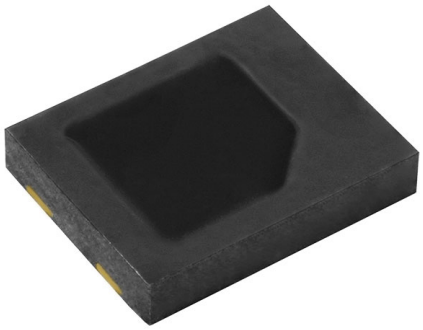
Silicon PIN Photodiode



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^2): 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: $\varphi = \pm 65°$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

e4

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Infographics

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^2 sensitive area and a daylight blocking filter matched with IR emitters operating at wavelength 870 nm or 950 nm.

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} (µA)**	**φ (°)**	**$\lambda_{0.5}$ (nm)**
VEMD5110X01	48	± 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 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage		V_R	20	V
Power dissipation	$T_{amb} \leq 25$ °C	P_V	215	mW
Junction temperature		T_j	110	°C
Operating temperature range		T_{amb}	-40 to +110	°C
Storage temperature range		T_{stg}	-40 to +110	°C
Soldering temperature	According to reflow sloder profile Fig. 8	T_{sd}	260	°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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Forward voltage	I_F = 50 mA	V_F	-	1	1.3	V
Breakdown voltage	I_R = 100 µA, E = 0	$V_{(BR)}$	20	-	-	V
Reverse dark current	V_R = 10 V, E = 0	I_{ro}	-	2	30	nA
Diode capacitance	V_R = 0 V, f = 1 MHz, E = 0	C_D	-	70	-	pF
	V_R = 3 V, f = 1 MHz, E = 0	C_D	-	25	40	pF
Open circuit voltage	E_e = 1 mW/cm², λ = 950 nm	V_o	-	350	-	mV
Temperature coefficient of V_o	E_e = 1 mW/cm², λ = 950 nm	TK_{Vo}	-	-2.6	-	mV/K
Short circuit current	E_e = 1 mW/cm², λ = 950 nm	I_k	-	45	-	µA
Temperature coefficient of I_k	E_e = 1 mW/cm², λ = 950 nm	TK_{Ik}	-	0.1	-	%/K
Reverse light current	E_e = 1 mW/cm², λ = 950 nm, V_R = 5 V	I_{ra}	40	48	-	µA
Angle of half sensitivity		φ	-	± 65	-	°
Wavelength of peak sensitivity		λ_p	-	940	-	nm
Range of spectral bandwidth		$\lambda_{0.5}$	-	790 to 1050	-	nm
Noise equivalent power	V_R = 10 V, λ = 950 nm	NEP	-	4×10^{-14}	-	W/√Hz
Rise time	V_R = 10 V, R_L = 1 kΩ, λ = 820 nm	t_r	-	100	-	ns
Fall time	V_R = 10 V, R_L = 1 kΩ, λ = 820 nm	t_f	-	100	-	ns

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

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

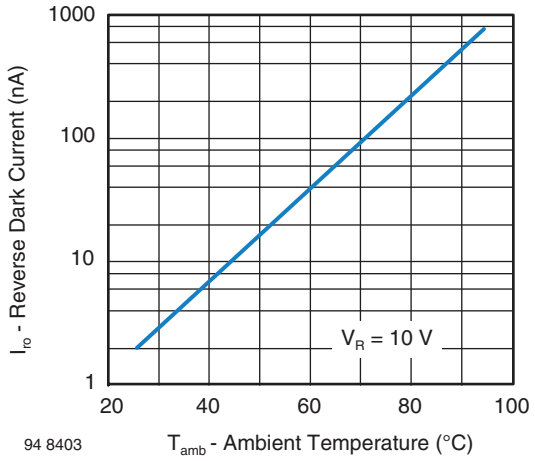


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

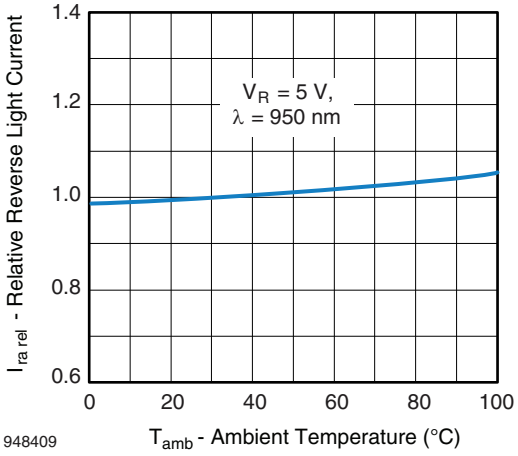


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

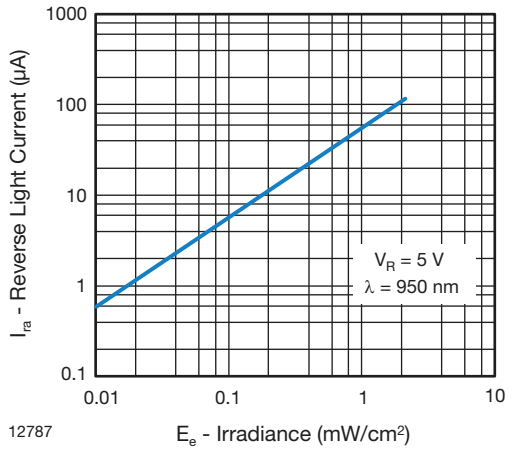


Fig. 3 - Reverse Light Current vs. Irradiance

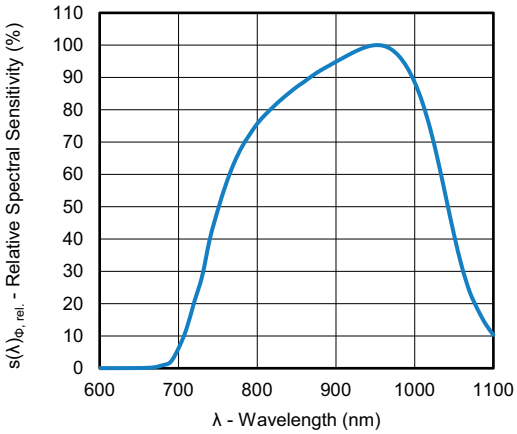


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

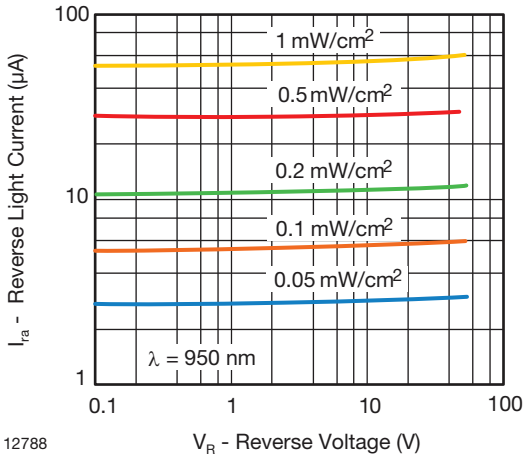


Fig. 4 - Reverse Light Current vs. Reverse Voltage

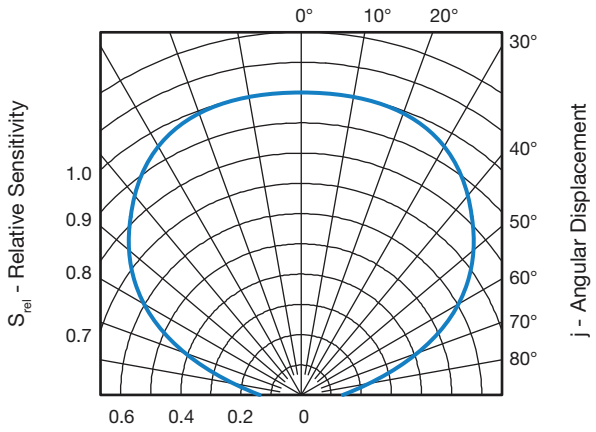


Fig. 7 - Relative Sensitivity vs. Angular Displacement

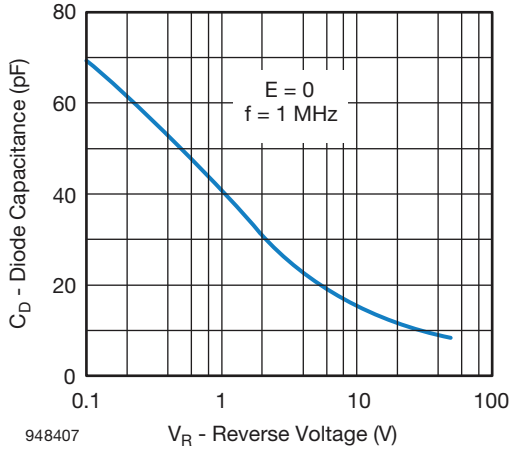
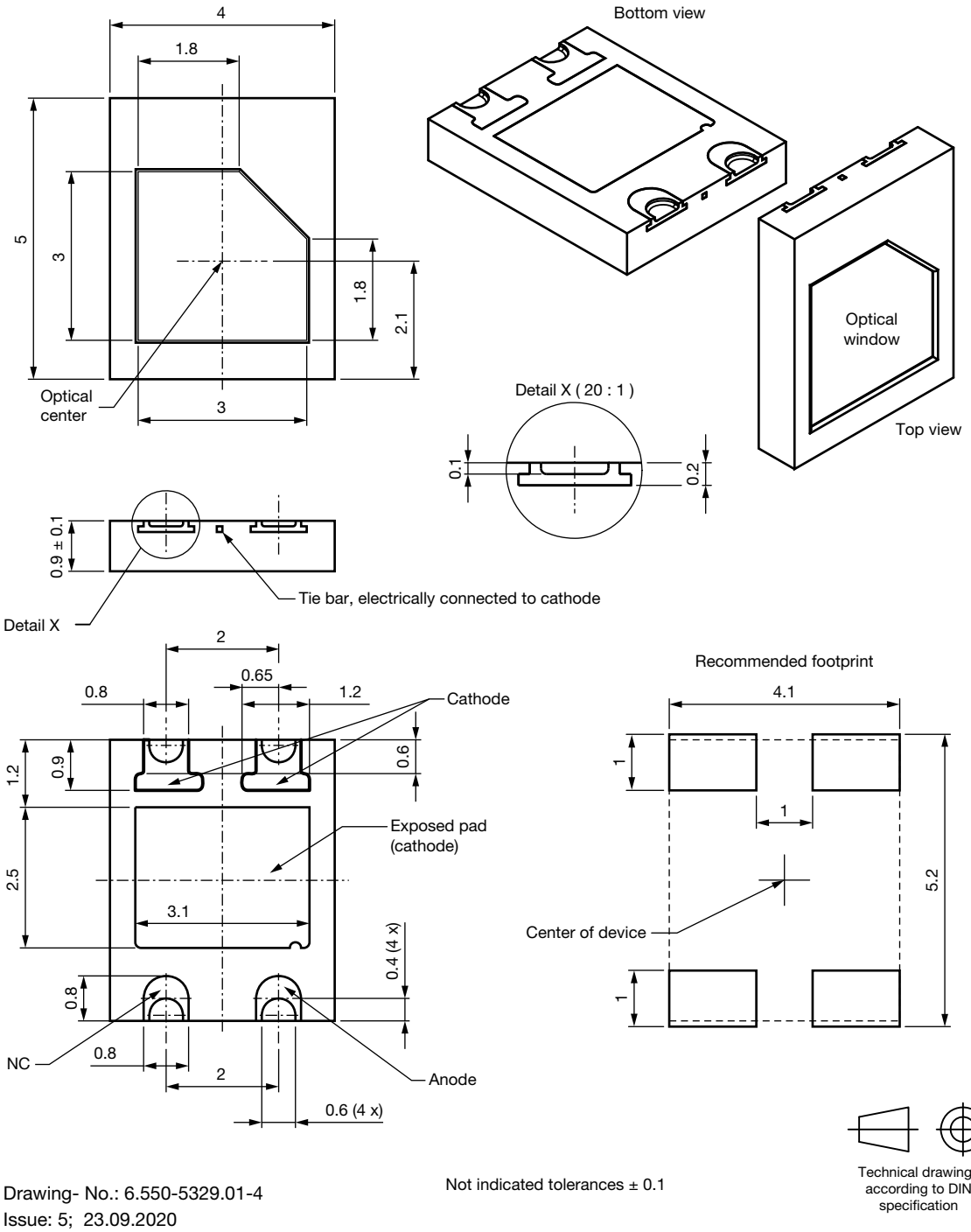


Fig. 5 - Diode Capacitance vs. Reverse Voltage

PACKAGE DIMENSIONS in millimeters

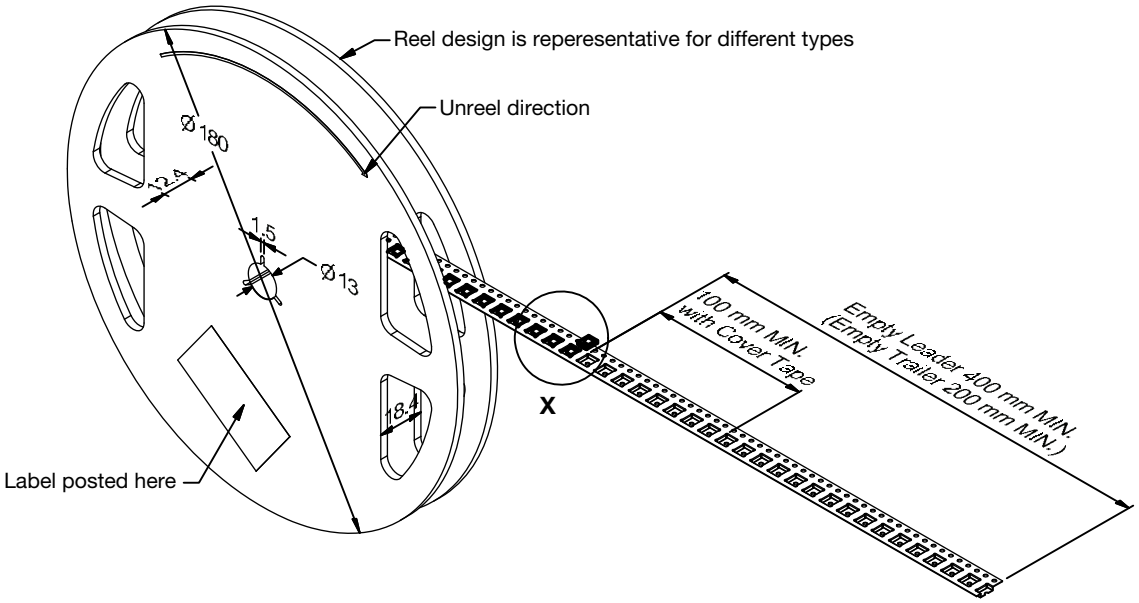


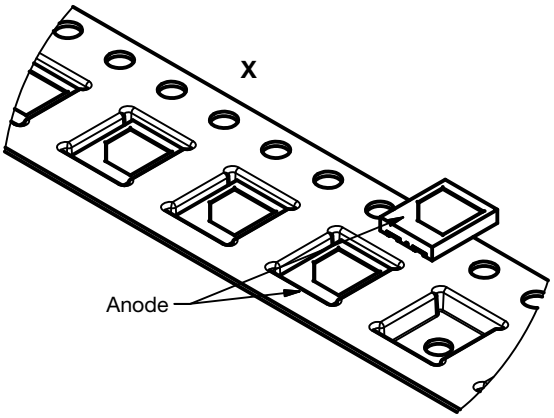
Drawing- No.: 6.550-5329.01-4
Issue: 5; 23.09.2020

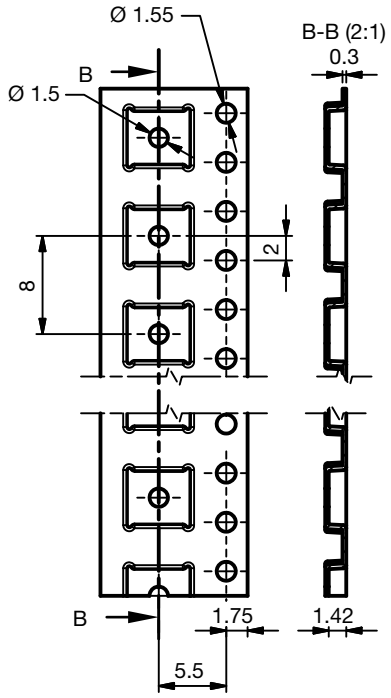
Not indicated tolerances ± 0.1

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

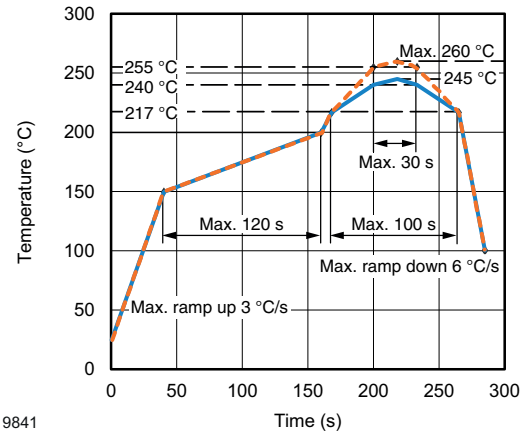


Fig. 8 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020D

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 °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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