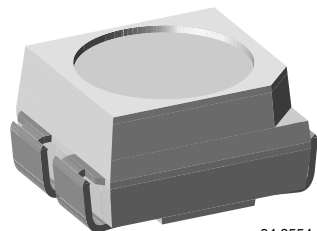




## Silicon NPN Phototransistor



94 8554

### DESCRIPTION

VEMT4700 is a high speed silicon NPN epitaxial planar phototransistor in a miniature PLCC-3 package for surface mounting on printed boards. The device is sensitive to visible and near infrared radiation.

### FEATURES

- Package type: surface mount
- Package form: PLCC-3
- Dimensions (L x W x H in mm): 3.5 x 2.8 x 1.75
- High photo sensitivity
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 60^\circ$
- Base terminal connected
- Package notch indicates collector
- Package matched with IR emitter series VSML3710
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Photo interrupters
- Miniature switches
- Counters
- Encoders
- Position sensors
- Light sensors

### PRODUCT SUMMARY

| COMPONENT | $I_{ca}$ (mA) | $\phi$ (deg) | $\lambda_{0.1}$ (nm) |
|-----------|---------------|--------------|----------------------|
| VEMT4700  | 0.5           | $\pm 60$     | 450 to 1080          |

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM |
|---------------|---------------|------------------------------|--------------|
| VEMT4700-GS08 | Tape and reel | MOQ: 7500 pcs, 1500 pcs/reel | PLCC-3       |
| VEMT4700-GS18 | Tape and reel | MOQ: 8000 pcs, 8000 pcs/reel | PLCC-3       |

#### Note

- MOQ: minimum order quantity

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

| PARAMETER                           | TEST CONDITION                                      | SYMBOL     | VALUE         | UNIT               |
|-------------------------------------|---|------------|---------------|--------------------|
| Collector emitter voltage           |   | $V_{CEO}$  | 70            | V                  |
| Emitter collector voltage           |   | $V_{ECO}$  | 5             | V                  |
| Collector current                   |   | $I_C$      | 50            | mA                 |
| Collector peak current              | $t_p/T \leq 0.1$ , $t_p \leq 10\text{ }\mu\text{s}$ | $I_{CM}$   | 100           | mA                 |
| Power dissipation                   |   | $P_V$      | 100           | mW                 |
| Junction temperature                |   | $T_J$      | 100           | $^{\circ}\text{C}$ |
| Operating temperature range         |   | $T_{amb}$  | - 40 to + 100 | $^{\circ}\text{C}$ |
| Storage temperature range           |   | $T_{stg}$  | - 40 to + 100 | $^{\circ}\text{C}$ |
| Soldering temperature               | Acc. reflow solder profile fig. 10                  | $T_{sd}$   | 260           | $^{\circ}\text{C}$ |
| Thermal resistance junction/ambient | Soldered on PCB with pad dimensions: 4 mm x 4 mm    | $R_{thJA}$ | 400           | K/W                |

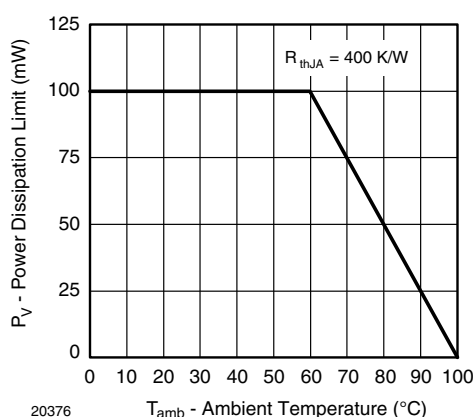


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

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

| PARAMETER                            | TEST CONDITION   | SYMBOL          | MIN. | TYP.        | MAX. | UNIT          |
|--------------------------------------|--|-----------------|------|-------------|------|---------------|
| Collector emitter breakdown voltage  | $I_C = 1\text{ mA}$  | $V_{(BR)CEO}$   | 70   |             |      | V             |
| Collector emitter dark current       | $V_{CE} = 20\text{ V}$ , $E = 0$   | $I_{CEO}$       |      | 1           | 200  | nA            |
| Collector emitter capacitance        | $V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$   | $C_{CEO}$       |      | 3           |      | pF            |
| Collector light current              | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_{CE} = 5\text{ V}$                     | $I_{ca}$        | 0.25 | 0.5         |      | mA            |
| Angle of half sensitivity            |  | $\phi$          |      | $\pm 60$    |      | deg           |
| Wavelength of peak sensitivity       |  | $\lambda_p$     |      | 850         |      | nm            |
| Range of spectral bandwidth          |  | $\lambda_{0.1}$ |      | 450 to 1080 |      | nm            |
| Collector emitter saturation voltage | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $I_C = 0.1\text{ mA}$                     | $V_{CEsat}$     |      | 0.15        | 0.3  | V             |
| Rise time, fall time                 | $V_S = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $\lambda = 950\text{ nm}$ , $R_L = 1\text{ k}\Omega$  | $t_r/t_f$       |      | 6           |      | $\mu\text{s}$ |
|                                      | $V_S = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $\lambda = 950\text{ nm}$ , $R_L = 100\text{ }\Omega$ | $t_r/t_f$       |      | 2           |      | $\mu\text{s}$ |
| Cut-off frequency                    | $V_S = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $R_L = 100\text{ }\Omega$                             | $f_c$           |      | 180         |      | kHz           |

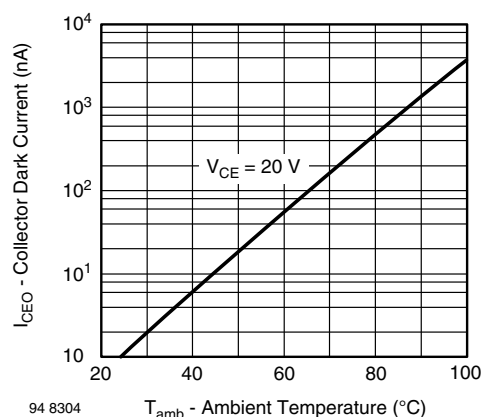
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Fig. 2 - Collector Dark Current vs. Ambient Temperature

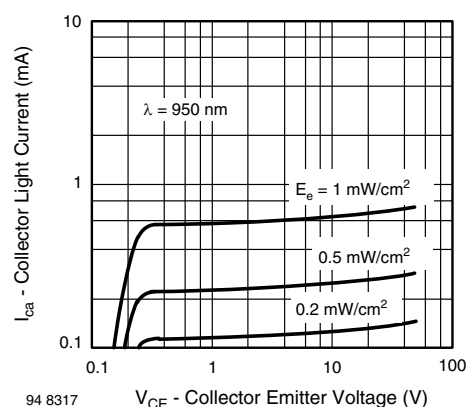


Fig. 5 - Collector Light Current vs. Collector Emitter Voltage

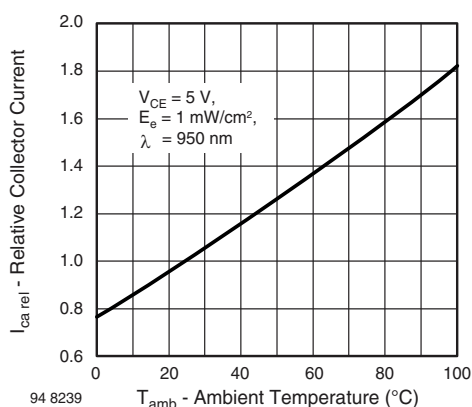


Fig. 3 - Relative Collector Current vs. Ambient Temperature

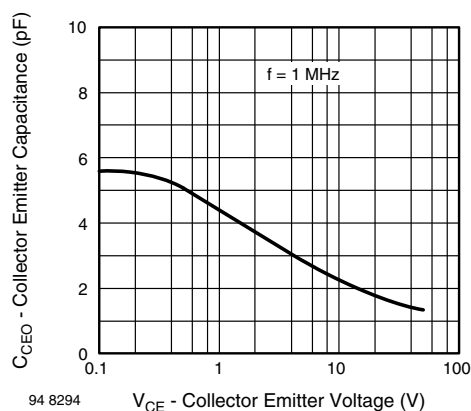


Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage

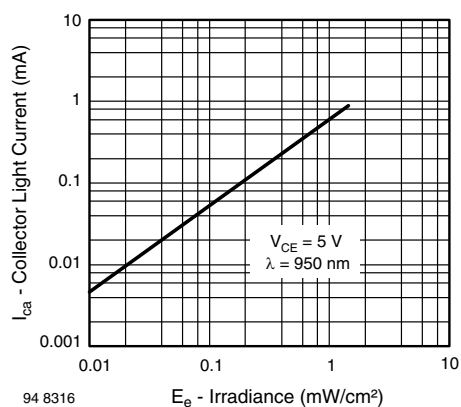


Fig. 4 - Collector Light Current vs. Irradiance

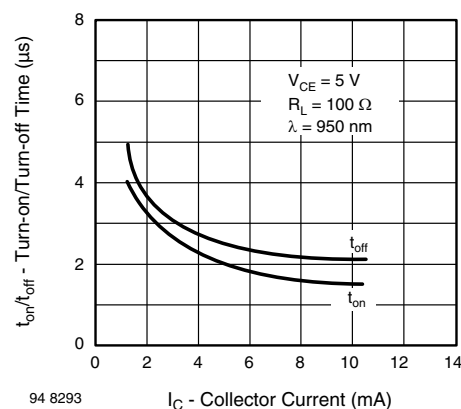


Fig. 7 - Turn-on/Turn-off Time vs. Collector Current

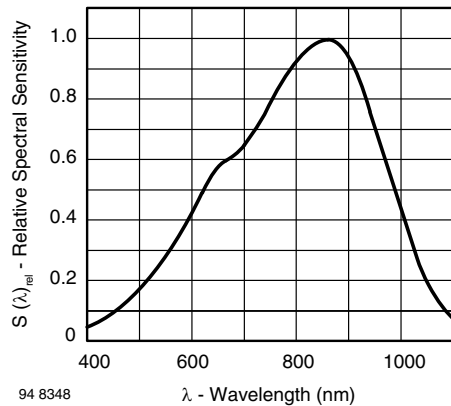


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

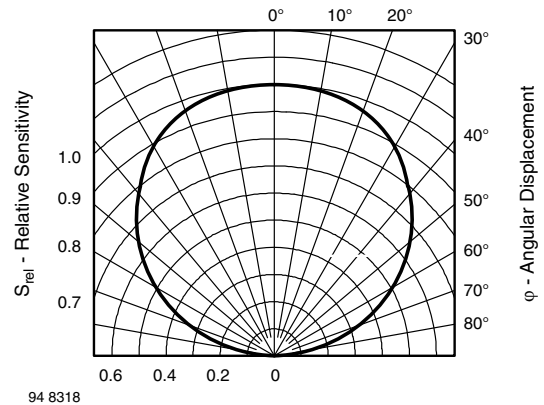
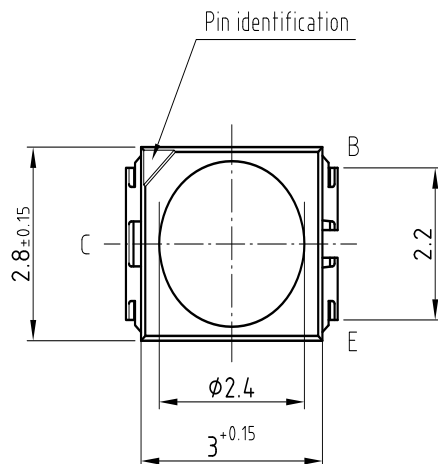
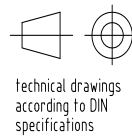
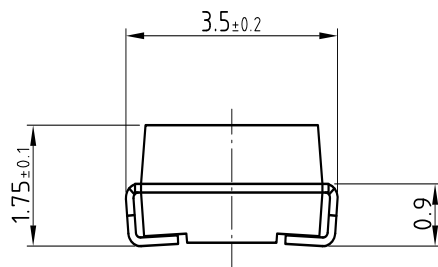
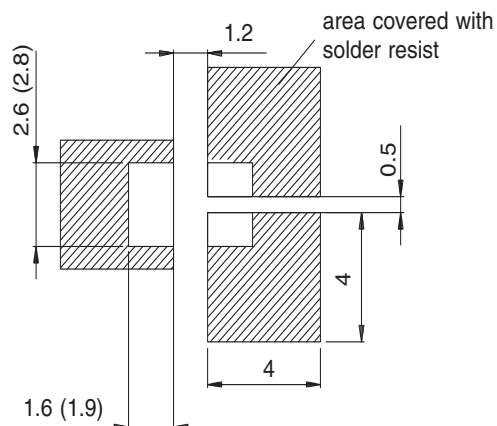


Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement

# PACKAGE DIMENSIONS in millimeters



## Mounting Pad Layout



Drawing-No.: 6.541-5070.01-4  
Issue: 1; 30.05.07  
21439

Dimensions: IR and vaporphase  
(wave soldering)



## SOLDER PROFILE

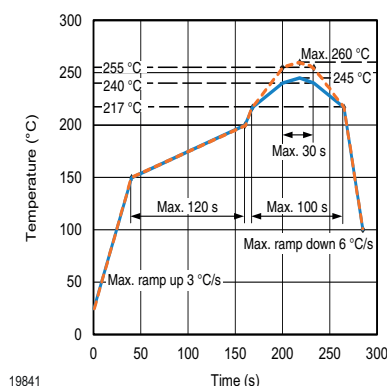


Fig. 10 - Lead (Pb)-free Reflow Solder Profile  
acc. J-STD-020

## 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

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:  
Floor life: 168 h  
Conditions:  $T_{amb} < 30^{\circ}\text{C}$ ,  $\text{RH} < 60\%$   
Moisture sensitivity level 3, acc. to J-STD-020.

## DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at  $40^{\circ}\text{C}$  (+  $5^{\circ}\text{C}$ ),  $\text{RH} < 5\%$ .

## TAPE AND REEL

PLCC-3 components are packed in antistatic blister tape (DIN IEC (CO) 564) for automatic component insertion. Cavities of blister tape are covered with adhesive tape.

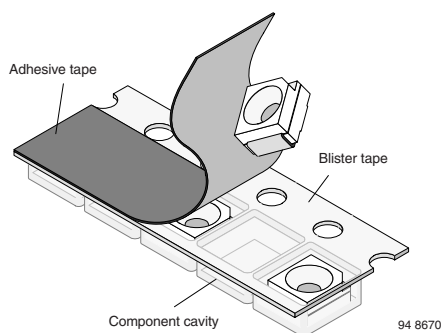


Fig. 11 - Blister Tape

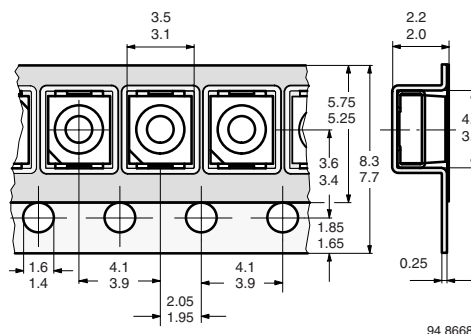


Fig. 12 - Tape Dimensions in mm for PLCC-3

## MISSING DEVICES

A maximum of 0.5 % of the total number of components per reel may be missing, exclusively missing components at the beginning and at the end of the reel. A maximum of three consecutive components may be missing, provided this gap is followed by six consecutive components.

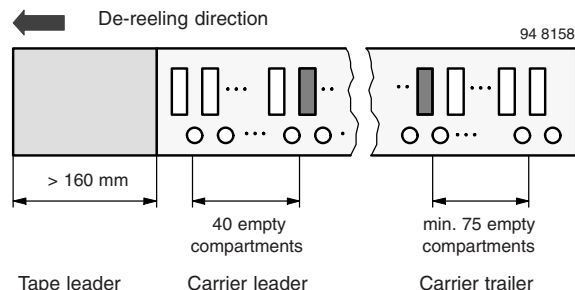


Fig. 13 - Beginning and End of Reel

The tape leader is at least 160 mm and is followed by a carrier tape leader with at least 40 empty compartments. The tape leader may include the carrier tape as long as the cover tape is not connected to the carrier tape. The least component is followed by a carrier tape trailer with a least 75 empty compartments and sealed with cover tape.

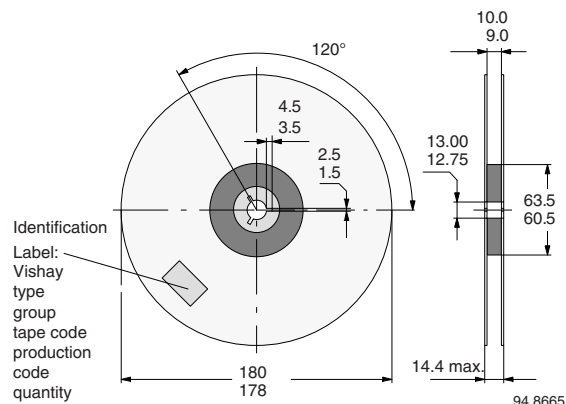




Fig. 14 - Dimensions of Reel-GS08

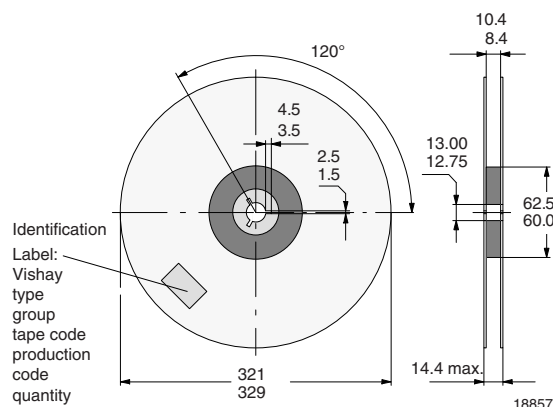


Fig. 15 - Dimensions of Reel-GS18

**COVER TAPE REMOVAL FORCE**

The removal force lies between 0.1 N and 1.0 N at a removal speed of 5 mm/s. In order to prevent components from popping out of the blisters, the cover tape must be pulled off at an angle of 180° with regard to the feed direction.



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