

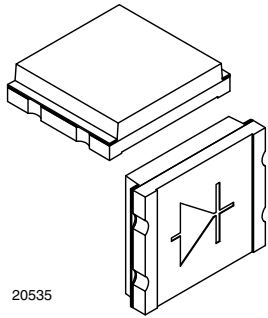


**THE DATASHEET OF  
TEMD5020X01**





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



### 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



### 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.

### 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   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ ,<br>$V_R = 5\text{ V}$  | $I_{ra}$        | 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   | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ ,<br>$\lambda = 820\text{ nm}$ | $t_r$           |      | 100                 |      | ns                          |
| Fall time   | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ ,<br>$\lambda = 820\text{ nm}$ | $t_f$           |      | 100                 |      | ns                          |

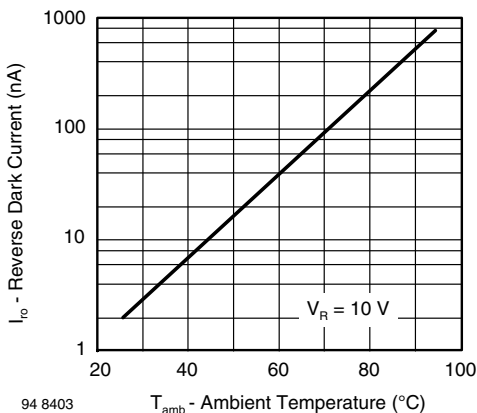
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

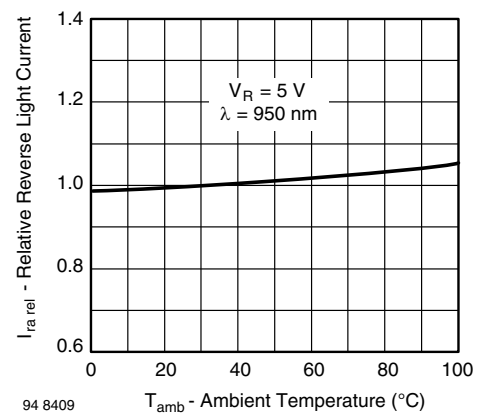
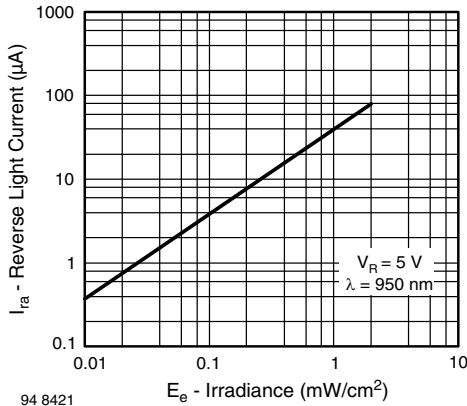
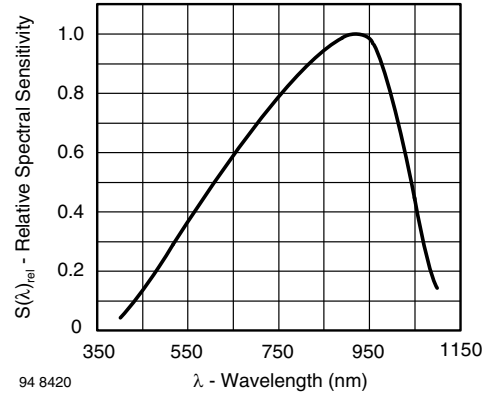


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature



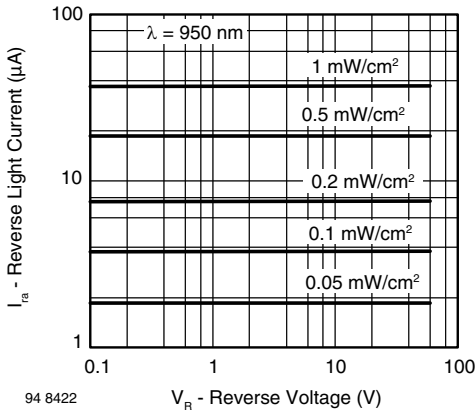
94 8421

Fig. 3 - Reverse Light Current vs. Irradiance



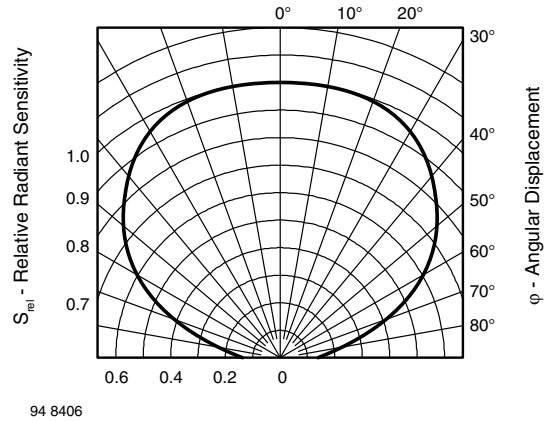
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Fig. 6 - Relative Spectral Sensitivity vs. Wavelength



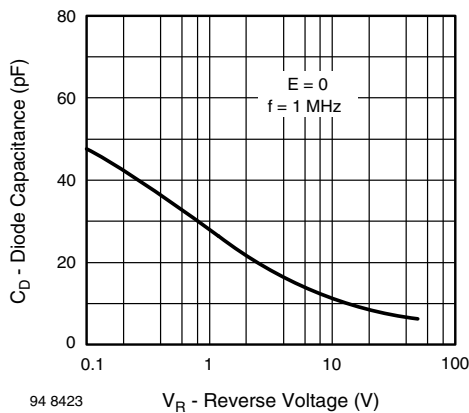
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Fig. 4 - Reverse Light Current vs. Reverse Voltage



94 8406

Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

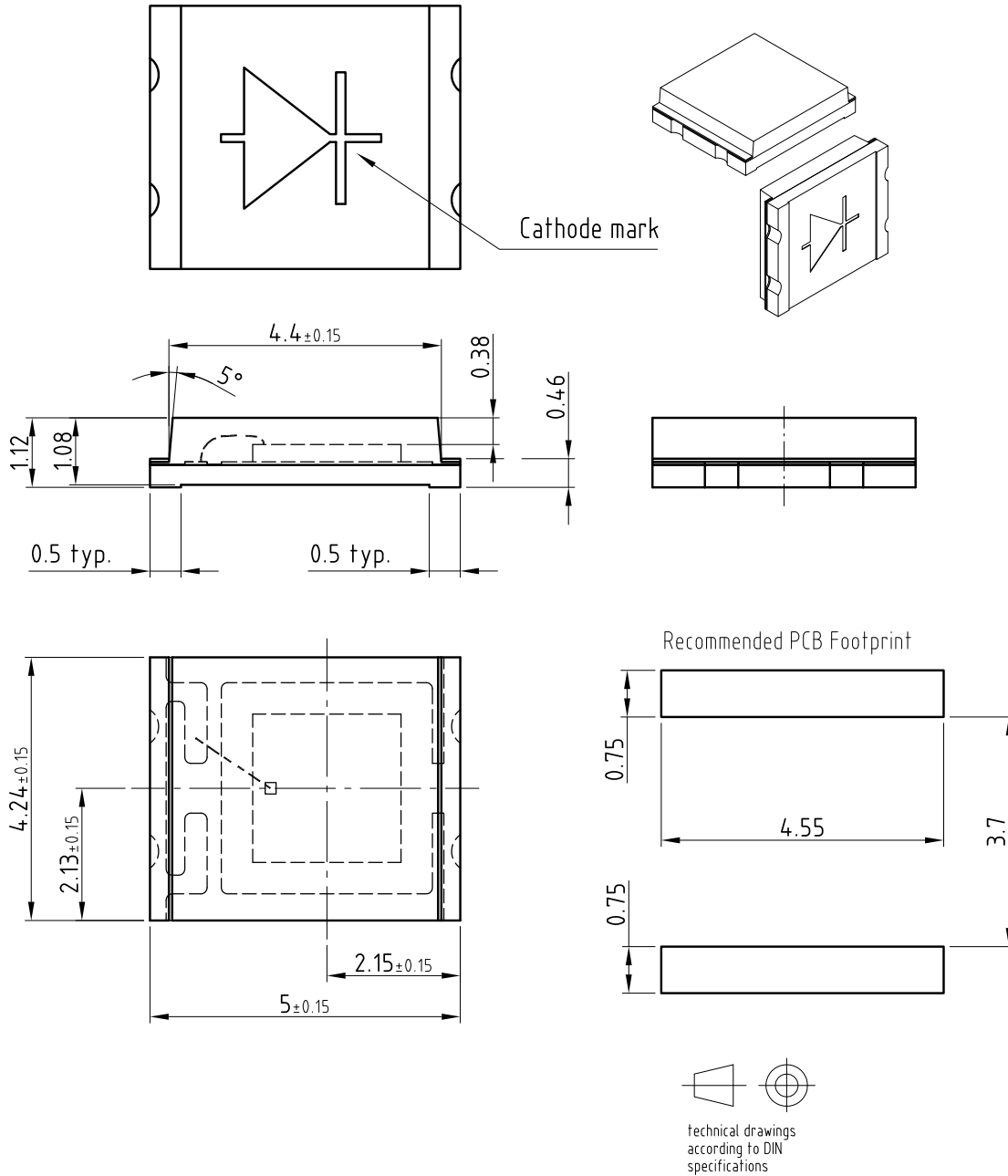


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Fig. 5 - Diode Capacitance vs. Reverse Voltage



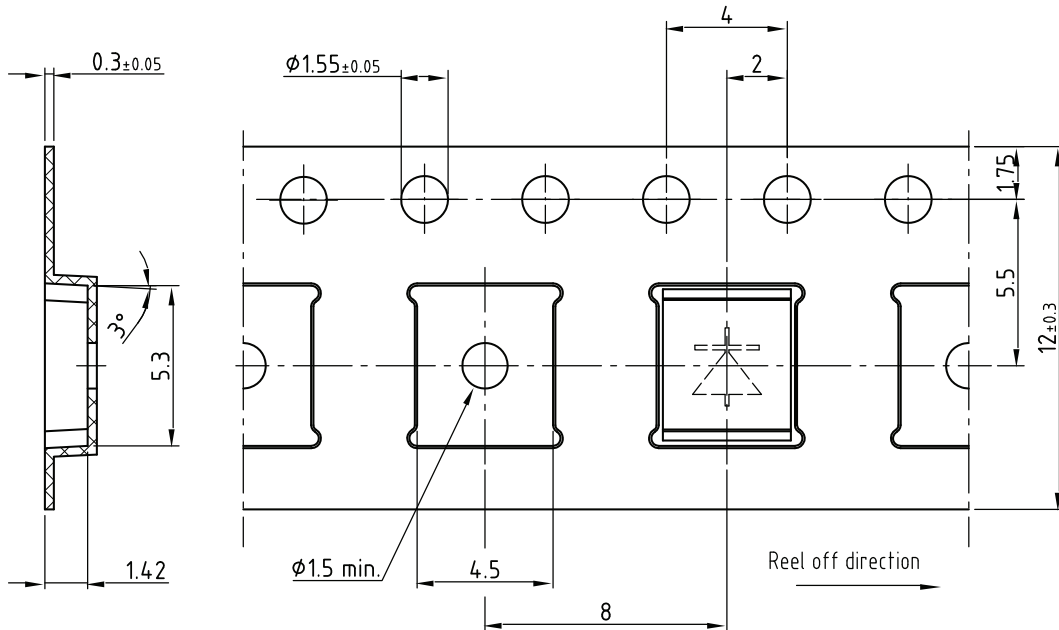
PACKAGE DIMENSIONS in millimeters



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

Not indicated tolerances ± 0.1

**TAPING DIMENSIONS** in millimeters

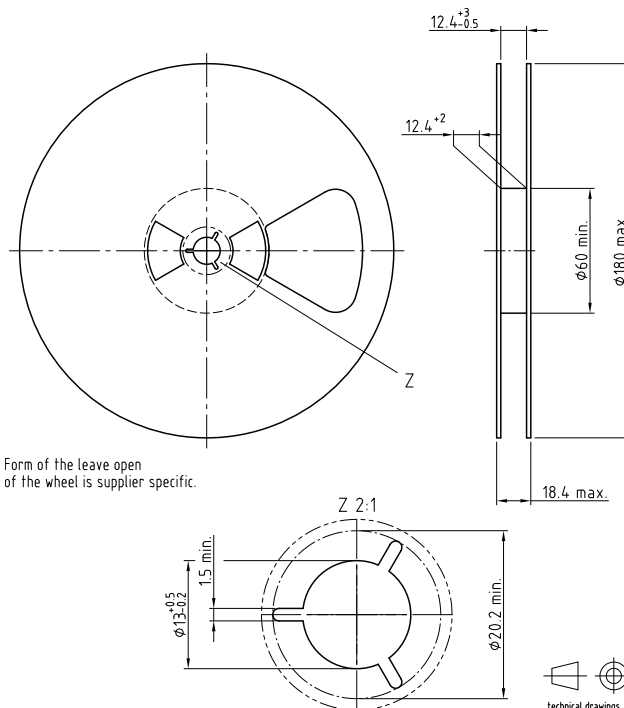


Drawing-No.: 9.700-5293.01-4  
 Issue: 1; 03.12.04  
 20537

Not indicated tolerances ±0.1

technical drawings according to DIN specifications

**REEL DIMENSIONS** in millimeters



Form of the leave open of the wheel is supplier specific.

Drawing-No.: 9.800-5097.01-4  
 Issue: 1; 05.05.08  
 20874

technical drawings according to DIN specifications

**SOLDER PROFILE**

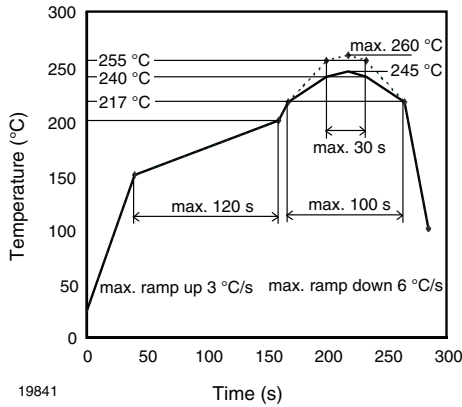


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020D

**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:  $T_{amb} < 30\text{ °C}$ , 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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