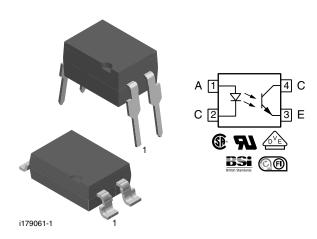




Vishay Semiconductors

Optocoupler, Phototransistor Output, Low Input Current



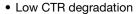
DESCRIPTION

The SFH618A (DIP) and SFH6186 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared diode emitter, which is optically coupled to silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 or SMD package.

The coupling devices are designed for signal transmission between two electrically separated circuits. The couplers are end-stackable with 2.54 mm lead spacing. Creepage and clearance distances of > 8 mm achieved with option 6.

FEATURES

· Good CTR linearity depending on forward current



- High collector emitter voltage, V_{CEO} = 55 V
- Isolation test voltage, 5300 V_{RMS}
- Low coupling capacitance
- End stackable, 0.100" (2.54 mm) spacing
- High common mode transient immunity
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Telecom
- · Industrial controls
- Battery powered equipment
- Office machines

AGENCY APPROVALS

The safety application model number covering all products in this datasheet is SFH618A. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744 system code H or J, double protection
- CSA 93751
- DIN EN 60747-5-5 (VDE 0884-5) available with option 1
- BSI IEC 60950; IEC 60065
- FIMKO

ORDERING INFORM	ATION				
S F H 6	1 8 #	- # X 0 # CTR PACKAGE OPTIC	# T ON TAPE	Option 6 10.16 mm 10.16 mm Option 9	
AGENCY CERTIFIED/PACKAGE		CTR (%) 1 mA			
UL, CUL	63 to 125	100 to 200	160 to 320	250 to 500	
DIP-4	SFH618A-2	SFH618A-3	SFH618A-4	SFH618A-5	
DIP-4, 400 mil, option 6	-	SFH618A-3X006	-	-	
SMD-4, option 7	-	-	-	SFH618A-5X007T (1)	
SMD-4, option 9	SFH6186-2T ⁽¹⁾	SFH6186-3T ⁽¹⁾ , SFH6186-3T1 ⁽²⁾ , SFH6186-3X002T ⁽¹⁾	SFH6186-4T ⁽¹⁾	SFH6186-5T ⁽¹⁾ , SFH6186-5T1 ⁽²⁾	
VDE, UL, CUL	63 to 125	100 to 200	160 to 320	250 to 500	
DIP-4	-	SFH618A-3X001	SFH618A-4X001	-	
DIP-4, 400 mil, option 6	-	SFH618A-3X016	SFH618A-4X016	SFH618A-5X016	
SMD-4, option 7	-	SFH618A-3X017T ⁽¹⁾	-	SFH618A-5X017T (1)	
SMD-4, option 9	-	SFH6186-3X001T (1)	SFH6186-4X001T	SFH6186-5X001T (1)	

Notes

Rev. 2.5, 18-Jun-14

- Additional options may be possible, please contact sales office
- (1) Also available in tubes, do not put T to the end
- (2) Product is rotated 90° in tape and reel cavity



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SFH618A, SFH6186

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ABSOLUTE MAXIMUM RA	ATINGS ($T_{amb} = 25 ^{\circ}C$, unless of	therwise specifie	d)	
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Reverse voltage		V_{R}	6	V
Power dissipation		P _{diss}	70	mW
Forward current		l _F	60	mA
OUTPUT	·			
Collector emitter voltage		V_{CEO}	55	V
Emitter collector voltage		V _{ECO}	7	V
0 " .		I _C	50	mA
Collector current	t _p ≤ 1 ms	I _C	100	mA
Power dissipation		P _{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector	t = 1 s	V _{ISO}	5300	V _{RMS}
la clatica vaciatana	V _{IO} = 500 V, T _{amb} = 25 °C	R _{IO}	≥ 10 ¹²	Ω
Isolation resistance	V _{IO} = 500 V, T _{amb} = 100 °C	R _{IO}	≥ 10 ¹¹	Ω
Storage temperature range		T _{stg}	-55 to +150	°C
Ambient temperature range		T _{amb}	-55 to +100	°C
Junction temperature		Tj	125	°C
Soldering temperature (1)	max. 10 s, dip soldering distance to seating plane ≥ 1.5 mm	T _{sld}	260	°C

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 (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

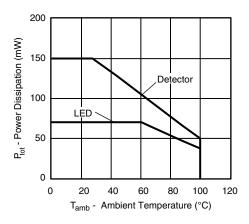


Fig. 1 - Permissible Power Dissipation vs. Ambient Temperature



SFH618A, SFH6186

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ELECTRICAL CHARACTE						1441/	
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	$I_F = 5 \text{ mA}$		V_{F}		1.1	1.5	V
Reverse current	V _R = 6 V		I _R		0.01	10	μΑ
Capacitance	$V_R = 0 V, f = 1 MHz$		Co		25		pF
Thermal resistance			R _{thja}		1070		K/W
OUTPUT							
Collector emitter leakage current	V _{CE} = 10 V		I _{CEO}		10	200	nA
Collector emitter capacitance	V _{CE} = 5 V, f = 1 MHz		C _{CE}		7		pF
Thermal resistance			R _{thja}		500		K/W
COUPLER							
	I _C = 0.32 mA, I _F = 1 mA	SFH618A-2	V _{CEsat}		0.25	0.4	V
		SFH6186-2	V _{CEsat}		0.25	0.4	V
	I _C = 0.5 mA, I _F = 1 mA	SFH618A-3	V _{CEsat}		0.25	0.4	V
Collector emitter saturation		SFH6186-3	V _{CEsat}		0.25	0.4	V
voltage	I _C = 0.8 mA, I _F = 1 mA	SFH618A-4	V _{CEsat}		0.25	0.4	V
		SFH6186-4	V _{CEsat}		0.25	0.4	V
	1 405 m A 1 4 ·· A	SFH618A-5	V _{CEsat}		0.25	0.4	V
	$I_C = 1.25 \text{ mA}, I_F = 1 \text{ mA}$	SFH6186-5	V _{CEsat}		0.25	0.4	V
Coupling capacitance			C _C		0.25		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.

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
_	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SFH618A-2	CTR	63		125	%
	$I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$	SFH6186-2	CTR	63		125	%
	1 05 1 1 5 1	SFH618A-2	CTR	32	75		%
	$I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$	SFH6186-2	CTR	32	75		%
	I= 1 mA V== 05 V	SFH618A-3	CTR	100		200	%
	$I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$	SFH6186-3	CTR	100		200	%
	$I_F = 0.5 \text{ mA}, V_{CF} = 1.5 \text{ V}$	SFH618A-3	CTR	50	120		%
1 //	$I_F = 0.5 \text{ IIIA}, V_{CE} = 1.5 \text{ V}$	SFH6186-3	CTR	50	120		%
I _C /I _F	1 1 mA 1/ 0.5 1/	SFH618A-4	CTR	160		320	%
$I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$ $I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ $I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$	$I_F = 1 \text{ IIIA}, V_{CE} = 0.5 \text{ V}$	SFH6186-4	CTR	160		320	%
	1 05 mA V 15 V	SFH618A-4	CTR	80	200		%
	IF = 0.5 MA, V _{CE} = 1.5 V	SFH6186-4	CTR	80	200		%
	SFH618A-5	CTR	250		500	%	
	SFH6186-5	CTR	250		500	%	
	1 05 15	SFH618A-5	CTR	125	300		%
	$I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$	SFH6186-5	CTR	125	300		%

SWITCHING CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)							
PARAMETER TEST CONDITION SYMBOL MIN. TYP. MAX. UNIT							
Turn on time	$V_{CC} = 5 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$	t _{on}		6		μs	
Rise time	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω	t _r		3.5		μs	
Turn off time	$V_{CC} = 5 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$	t _{off}		5.5		μs	
Fall time	$V_{CC} = 5 \text{ V}, I_{C} = 2 \text{ mA}, R_{L} = 100 \Omega$	t _f		5		μs	



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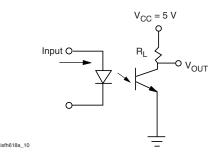


Fig. 2 - Test Circuit

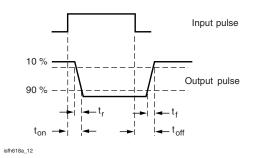


Fig. 3 - Test Circuit and Waveforms

SAFETY AND INSULATION RATINGS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Climatic classification (according to IEC68 part 1)				55/100/21			
Comparative tracking index		CTI	175		399		
V _{IOTM}			10000			V	
V _{IORM}			890			V	
P _{SO}					400	mW	
I _{SI}					275	mA	
T _{SI}					175	°C	
Creepage distance	Standard DIP-4		7			mm	
Clearance distance	Standard DIP-4		7			mm	
Creepage distance	400 mil DIP-4		8			mm	
Clearance distance	400 mil DIP-4		8			mm	
Insulation thickness, reinforced rated	per IEC60950 2.10.5.1		0.4			mm	

Note

As per IEC60747-5-5, § 7.4.3.8.2, 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)

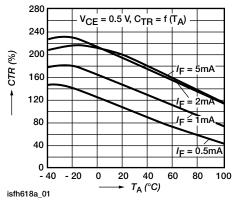


Fig. 4 - Current Transfer Ratio (typ.)

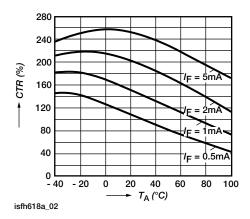


Fig. 5 - Current Transfer Ratio (typ.)



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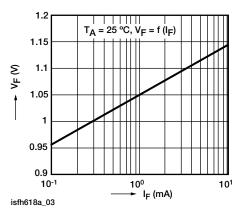


Fig. 6 - Diode Forward Voltage (typ.)

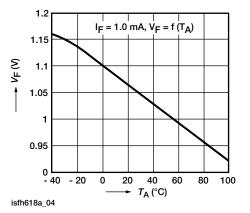


Fig. 7 - Diode Forward Voltage (typ.)

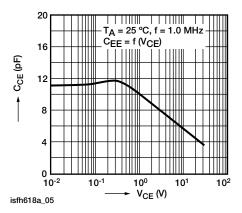


Fig. 8 - Transistor Capacitance

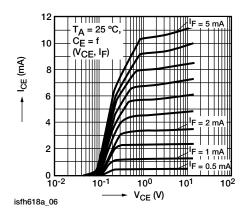


Fig. 9 - Output Characteristics

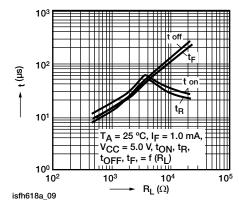


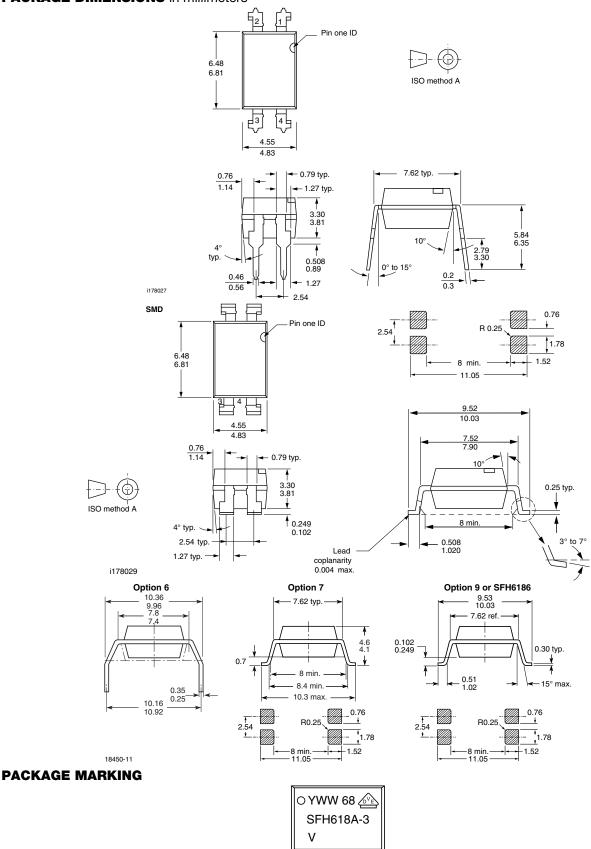
Fig. 10 - Switching Times (typ.)



SFH618A, SFH6186

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PACKAGE DIMENSIONS in millimeters





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