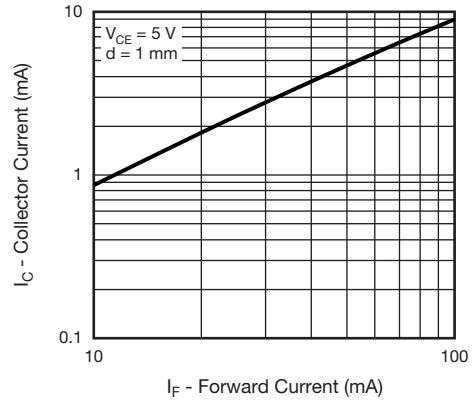


Fig. 7 - Collector Current vs. Forward Current

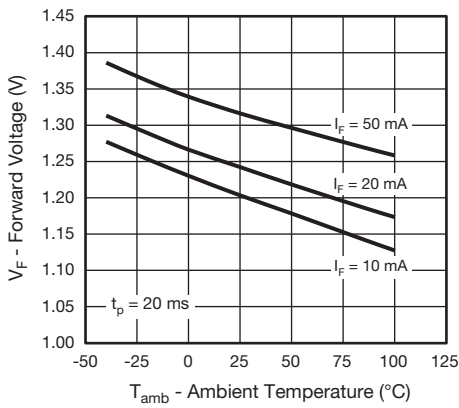


Fig. 5 - Forward Voltage vs. Ambient Temperature

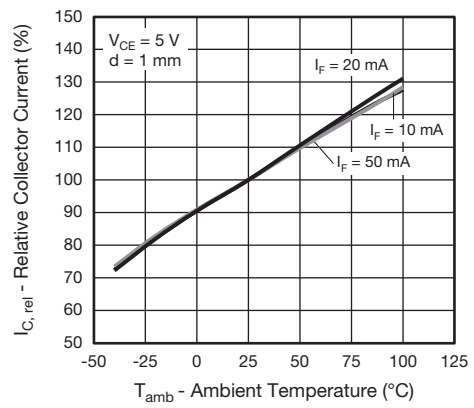


Fig. 8 - Relative Collector Current vs. Ambient Temperature

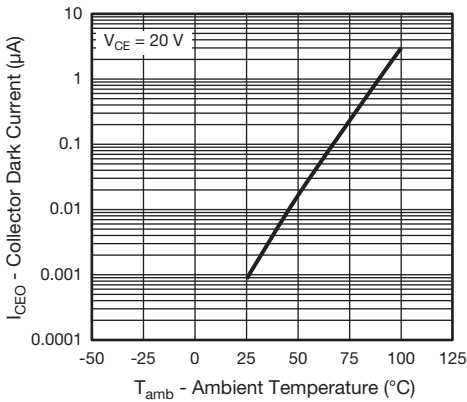


Fig. 6 - Collector Dark Current vs. Ambient Temperature

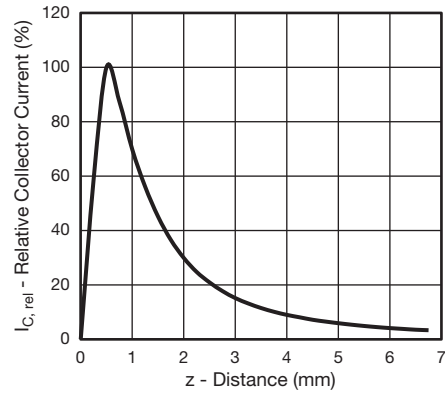


Fig. 9 - Relative Collector Current vs. Distance

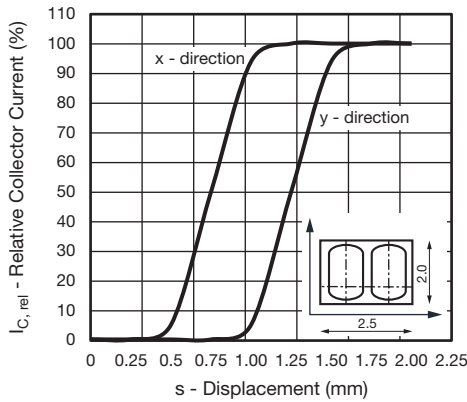


Fig. 10 - Relative Collector Current vs. Displacement

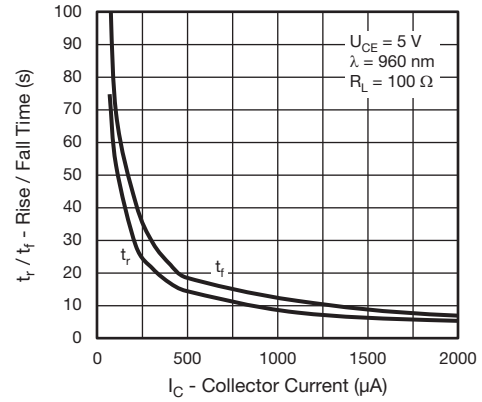


Fig. 11 - Rise / Fall Time vs. Collector Current

PRECAUTIONS FOR USE

1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (burn out will happen).

2. Storage

- 2.1. Storage temperature and rel. humidity conditions are: 5 °C to 30 °C, RH 60
- 2.2. Floor life must not exceed 168 h, according to JEDEC® level 3, J-STD-020.

Once the package is opened, the products should be used within 168 h. Otherwise, they should be kept in a damp proof box with desiccant.

Considering tape life, we suggest to use products within one year from production date.

- 2.3. If opened more than 168 h in an atmosphere 5 °C to 30 °C, RH 60 %, devices should be treated at 60 °C ± 5 °C for 15 h.
- 2.4. If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3.

REFLOW SOLDER PROFILE

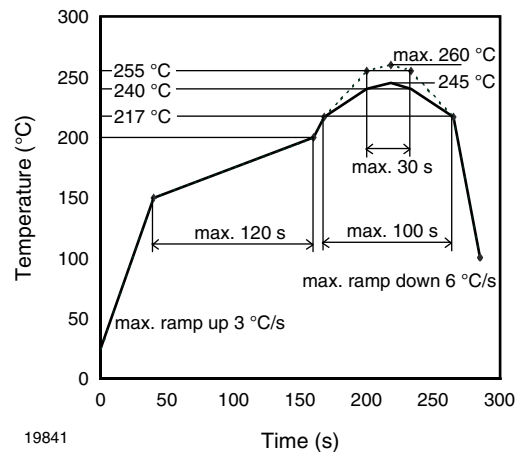
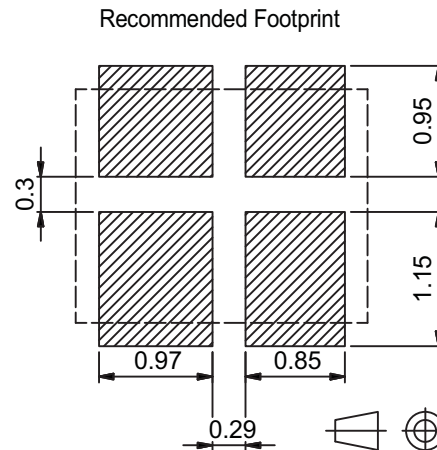
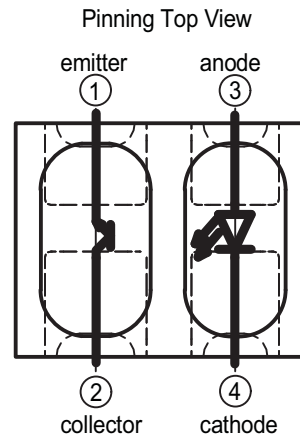
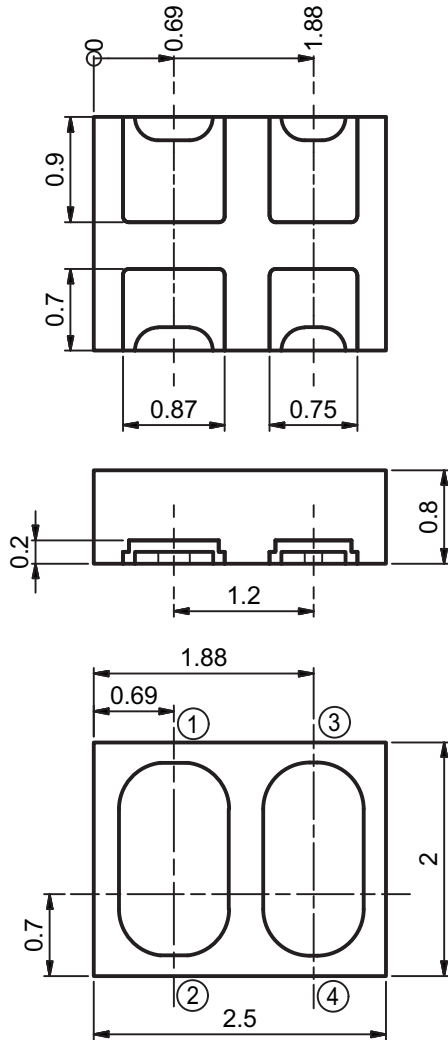


Fig. 12 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

PACKAGE DIMENSIONS in millimeters



Drawing refers to following types:
VCNT2020

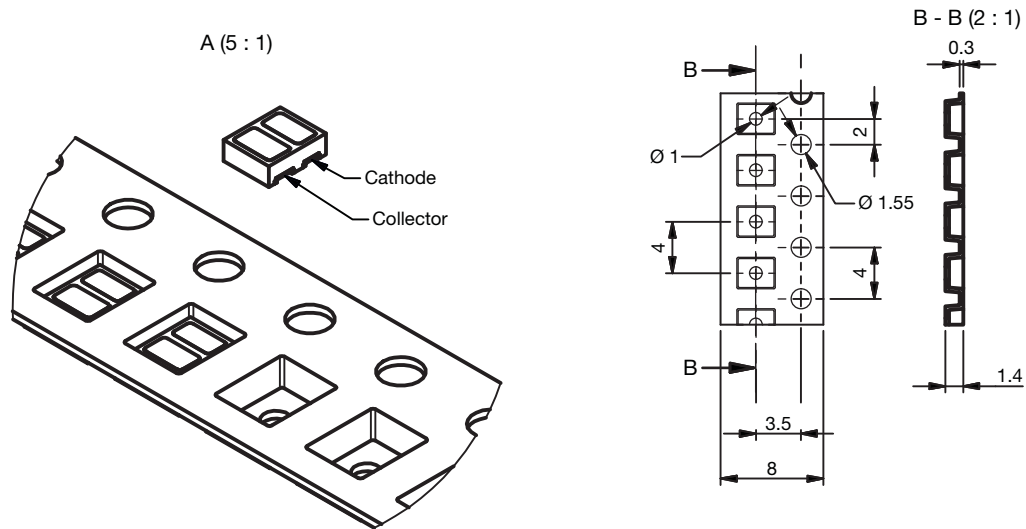
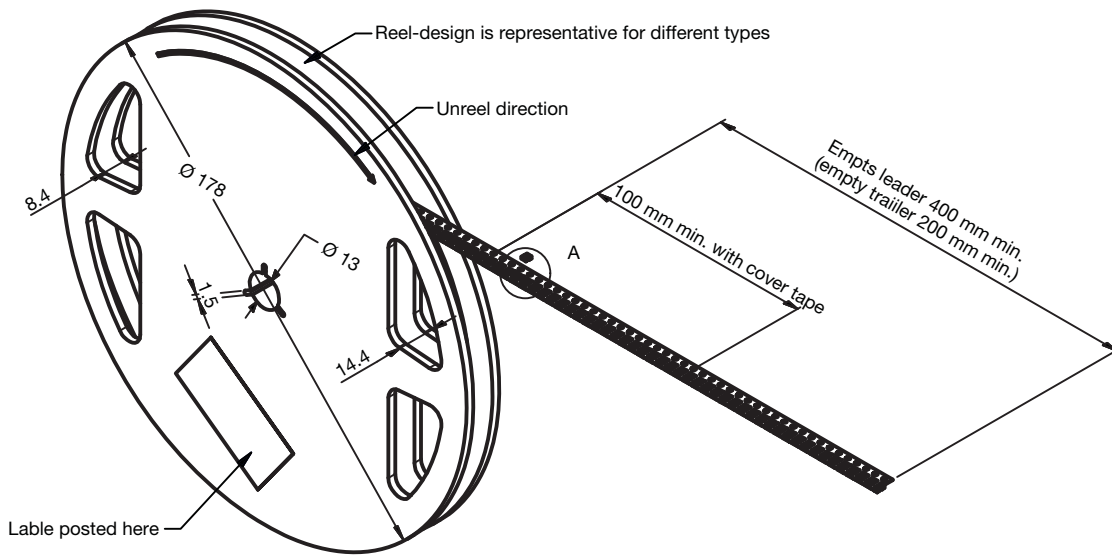
Drawing-No.: VMS 008-5050 Prel. Issue: 10; 15.06.2016

Not indicated tolerances ± 0.1 mm

Technical drawings according to DIN specification.

TAPE AND REEL DIMENSIONS in millimeters

3000 pcs/reel



Drawing-No.: AK-11.0005.03
Issue: Preliminary; 15.05.2015



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