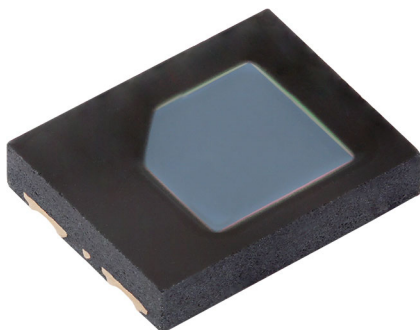




Ambient Light Sensor



DESCRIPTION

VEMD5510C 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 550 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
- High photo sensitivity
- Suppression filter for near infrared radiation
- Fast response times
- Angle of half sensitivity: $\varphi = \pm 65^\circ$
- 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} (μA)	φ (°)	$\lambda_{0.5}$ (nm)
VEMD5510C	0.6	± 65	440 to 700

Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD5510C	Tape and reel	MOQ: 1000 pcs, 1000 pcs/reel	Top view
VEMD5510C-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 kΩ, 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_{r0}	-	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	-	240	-	mV
Temperature coefficient of V_o	$E_V = 100\text{ lx}$, CIE illuminant A	TK_{V_o}	-	-2.5	-	mV/K
Short circuit current	$E_V = 100\text{ lx}$, CIE illuminant A	I_k	-	0.6	-	μA
Reverse light current	$E_e = 0.2\text{ mW/cm}^2$, $\lambda = 525\text{ nm}$, $V_R = 5\text{ V}$	I_{ra}	2.0	2.6	-	μA
	$E_V = 100\text{ lx}$, CIE illuminant A, $V_R = 5\text{ V}$	I_{ra}	0.46	0.55	-	μA
Angle of half sensitivity		ϕ	-	± 65	-	$^{\circ}$
Wavelength of peak sensitivity		λ_p	-	550	-	nm
Range of spectral bandwidth		$\lambda_{0.5}$	-	440 to 700	-	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.

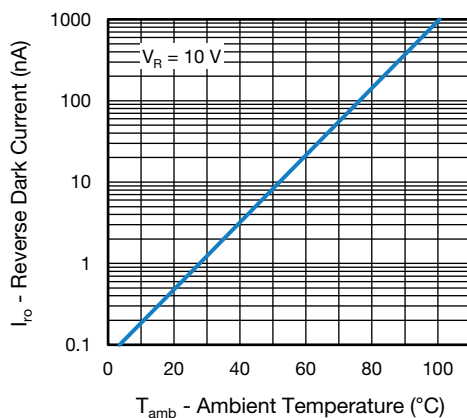


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

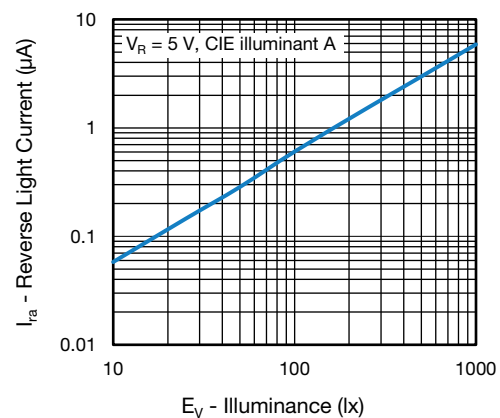


Fig. 2 - Reverse Light Current vs. Irradiance

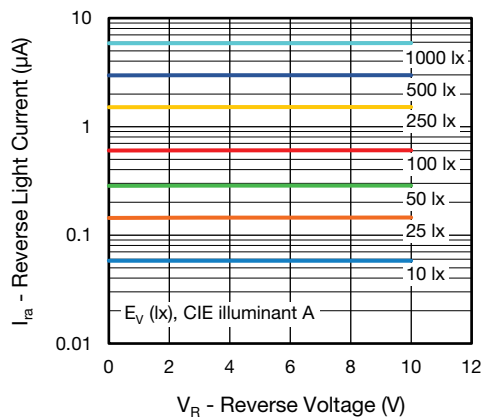


Fig. 3 - Reverse Light Current vs. Reverse Voltage

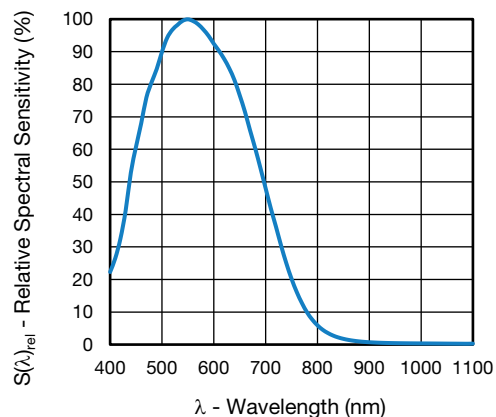


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

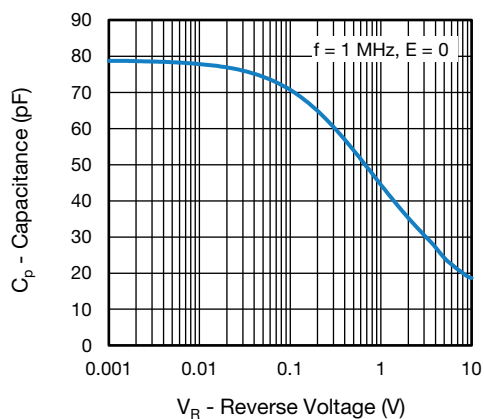


Fig. 4 - Diode Capacitance vs. Reverse Voltage

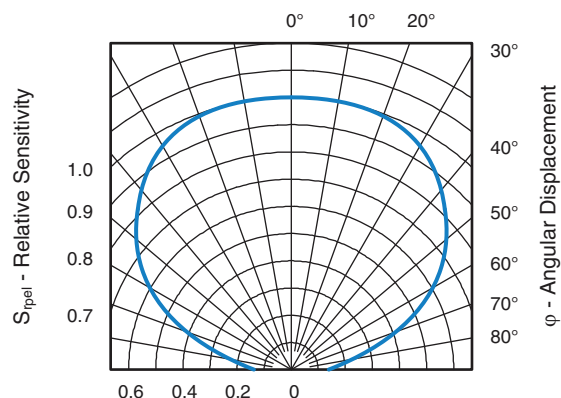


Fig. 6 - Relative Sensitivity vs. Angular Displacement

Technical drawing of the SMD package showing top, bottom, and side views with dimensions and labels.

Top view: Shows the overall dimensions of the package. The total width is 4.0 mm, and the total height is 5.0 mm. The central optical window has a width of 1.8 mm and a height of 3.0 mm. The distance from the center of the optical window to the bottom edge is 2.1 mm. The distance from the center of the optical window to the side edges is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The label "Optical center" points to the center of the optical window.

Bottom view: Shows the underside of the package. The label "Bottom view" is at the top. The label "Optical window" is at the bottom. The label "Tie bar, electrically connected to cathode" points to the tie bar. The label "Detail X (20 : 1)" points to the detail view of the tie bar. The label "Detail X" points to the detail view of the tie bar. The label "Cathode" points to the cathode. The label "Exposed pad (cathode)" points to the exposed pad. The label "Anode" points to the anode. The label "NC" points to the no connection pad. The label "Center of device" points to the center of the device.

Side view: Shows the profile of the package. The total height is 5.0 mm. The distance from the top edge to the bottom edge of the optical window is 3.0 mm. The distance from the bottom edge of the optical window to the bottom edge of the package is 2.1 mm. The distance from the center of the optical window to the side edges is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The label "Optical center" points to the center of the optical window.

Detail X (20 : 1): Shows the detail of the tie bar. The tie bar has a width of 0.1 mm and a height of 0.2 mm. The tie bar is electrically connected to the cathode.

Recommended footprint: Shows the recommended footprint for the package. The total width is 4.1 mm, and the total height is 5.2 mm. The distance from the center of the device to the side edges is 1.0 mm. The distance from the center of the device to the top and bottom edges is 1.0 mm. The label "Center of device" points to the center of the device.

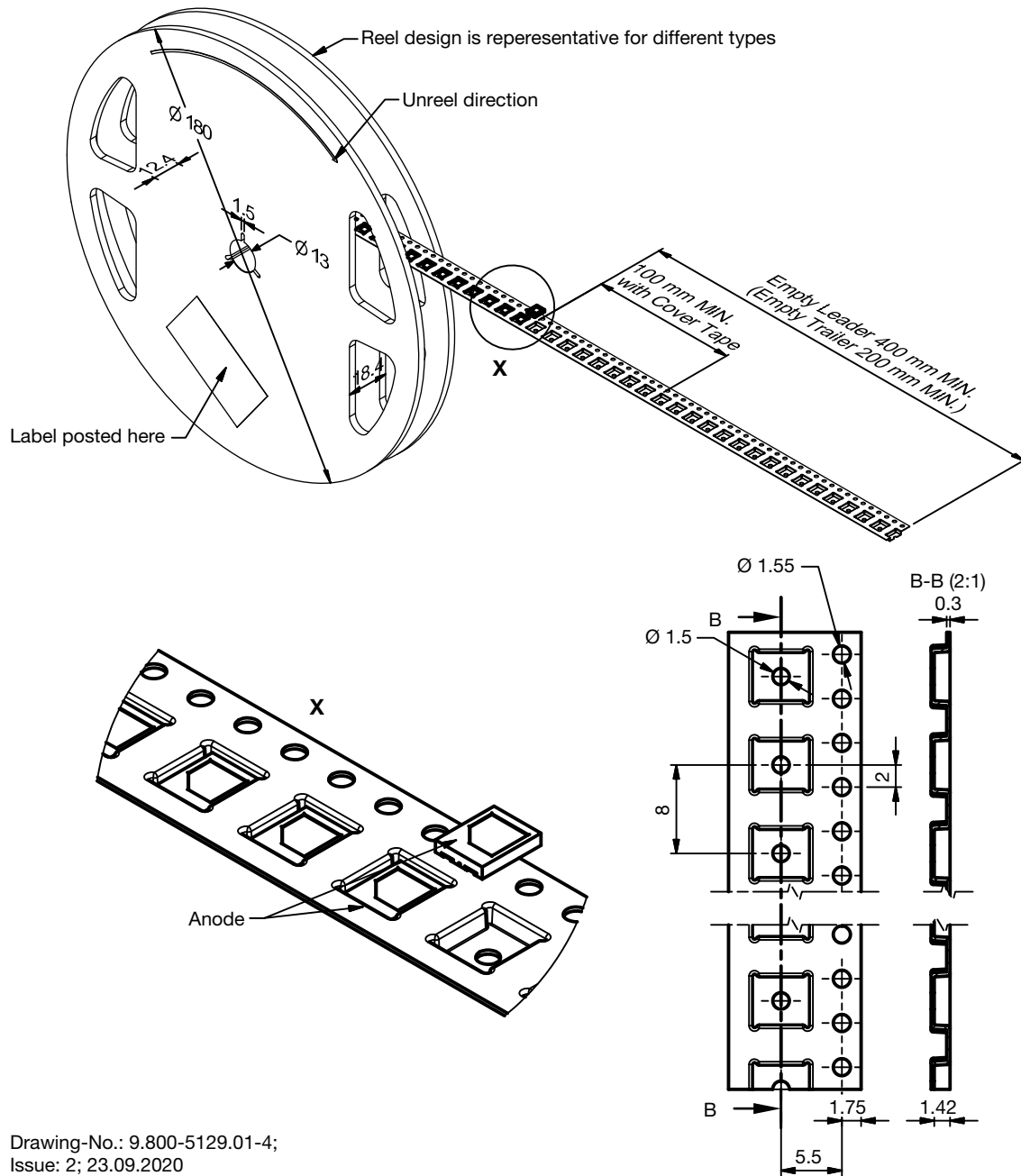
Not indicated tolerances ± 0.1



Technical drawings
according to DIN
specification



TAPE AND REEL DIMENSIONS in millimeters



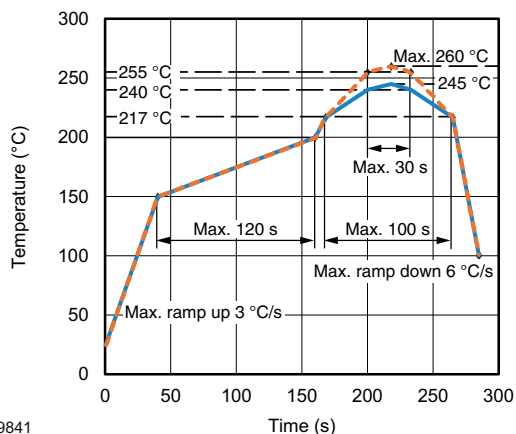
**SOLDER PROFILE**

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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