**DESCRIPTION**

VEMT4700F is a high speed silicon NPN epitaxial planar phototransistor in a miniature PLCC-3 package. The integrated daylight blocking filter is matched to 950 nm IR emitters.

**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 radiant sensitivity
- Fast response times
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- Angle of half sensitivity: $\varphi = \pm 60^\circ$
- 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
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

**APPLICATIONS**

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

**PRODUCT SUMMARY**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>$I_{ca}$ (mA)</th>
<th>$\varphi$ (deg)</th>
<th>$\lambda_{0.5}$ (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEMT4700F</td>
<td>0.5</td>
<td>$\pm 60$</td>
<td>870 to 1050</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>REMARKS</th>
<th>PACKAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEMT4700F-GS08</td>
<td>Tape and reel</td>
<td>MOQ: 7500 pcs, 1500 pcs/reel</td>
<td>PLCC-3</td>
</tr>
<tr>
<td>VEMT4700F-GS18</td>
<td>Tape and reel</td>
<td>MOQ: 8000 pcs, 8000 pcs/reel</td>
<td>PLCC-3</td>
</tr>
</tbody>
</table>

**Note**

- Test conditions see table “Basic Characteristics”
- MOQ: minimum order quantity
ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector emitter voltage</td>
<td></td>
<td>V_{CEO}</td>
<td>70</td>
<td>V</td>
</tr>
<tr>
<td>Emitter collector voltage</td>
<td></td>
<td>V_{ECO}</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td></td>
<td>I_{C}</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Collector peak current</td>
<td>t_p/T ≤ 0.1, t_p ≤ 10 μs</td>
<td>I_{CM}</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Power dissipation</td>
<td></td>
<td>P_{V}</td>
<td>100</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td></td>
<td>T_{j}</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td></td>
<td>T_{amb}</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td></td>
<td>T_{stg}</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>Acc. reflow solder profile fig. 10</td>
<td>T_{sd}</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction/ambient</td>
<td>Soldered on PCB with pad dimensions: 4 mm x 4 mm</td>
<td>R_{thJA}</td>
<td>400</td>
<td>K/W</td>
</tr>
</tbody>
</table>

**Fig. 1 - Power Dissipation Limit vs. Ambient Temperature**

![Power Dissipation Limit](image)

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector emitter breakdown voltage</td>
<td>I_{C} = 1 mA</td>
<td>V_{(BR)CEO}</td>
<td>70</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector emitter dark current</td>
<td>V_{CE} = 20 V, E = 0</td>
<td>I_{CEO}</td>
<td>1</td>
<td>200</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td>Collector emitter capacitance</td>
<td>V_{CE} = 5 V, f = 1 MHz, E = 0</td>
<td>C_{CEO}</td>
<td>3</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Collector light current</td>
<td>E_{e} = 1 mW/cm^2, λ = 950 nm, V_{CE} = 5 V</td>
<td>I_{ca}</td>
<td>0.25</td>
<td>0.5</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td></td>
<td>φ</td>
<td>±60</td>
<td>deg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td></td>
<td>λ_{p}</td>
<td>940</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td></td>
<td>λ_{0.5}</td>
<td>870 to 1050</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector emitter saturation voltage</td>
<td>E_{e} = 1 mW/cm^2, λ = 950 nm, I_{C} = 0.1 mA</td>
<td>V_{CEsat}</td>
<td>0.15</td>
<td>0.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Rise time, fall time</td>
<td>V_{S} = 5 V, I_{C} = 1 mA, λ = 950 nm, R_{L} = 1 kΩ</td>
<td>t_{r/t}</td>
<td>6</td>
<td></td>
<td>μs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V_{S} = 5 V, I_{C} = 1 mA, λ = 950 nm, R_{L} = 100 Ω</td>
<td>t_{r/t}</td>
<td>2</td>
<td></td>
<td>μs</td>
<td></td>
</tr>
<tr>
<td>Cut-off frequency</td>
<td>V_{S} = 5 V, I_{C} = 2 mA, R_{L} = 100 Ω</td>
<td>f_{c}</td>
<td>180</td>
<td>kHz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**BASIC CHARACTERISTICS**  \((T_{\text{amb}} = 25 \, ^{\circ}\text{C}, \text{unless otherwise specified})\)

![Figure 1](image1.png)  
**Fig. 1** - Collector Dark Current vs. Ambient Temperature

![Figure 2](image2.png)  
**Fig. 2** - Collector Dark Current vs. Ambient Temperature

![Figure 3](image3.png)  
**Fig. 3** - Relative Collector Current vs. Ambient Temperature

![Figure 4](image4.png)  
**Fig. 4** - Collector Light Current vs. Irradiance

![Figure 5](image5.png)  
**Fig. 5** - Collector Light Current vs. Collector Emitter Voltage

![Figure 6](image6.png)  
**Fig. 6** - Collector Emitter Capacitance vs. Collector Emitter Voltage

![Figure 7](image7.png)  
**Fig. 7** - Turn-on/Turn-off Time vs. Collector Current

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**Document Number:** 81120  
**For technical questions, contact:** detectortechsupport@vishay.com  
**www.vishay.com**

Rev. 1.1, 14-Jul-10
VEMT4700F
Vishay Semiconductors  Silicon NPN Phototransistor

Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement

PACKAGE DIMENSIONS in millimeters

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: $T_{amb} < 30 \, ^\circ C$, RH < 60 %

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 °C (+ 5 °C), RH < 5 %.
**TAPE AND REEL**

PLCC-2 components are packed in antistatic blister tape (DIN IEC (CO) 564) for automatic component insertion. Cavities of blister tape are covered with adhesive tape.

**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.

**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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