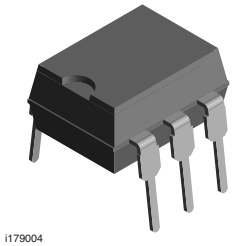
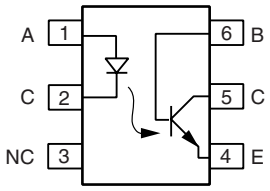
Optocoupler, Phototransistor Output, Low Input Current, with Base Connection, 5300 V_{RMS}





FEATURES

- Very high CTR at I_F = 1.0 mA, V_{CE} = 0.5 V
- Specified minimum CTR at I_F = 0.5 mA
- V_{CE} = 1.5 V ≥ 32 % (typ. 120 %)
- Good CTR linearity with forward current
- Low CTR degradation
- High collector-emitter voltage, V_{CEO} = 55 V
- Isolation test voltage: 5300 V_{RMS}
- Low current input
- Low coupling capacitance
- High common mode transient immunity
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The SFH608 is an optocoupler designed for high current transfer ratio at low input currents with the output transistor saturated. This makes the device ideal for low current switching applications. The SFH608 is packaged in a six pin plastic DIP.

AGENCY APPROVALS

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

APPLICATIONS

- Telecommunications
- Industrial controls
- Office machines
- Microprocessor system interfaces

ORDER INFORMATION	
PART	**REMARKS**
SFH608-2	CTR 63 % to 125 %, DIP-6
SFH608-3	CTR 100 % to 200 %, DIP-6
SFH608-4	CTR 160 % to 320 %, DIP-6
SFH608-5	CTR 250 % to 500 %, DIP-6
SFH608-2-X006	CTR 63 % to 125 %, DIP-6 400 mil (option 6)
SFH608-2-X007	CTR 63 % to 125 %, SMD-6 (option 7)
SFH608-2-X009	CTR 63 % to 125 %, SMD-6 (option 9)
SFH608-3-X006	CTR 100 % to 200 %, DIP-6 400 mil (option 6)
SFH608-3-X007	CTR 100 % to 200 %, SMD-6 (option 7)
SFH608-4-X006	CTR 160 % to 320 %, DIP-6 400 mil (option 6)
SFH608-4-X007	CTR 160 % to 320 %, SMD-6 (option 7)
SFH608-5-X007	CTR 250 % to 500 %, SMD-6 (option 7)

Note
For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS (1)

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}	70	mW
OUTPUT				
Collector emitter voltage		V_{CE}	55	V
Collector base voltage		V_{CBO}	55	V
Emitter base voltage		V_{EBO}	7	V
Collector current		I_C	50	mA
Surge collector current	$t_P \leq 1.0$ ms		100	mA
Total power dissipation		P_{diss}	150	mW
COUPLER				
Isolation test voltage between emitter and detector	t = 1.0 s	V_{ISO}	5300	V_{RMS}
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Comparative tracking index per DIN IEC 112/VDE0303, part 1			175	
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	≥ 10^{12}	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	≥ 10^{11}	Ω
Storage temperature range		T_{stg}	- 55 to + 150	°C
Operating temperature range		T_{amb}	- 55 to + 100	°C
Soldering temperature (2)	max. 10 s, dip soldering: distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C

Notes

(1) T_{amb} = 25 °C, unless otherwise specified.
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.

(2) 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

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I_F = 5 mA		V_F		1.1	1.5	V
Reverse voltage	I_R = 10 µA		V_R	6			V
Reverse current	V_R = 6 V		I_R		0.01	10	µA
Capacitance	V_R = 0 V, f = 1 MHz		C_O		25		pF
Thermal resistance			R_{thja}		1070		K/W
OUTPUT							
Collector emitter voltage	I_{CE} = 10 µA		V_{CEO}	55			V
Emitter base voltage	I_{EB} = 10 µA		V_{EBO}	7			V
Collector emitter capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CE}		10		pF
Collector base capacitance	V_{CE} = 5 V, f = 1 MHz		C_{CB}		16		pF
Emitter base capacitance	V_{CE} = 5 V, f = 1 MHz		C_{EB}		10		pF
Thermal resistance			R_{thja}		500		K/W
Collector emitter leakage current	V_{CE} = 10 V		I_{CEO}		10	200	nA

ELECTRICAL CHARACTERISTICS

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
COUPLER							
Coupling capacitance			C_C		0.6		pF
Saturation voltage, collector emitter	I_C = 0.32 mA, I_F = 1 mA	SFH608-2	V_{CEsat}		0.25	0.4	V
	I_C = 0.5 mA, I_F = 1 mA	SFH608-3	V_{CEsat}		0.25	0.4	V
	I_C = 0.8 mA, I_F = 1 mA	SFH608-4	V_{CEsat}		0.25	0.4	V
	I_C = 1.25 mA, I_F = 1 mA	SFH608-5	V_{CEsat}		0.25	0.4	V

Note

T_{amb} = 25 °C, unless otherwise specified.
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

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Coupling transfer ratio	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-2	CTR	63		125	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-2	CTR	32	75		%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-3	CTR	100		200	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-3	CTR	50	120		%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-4	CTR	160		320	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-4	CTR	80	200		%
	I_F = 1 mA, V_{CC} = 0.5 V	SFH608-5	CTR	250		500	%
	I_F = 0.5 mA, V_{CC} = 1.5 V	SFH608-5	CTR	125	300		%

SWITCHING CHARACTERISTICS

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	I_C = 2 mA (to adjust by I_F), R_L = 100 Ω, V_{CC} = 5 V	t_{on}		8		µs
Rise time	I_C = 2 mA (to adjust by I_F), R_L = 100 Ω, V_{CC} = 5 V	t_r		5		µs
Turn-off time	I_C = 2 mA (to adjust by I_F), R_L = 100 Ω, V_{CC} = 5 V	t_{off}		7.5		µs
Fall time	I_C = 2 mA (to adjust by I_F), R_L = 100 Ω, V_{CC} = 5 V	t_f		7		µs

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_{IOTM}			8000			V
V_{IORM}			890			V
P_{SO}					700	mW
I_{SI}					400	mA
T_{SI}					175	°C
Creepage distance	standard DIP-6		7			mm
Clearance distance	standard DIP-6		7			mm
Creepage distance	400 mil DIP-6		8			mm
Clearance distance	400 mil DIP-6		8			mm
Insulation thickness, reinforced rated	per IEC 60950 2.10.5.1		0.4			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

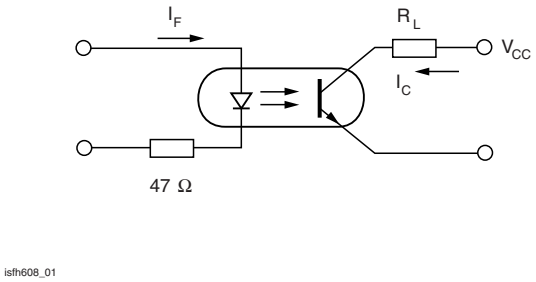


Fig. 1 - Switching Schematic

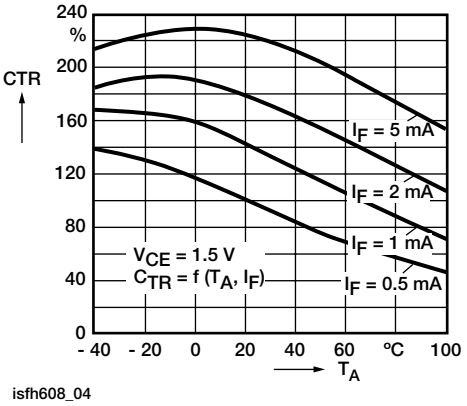


Fig. 4 - Current Transfer Ratio (typ.)

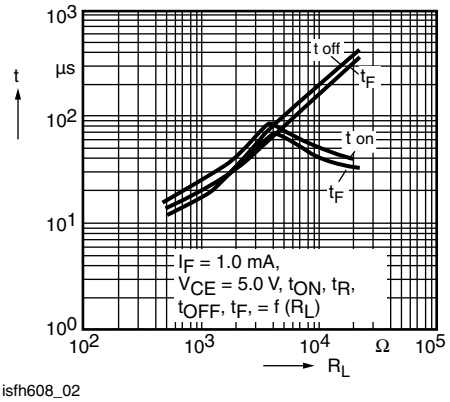


Fig. 2 - Switching Times

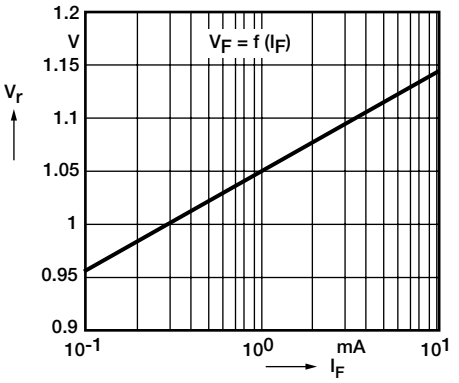


Fig. 5 - Diode Forward Voltage (typ.)

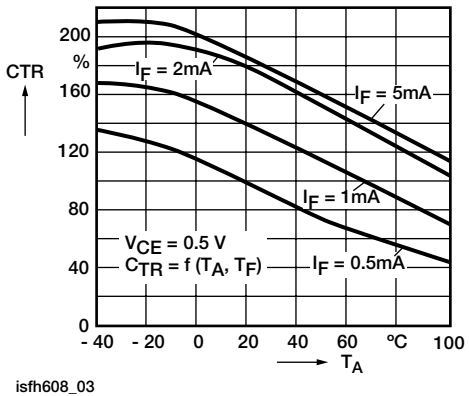


Fig. 3 - Current Transfer Ratio (typ.)

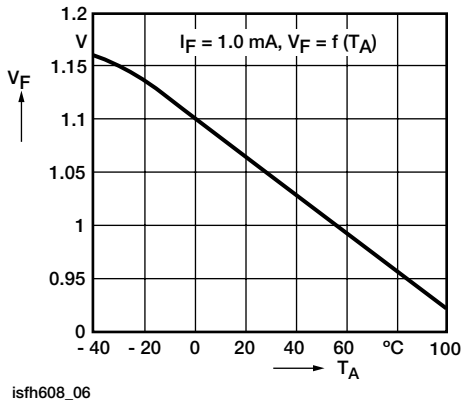
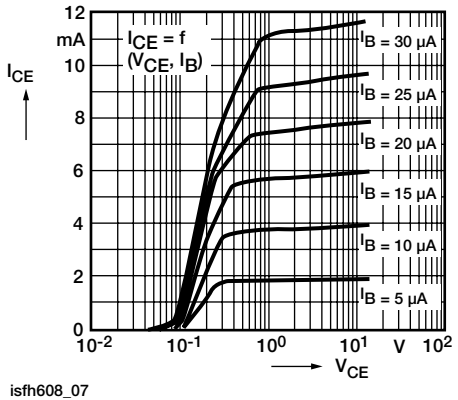
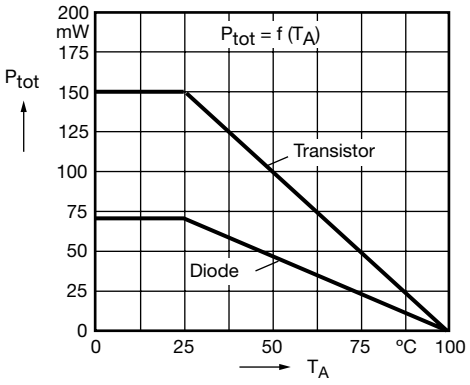


Fig. 6 - Diode Forward Voltage (typ.)



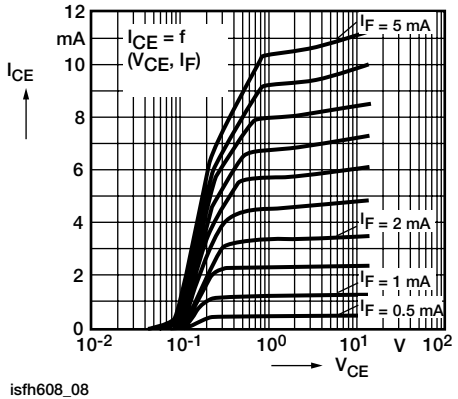
isfh608_07

Fig. 7 - Output Characteristics



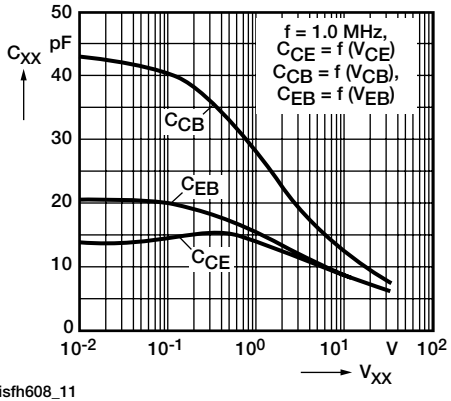
isfh608_10

Fig. 10 - Permissible Power Dissipation for Transistor and Diode



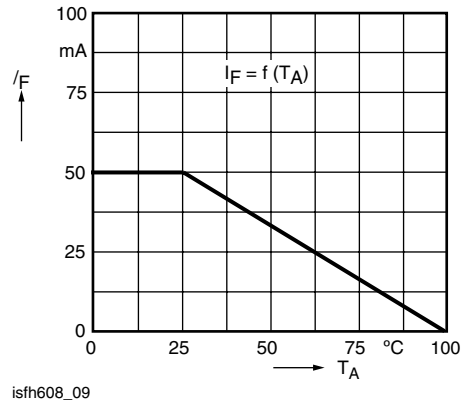
isfh608_08

Fig. 8 - Output Characteristics



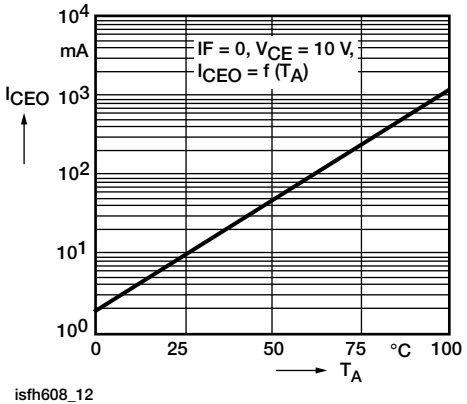
isfh608_11

Fig. 11 - Transistor Capacitance



isfh608_09

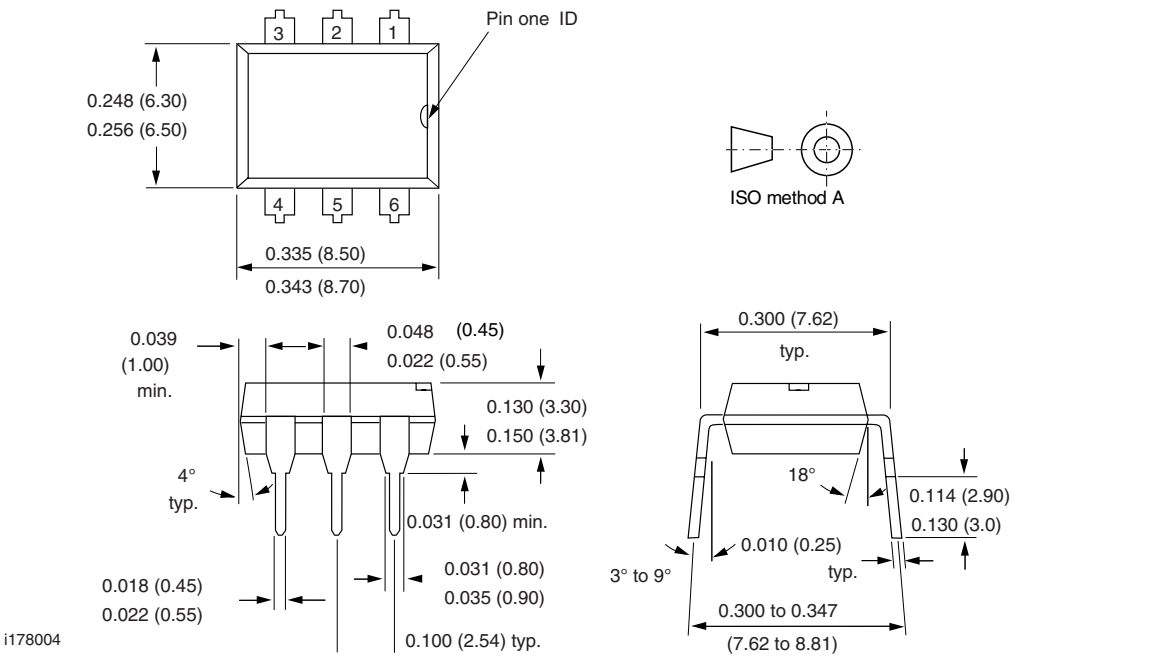
Fig. 9 - Permissible Forward Current Diode



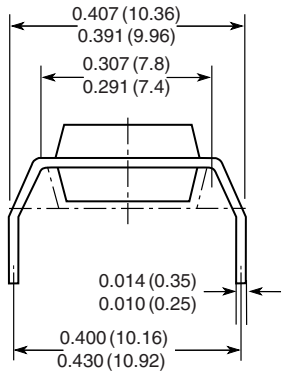
isfh608_12

Fig. 12 - Collector Emitter Leakage Current vs. Temperature

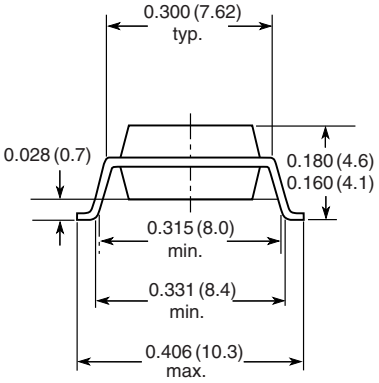
PACKAGE DIMENSIONS in inches (millimeters)



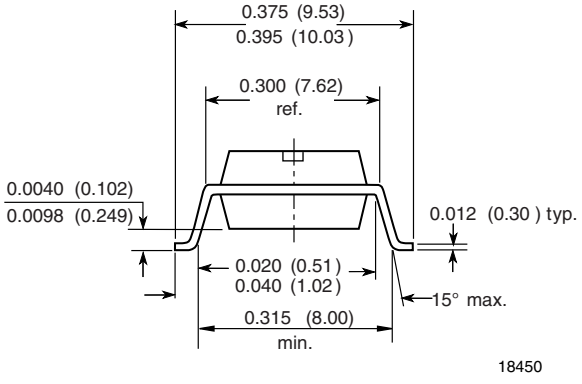
Option 6



Option 7



Option 9



OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.