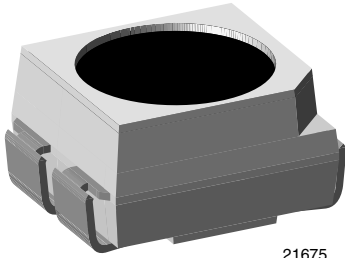


## Silicon NPN Phototransistor



21675

### 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:  $\phi = \pm 60^\circ$
- 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
- 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

COMPONENT	$I_{ca}$ (mA)	$\phi$ (deg)	$\lambda_{0.5}$ (nm)
VEMT4700F	0.5	$\pm 60$	870 to 1050

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMT4700F-GS08	Tape and reel	MOQ: 7500 pcs, 1500 pcs/reel	PLCC-3
VEMT4700F-GS18	Tape and reel	MOQ: 8000 pcs, 8000 pcs/reel	PLCC-3

#### Note

- MOQ: minimum order quantity

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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

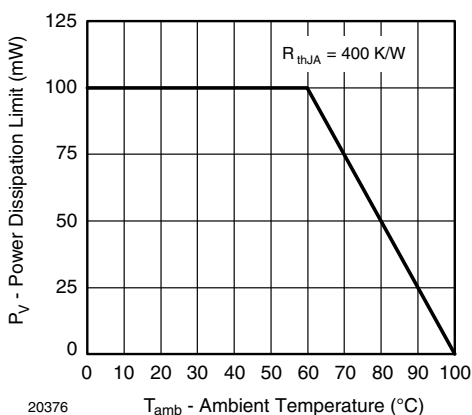


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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		$\lambda_p$		940		nm
Range of spectral bandwidth		$\lambda_{0.5}$		870 to 1050		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)

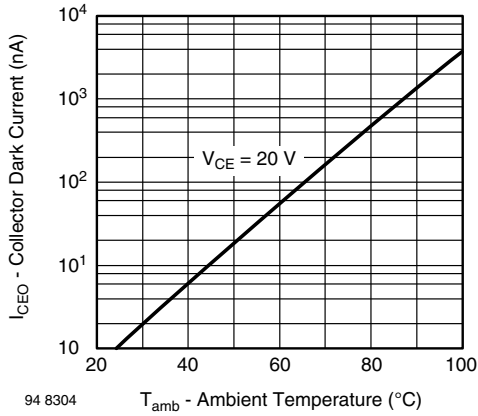


Fig. 2 - Collector Dark Current vs. Ambient Temperature

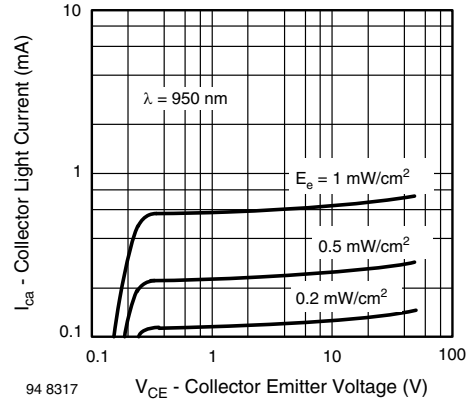


Fig. 5 - Collector Light Current vs. Collector Emitter Voltage

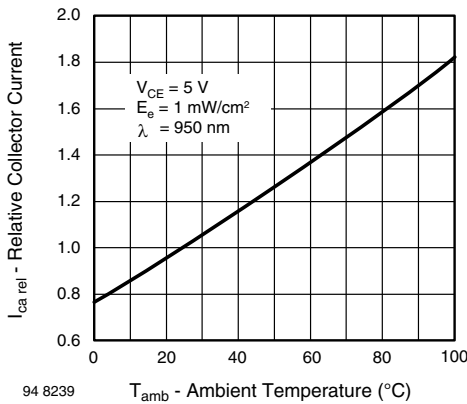


Fig. 3 - Relative Collector Current vs. Ambient Temperature

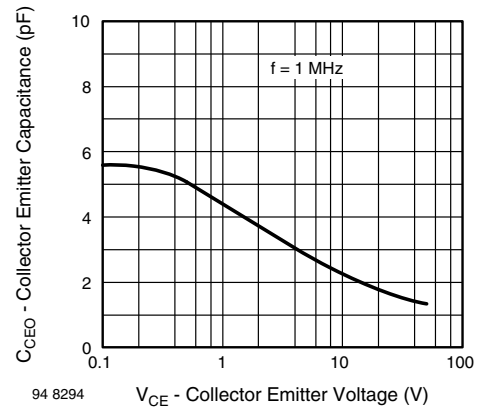


Fig. 6 - Collector Emitter Capacitance vs. Collector Emitter Voltage

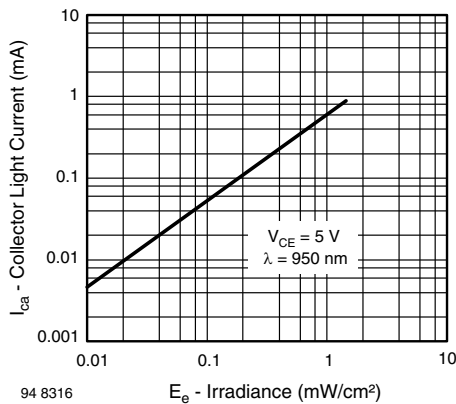


Fig. 4 - Collector Light Current vs. Irradiance

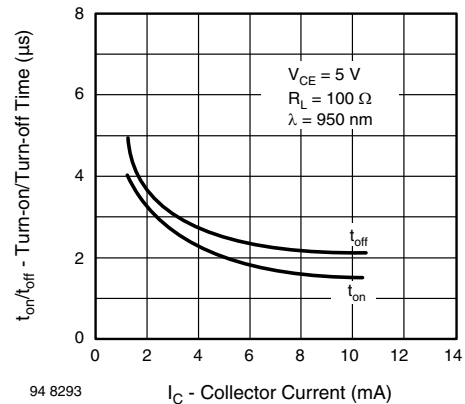


Fig. 7 - Turn-on/Turn-off Time vs. Collector Current

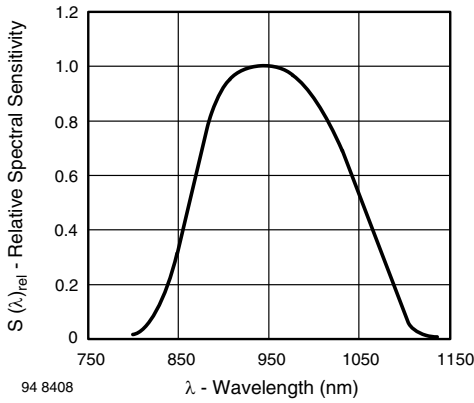


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

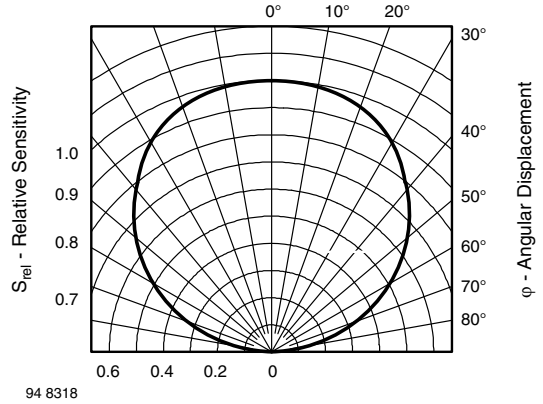
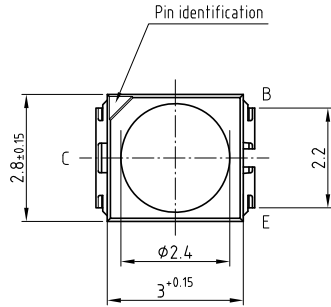
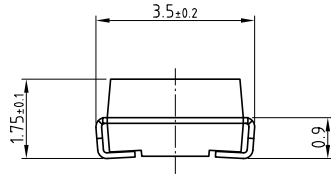


Fig. 9 - Relative Radiant Sensitivity vs. Angular Displacement

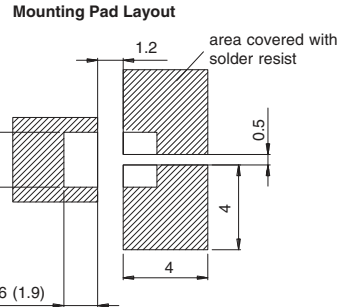
**PACKAGE DIMENSIONS** in millimeters



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



Technical drawings according to DIN specifications



Dimensions: IR and vaporphase (wave soldering)

**SOLDER PROFILE**

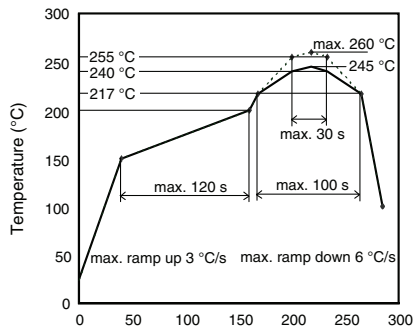


Fig. 10 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

**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:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$   
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  $40\text{ °C} (+ 5\text{ °C})$ ,  $RH < 5\%$ .

**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.

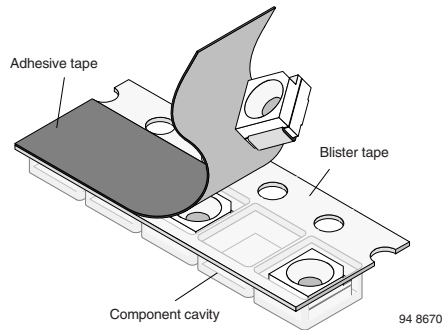


Fig. 11 - Blister Tape

component is followed by a carrier tape trailer with a least 75 empty compartments and sealed with cover tape.

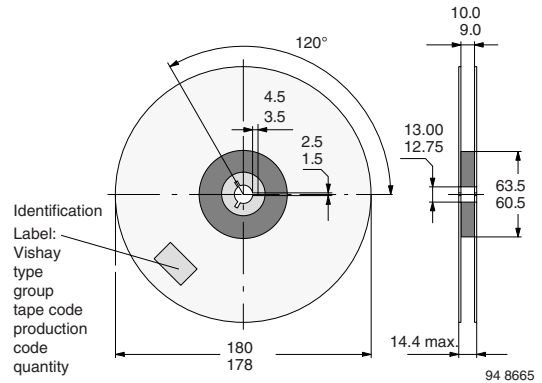


Fig. 14 - Dimensions of Reel-GS08

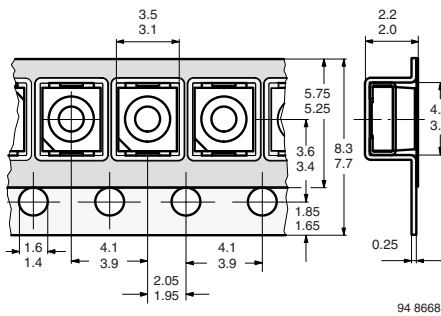


Fig. 12 - Tape Dimensions in mm for PLCC-2

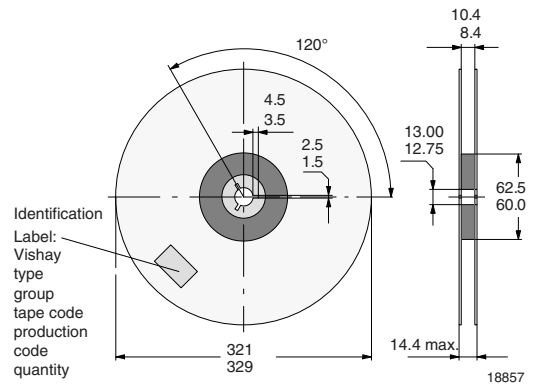


Fig. 15 - Dimensions of Reel-GS18

**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.

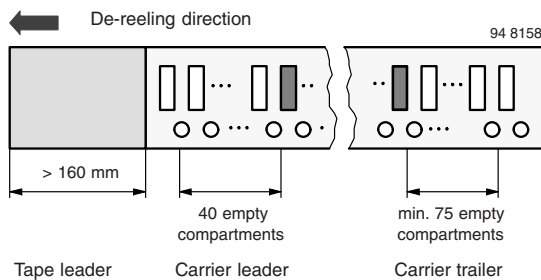


Fig. 13 - Beginning and End of Reel

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



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