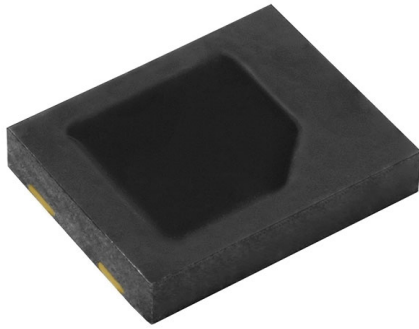


## Silicon PIN Photodiode



### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

VEMD5110X01 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 and a daylight blocking filter matched with IR emitters operating at wavelength 870 nm or 950 nm.

### 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
- AEC-Q101 qualified
- High sensitivity
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- 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)

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- High speed detector for infrared radiation
- Infrared remote control and free air data transmission systems, e.g. road cash systems
- Photodiode for smoke detectors
- Photodiode for rain sensors
- [Hygienic applications](#)

### PRODUCT SUMMARY

COMPONENT	$I_{ra}$ ( $\mu A$ )	$\phi$ ( $^\circ$ )	$\lambda_{0.5}$ (nm)
VEMD5110X01	48	$\pm 65$	790 to 1050

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD5110X01	Tape and reel	MOQ: 1000 pcs, 1000 pcs/reel	Top view
VEMD5110X01-GS15	Tape and reel	MOQ: 5000 pcs, 5000 pcs/reel	Top view

#### Note

- MOQ: minimum order quantity

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	20	V
Power dissipation	$T_{amb} \leq 25^\circ C$	$P_V$	215	mW
Junction temperature		$T_j$	110	$^\circ C$
Operating temperature range		$T_{amb}$	-40 to +110	$^\circ C$
Storage temperature range		$T_{stg}$	-40 to +110	$^\circ C$
Soldering temperature	According to reflow solder profile Fig. 8	$T_{sd}$	260	$^\circ C$
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

<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 50\text{ mA}$	$V_F$	-	1	1.3	V
Breakdown voltage	$I_R = 100\text{ }\mu\text{A}$ , $E = 0$	$V_{(BR)}$	20	-	-	V
Reverse dark current	$V_R = 10\text{ V}$ , $E = 0$	$I_{r0}$	-	2	30	nA
Diode capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_D$	-	70	-	pF
	$V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_D$	-	25	40	pF
Open circuit voltage	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$V_o$	-	350	-	mV
Temperature coefficient of $V_o$	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$TK_{V_o}$	-	-2.6	-	mV/K
Short circuit current	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$I_k$	-	45	-	$\mu\text{A}$
Temperature coefficient of $I_k$	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$TK_{I_k}$	-	0.1	-	%/K
Reverse light current	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_R = 5\text{ V}$	$I_{ra}$	40	48	-	$\mu\text{A}$
Angle of half sensitivity		$\phi$	-	$\pm 65$	-	$^{\circ}$
Wavelength of peak sensitivity		$\lambda_p$	-	940	-	nm
Range of spectral bandwidth		$\lambda_{0.5}$	-	790 to 1050	-	nm
Noise equivalent power	$V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$	NEP	-	$4 \times 10^{-14}$	-	W/ $\sqrt{\text{Hz}}$
Rise time	$V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$	$t_r$	-	100	-	ns
Fall time	$V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$	$t_f$	-	100	-	ns

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

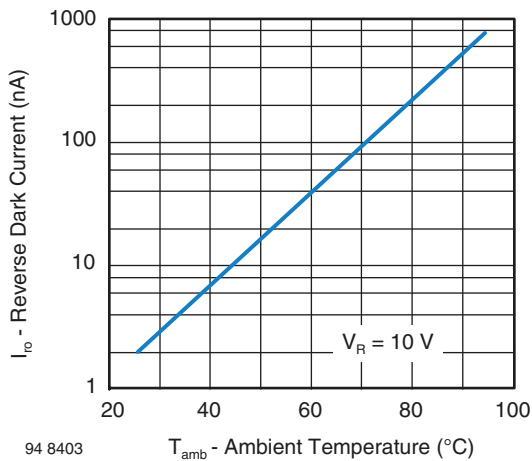
 Basic characteristics graphs to be extended to  $110\text{ }^{\circ}\text{C}$  ambient temperatures where applicable.


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

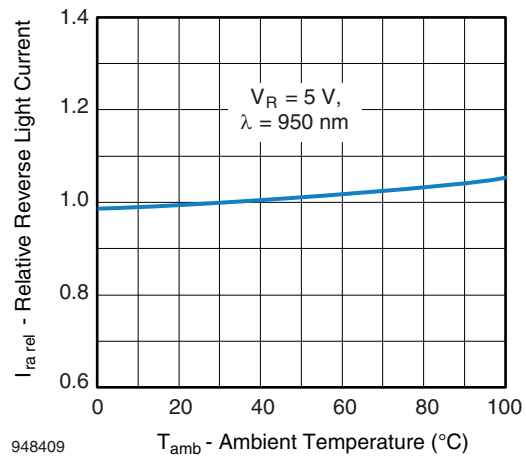
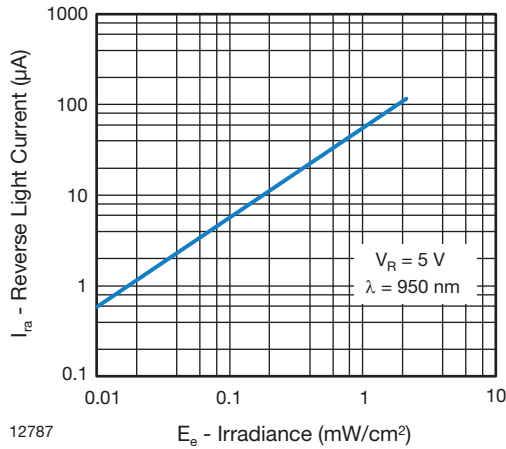


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature



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Fig. 3 - Reverse Light Current vs. Irradiance

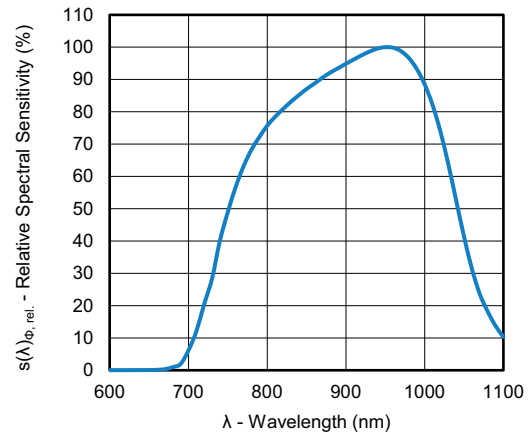
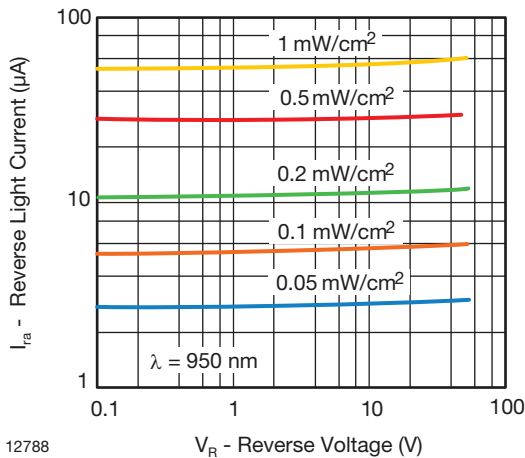


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength



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Fig. 4 - Reverse Light Current vs. Reverse Voltage

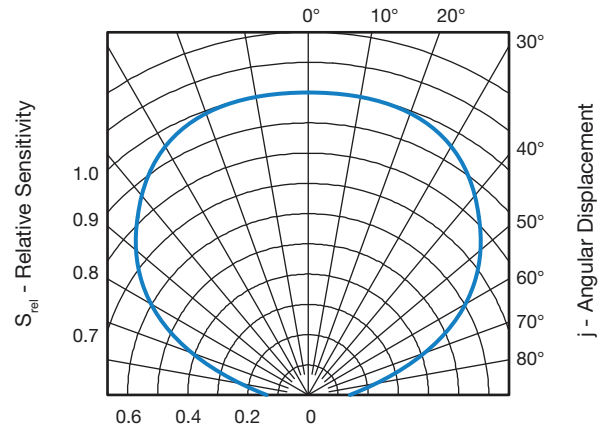
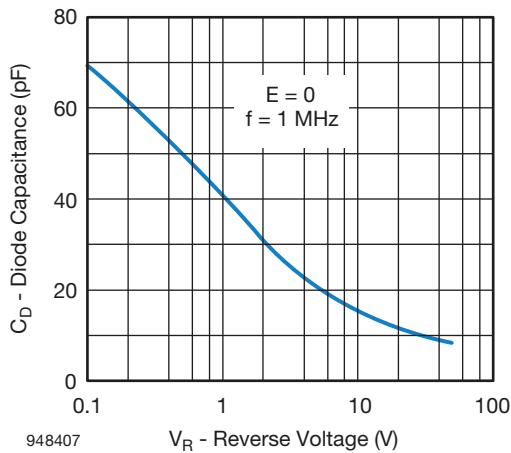
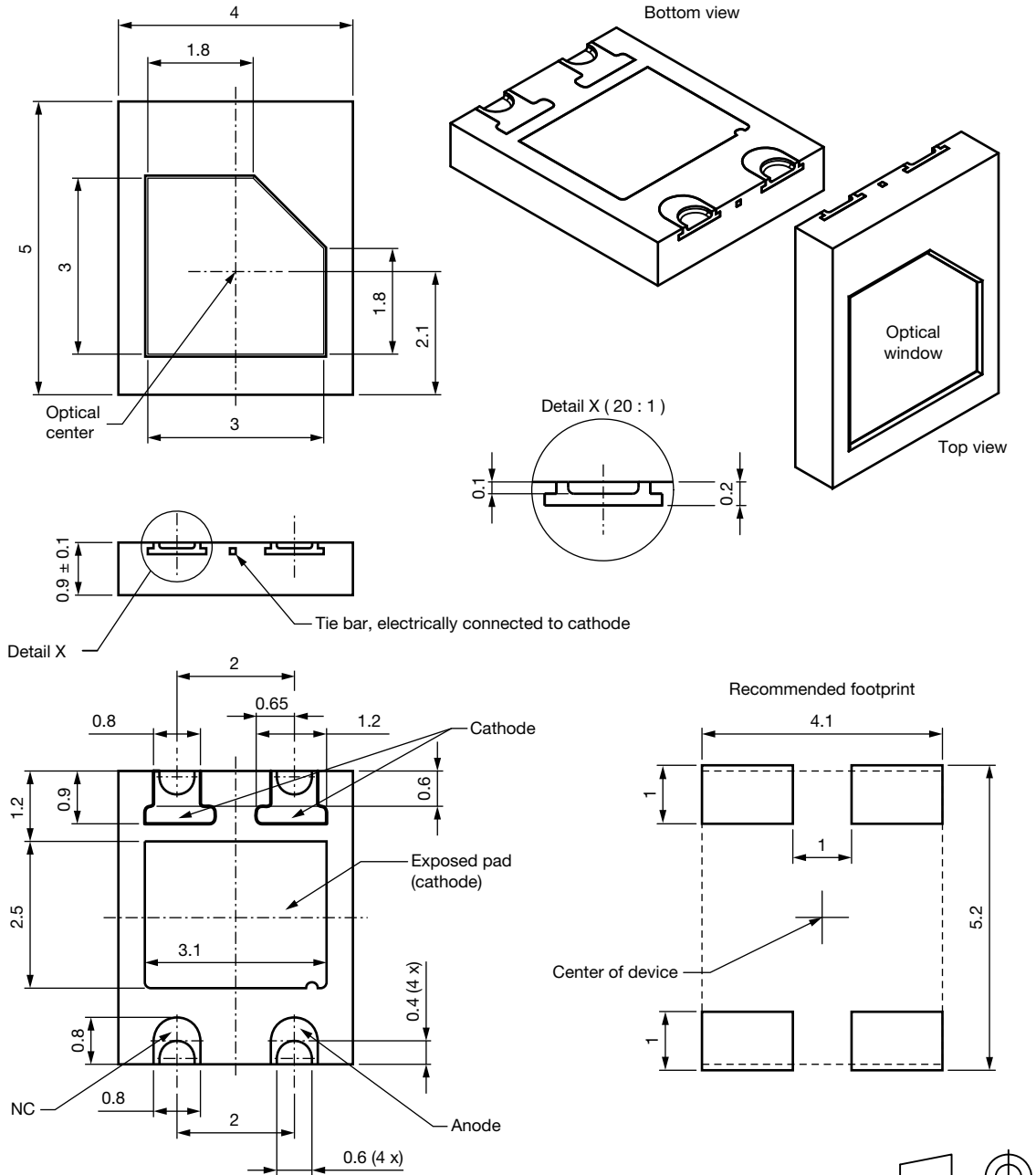


Fig. 7 - Relative Sensitivity vs. Angular Displacement



948407  
Fig. 5 - Diode Capacitance vs. Reverse Voltage

**PACKAGE DIMENSIONS** in millimeters

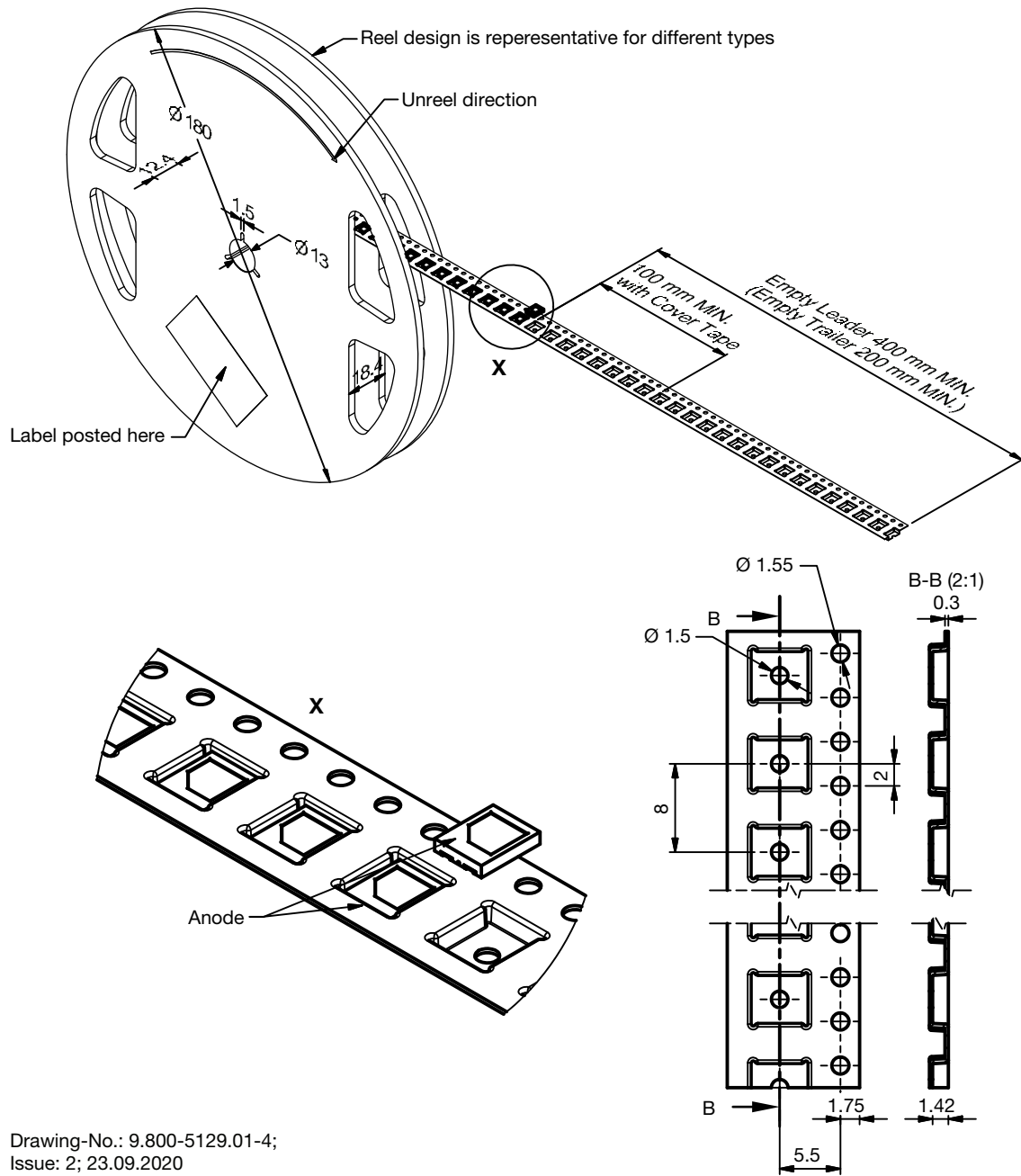


Drawing- No.: 6.550-5329.01-4  
Issue: 5; 23.09.2020

Not indicated tolerances  $\pm 0.1$

Technical drawings according to DIN specification

**TAPE AND REEL DIMENSIONS** in millimeters



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

**SOLDER PROFILE**



Fig. 8 - 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),  $RH < 5\%$

19841



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