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Vishay Semiconductors

Reflective Optical Sensor With Transistor Output



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

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.

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

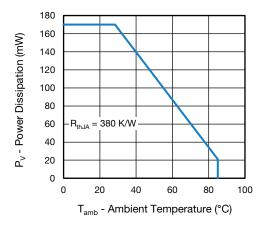


Fig. 1 - Power Dissipation vs. Ambient Temperature

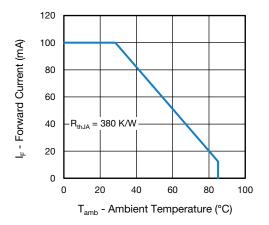
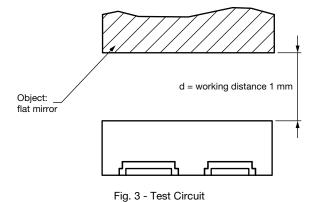


Fig. 2 - Forward Current vs. Ambient Temperature

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	
Forward voitage	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	μΑ	
OUTPUT (DETECTOR)							
Collector emitter breakdown voltage	$I_C = 0.1 \text{ mA, E} = 0$	V _{(BR)CEO}	20	ı	-	V	
Emitter collector voltage	$I_E = 100 \mu A, E = 0$	V _{ECO}	7	1	-	V	
Collector emitter dark current	$V_{CE} = 5 \text{ V, E} = 0$	I _{CEO}	-	1	100	nA	
SENSOR							
Collector current	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}, d = 1 \text{ mm}$	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, $R_L = 100 \Omega$	t _r	-	10	70	μs	
Fall time	$I_C = 0.8 \text{ mA}, V_{CE} = 5 \text{ V}, R_L = 100 \Omega$	t _f	-	15	70	μs	



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BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

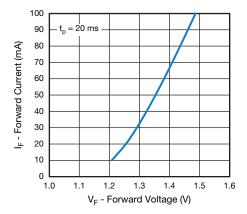


Fig. 4 - Forward Current vs. Forward Voltage

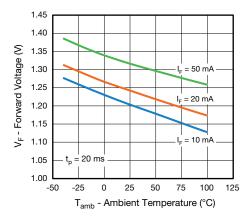


Fig. 5 - Forward Voltage vs. Ambient Temperature

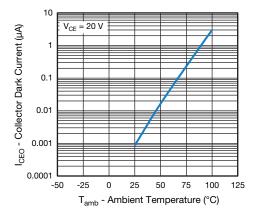


Fig. 6 - Collector Dark Current vs. Ambient Temperature

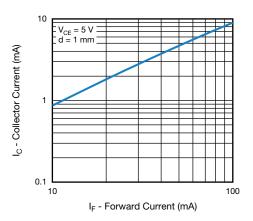


Fig. 7 - Collector Current vs. Forward Current

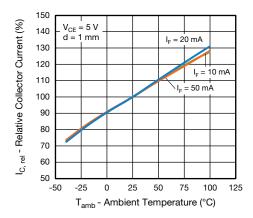


Fig. 8 - Relative Collector Current vs. Ambient Temperature

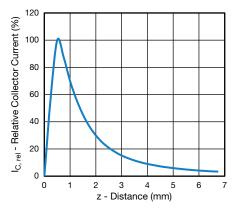


Fig. 9 - Relative Collector Current vs. Distance

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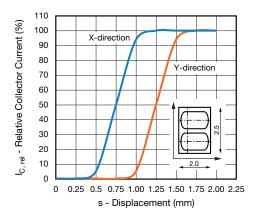


Fig. 10 - Relative Collector Current vs. Displacement

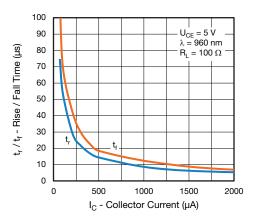


Fig. 11 - Rise / Fall Time vs. Collector Current

FLOOR LIFE

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:

Moisture sensitivity: level 4

Floor life: 72 h

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 recommended conditions:

192 h at 40 °C (+ 5 °C), RH < 5 %

or

96 h at 60 °C (+ 5 °C), RH < 5 %

REFLOW SOLDER PROFILE

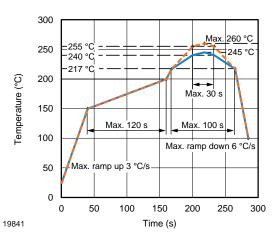
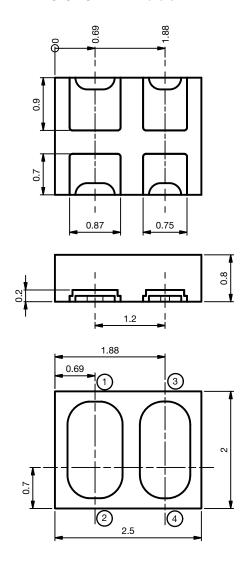


Fig. 12 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

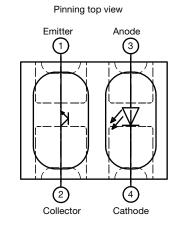


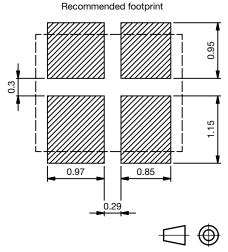
PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5338.01-4 Issue: 1; 16.06.2016

Not indicated tolerances ± 0.1



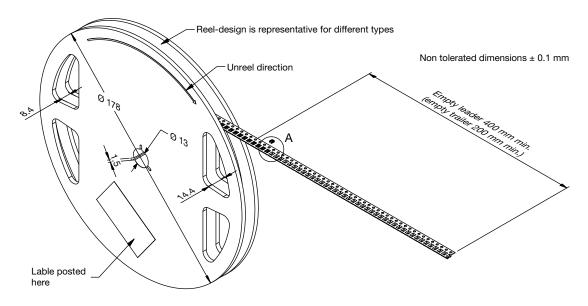


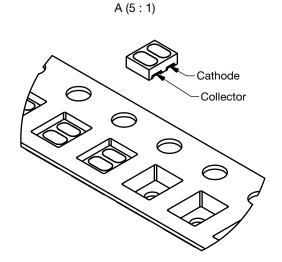
Technical drawings according to DIN specification

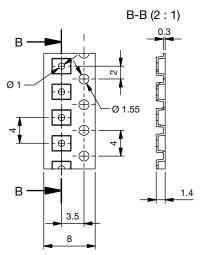
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TAPE AND REEL DIMENSIONS in millimeters

3000 pcs/reel







Drawing refers to following Type: VCNT2020 Drawing No.: 9.800-5132.01-4

Issue: 1; 18.01.2018



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