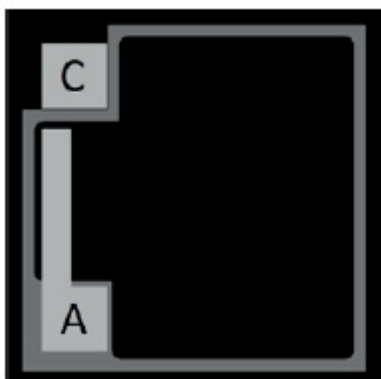


## Silicon PIN Photodiode



### FEATURES

- Package type: chip
- Package form: single chip
- Dimensions (L x W x H in mm): 0.72 x 0.72 x 0.2
- Radiant sensitive area (in mm<sup>2</sup>): 0.34
- Peak sensitivity wavelength: 570 nm
- High photo sensitivity
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 60^\circ$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### DESCRIPTION

T1678P ambient light chip is an epitaxial photodiode with ambient light spectral characteristic. Anode and cathode contact are bond pads on top of the chip.

### GENERAL INFORMATION

The datasheet is based on Vishay optoelectronics sample testing under certain predetermined and assumed conditions, and is provided for illustration purpose only. Customers are encouraged to perform testing in actual proposed packaged and used conditions. Vishay optoelectronics die products are tested using Vishay optoelectronics based quality assurance procedures and are manufactured using Vishay optoelectronics established processes. Estimates such as those described and set forth in this datasheet for semiconductor die will vary depending on a number of packaging, handling, use, and other factors. Therefore sold die may not perform on an equivalent basis to standard package products.

### PRODUCT SUMMARY

| COMPONENT | $I_{ra}$ (nA) | $\phi$ (deg) | $\lambda_{0.5}$ (nm) |
|-----------|---------------|--------------|----------------------|
| T1678P    | 15            | $\pm 60$     | 440 to 700           |

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING                           | REMARKS         | PACKAGE FORM |
|---------------|-------------------------------------|-----------------|--------------|
| T1678P-SD-F   | Wafer sawn on foil with disco frame | MOQ: 58 000 pcs | Chip         |

#### 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                   |                | $V_R$      | 16          | V                |
| Junction temperature              |                | $T_j$      | 100         | $^\circ\text{C}$ |
| Operating temperature range       |                | $T_{amb}$  | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range         |                | $T_{stg1}$ | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range on foil |                | $T_{stg2}$ | -40 to +50  | $^\circ\text{C}$ |

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                                            |                 |      |            |      |      |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------|------|------------|------|------|
| PARAMETER                                                                                           | TEST CONDITION                                                                             | SYMBOL          | MIN. | TYP.       | MAX. | UNIT |
| Breakdown voltage                                                                                   | $I_R = 100\text{ }\mu\text{A}$ , $E = 0$                                                   | $V_{(BR)}$      | 16   |            |      | V    |
| Reverse dark current                                                                                | $V_R = 10\text{ V}$ , $E = 0$                                                              | $I_{ro}$        |      | 0.1        | 2    | nA   |
| Diode capacitance                                                                                   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                                          | $C_D$           |      | 72         |      | pF   |
|                                                                                                     | $V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                                          | $C_D$           |      | 35         |      | pF   |
| Reverse light current                                                                               | $E_e = 10\text{ }\mu\text{W}/\text{cm}^2$ , $\lambda = 530\text{ nm}$ , $V_R = 5\text{ V}$ | $I_{ra}$        |      | 15         |      | nA   |
|                                                                                                     | $E_v = 100\text{ lux}$ , white LED 4300 K, $V_R = 5\text{ V}$                              | $I_{ra}$        |      | 43         |      | nA   |
|                                                                                                     | $E_v = 100\text{ lux}$ , CIE illumination A, $V_R = 5\text{ V}$                            | $I_{ra}$        |      | 87         |      | nA   |
| Angle of half sensitivity                                                                           |                                                                                            | $\phi$          |      | $\pm 60$   |      | deg  |
| Wavelength of peak sensitivity                                                                      |                                                                                            | $\lambda_p$     |      | 570        |      | nm   |
| Range of spectral bandwidth                                                                         |                                                                                            | $\lambda_{0.5}$ |      | 440 to 700 |      | nm   |
| Rise time                                                                                           | $V_R = 5\text{ V}$ , $R_L = 50\text{ k}\Omega$ , $\lambda = 515\text{ nm}$                 | $t_r$           |      | 100        |      | ns   |
| Fall time                                                                                           |                                                                                            | $t_f$           |      | 100        |      | ns   |
| Rise time                                                                                           | $V_R = 5\text{ V}$ , $R_L = 1000\text{ k}\Omega$ , $\lambda = 515\text{ nm}$               | $t_r$           |      | 415        |      | ns   |
| Fall time                                                                                           |                                                                                            | $t_f$           |      | 415        |      | ns   |

**Note**

- The measurements are based on samples of die which are mounted on a TO18-header without resin coating

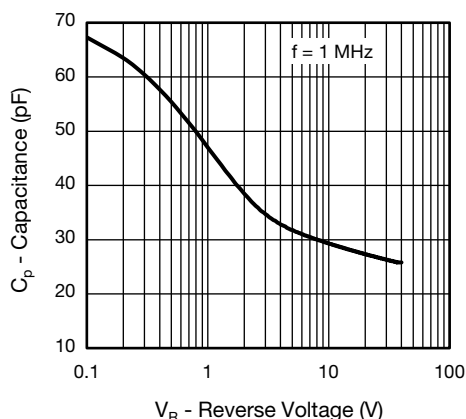
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Diode Capacitance vs. Reverse Voltage

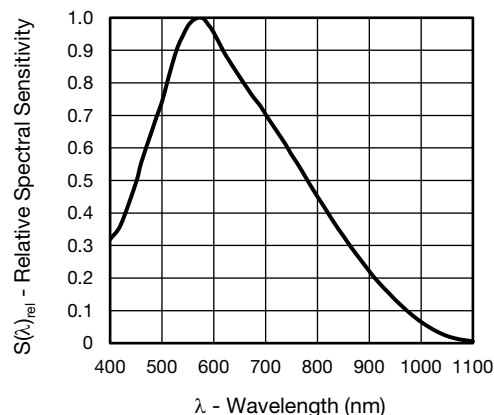


Fig. 3 - Relative Spectral Sensitivity vs. Wavelength of Epoxy Coated Die

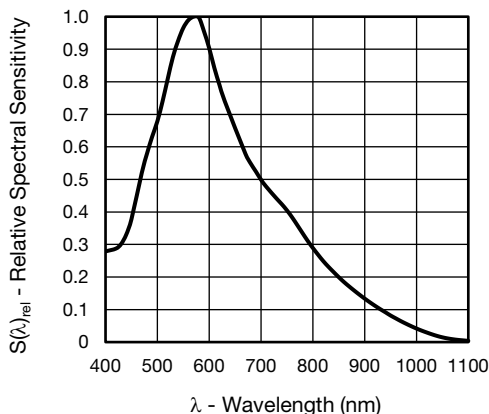
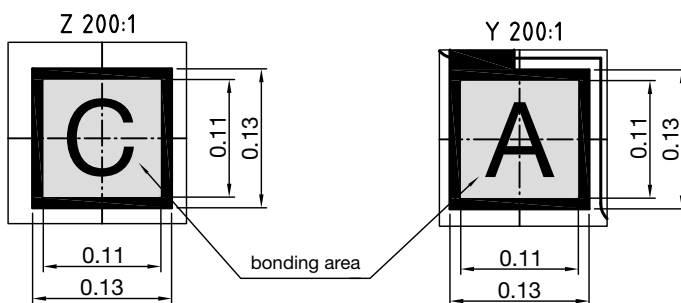
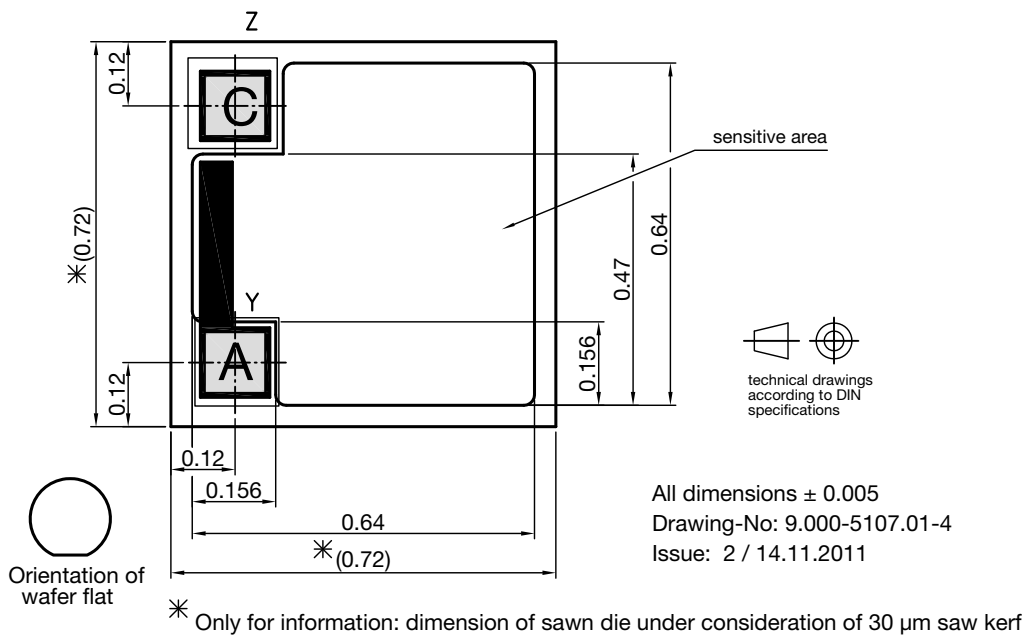


Fig. 2 - Relative Spectral Sensitivity vs. Wavelength of Bare Die

**DIMENSIONS** in millimeters


A: Anode  
C: Cathode

Opt. sensitive area: 0.34  $\text{mm}^2$   
Thickness: 200  $\mu\text{m} \pm 15 \mu\text{m}$

Bonding area: A: 110  $\mu\text{m} \times 110 \mu\text{m}$   
C: 110  $\mu\text{m} \times 110 \mu\text{m}$

Bonding restricted to this area in order to avoid damage of adjacent structures

| MECHANICAL DIMENSIONS             |        |       |             |       |               |
|-----------------------------------|--------|-------|-------------|-------|---------------|
| PARAMETER                         | SYMBOL | MIN.  | TYP.        | MAX.  | UNIT          |
| Length of chip edge (x-direction) | $L_x$  |       | 0.72        |       | mm            |
| Length of chip edge (y-direction) | $L_y$  |       | 0.72        |       | mm            |
| Sensitive area                    | $A_s$  |       | 0.34        |       | $\text{mm}^2$ |
| Wafer diameter                    | D      |       | 100         |       | mm            |
| Die height                        | H      | 0.185 | 0.2         | 0.215 | mm            |
| Bond pad anode                    |        |       | 0.11 x 0.11 |       | $\text{mm}^2$ |
| Bond pad cathode                  |        |       | 0.11 x 0.11 |       | $\text{mm}^2$ |



| ADDITIONAL INFORMATION                  |                       |
|-----------------------------------------|-----------------------|
| Frontside metallization, anode, cathode | AlSi                  |
| Backside                                | Electrically isolated |
| Dicing                                  | Sawing                |
| Die bonding technology                  | Epoxy bonding         |

**Note**

- All chips are checked in accordance with the Vishay Semiconductor, specification of visual inspection FVOV6870. The visual inspection shall be made in accordance with the "specification of visual inspection as referenced". The visual inspection of chip backside is performed with stereo microscope with incident light and 40x to 80x magnification. The quality inspection (final visual inspection) is performed by production. An additional visual inspection step as special release procedure by QM is not installed.

**HANDLING AND STORAGE CONDITIONS**

- The hermetically sealed shipment lots shall be opened in temperature and moisture controlled cleanroom environment only. It is mandatory to follow the rules for disposition of material that can be hazardous for humans and environment.
- Product must be handled only at ESD safe workstations. Standard ESD precautions and safe work environments are as defined in MIL-HDBK-263.
- Singulated die are not to be handled with tweezers. A vacuum wand with non metallic ESD protected tip should be used.

**PACKING**

Chips are fixed on adhesive foil. Upon request the foils can be mounted on plastic frame or disco frame. For shipment, the wafers are arranged to stacks and hermetically sealed in plastic bags to ensure protection against environmental influence (humidity and contamination).

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