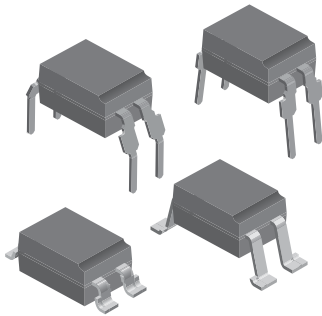




# Optocoupler, Phototransistor Output, AC Input



## FEATURES

- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V<sub>RMS</sub>
- High collector emitter voltage, V<sub>CEO</sub> = 70 V
- Low saturation voltage
- Fast switching times
- Low CTR degradation
- Temperature stable
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- High common-mode interference immunity
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

## DESCRIPTION

The SFH620A (DIP) and SFH6206 (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 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<sub>RMS</sub> or DC.

## AGENCY APPROVALS

The safety application model number covering all products in this datasheet is SFH620A and SHF6206. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744 system code H, V double protection
- CSA 93751
- BSI EN 60950, EN 60065
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC GB8898-2011, GB4943.1-2011

**ORDERING INFORMATION**

S F H 6 2 0 x - # X 0 # # T

PART NUMBER CTR BIN PACKAGE OPTION TAPE AND REEL

AGENCY CERTIFIED/PACKAGE	CTR (%)					
	± 10 mA					
	SFH620A			SFH6206		
UL, cUL, BSI	40 to 125	63 to 200	100 to 320	40 to 125	63 to 200	100 to 320
DIP-4	SFH620A-1	SFH620A-2	SFH620A-3	-	-	-
DIP-4, 400 mil, option 6	SFH620A-1X006	SFH620A-2X006	SFH620A-3X006	-	-	-
SMD-4, option 7	-	SFH620A-2X007T <sup>(1)</sup>	-	-	-	-
SMD-4, option 9	-	-	-	SFH6206-1T <sup>(1)</sup>	SFH6206-2T <sup>(1)</sup>	SFH6206-3T <sup>(1)</sup>
VDE, UL, CUL, BSI	40 to 125	63 to 200	100 to 320	40 to 125	63 to 200	100 to 320
DIP-4	SFH620A-1X001	SFH620A-2X001	SFH620A-3X001	-	-	-
DIP-4, 400 mil, option 6	-	SFH620A-2X016	SFH620A-3X016	-	-	-
SMD-4, option 7	-	SFH620A-2X017T	-	-	-	-
SMD-4, option 9	-	-	-	-	SFH6206-2X001T <sup>(1)</sup>	SFH6206-3X001T <sup>(1)</sup>

## Notes

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes; do not add T to end.



ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
DC forward current		$I_F$	$\pm 60$	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	$\pm 2.5$	A
Power dissipation		$P_{diss}$	100	mW
<b>OUTPUT</b>				
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	50	mA
	$t_p \leq 1\text{ }\mu\text{s}$	$I_C$	100	mA
Power dissipation		$P_{diss}$	150	mW
<b>COUPLER</b>				
Total power dissipation		$P_{tot}$	250	mW
Storage temperature range		$T_{stg}$	-55 to +150	$^{\circ}\text{C}$
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 $\geq 1.5\text{ mm}$	$T_{sld}$	260	$^{\circ}\text{C}$

**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.
- <sup>(1)</sup> 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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	$I_F = \pm 60\text{ mA}$		$V_F$		1.25	1.65	V
Capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_O$		50		pF
Thermal resistance			$R_{thja}$		750		K/W
<b>OUTPUT</b>							
Collector emitter capacitance	$V_{CE} = 5\text{ V}$ , $f = 1\text{ MHz}$		$C_{CE}$		6.8		pF
Thermal resistance			$R_{thja}$		500		$^{\circ}\text{C}/\text{W}$
<b>COUPLER</b>							
Collector emitter saturation voltage	$I_F = \pm 10\text{ mA}$ , $I_C = 2.5\text{ mA}$		$V_{CEsat}$		0.25	0.4	V
Coupling capacitance			$C_C$		0.2		pF
Collector emitter leakage current	$V_{CE} = 10\text{ V}$	SFH620A-1	$I_{CEO}$		2	50	nA
		SFH6206-1	$I_{CEO}$		2	50	nA
		SFH620A-2	$I_{CEO}$		2	50	nA
		SFH6206-2	$I_{CEO}$		2	50	nA
		SFH620A-3	$I_{CEO}$		5	100	nA
		SFH6206-3	$I_{CEO}$		5	100	nA

**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. Still air, coupler soldered to PCB or base.

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$V_{CE} = 5\text{ V}$ , $I_F = \pm 10\text{ mA}$	SFH620A-1	CTR	40		125	%
		SFH6206-1	CTR	40		125	%
		SFH620A-2	CTR	63		200	%
		SFH6206-2	CTR	63		200	%
		SFH620A-3	CTR	100		320	%
		SFH6206-3	CTR	100		320	%
	$V_{CE} = 5\text{ V}$ , $I_F = \pm 1\text{ mA}$	SFH620A-1	CTR	13	30		%
		SFH6206-1	CTR	13	30		%
		SFH620A-2	CTR	22	45		%
		SFH6206-2	CTR	22	45		%
		SFH620A-3	CTR	34	70		%
		SFH6206-3	CTR	34	70		%



isfh620a\_08

Fig. 1 - Switching Times Linear Operation (without Saturation)

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$	$t_{on}$		3		$\mu\text{s}$
Rise time	$R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$	$t_r$		2		$\mu\text{s}$
Turn-off time	$R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$	$t_{off}$		2.3		$\mu\text{s}$
Fall time	$R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$	$t_f$		2		$\mu\text{s}$
Cut-off frequency	$R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$	$t_{ctr}$		208		kHz

<b>SAFETY AND INSULATION RATINGS</b>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55/115/21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, $t = 1\text{ min}$	$V_{ISO}$	4470	$V_{RMS}$
Tested withstanding isolation voltage	According to UL1577, $t = 1\text{ s}$	$V_{ISO}$	5300	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	8000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$T_{amb} = 100\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	700	mW
Input safety current		$I_{SI}$	400	mA
Input safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance	DIP-4		$\geq 7$	mm
Clearance distance	DIP-4		$\geq 7$	mm
Creepage distance	DIP-4, 400 mil, option 6		$\geq 8$	mm
Clearance distance	DIP-4, 400 mil, option 6		$\geq 8$	mm
Creepage distance	SMD-4, option 7 and option 9		$\geq 7$	mm
Clearance distance	SMD-4, option 7 and option 9		$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	mm

**Note**

- As per DIN EN 60747-5-5, § 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<sub>amb</sub> = 25 °C, unless otherwise specified)

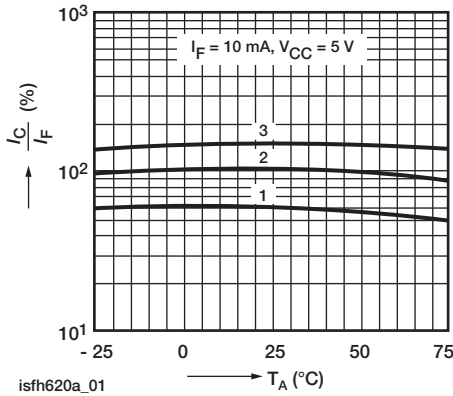


Fig. 2 - Current Transfer Ratio (CTR) vs. Temperature



Fig. 5 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

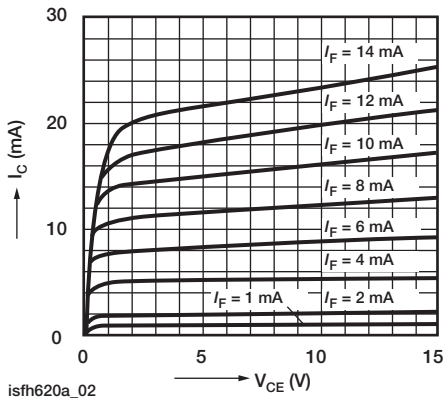


Fig. 3 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage



Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width



Fig. 4 - Diode Forward Voltage (Typ.) vs. Forward Current



Fig. 7 - Permissible Power Dissipation vs. Ambient Temperature

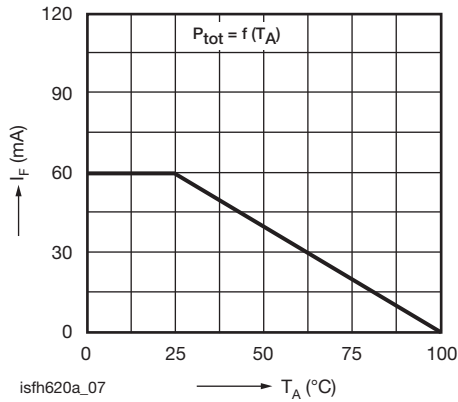


Fig. 8 - Permissible Diode Forward Current vs. Ambient Temperature

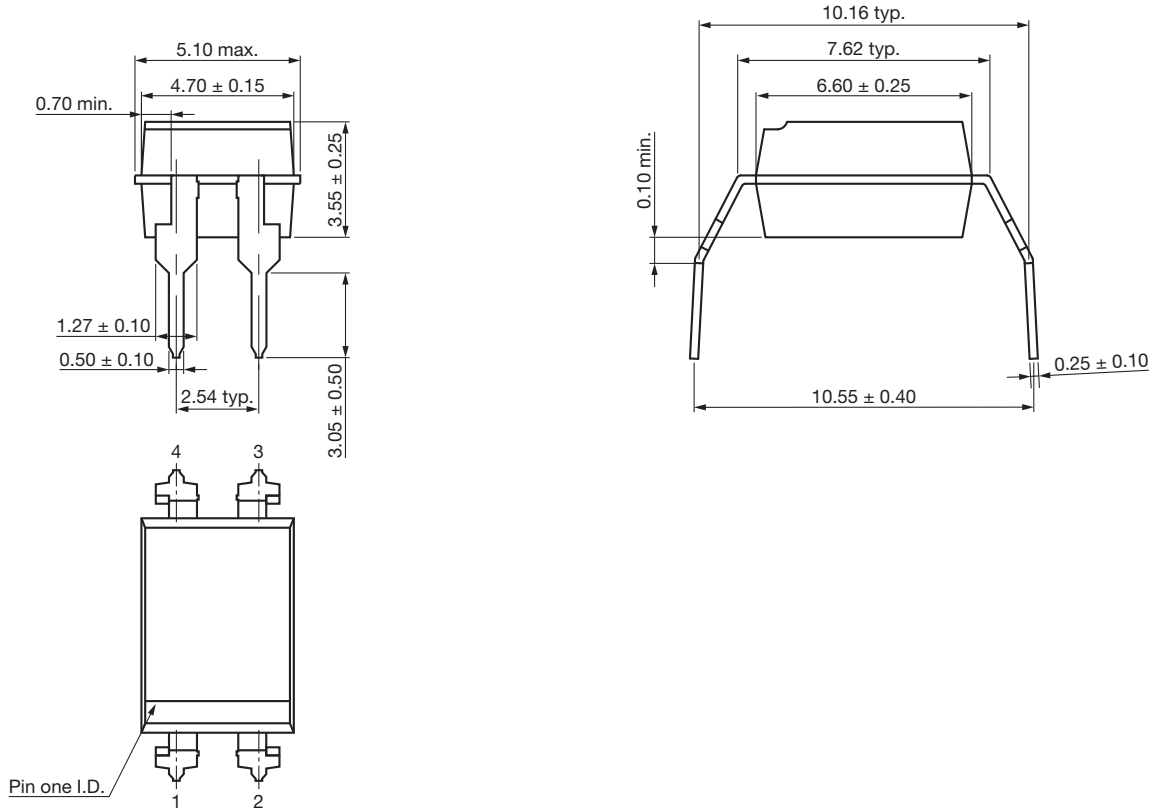
**PACKAGE DIMENSIONS** in millimeters

**DIP-4, Standard**

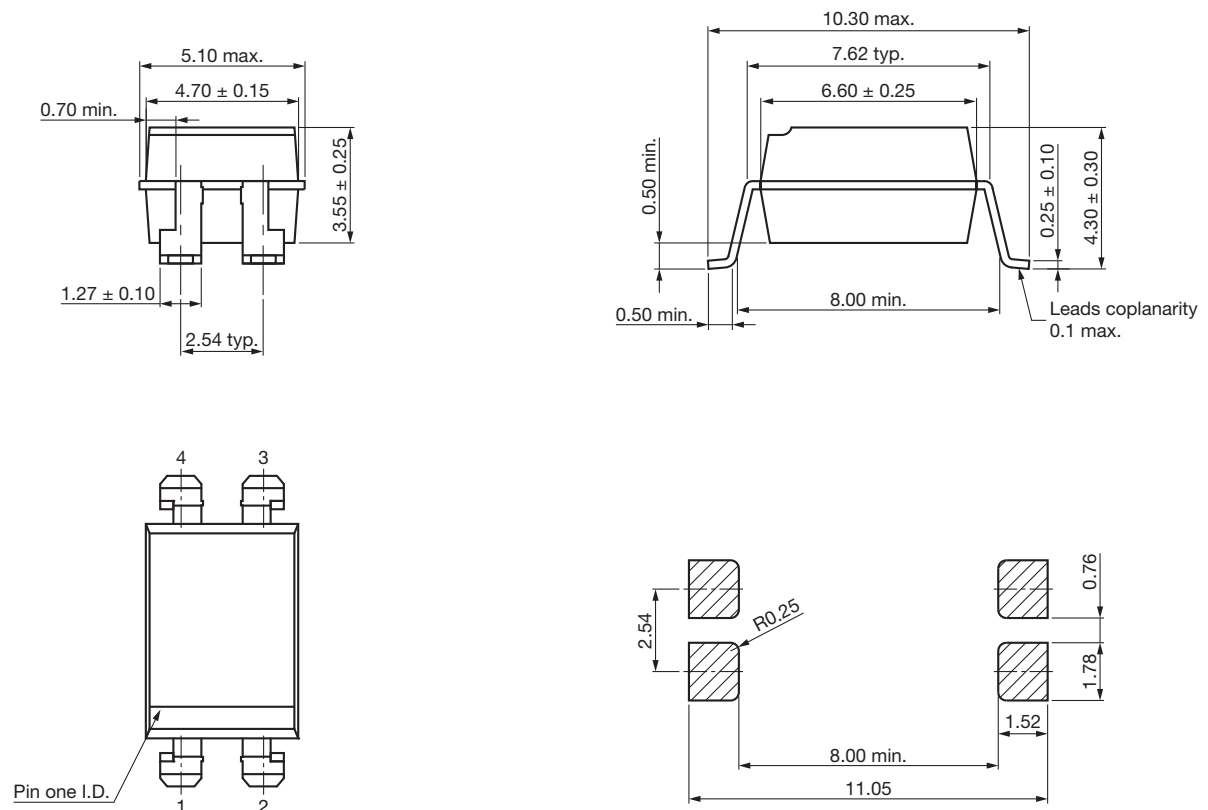




### DIP-4, Option 6



### SMD-4, Option 7



SMD-4, Option 9



PACKAGE MARKING (example)



Notes

- Only options 1 and 7 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.

SOLDER PROFILES



Fig. 9 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP-8 Devices



Fig. 10 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD-8 Devices



**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2

Floor life: unlimited

Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ , RH < 85 %

Moisture sensitivity level 1, according to J-STD-020





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