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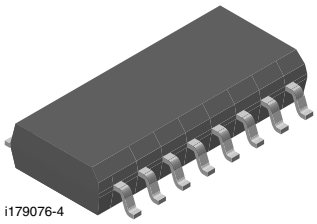
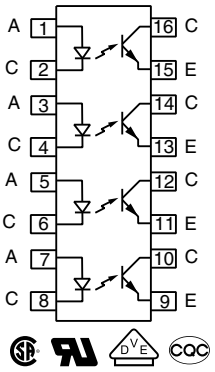
Optocoupler, Phototransistor Output, Quad Channel, SOP-16, Half Pitch Mini-Flat Package





FEATURES

- SOP (small outline package)
- Isolation test voltage, 3750 V_{RMS} (1.0 s)
- High collector emitter voltage, V_{CEO} = 70 V
- Low saturation voltage
- Fast switching times
- Temperature stable
- Low coupling capacitance
- End stackable, 0.050" (1.27 mm) spacing
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

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.

AGENCY APPROVALS

- UL1577, file no. E52744 system code U
- CSA 22.2 bulletin 5A, double protection
- DIN EN 60747-5-5 (VDE 0884)
- CQC GB4943.1-2011 (suitable for installation altitude below 2000 m)

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_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_R	6	V
DC forward current		I_F	50	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	2.5	A
Total power dissipation		P_{diss}	80	mW
OUTPUT				
Collector emitter voltage		V_{CE}	70	V
Emitter collector voltage		V_{EC}	7	V
Collector current		I_C	50	mA
	t_p = 1.0 ms	I_C	100	mA
Total power dissipation per channel		P_{diss}	150	mW

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Isolation test voltage between emitter and detector	t = 1.0 s	V_{ISO}	3750	V_{RMS}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Storage temperature range		T_{stg}	- 55 to + 125	°C
Ambient temperature range		T_{amb}	- 55 to + 100	°C
Junction temperature		T_j	100	°C
Soldering temperature (1)	max. 10 s dip soldering distance to seating plane ≥ 1.5 mm		260	°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.

(1) Refer to reflow profile for soldering conditions for surface mounted devices.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 5 mA	V_F		1.15	1.4	V
Reverse current	V_R = 6 V	I_R		0.01	10	µA
Capacitance	C_O	C_O		14		pF
Thermal resistance		R_{thja}		1000		K/W
OUTPUT						
Collector emitter leakage current	V_{CE} = 20 V	I_{CEO}			100	nA
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz	C_{CE}		2.8		pF
Thermal resistance		R_{thja}		500		K/W
COUPLER						
Collector emitter saturation voltage	I_F = 20 mA, I_C = 1 mA	V_{CEsat}		0.1	0.4	V
Coupling capacitance	f = 1 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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Current transfer ratio	I_F = 5 mA, V_{CC} = 5 V	CTR	50		300	%

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
NON-SATURATED						
Rise time	I_C = 2 mA, V_{CC} = 10 V, R_L = 100 Ω	t_r		4		µs
Fall time	I_C = 2 mA, V_{CC} = 10 V, R_L = 100 Ω	t_f		3		µs
Turn-on time	I_C = 2 mA, V_{CC} = 10 V, R_L = 100 Ω	t_{on}		5		µs
Turn-off time	I_C = 2 mA, V_{CC} = 10 V, R_L = 100 Ω	t_{off}		4		µs
SATURATED						
Rise time	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_r		15		µs
Fall time	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_f		0.5		µs
Turn-on time	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_{on}		1		µs
Turn-off time	I_F = 16 mA, V_{CC} = 5 V, R_L = 1.9 kΩ	t_{off}		30		µs

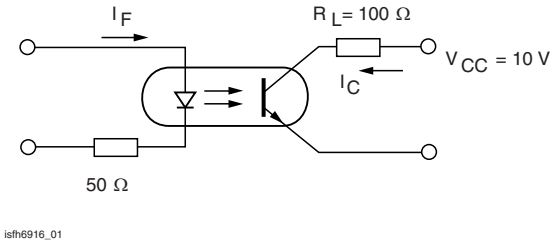


Fig. 1 - Switching Operation (without Saturation)

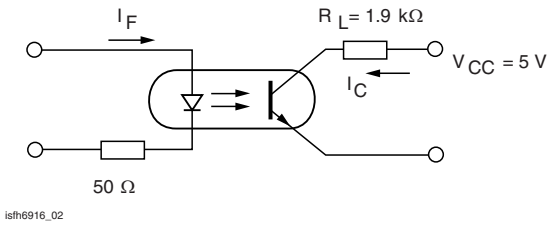


Fig. 2 - Switching Operation (with Saturation)

SAFETY AND INSULATION RATINGS						
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	°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 °C, unless otherwise specified)

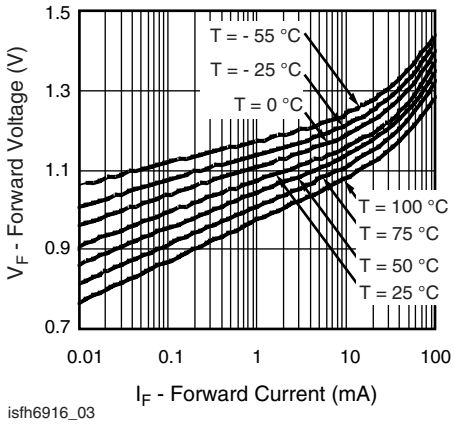


Fig. 3 - Diode Forward Voltage vs. Forward Current

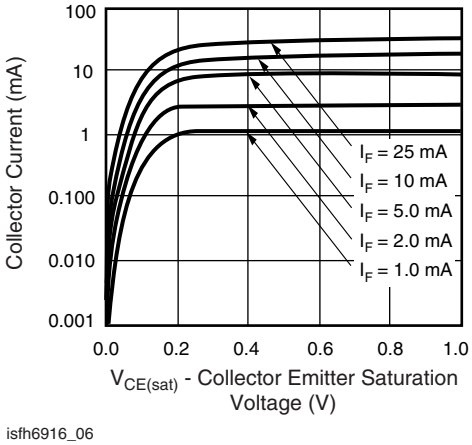


Fig. 6 - Collector Current vs. Collector Emitter Saturation Voltage

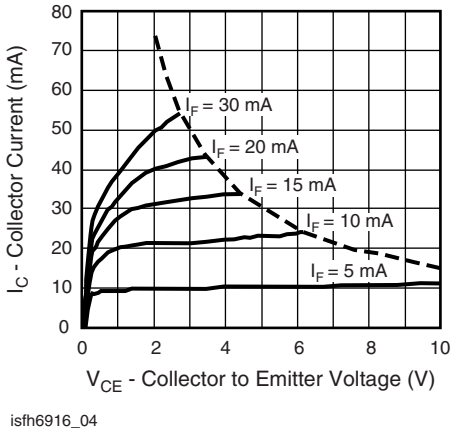


Fig. 4 - Collector Current vs. Collector Emitter Voltage

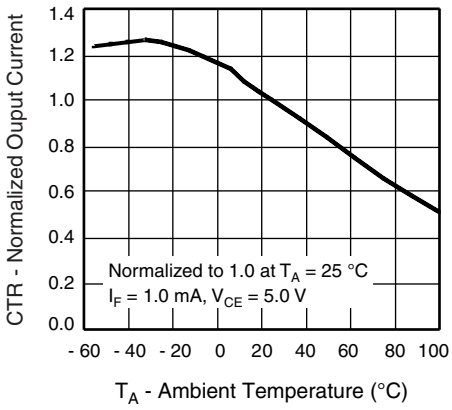


Fig. 7 - Normalized Output Current vs. Ambient Temperature

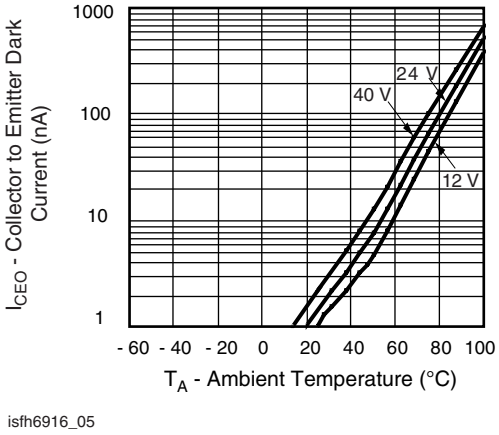


Fig. 5 - Collector to Emitter Dark Current vs. Ambient Temperature

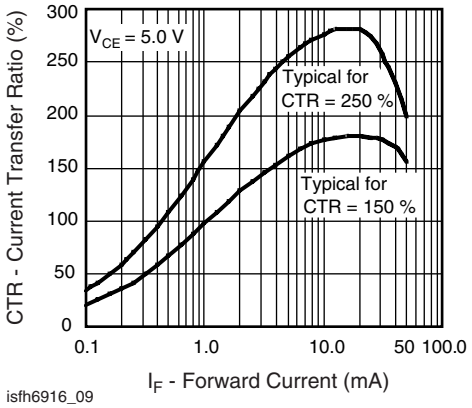


Fig. 8 - Current Transfer Ratio vs. Forward Current

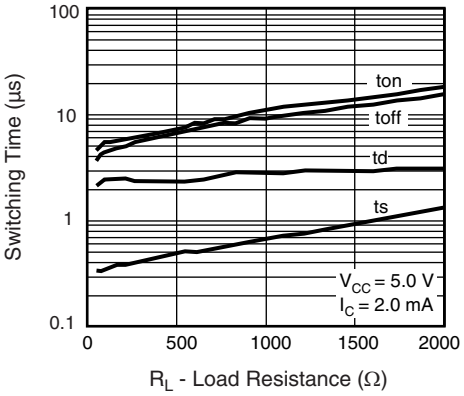


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Fig. 9 - Switching Time vs. Load Resistance

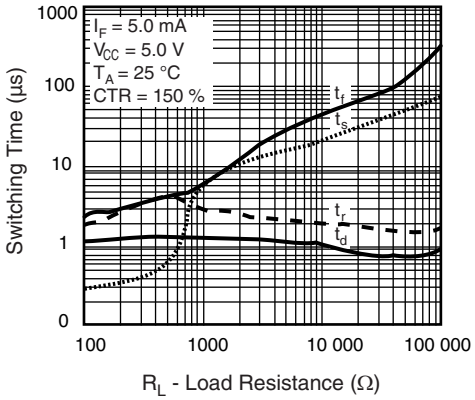

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Fig. 10 - Switching Time vs. Load Resistance

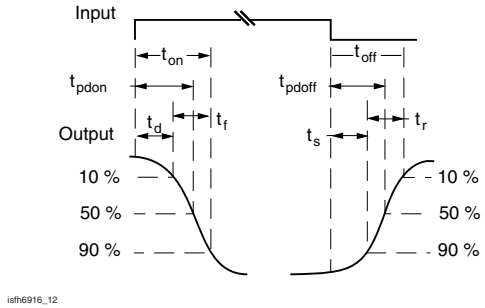

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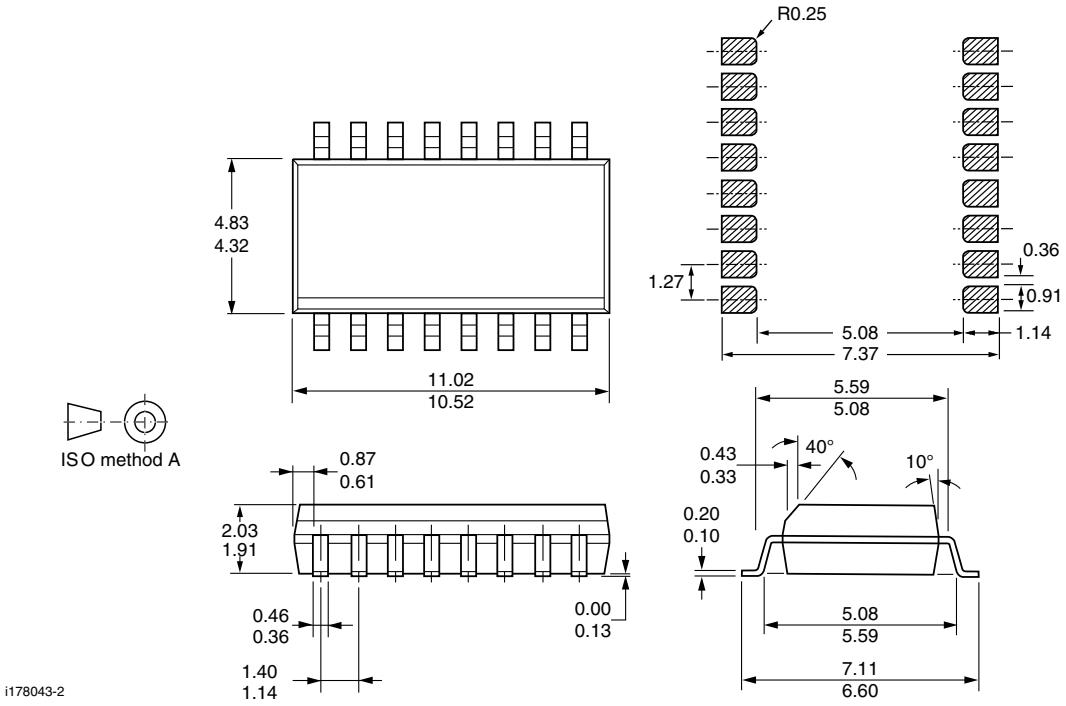
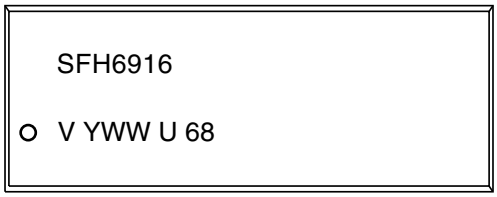
Fig. 11 - Switching Time Measurement

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



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