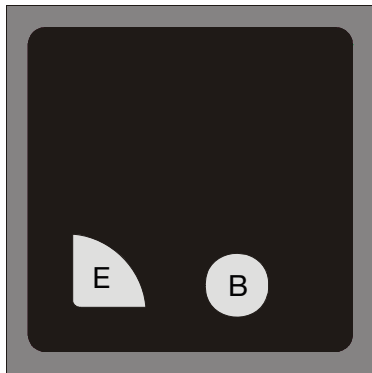


Silicon NPN Phototransistor



21682

FEATURES

- Package type: chip
- Package form: single chip
- Dimensions (L x W x H in mm): 0.72 x 0.72 x 0.22
- Wafer diameter (in mm): 100
- Radiant sensitive area (in mm²): 0.25
- High photo sensitivity
- Suitable for visible light
- Fast response times
- Angle of half sensitivity: $\phi = \pm 60^\circ$
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

T1070P ambient light sensor chip is a silicon NPN epitaxial planar phototransistor. It is sensitive to visible light much like the human eye and has peak sensitivity at 570 nm.

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.

APPLICATIONS

- Ambient light sensor
- Backlight dimmer

PRODUCT SUMMARY

| COMPONENT | I_{PCE} (μA) | ϕ (deg) | $\lambda_{0.5}$ (nm) |
|-----------|-----------------------|--------------|----------------------|
| T1070P | 50 | ± 60 | 440 to 800 |

Note

- Test condition see table "Basic Characteristics"

ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|---------------|-------------------------------------|-----------------|--------------|
| T1070P-SD-F | wafer sawn on foil with disco frame | MOQ: 55 000 pcs | chip |

Note

- MOQ: minimum order quantity

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

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-----------------------------------|----------------|------------|-------------|------------|
| Collector emitter voltage | | V_{CEO} | 6 | V |
| Emitter collector voltage | | V_{ECO} | 1.5 | V |
| Collector current | | I_C | 20 | mA |
| Junction temperature | | T_j | 100 | $^\circ C$ |
| Operating temperature range | | T_{amb} | -40 to +100 | $^\circ C$ |
| Storage temperature range | | T_{stg1} | -40 to +100 | $^\circ C$ |
| Storage temperature range on foil | | T_{stg2} | -40 to +50 | $^\circ C$ |

| BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|---|---|-----------------|------|------------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Collector emitter breakdown voltage | $I_C = 0.1\text{ mA}$ | $V_{(BR)CEO}$ | 6 | | | V |
| Collector dark current | $V_{CE} = 5\text{ V}, E = 0$ | I_{CEO} | | 3 | 50 | nA |
| Collector emitter capacitance | $V_{CE} = 5\text{ V}, f = 1\text{ MHz}, E = 0$ | C_{CEO} | | 16 | | pF |
| Collector light current | $E_V = 20\text{ lx}, \text{CIE illuminant A}, V_{CE} = 5\text{ V}$ | I_{PCE} | | 10 | | μA |
| | $E_V = 100\text{ lx}, \text{CIE illuminant A}, V_{CE} = 5\text{ V}$ | I_{PCE} | | 50 | | μA |
| Temperature coefficient of I_{PCE} | CIE illuminant A | $TK_{I_{PCE}}$ | | 1.18 | | %/K |
| | LED, white | $TK_{I_{PCE}}$ | | 0.9 | | %/K |
| Angle of half sensitivity | | φ | | ± 60 | | deg |
| Wavelength of peak sensitivity | | λ_p | | 570 | | nm |
| Range of spectral bandwidth | | $\lambda_{0.5}$ | | 440 to 800 | | nm |
| Collector emitter saturation voltage | $E_V = 20\text{ lx}, \text{CIE illuminant A}, I_{PCE} = 1.2\text{ }\mu\text{A}$ | V_{CEsat} | | 0.1 | | V |

Note

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

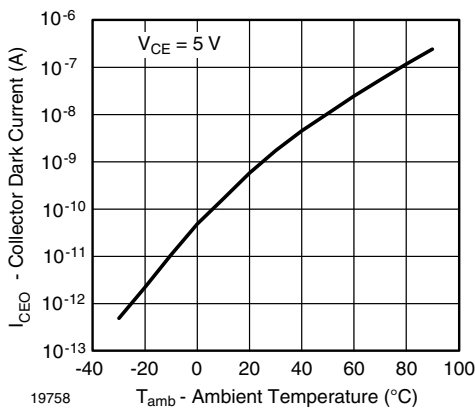
BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Collector Dark Current vs. Ambient Temperature

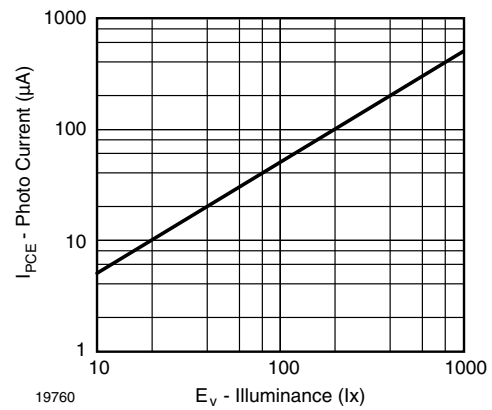


Fig. 3 - Photo Current vs. Illuminance

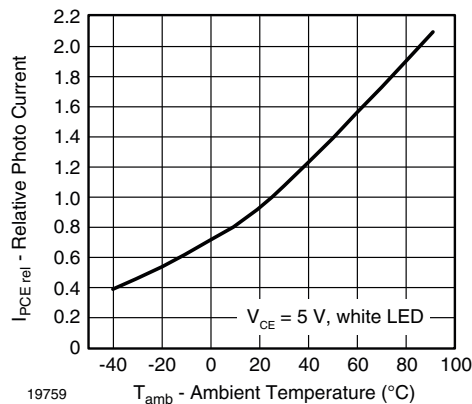


Fig. 2 - Relative Photo Current vs. Ambient Temperature

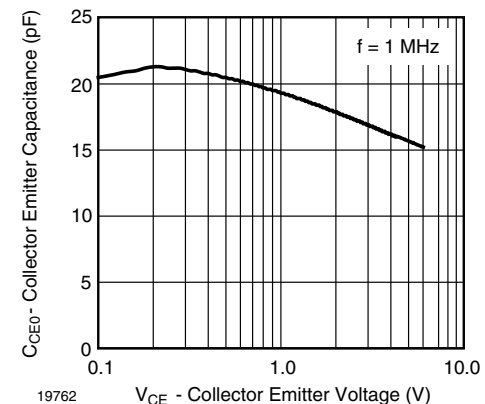


Fig. 4 - Collector Emitter Capacitance vs. Collector Emitter Voltage

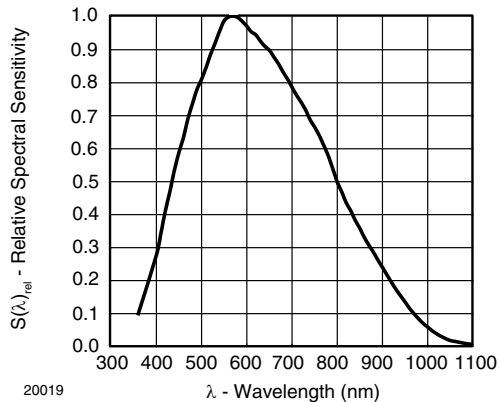


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

| 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 | 0.5 x 0.5 | | | mm ² |
| Die height | H | | 0.22 | | mm |
| Bond pad emitter (E) | a x b | | 0.1 x 0.1 | | mm ² |

| ADDITIONAL INFORMATION | |
|--|---------------|
| Frontside metallization, base (B), emitter (E) | aluminum |
| Backside metallization, collector | gold alloy |
| 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).

Use for recycling reliable operators only. We can help getting in touch with your nearest sales office. By agreement we will take back packing material, if it is sorted. You will have to bear the costs of transport. We will invoice you for any costs incurred for packing material that is returned unsorted or which we are not obliged to accept.



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