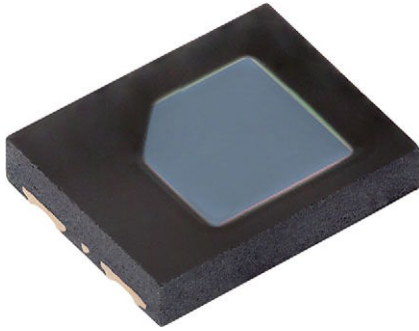


Ambient Light Sensor



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 mm² 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 mm²): 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



APPLICATIONS

- Wearables
- Optical heart rate monitoring
- Ambient light sensors

PRODUCT SUMMARY

COMPONENT	I_{ra} (μ A)	ϕ ($^\circ$)	$\lambda_{0.5}$ (nm)
VEMD5510CF	0.25	± 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	± 2000 V, 1.5 k Ω , 100 pF, 3 pulses	ESD_{HBM}	≥ 2	kV

BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 50\text{ mA}$	V_F	-	0.9	1.3	V
Breakdown voltage	$I_R = 100\text{ }\mu\text{A}$, $E = 0$	$V_{(BR)}$	20	-	-	V
Reverse dark current	$V_R = 10\text{ V}$, $E = 0$	I_{ro}	-	0.2	10	nA
Diode capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$	C_D	-	80	-	pF
	$V_R = 3\text{ V}$, $f = 1\text{ MHz}$, $E = 0$	C_D	-	30	40	pF
Open circuit voltage	$E_V = 100\text{ lx}$, CIE illuminant A	V_o	-	210	-	mV
Temperature coefficient of V_o	$E_V = 100\text{ lx}$, CIE illuminant A	TK_{V_o}	-	-2.3	-	mV/K
Short circuit current	$E_V = 100\text{ lx}$, CIE illuminant A	I_k	-	0.25	-	μA
Reverse light current	$E_e = 0.2\text{ mW/cm}^2$, $\lambda = 525\text{ nm}$, $V_R = 5\text{ V}$	I_{ra}	1.35	2.1	3.05	μA
	$E_V = 100\text{ lx}$, CIE illuminant A, $V_R = 5\text{ V}$	I_{ra}	0.16	0.25	0.39	μA
Angle of half sensitivity		ϕ	-	± 65	-	$^{\circ}$
Wavelength of peak sensitivity		λ_p	-	540	-	nm
Range of spectral bandwidth		$\lambda_{0.5}$	-	440 to 620	-	nm
Rise time	$V_R = 5\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 525\text{ nm}$	t_r	-	40	-	ns
Fall time	$V_R = 5\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 525\text{ nm}$	t_f	-	30	-	ns

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

Basic characteristics graphs to be extended to $110\text{ }^{\circ}\text{C}$ ambient temperatures where applicable.

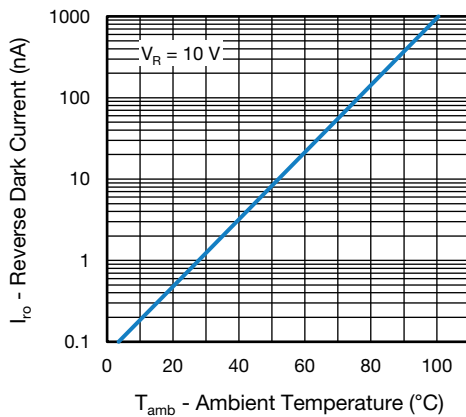


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

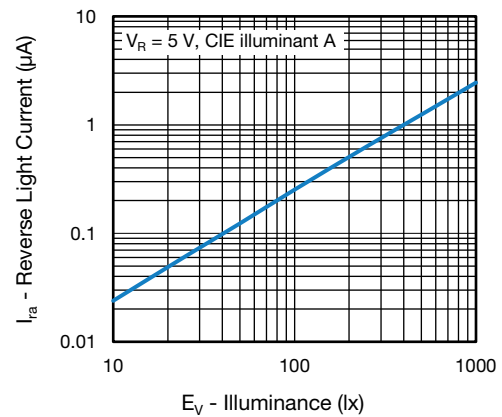


Fig. 2 - Reverse Light Current vs. Irradiance

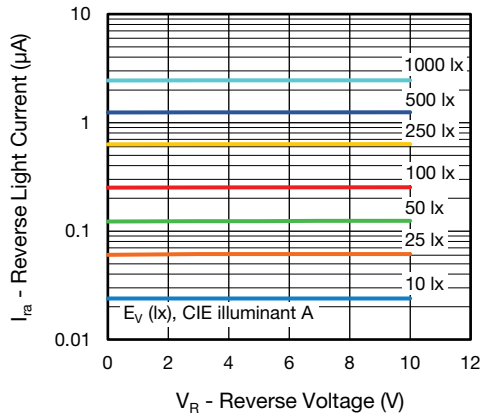


Fig. 3 - Reverse Light Current vs. Reverse Voltage

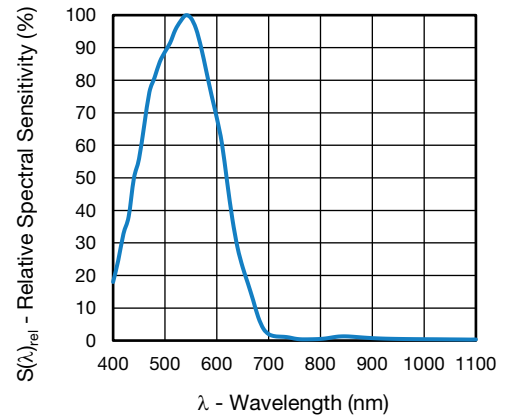


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

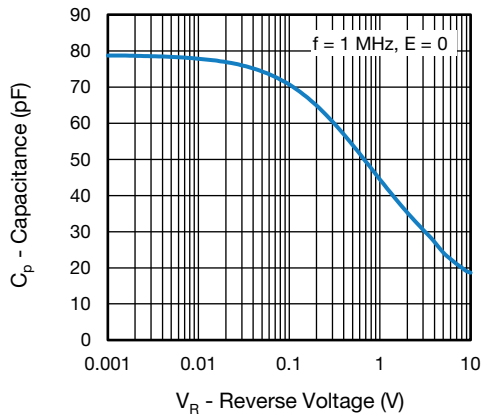


Fig. 4 - Diode Capacitance vs. Reverse Voltage

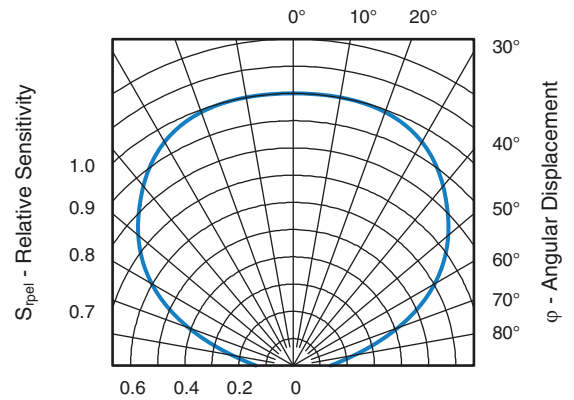
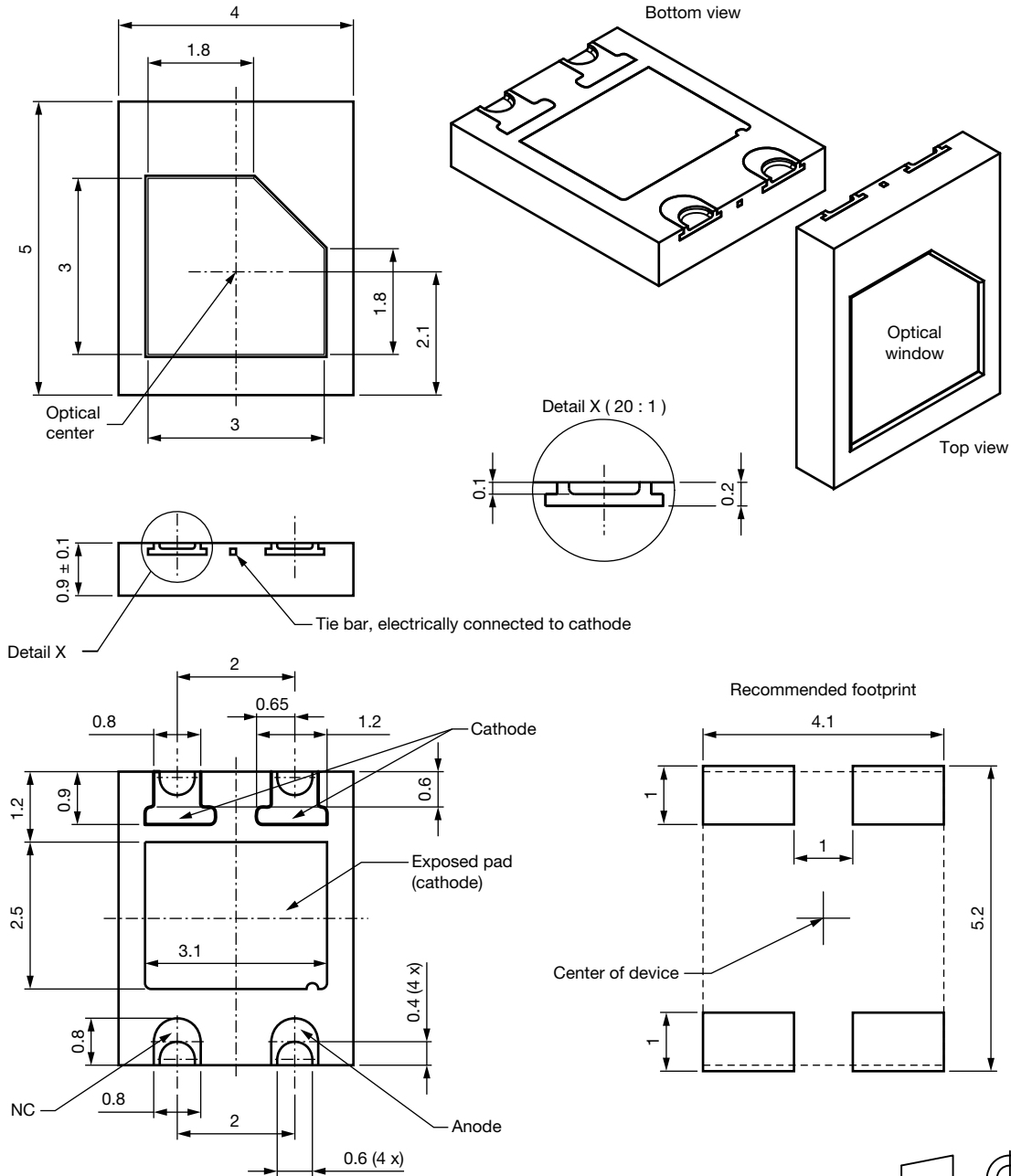


Fig. 6 - Relative Sensitivity vs. Angular Displacement

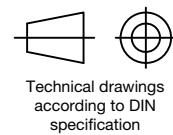


PACKAGE DIMENSIONS in millimeters



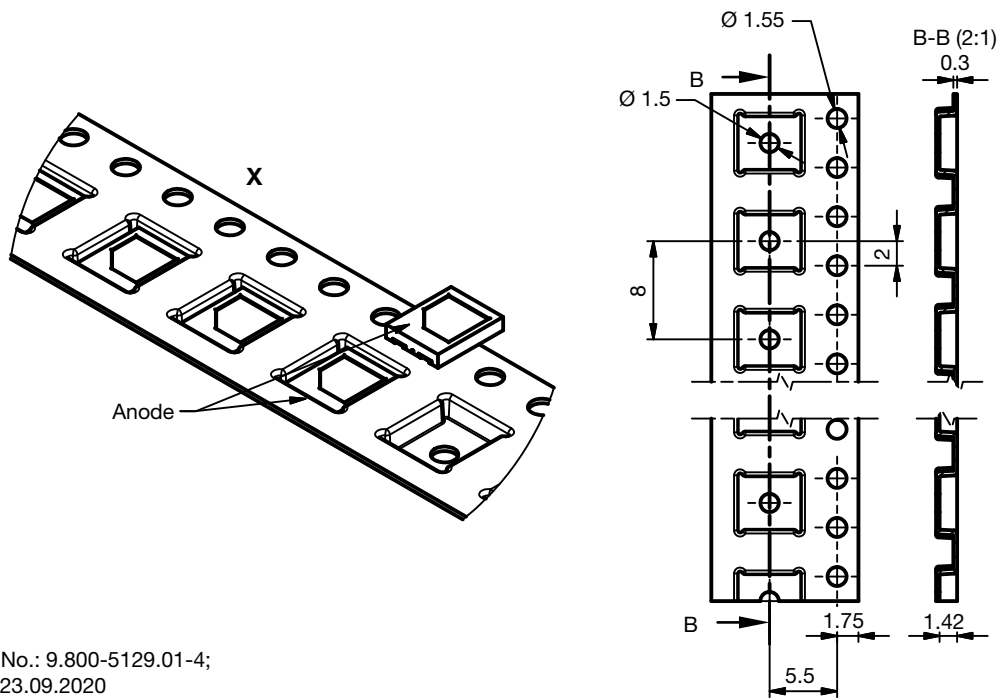
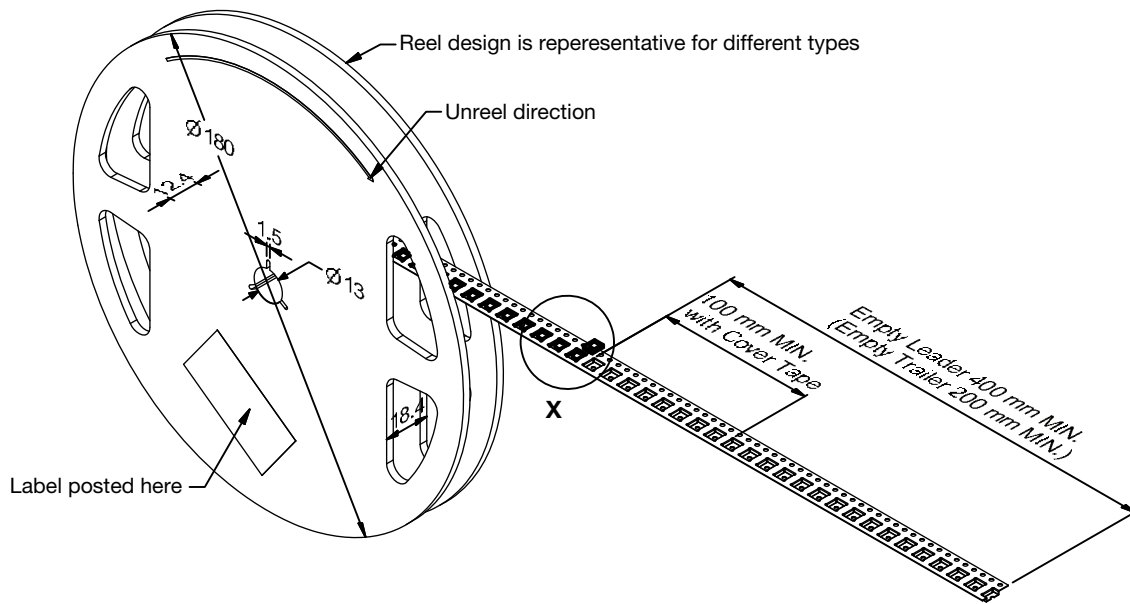
Drawing- No.: 6.550-5329.01-4
Issue: 5; 23.09.2020

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



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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