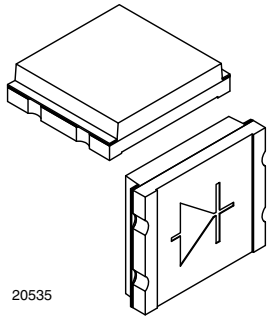




# Silicon PIN Photodiode, RoHS Compliant, Released for Lead (Pb)-free Reflow Soldering, AEC-Q101 Released



20535

## DESCRIPTION

TEM5020X01 is a high speed and high sensitive PIN photodiode. It is a miniature surface mount device (SMD) including the chip with a 4.4 mm<sup>2</sup> sensitive area detecting visible and near infrared radiation.

## FEATURES

- Package type: surface mount
- Package form: top view
- Dimensions (L x W x H in mm): 5 x 4.24 x 1.12
- Radiant sensitive area (in mm<sup>2</sup>): 4.4
- AEC-Q101 qualified
- High photo sensitivity
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 65^\circ$
- Floor life: 72 h, MSL 4, acc. J-STD-020
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



## Note

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

## APPLICATIONS

- High speed photo detectors

PRODUCT SUMMARY			
COMPONENT	I <sub>ra</sub> (μA)	φ (deg)	λ0.1 (nm)
TEM5020X01	35	± 65	430 to 1100

## Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
TEM5020X01	Tape and reel	MOQ: 1500 pcs, 1500 pcs/reel	Top view

## Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V <sub>R</sub>	60	V
Power dissipation	T <sub>amb</sub> ≤ 25 °C	P <sub>V</sub>	215	mW
Junction temperature		T <sub>j</sub>	100	°C
Operating temperature range		T <sub>amb</sub>	- 40 to + 100	°C
Storage temperature range		T <sub>stg</sub>	- 40 to + 110	°C
Soldering temperature	Acc. reflow solder profile fig. 8	T <sub>sd</sub>	260	°C
Thermal resistance junction/ambient	Soldered on PCB with pad dimensions: 4 mm x 4 mm	R <sub>thJA</sub>	350	K/W

<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	$I_R = 100\text{ }\mu\text{A}$ , $E = 0$	$V_{(BR)}$	60			V
Reverse dark current	$V_R = 10\text{ V}$ , $E = 0$	$I_{ro}$		2	30	nA
Diode capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_D$		48		pF
	$V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_D$		17	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	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$I_k$		32		$\mu\text{A}$
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	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_R = 5\text{ V}$	$I_{ra}$	25	35		$\mu\text{A}$
Angle of half sensitivity		$\phi$		$\pm 65$		deg
Wavelength of peak sensitivity		$\lambda_p$		900		nm
Range of spectral bandwidth		$\lambda_{0.1}$		430 to 1100		nm
Noise equivalent power	$V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$	NEP		$4 \times 10^{-14}$		$\text{W}/\sqrt{\text{Hz}}$
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

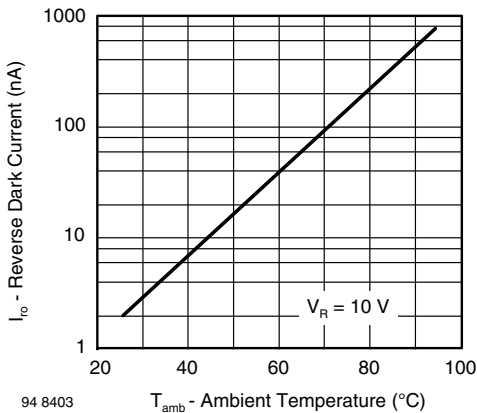
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

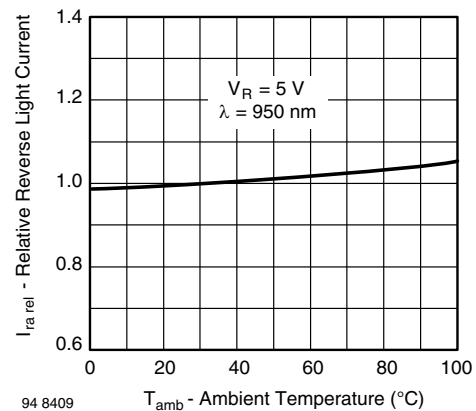
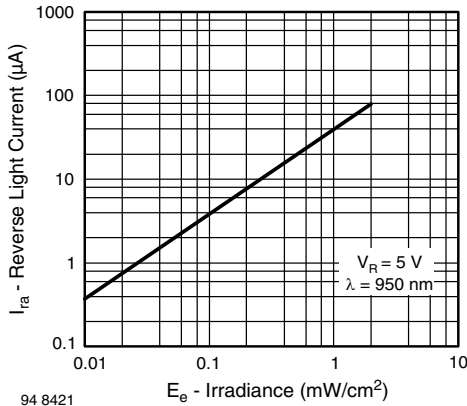
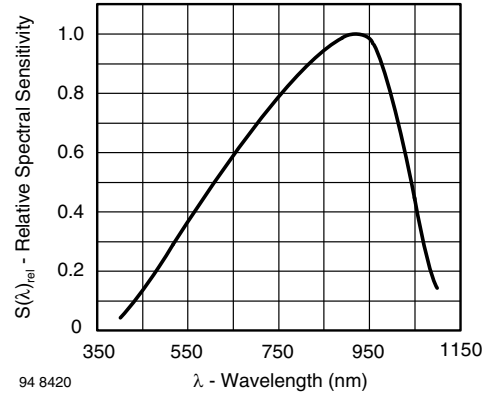


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature



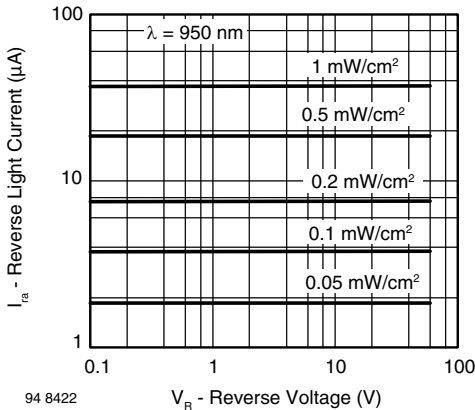
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Fig. 3 - Reverse Light Current vs. Irradiance



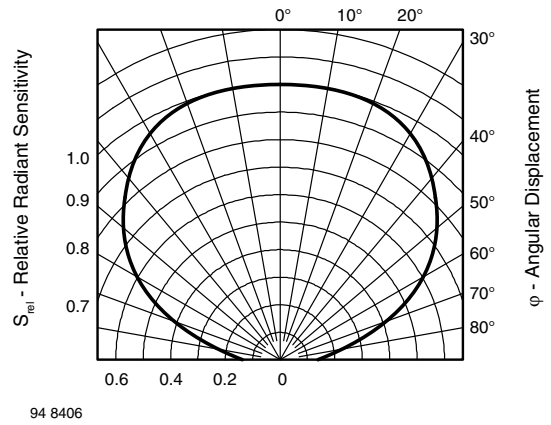
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Fig. 6 - Relative Spectral Sensitivity vs. Wavelength



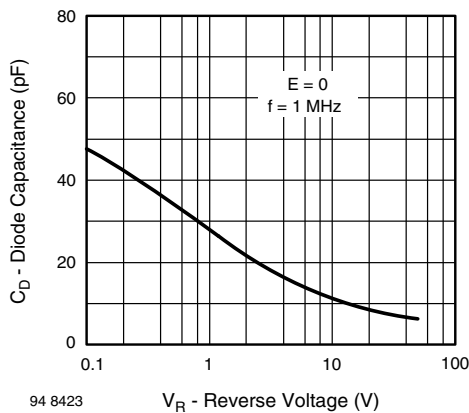
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Fig. 4 - Reverse Light Current vs. Reverse Voltage



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Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

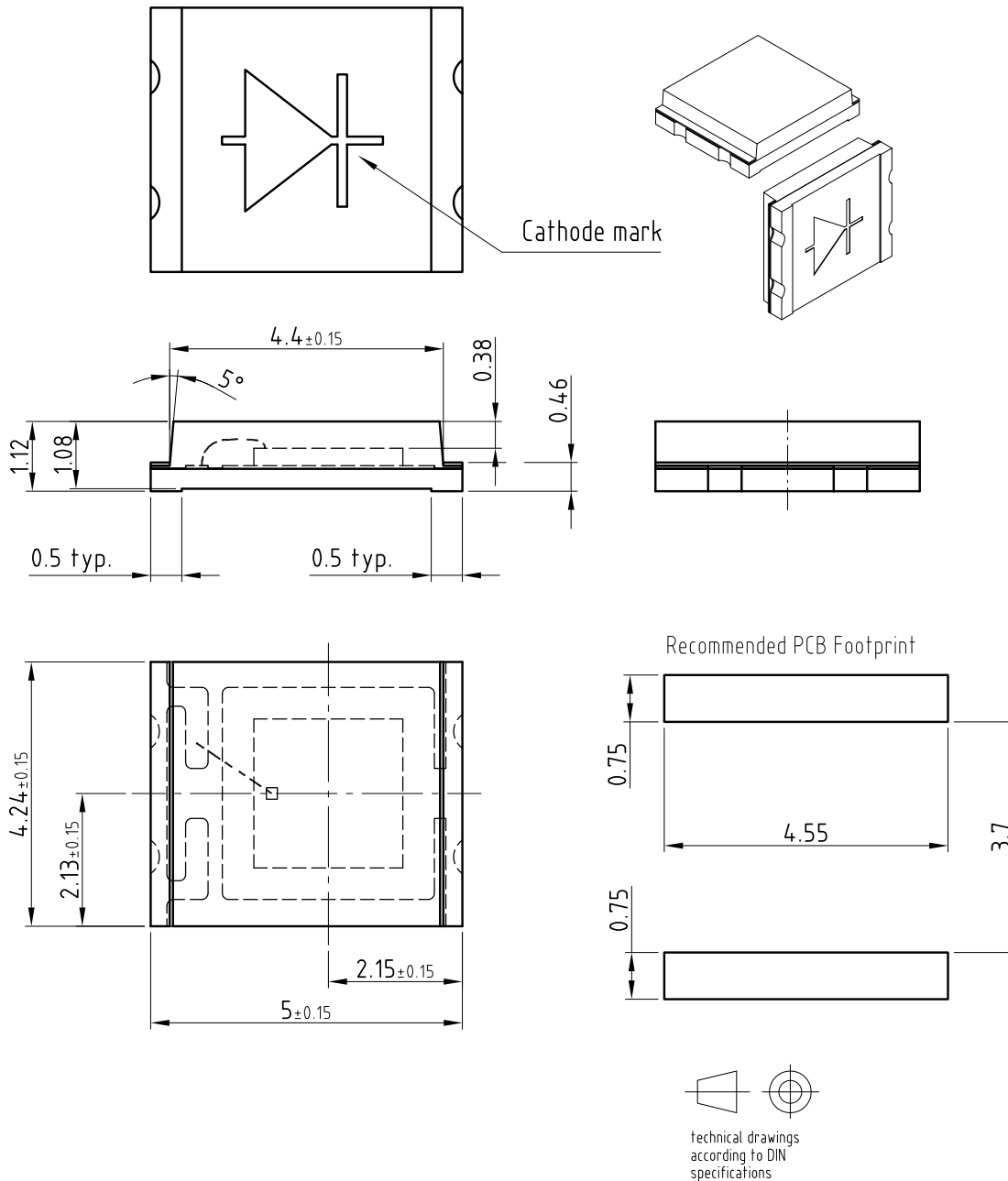


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Fig. 5 - Diode Capacitance vs. Reverse Voltage



### PACKAGE DIMENSIONS in millimeters



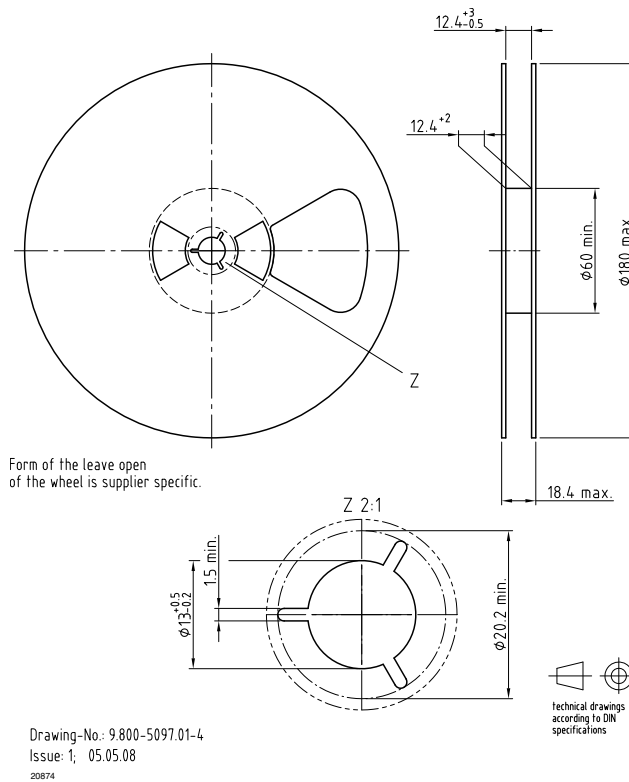
Drawing-No.: 6.541-5059.01-4  
 Issue: 4; 26.04.07  
 19280

Not indicated tolerances  $\pm 0.1$

**TAPING DIMENSIONS** in millimeters



**REEL DIMENSIONS** in millimeters





**SOLDER PROFILE**

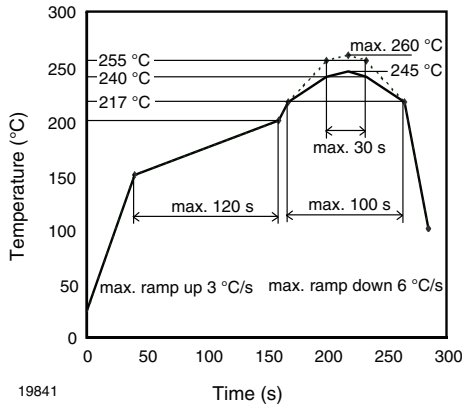


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020D

**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:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ , 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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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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