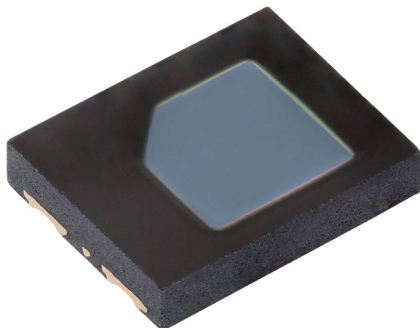




## Ambient Light Sensor



### DESCRIPTION

VEMD5510CF is a high speed and high sensitive PIN photodiode. It is a low profile surface-mount device (SMD) including the chip with a 7.5 mm<sup>2</sup> sensitive area detecting visible light much like the human eye. The diode has its peak sensitivity at 540 nm and a low capacitance.

### FEATURES

- Package type: surface-mount
- Package form: top view
- Dimensions (L x W x H in mm): 5 x 4 x 0.9
- Radiant sensitive area (in mm<sup>2</sup>): 7.5
- Suppression filter for infrared radiation
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 65^\circ$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Wearables
- Optical heart rate monitoring
- Ambient light sensors

### PRODUCT SUMMARY

COMPONENT	$I_{ra}$ ( $\mu$ A)	$\phi$ ( $^\circ$ )	$\lambda_{0.5}$ (nm)
VEMD5510CF	0.25	$\pm 65$	440 to 620

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD5510CF	Tape and reel	MOQ: 1000 pcs, 1000 pcs/reel	Top view
VEMD5510CF-GS15	Tape and reel	MOQ: 5000 pcs, 5000 pcs/reel	Top view

#### Note

- MOQ: minimum order quantity

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	20	V
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_V$	215	mW
Junction temperature		$T_j$	110	$^\circ\text{C}$
Operating temperature range		$T_{amb}$	-40 to +100	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-40 to +100	$^\circ\text{C}$
Soldering temperature	According to reflow solder profile Fig. 8	$T_{sd}$	260	$^\circ\text{C}$
Thermal resistance junction to ambient		$R_{thJA}$	350	K/W
ESD safety HBM	$\pm 2000$ V, 1.5 k $\Omega$ , 100 pF, 3 pulses	$ESD_{HBM}$	$\geq 2$	kV



BASIC CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	I <sub>F</sub> = 50 mA	V <sub>F</sub>	-	0.9	1.3	V
Breakdown voltage	I <sub>R</sub> = 100 μA, E = 0	V <sub>(BR)</sub>	20	-	-	V
Reverse dark current	V <sub>R</sub> = 10 V, E = 0	I <sub>ro</sub>	-	0.2	10	nA
Diode capacitance	V <sub>R</sub> = 0 V, f = 1 MHz, E = 0	C <sub>D</sub>	-	80	-	pF
	V <sub>R</sub> = 3 V, f = 1 MHz, E = 0	C <sub>D</sub>	-	30	40	pF
Open circuit voltage	E <sub>V</sub> = 100 lx, CIE illuminant A	V <sub>o</sub>	-	210	-	mV
Temperature coefficient of V <sub>o</sub>	E <sub>V</sub> = 100 lx, CIE illuminant A	TK <sub>V<sub>o</sub></sub>	-	-2.3	-	mV/K
Short circuit current	E <sub>V</sub> = 100 lx, CIE illuminant A	I <sub>k</sub>	-	0.25	-	μA
Reverse light current	E <sub>e</sub> = 0.2 mW/cm <sup>2</sup> , λ = 525 nm, V <sub>R</sub> = 5 V	I <sub>ra</sub>	1.35	2.1	3.05	μA
	E <sub>V</sub> = 100 lx, CIE illuminant A, V <sub>R</sub> = 5 V	I <sub>ra</sub>	0.16	0.25	0.39	μA
Angle of half sensitivity		φ	-	± 65	-	°
Wavelength of peak sensitivity		λ <sub>p</sub>	-	540	-	nm
Range of spectral bandwidth		λ <sub>0.5</sub>	-	440 to 620	-	nm
Rise time	V <sub>R</sub> = 5 V, R <sub>L</sub> = 50 Ω, λ = 525 nm	t <sub>r</sub>	-	40	-	ns
Fall time	V <sub>R</sub> = 5 V, R <sub>L</sub> = 50 Ω, λ = 525 nm	t <sub>f</sub>	-	30	-	ns

**BASIC CHARACTERISTICS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

Basic characteristics graphs to be extended to 110 °C ambient temperatures where applicable.

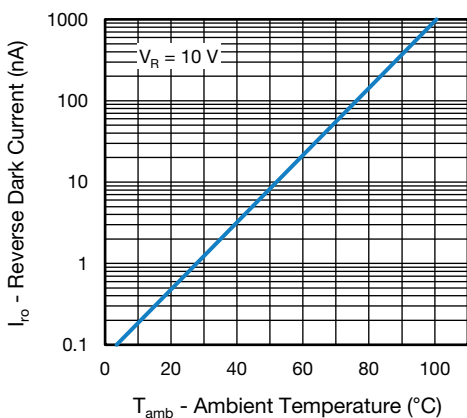


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

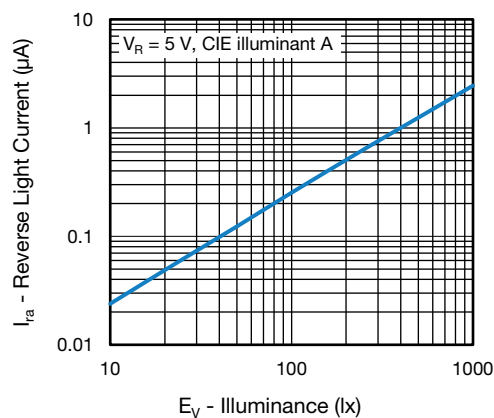


Fig. 2 - Reverse Light Current vs. Irradiance

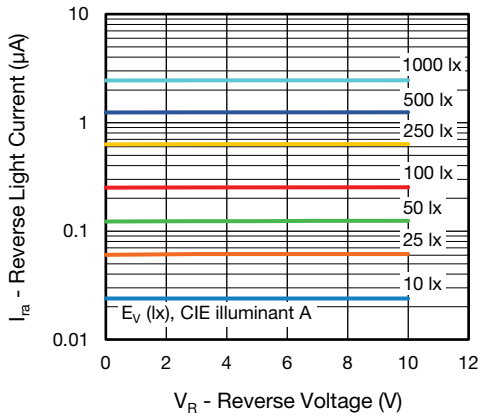


Fig. 3 - Reverse Light Current vs. Reverse Voltage

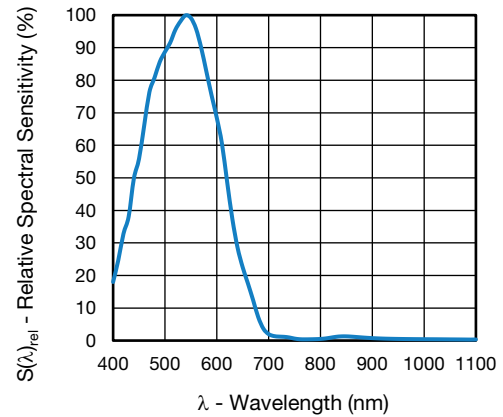


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

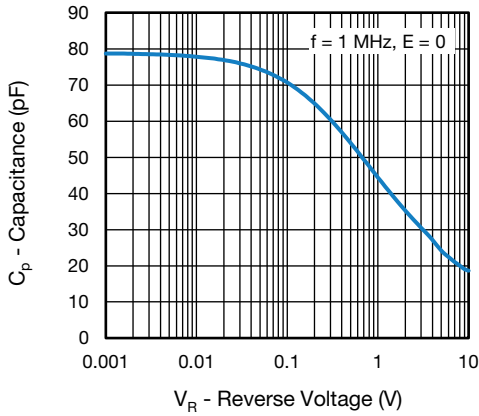


Fig. 4 - Diode Capacitance vs. Reverse Voltage

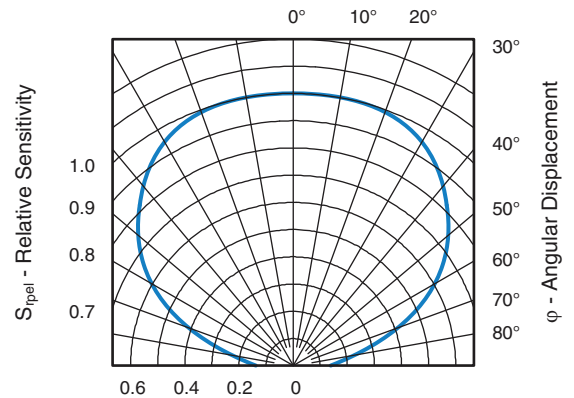
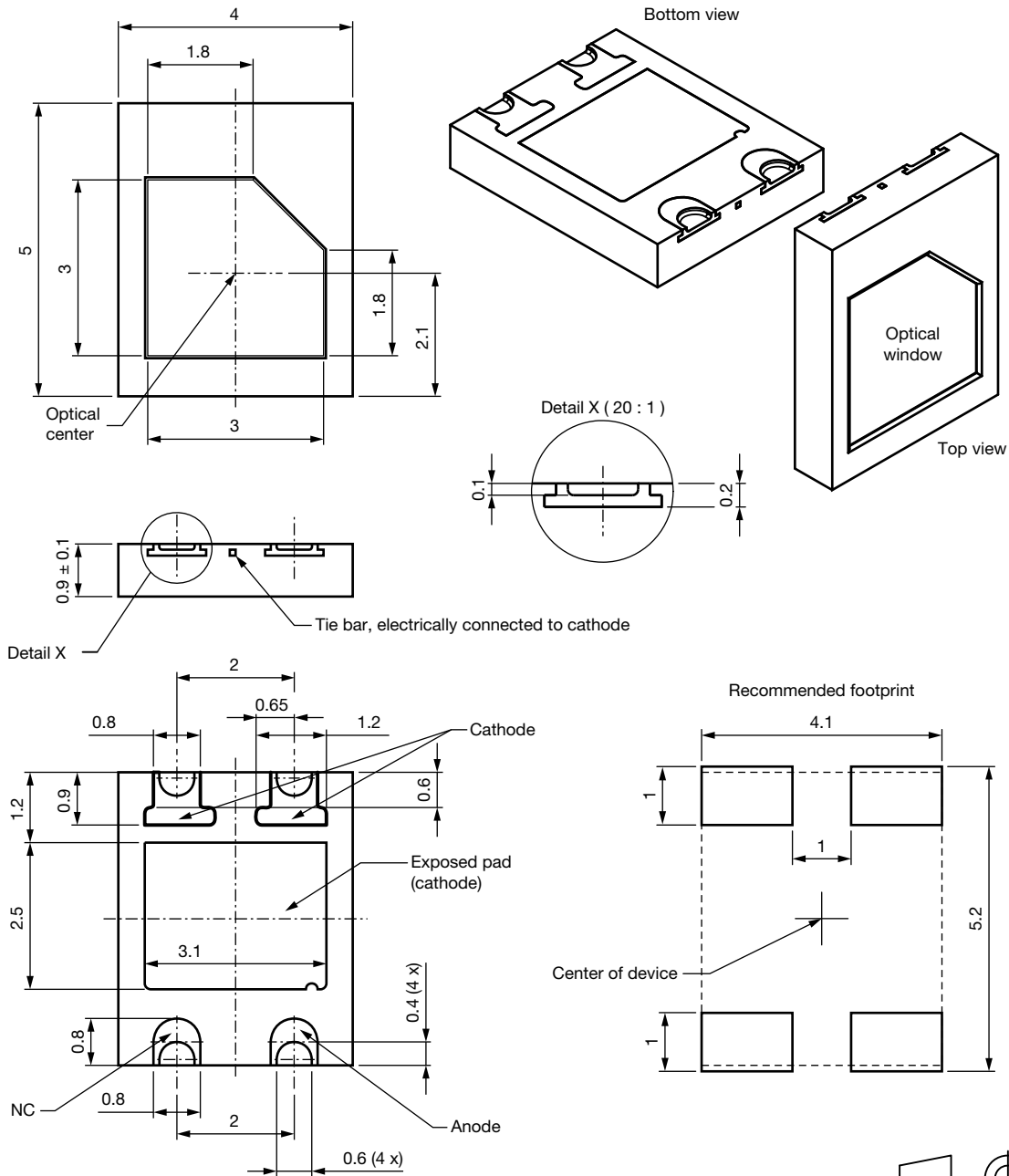


Fig. 6 - Relative Sensitivity vs. Angular Displacement

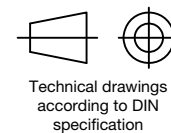


PACKAGE DIMENSIONS in millimeters



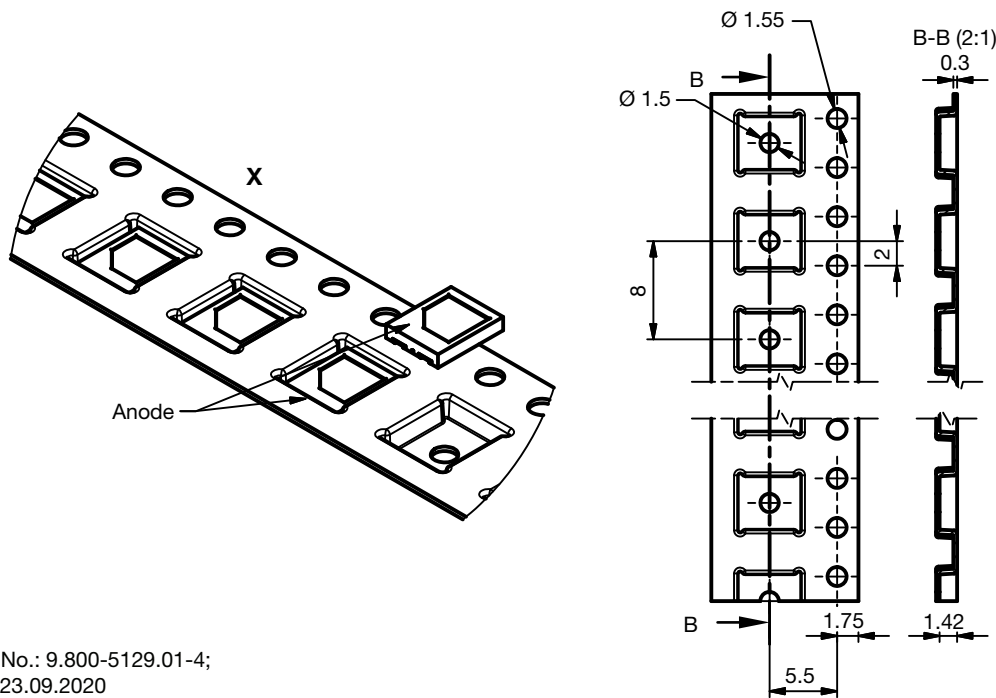
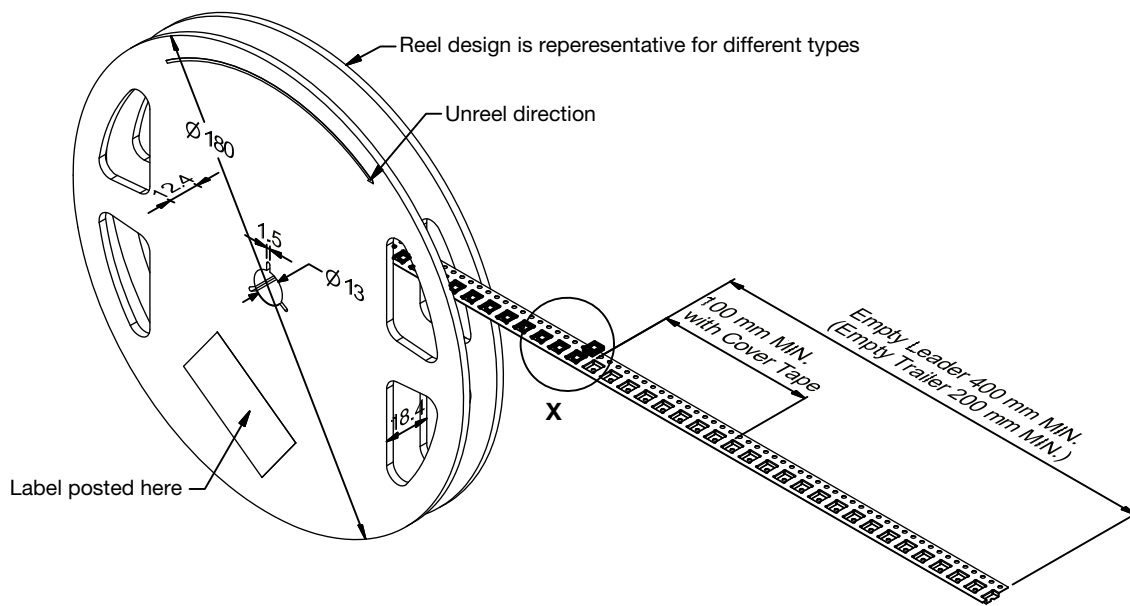
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Issue: 5; 23.09.2020

Not indicated tolerances ± 0.1

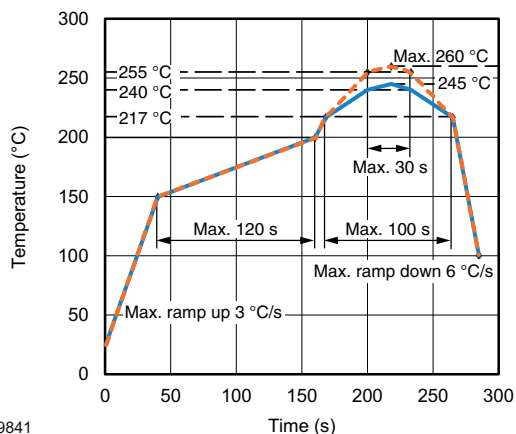




TAPE AND REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5129.01-4;  
Issue: 2; 23.09.2020

**SOLDER PROFILE**

19841

Fig. 7 - Lead (Pb)-free Reflow Solder Profile  
According to J-STD-020D

**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**

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:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

**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),  $RH < 5\%$ .



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