

# Phototransistor Optocoupler Quad Miniflat Package

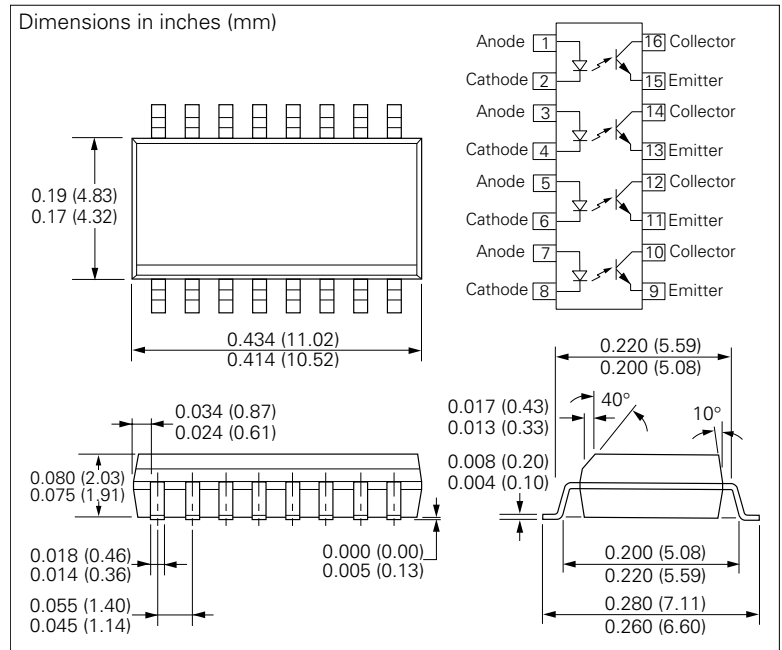
## FEATURES

- **Current Transfer Ratio**
  - SFH6916, 50%–300%
- **SOP (Small Outline Package)**
- **Isolation Test Voltage, 3750 V<sub>RMS</sub> (1.0 s)**
- **High Collector-Emitter Voltage, V<sub>CEO</sub>=70 V**
- **Low Saturation Voltage**
- **Fast Switching Times**
- **Field-Effect Stable by TRIOS (TRansparent IOn Shield)**
- **Temperature Stable**
- **Low Coupling Capacitance**
- **End-Stackable, 0.050" (1.27 mm) Spacing**
- **Underwriters Lab File #52744**

## DESCRIPTION

The SFH6916 family has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 16 pin 50 mil lead pitch miniflat package. It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.



## Absolute Maximum Ratings, T<sub>A</sub>=25°C (except where noted)

### Emitter

Reverse Voltage .....	6.0 V
DC Forward Current .....	50 mA
Surge Forward Current (t <sub>P</sub> ≤10 μs) .....	2.5 A
Total Power Dissipation per channel .....	80 mW

### Detector

Collector-Emitter Voltage .....	70 V
Emitter-Collector Voltage .....	7.0 V
Collector Current .....	50 mA
Collector Current (t <sub>P</sub> ≤1.0 ms) .....	100 mA
Total Power Dissipation per channel .....	150 mW

### Package

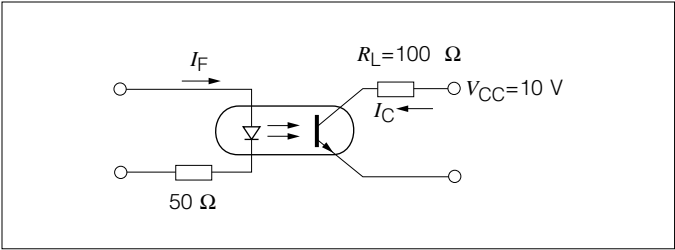
Isolation Test Voltage between Emitter and	
Detector (1.0 s) .....	3750 V <sub>RMS</sub>
Creepage .....	≥5.33 mm
Clearance .....	≥5.08 mm
Comparative Tracking Index	
per DIN IEC 112/VDE0 303, part 1 .....	≥175
Isolation Resistance	
V <sub>IO</sub> =500 V, T <sub>A</sub> =25°C .....	≥10 <sup>12</sup> Ω
V <sub>IO</sub> =500 V, T <sub>A</sub> =100°C .....	≥10 <sup>11</sup> Ω
Storage Temperature Range .....	–55 to +125°C
Ambient Temperature Range .....	–55 to +100°C
Junction Temperature .....	100°C
Soldering Temperature (max. 10 s Dip Soldering	
Distance to Seating Plane ≥1.5 mm) .....	260°C
Total Power Dissipation .....	70 mW

**Table 1. Electrical Characteristics,  $T_A=25^{\circ}\text{C}$  (except where noted)**

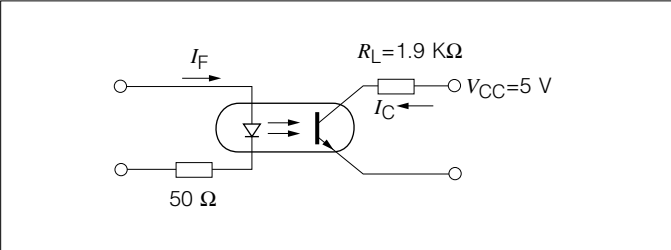
Description	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>Emitter (IR GaAs)</b>						
Forward Voltage	$V_F$	—	1.15	1.4	V	$I_F=5\text{ mA}$
Reverse Current	$I_R$	—	0.01	10	$\mu\text{A}$	$V_R=6.0\text{ V}$
Capacitance	$C_O$	—	14	—	pF	$V_R=0.0\text{ V}$ , $f=1.0\text{ MHz}$
Thermal Resistance	$R_{thJA}$	—	1000	—	K/W	—
<b>Detector (Si Phototransistor)</b>						
Leakage Current, Collector-Emitter	$I_{CEO}$	—	—	100	nA	$V_{CE}=20\text{ V}$
Capacitance	$C_{CE}$	—	2.8	—	pF	$V_{CE}=5.0\text{ V}$ , $f=1.0\text{ MHz}$
Thermal Resistance	$R_{thJA}$	—	500	—	K/W	—
<b>Package</b>						
Collector-Emitter Saturation Voltage	$V_{CESAT}$	—	0.1	0.4	V	$I_F=20\text{ mA}$ , $I_C=1.0\text{ mA}$
Coupling Capacitance	$C_C$	—	1.0	—	pF	$f=1.0\text{ MHz}$
Current Transfer Ratio	CTR	50	—	300	%	$I_F=5.0\text{ mA}$ , $V_{CC}=5.0\text{ V}$

**Switching Times (Typical)**

**Figure 1. Switching Operation (without saturation)**



**Figure 2. Switching Operation (with saturation)**



**Table 2.  $I_C=2.0\text{ mA}$ ,  $V_{CC}=10\text{ V}$ ,  $T_A=25^{\circ}\text{C}$**

Parameter	Symbol	Value	Unit
Load Resistance	$R_L$	100	$\Omega$
Rise Time	$t_r$	4.0	$\mu\text{s}$
Fall Time	$t_f$	3.0	
Turn on Time	$t_{ON}$	5.0	
Turn off Time	$t_{OFF}$	4.0	

**Table 3.  $I_F=16.0\text{ mA}$ ,  $V_{CC}=5.0\text{ V}$ ,  $T_A=25^{\circ}\text{C}$**

Parameter	Symbol	Value	Unit
Load Resistance	$R_L$	1.9	k $\Omega$
Rise Time	$t_r$	15	$\mu\text{s}$
Fall Time	$t_f$	0.5	
Turn on Time	$t_{ON}$	1.0	
Turn off Time	$t_{OFF}$	30	

Figure 3. Diode Forward Voltage vs. Forward Current

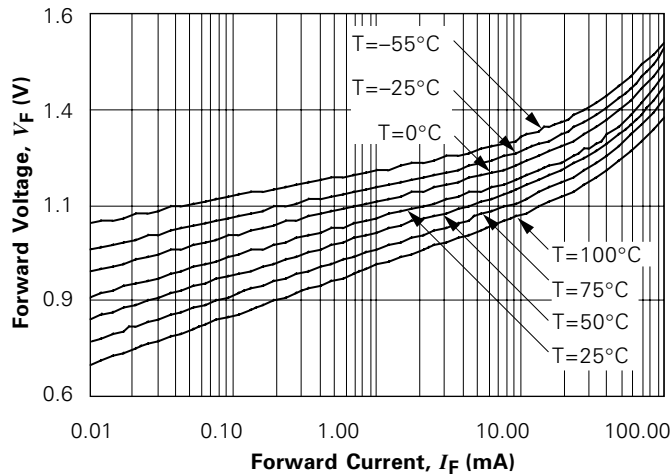


Figure 6. Collector Current vs. Collector-Emitter Saturation Voltage

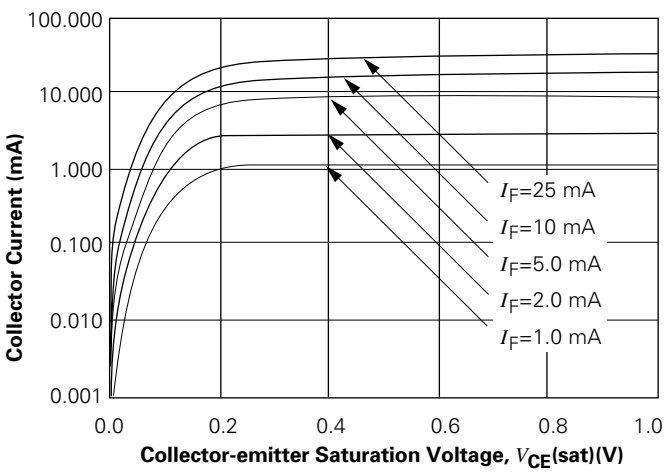


Figure 4. Collector Current vs. Collector Emitter Voltage

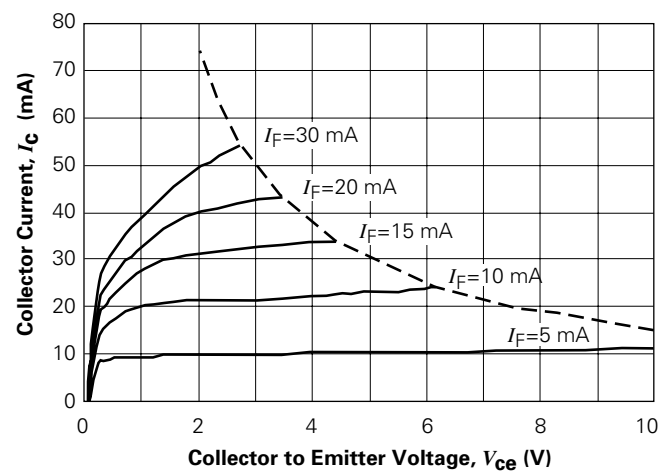


Figure 7. Normalized Output Current vs. Ambient Temperature

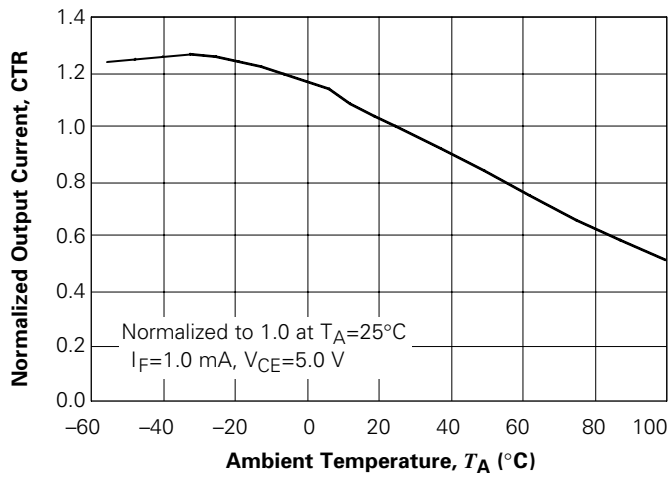


Figure 5. Collector to Emitter Dark Current vs. Ambient Temperature

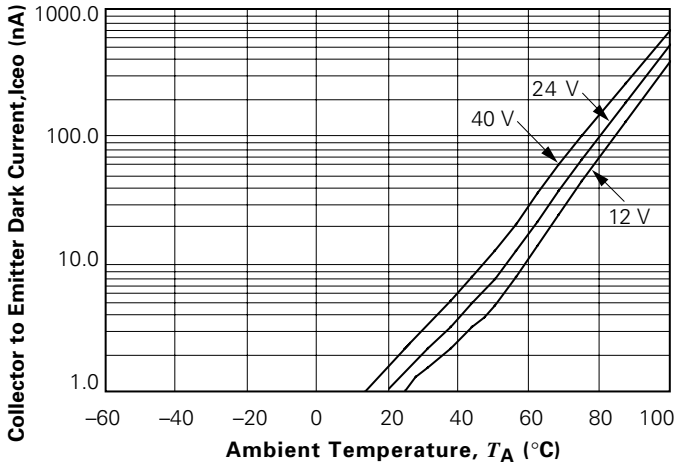


Figure 8. Normalized Output Current vs. Ambient Temperature

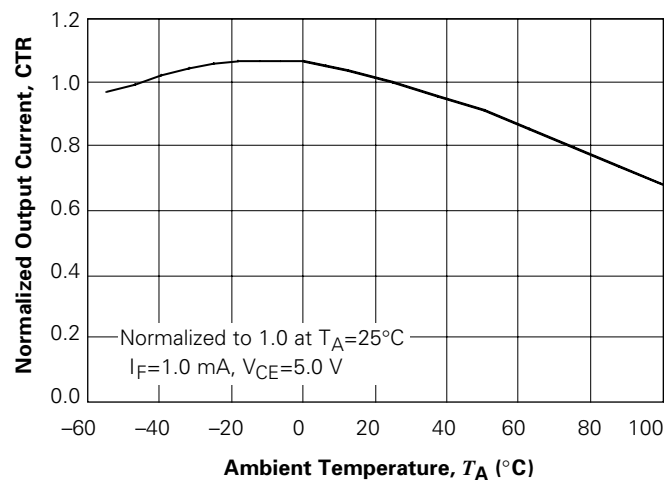


Figure 9. Current Transfer Ratio vs. Forward Current

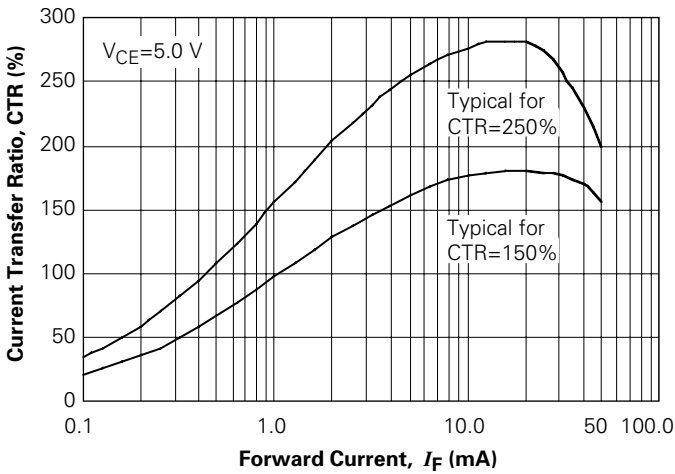


Figure 12. Switching Time Measurement

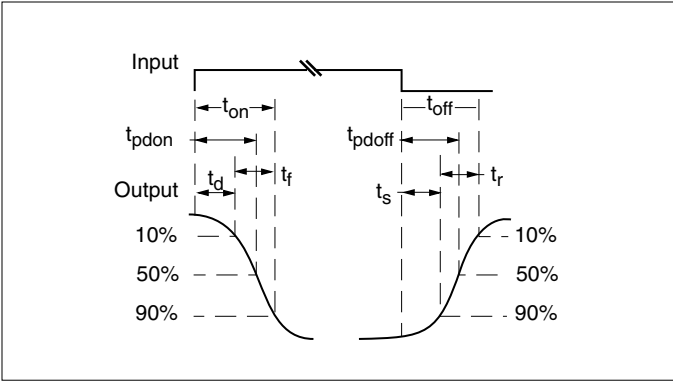


Figure 10. Switching Time vs. Load Resistance

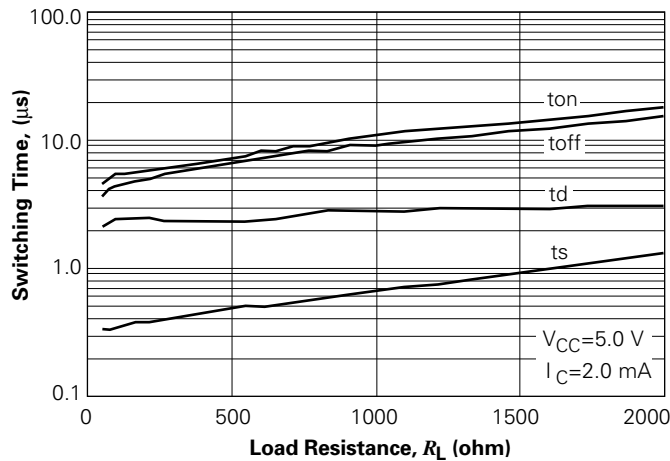


Figure 11. Switching Time vs. Load Resistance

