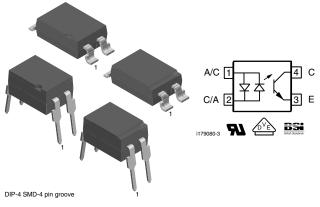
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Vishay Semiconductors

# **Optocoupler, Phototransistor Output, AC Input, Low Input Current**



### DESCRIPTION

The SFH628A (DIP) and SFH6286 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode, which is optically coupled to a 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 are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400  $V_{RMS}$  or DC.

### FEATURES

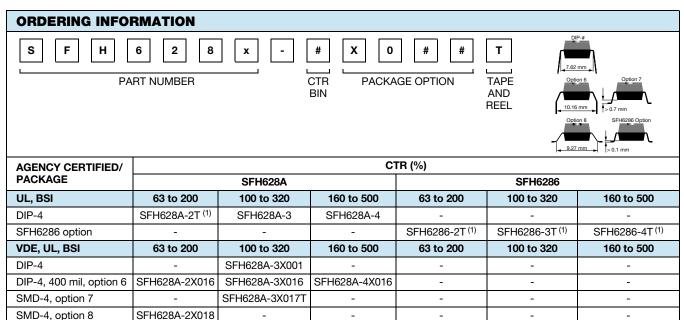
- High common mode interference immunity
- Isolation test voltage, 5300 V<sub>BMS</sub>
- Low coupling capacitance
- Good CTR linearity depending on forward current
- Low CTR degradation
- High collector emitter voltage,  $V_{CEO} = 55 \text{ V}$
- Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

### APPLICATIONS

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

### AGENCY APPROVALS

- UL1577, file no. E52744 system code H
- DIN EN 60747-5-5 (VDE0884-5), available with option 1
- BSI IEC 60950; IEC 60065



#### Notes

Additional options may be possible, please contact sales office.

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<sup>(1)</sup> Also available in tubes; do not add T to end.

SFH6286 option

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SFH6286-2X001T SFH6286-3X001T SFH6286-4X001T (1)

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RoHS

COMPLIANT





## **Vishay Semiconductors**

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)   PARAMETER TEST CONDITION SYMBOL VALUE								
	TEST CONDITION	SYMBOL	VALUE	UNIT				
INPUT								
DC forward current		١ <sub>F</sub>	± 50	mA				
Surge forward current	t ≤ 10 µs	I <sub>FSM</sub>	± 2.5	А				
Power dissipation		P <sub>diss</sub>	76	mW				
OUTPUT								
Collector emitter voltage		V <sub>CEO</sub>	55	V				
Emitter collector voltage		V <sub>ECO</sub>	7	V				
		Ι <sub>C</sub>	50	mA				
Collector current	t <sub>p</sub> ≤ 1 ms	Ι <sub>C</sub>	100	mA				
Power dissipation		P <sub>diss</sub>	150	mW				
COUPLER								
Isolation test voltage		V <sub>ISO</sub>	5300	V <sub>RMS</sub>				
Creepage distance			≥7	mm				
Clearance distance			≥7	mm				
Insulation thickness between			≥ 0.4	mm				
Comparative tracking index per DIN IEC112/			175					
Isolation resistance	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 25 °C	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω				
	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 100 °C	R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω				
Storage temperature range		T <sub>stg</sub>	-55 to +150	°C				
Ambient temperature range		T <sub>amb</sub>	-55 to +100	°C				
Soldering temperature <sup>(1)</sup>	max. 10 s, dip soldering distance	T <sub>sld</sub>	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 ٠ 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).

ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
INPUT								
Forward voltage	$I_F = \pm 5 \text{ mA}$		V <sub>F</sub>		1.1	1.5	V	
Capacitance	V <sub>R</sub> = 0 V, f = 1 MHz		Co		45		pF	
Thermal resistance			R <sub>thja</sub>		1070		K/W	
OUTPUT								
Collector emitter leakage current	V <sub>CE</sub> = 10 V		I <sub>CEO</sub>		10	200	nA	
Collector emitter capacitance	V <sub>CE</sub> = 5 V, f = 1 MHz		C <sub>CE</sub>		7		pF	
Thermal resistance			R <sub>thja</sub>		500		K/W	
COUPLER								
Collector emitter saturation voltage	$I_F = \pm 1 \text{ mA}, I_C = 0.5 \text{ mA}$	SFH628A-2	V <sub>CEsat</sub>		0.25	0.4	V	
		SFH6286-2	V <sub>CEsat</sub>		0.25	0.4	V	
	$I_{\rm F} = \pm 1$ mA, $I_{\rm C} = 0.8$ mA	SFH628A-3	V <sub>CEsat</sub>		0.25	0.4	V	
		SFH6286-3	V <sub>CEsat</sub>		0.25	0.4	V	
	$I_F = \pm 1 \text{ mA}, I_C = 1.25 \text{ mA}$	SFH628A-4	V <sub>CEsat</sub>		0.25	0.4	V	
		SFH6286-4	V <sub>CEsat</sub>		0.25	0.4	V	

#### Note

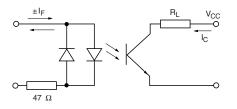
Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering • evaluation. Typical values are for information only and are not part of the testing requirements.



# **Vishay Semiconductors**

CURRENT TRANSFER RATIO (T <sub>amb</sub> = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT	
	$I_{F} = \pm 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$	SFH628A-2	CTR	63		200	%	
		SFH6286-2	CTR	63		200	%	
	$I_{\rm F} = \pm 0.5$ mA, $V_{\rm CE} = 1.5$ V	SFH628A-2	CTR	32	100		%	
I <sub>C</sub> /I <sub>F</sub>		SFH6286-2	CTR	32	100		%	
	$I_F = \pm 1$ mA, $V_{CE} = 0.5$ V	SFH628A-3	CTR	100		320	%	
		SFH6286-3	CTR	100		320	%	
	I <sub>E</sub> = ± 0.5 mA, V <sub>CE</sub> = 1.5 V	SFH628A-3	CTR	50	160		%	
	$r_{\rm F} = \pm 0.5  \text{mA},  v_{\rm CE} = 1.5  \text{v}$	SFH6286-3	CTR	50	160		%	
	$I_{F} = \pm 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$	SFH628A-4	CTR	160		500	%	
		SFH6286-4	CTR	160		500	%	
	$I_F = \pm 0.5$ mA, $V_{CE} = 1.5$ V	SFH628A-4	CTR	80	250		%	
		SFH6286-4	CTR	80	250		%	

SWITCHING CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Turn-on time	$V_{CC}$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 $\Omega$	t <sub>on</sub>		6		μs	
Rise time	$V_{CC}$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 $\Omega$	t <sub>r</sub>		3.5		μs	
Turn-off time	$V_{CC}$ = 5 V, $I_C$ = 2 mA, $R_L$ = 100 $\Omega$	t <sub>off</sub>		5.5		μs	
Fall time	$V_{CC}$ = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 $\Omega$	t <sub>f</sub>		5		μs	



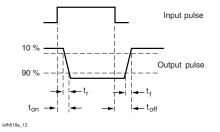


Fig. 1 - Test Circuit

Fig. 2 - Test Circuit and Waveforms

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			
V <sub>IOTM</sub>			10000			V		
V <sub>IORM</sub>			890			V		
P <sub>SO</sub>					400	mW		
I <sub>SI</sub>					275	mA		
T <sub>SI</sub>					175	°C		
Creepage distance	Standard DIP-8		7			mm		
Clearance distance	Standard DIP-8		7			mm		
Creepage distance	400 mil DIP-8		8			mm		
Clearance distance	400 mil DIP-8		8			mm		
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			mm		

#### Note

• As per IEC 60747-5-5, § 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.

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## **Vishay Semiconductors**

### **TYPICAL CHARACTERISTICS** ( $T_{amb} = 25$ °C, unless otherwise specified)

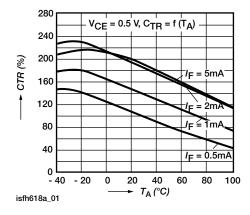


Fig. 3 - Current Transfer Ratio (typ.)

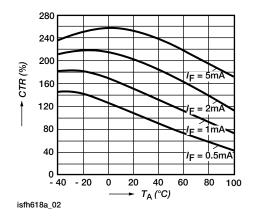


Fig. 4 - Current Transfer Ratio (typ.)

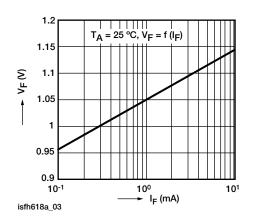


Fig. 5 - Diode Forward Voltage (typ.)

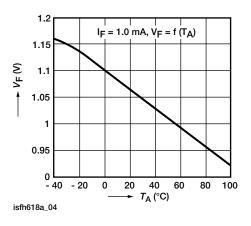


Fig. 6 - Diode Forward Voltage (typ.)

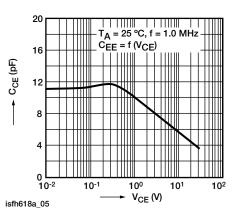


Fig. 7 - Transistor Capacitance

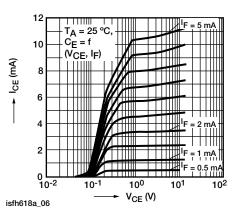


Fig. 8 - Output Characteristics

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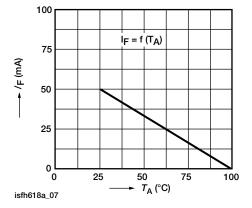


Fig. 9 - Permissible Forward Current Diode

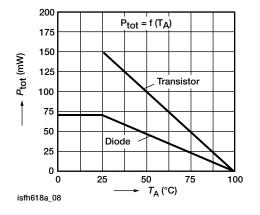
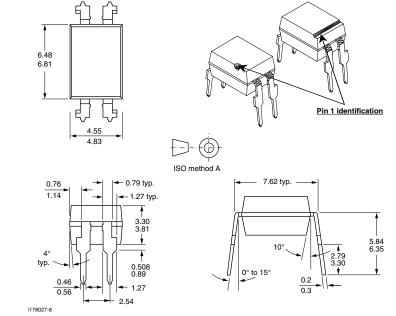


Fig. 10 - Permissible Power Dissipation

### **PACKAGE DIMENSIONS** in millimeters



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t (µs)

10<sup>3</sup>

102

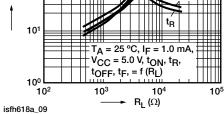


Fig. 11 - Switching Times (Typ.)

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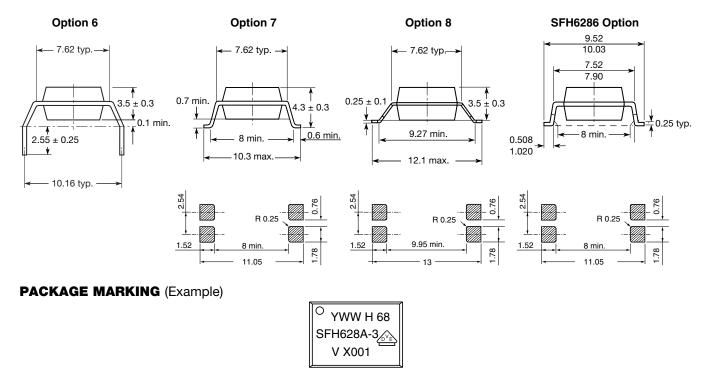
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# SFH628A, SFH6286



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#### Notes

- Only options 1, 7, and 8 are reflected in the package marking.
- The VDE logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.



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