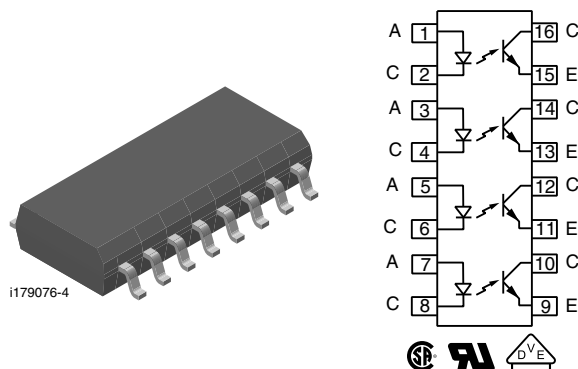


# Optocoupler, Phototransistor Output, Quad Channel, SOP-16, Half Pitch Mini-Flat Package



## DESCRIPTION

The SFH6916 has a GaAs infrared 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.

## FEATURES

- 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
- Temperature stable
- Low coupling capacitance
- End stackable, 0.050" (1.27 mm) spacing
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



## Note

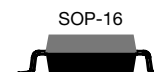
\*\* Please see document "Vishay Material Category Policy":  
[www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

## AGENCY APPROVALS

- UL1577, file no. E52744 system code U
- CSA 22.2 bulletin 5A, double protection
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 (pending)

## ORDERING INFORMATION

S	F	H	6	9	1	6
PART NUMBER						



AGENCY CERTIFIED/PACKAGE	CTR (%)
UL, cUL	50 to 300
SOP-16, quad channel	SFH6916

## ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		V <sub>R</sub>	6	V
DC forward current		I <sub>F</sub>	50	mA
Surge forward current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	2.5	A
Total power dissipation		P <sub>diss</sub>	80	mW
<b>OUTPUT</b>				
Collector emitter voltage		V <sub>CE</sub>	70	V
Emitter collector voltage		V <sub>EC</sub>	7	V
Collector current		I <sub>C</sub>	50	mA
	t <sub>p</sub> = 1.0 ms	I <sub>C</sub>	100	mA
Total power dissipation per channel		P <sub>diss</sub>	150	mW

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Isolation test voltage between emitter and detector	$t = 1.0\text{ s}$	$V_{ISO}$	3750	$V_{RMS}$
Isolation resistance	$V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Storage temperature range		$T_{stg}$	- 55 to + 125	$^{\circ}\text{C}$
<b>COUPLER</b>				
Ambient temperature range		$T_{amb}$	- 55 to +100	$^{\circ}\text{C}$
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	max. 10 s dip soldering distance to seating plane $\geq 1.5\text{ mm}$		260	$^{\circ}\text{C}$
Total power dissipation		$P_{tot}$	700	mW

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

<sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

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

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 5\text{ mA}$	$V_F$		1.15	1.4	V
Reverse current	$V_R = 6\text{ V}$	$I_R$		0.01	10	$\mu\text{A}$
Capacitance	$C_O$	$C_O$		14		pF
Thermal resistance		$R_{thja}$		1000		K/W
<b>OUTPUT</b>						
Collector emitter leakage current	$V_{CE} = 20\text{ V}$	$I_{CEO}$			100	nA
Collector emitter capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}$	$C_{CE}$		2.8		pF
Thermal resistance		$R_{thja}$		500		K/W
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 20\text{ mA}, I_C = 1\text{ mA}$	$V_{CEsat}$		0.1	0.4	V
Coupling capacitance	$f = 1\text{ MHz}$	$C_C$		1		pF

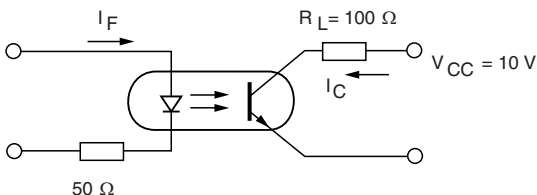
**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

**CURRENT TRANSFER RATIO** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

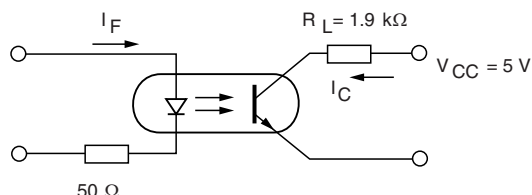
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 5\text{ mA}, V_{CC} = 5\text{ V}$	CTR	50		300	%

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>NON-SATURATED</b>						
Rise time	$I_C = 2\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$	$t_r$		4		$\mu\text{s}$
Fall time	$I_C = 2\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$	$t_f$		3		$\mu\text{s}$
Turn-on time	$I_C = 2\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$	$t_{on}$		5		$\mu\text{s}$
Turn-off time	$I_C = 2\text{ mA}$ , $V_{CC} = 10\text{ V}$ , $R_L = 100\ \Omega$	$t_{off}$		4		$\mu\text{s}$
<b>SATURATED</b>						
Rise time	$I_F = 16\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1.9\text{ k}\Omega$	$t_r$		15		$\mu\text{s}$
Fall time	$I_F = 16\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1.9\text{ k}\Omega$	$t_f$		0.5		$\mu\text{s}$
Turn-on time	$I_F = 16\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1.9\text{ k}\Omega$	$t_{on}$		1		$\mu\text{s}$
Turn-off time	$I_F = 16\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1.9\text{ k}\Omega$	$t_{off}$		30		$\mu\text{s}$



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Fig. 1 - Switching Operation (without Saturation)



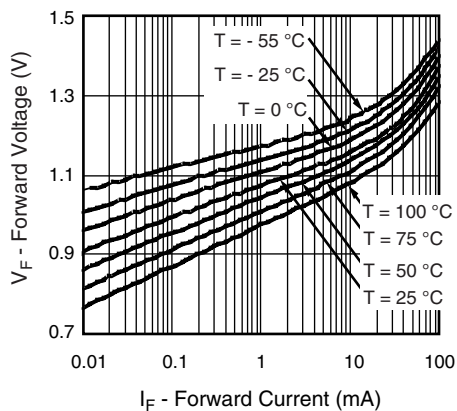
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Fig. 2 - Switching Operation (with Saturation)

<b>SAFETY AND INSULATION RATINGS</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Comparative tracking index		CTI	175		399	
Peak transient overvoltage		$V_{IOTM}$	6000			V
Peak insulation voltage		$V_{IORM}$	707			V
Safety rating - power output		$P_{SO}$			350	mW
Safety rating - input current		$I_{SI}$			150	mA
Safety rating - temperature		$T_{SI}$			175	$^{\circ}\text{C}$
Creepage distance			5			mm
Clearance distance			5			mm

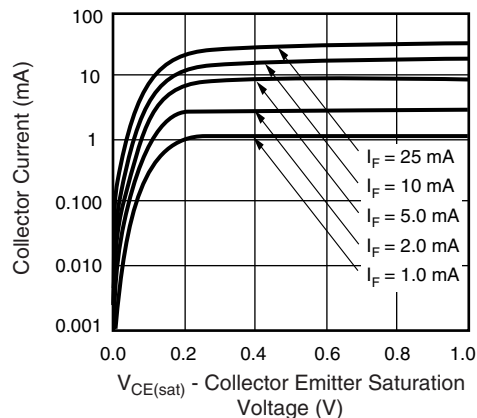
**Note**

- As per IEC 60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

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


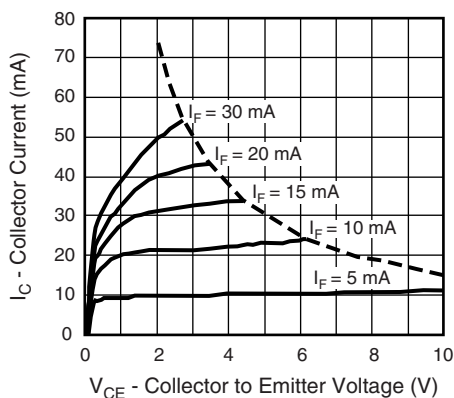
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Fig. 3 - Diode Forward Voltage vs. Forward Current



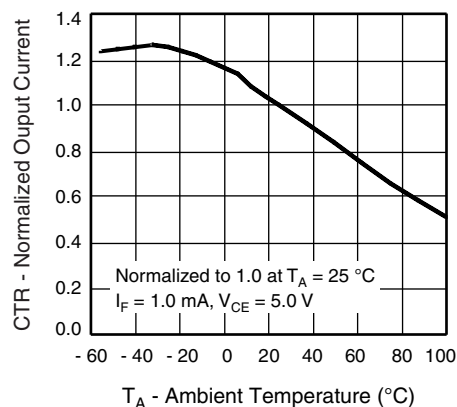
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Fig. 6 - Collector Current vs. Collector Emitter Saturation Voltage



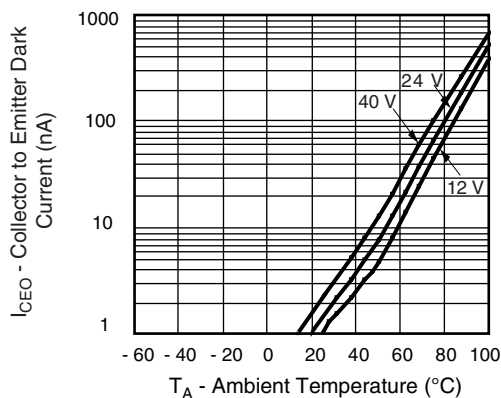
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Fig. 4 - Collector Current vs. Collector Emitter Voltage



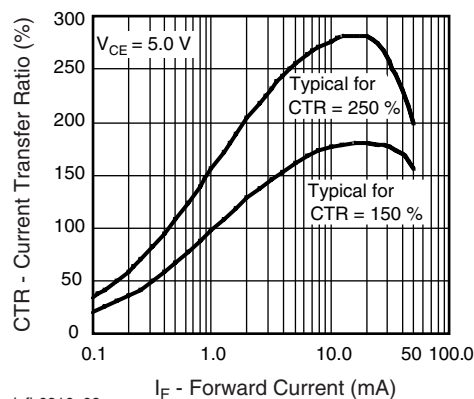
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Fig. 7 - Normalized Output Current vs. Ambient Temperature



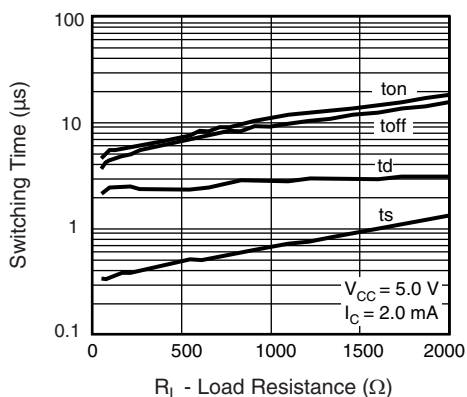
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Fig. 5 - Collector to Emitter Dark Current vs. Ambient Temperature



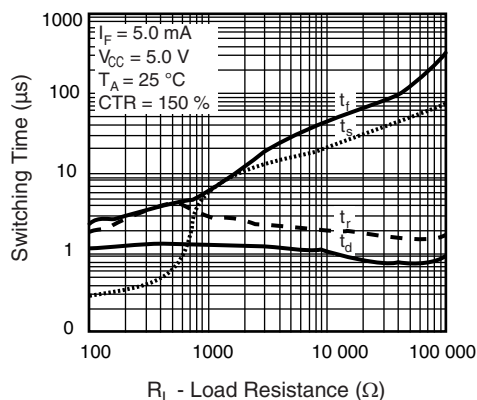
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Fig. 8 - Current Transfer Ratio vs. Forward Current



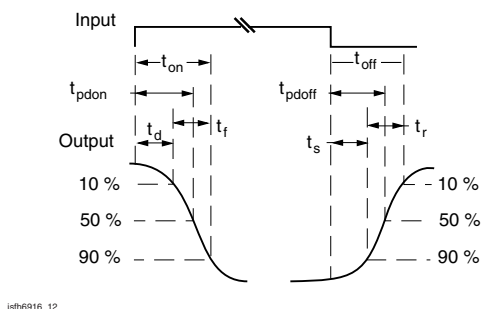
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Fig. 9 - Switching Time vs. Load Resistance



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Fig. 10 - Switching Time vs. Load Resistance

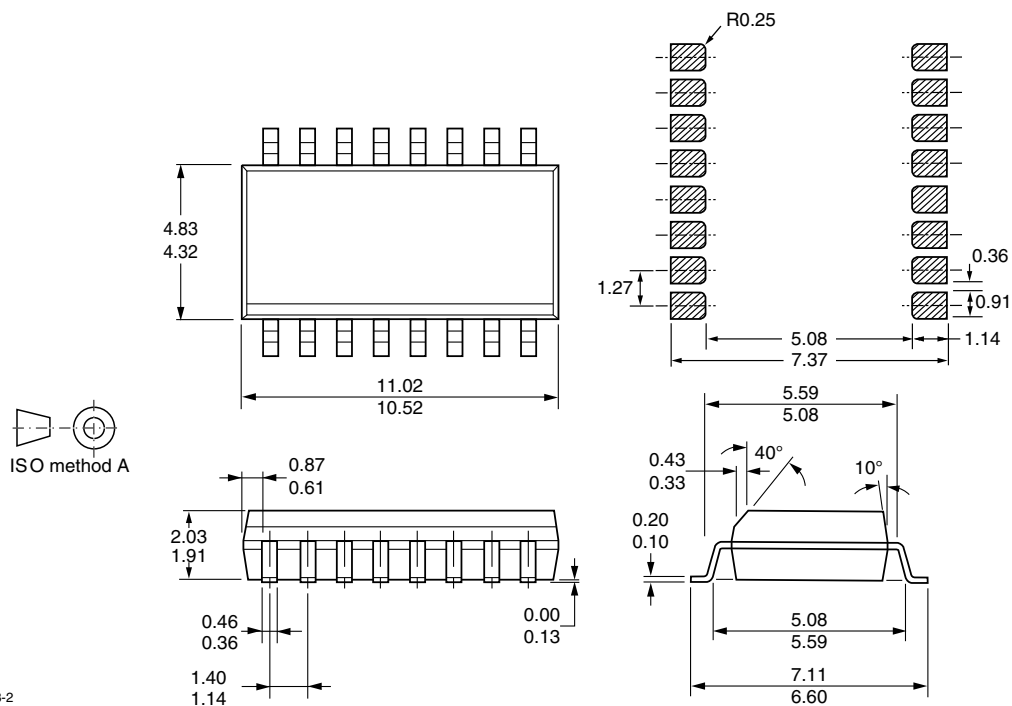


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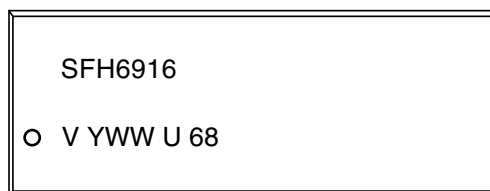
Fig. 11 - Switching Time Measurement



**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING**





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