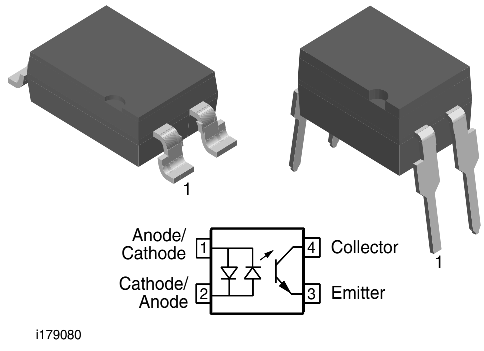
Phototransistor, 5.3 KV TRIOS® Low Current AC Input Optocoupler

Features

- High Common-mode Interference Immunity
- Isolation Test Voltage, 5300 V_{RMS}
- Low Coupling Capacitance
- Field-Effect Stable by TRIOS (TRansparent IOn Shield)
- Good CTR Linearity Depending on Forward Current
- Low CTR Degradation
- High Collector-emitter Voltage, V_{CEO} = 55 V



Agency Approvals

- UL File No. 52744, System Code H or J
- VDE 0884 Available with Option 1

Applications

Telecom
Industrial Controls
Battery Powered Equipment
Office Machines

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 > 8.0 mm are achieved with option 6. This version complies with IEC 950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400 V_{RMS} or DC.

Order Information

Part	Remarks
SFH628A-2	CTR 63-200 %, DIP
SFH628A-3	CTR 100-320 %, DIP
SFH628A-4	CTR 160-500 %, DIP
SFH6286-2	CTR 63-200 %, SMD
SFH6286-3	CTR 100-320 %, SMD
SFH6286-4	CTR 160-500 % SMD

For additional order information see Option Section

Absolute Maximum Ratings

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

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the devise. 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 Rating for extended periods of the time can adversely affect reliability.

Emitter

Parameter	Test condition	Symbol	Value	Unit
DC forward current		I_F	± 50	mA
Surge forward current	t ≤ 10 µs	I_{FSM}	± 2.5	A

Detector

Parameter	Test condition		Symbol	Value	Unit
Collector-emitter voltage			V_{CE}	55	V
Emitter-collector voltage			V_{EC}	7.0	V
Collector current			I_C	50	mA
	$t_p \leq 1.0$ ms		I_C	100	mA
Power dissipation			P_{Diss}	150	mW

Coupler

Parameter	Test condition		Symbol	Value	Unit
Isolation test voltage between emitter and detector, refer to Climate DIN 40046, part2, Nov.74			V_{IO}	5300	V_{RMS}
Creepage distance				≥ 7.0	mm
Clearance				≥ 7.0	mm
Insulation thickness between emitter and detector				≥ 0.4	mm
Comparative tracking index per DIN IEC 112/VDEO 303, part 1				175	
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 +150	°C
Ambient temperature range			T_{amb}	- 55 to +100	°C
Junction temperature			T_J	100	°C
Soldering temperature (max. 10 s. Dip Soldering distance to seating plane ≥ 1.5 mm)			T_{sd}	260	°C

Electrical Characteristics

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.

Emitter

Parameter	Test condition		Symbol		Typ.	Max	Unit
Forward voltage	I_F = 5.0 mA		V_F		1.1	1.5	V
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O		45		pF
Thermal resistance			R_{thJA}		1070		K/W

Detector

Parameter	Test condition		Symbol		Typ.	Max	Unit
Collector-emitter leakage current	V_{CE} = 10 V		I_{CEO}		10	200	nA
Capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}		7		pF
Thermal resistance			R_{thJA}		500		K/W

Coupler

Parameter	Test condition	Part	Symbol		Typ.	Max	Unit
Collector-emitter saturation voltage	I_F = ± 1.0 mA, I_C = 0.5 mA	SFH628A-2/ SFH6286-2	V_{CEsat}		0.25	0.4	V
	I_F = ± 1.0 mA, I_C = 0.8 mA	SFH628A-3/ SFH6286-3	V_{CEsat}		0.25	0.4	V
	I_F = ± 1.0 mA, I_C = 1.25 mA	SFH628A-4/ SFH6286-4	V_{CEsat}		0.25	0.4	V

Current Transfer Ratio

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
I_C/I_F	I_F = ± 1.0 mA, V_{CE} = 0.5 V	SFH628A-2/ SFH6286-2	CTR	63		200	%
	I_F = ± 0.5 mA, V_{CE} = 1.5 V	SFH628A-2/ SFH6286-2	CTR	32	100		%
	I_F = ± 1.0 mA, V_{CE} = 0.5 V	SFH628A-3/ SFH6286-3	CTR	100		320	%
	I_F = ± 0.5 mA, V_{CE} = 1.5 V	SFH628A-3/ SFH6286-3	CTR	50	160		%
	I_F = ± 1.0 mA, V_{CE} = 0.5 V	SFH628A-4/ SFH6286-4	CTR	160		500	%
	I_F = ± 0.5 mA, V_{CE} = 1.5 V	SFH628A-4/ SFH6286-4	CTR	80	250		%

Switching Characteristics

Parameter	Test condition		Symbol			Max	Unit
Turn-on time	V_{CC} = 5.0 V, I_C = 2.0 mA, R_L = 100 Ω		t_{on}			6.0	µs
Rise time	V_{CC} = 5.0 V, I_C = 2.0 mA, R_L = 100 Ω		t_r			3.5	µs
Turn-off time	V_{CC} = 5.0 V, I_C = 2.0 mA, R_L = 100 Ω		t_{off}			5.5	µs
Fall time	V_{CC} = 5.0 V, I_C = 2.0 mA, R_L = 100 Ω		t_f			5.0	µs

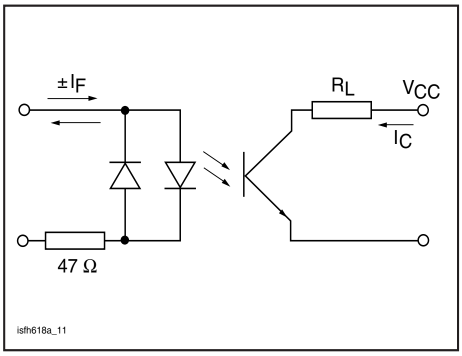


Figure 1. Test Circuit

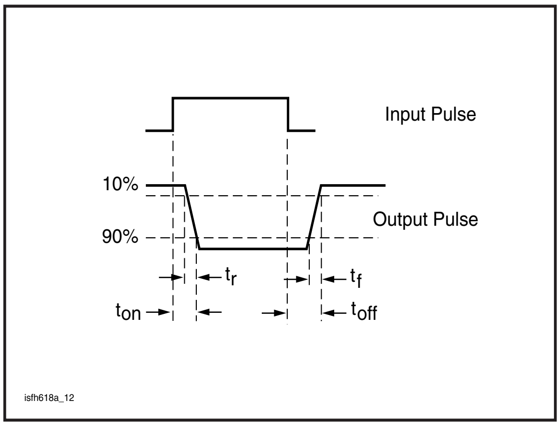


Figure 2. Test Circuit and Waveforms

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

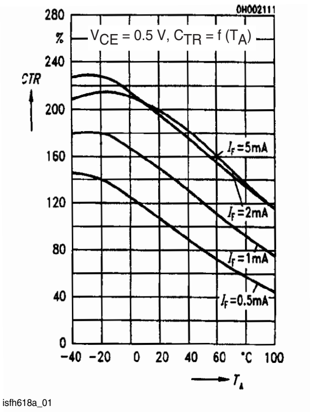


Figure 3. Current Transfer Ratio (typ.)

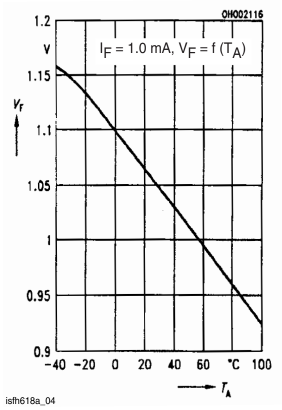


Figure 6. Diode Forward Voltage (typ.)

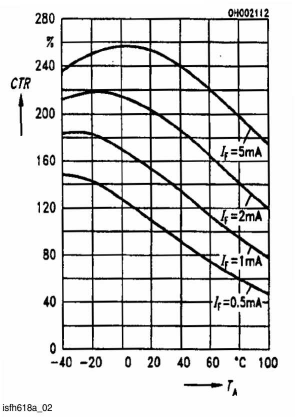


Figure 4. Current Transfer Ratio (typ.)

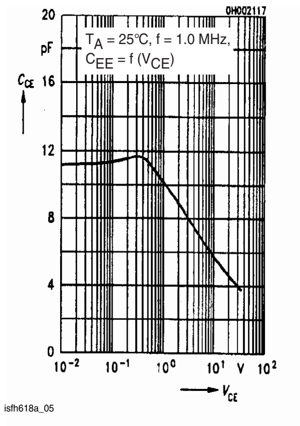


Figure 7. Transistor Capacitance

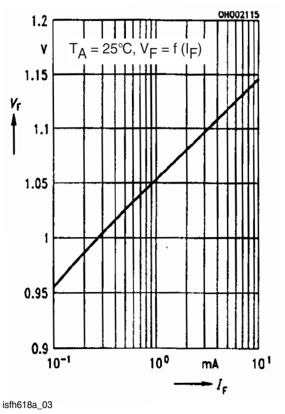


Figure 5. Diode Forward Voltage (typ.)

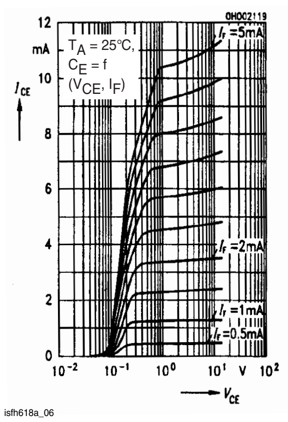


Figure 8. Output Characteristics

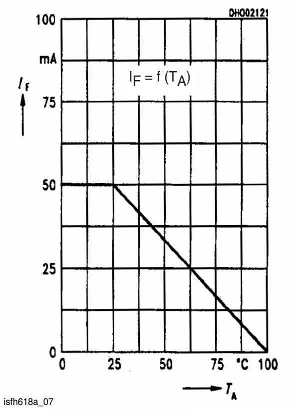


Figure 9. Permissible Forward Current Diode

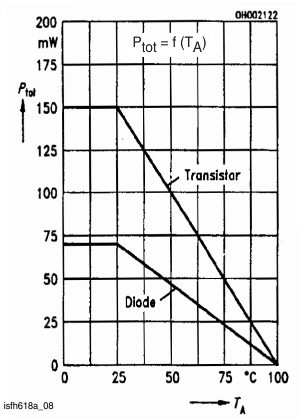


Figure 10. Permissible power dissipation

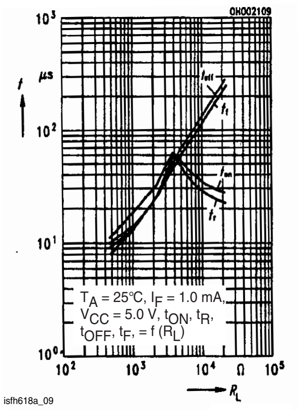
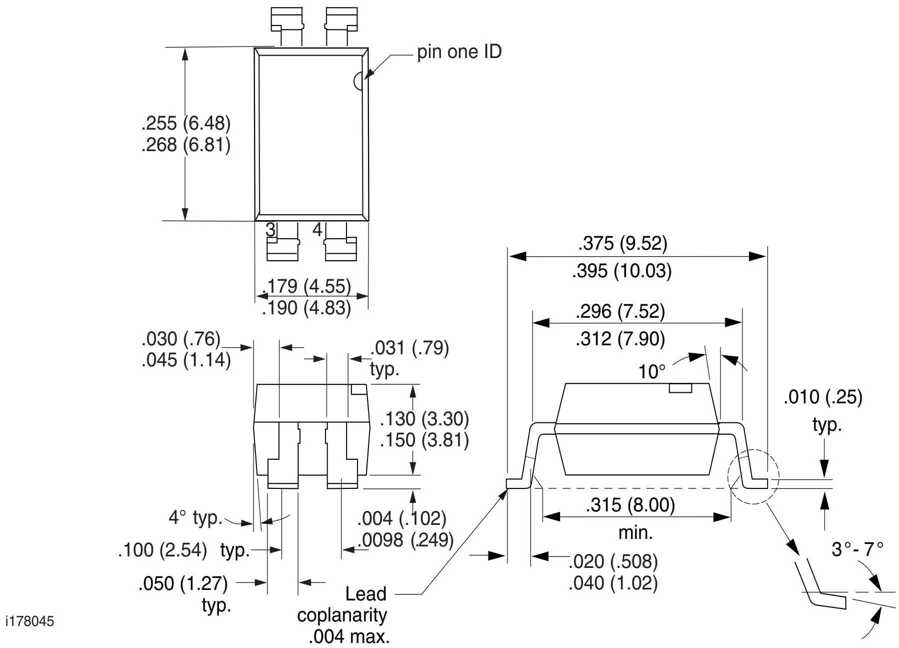
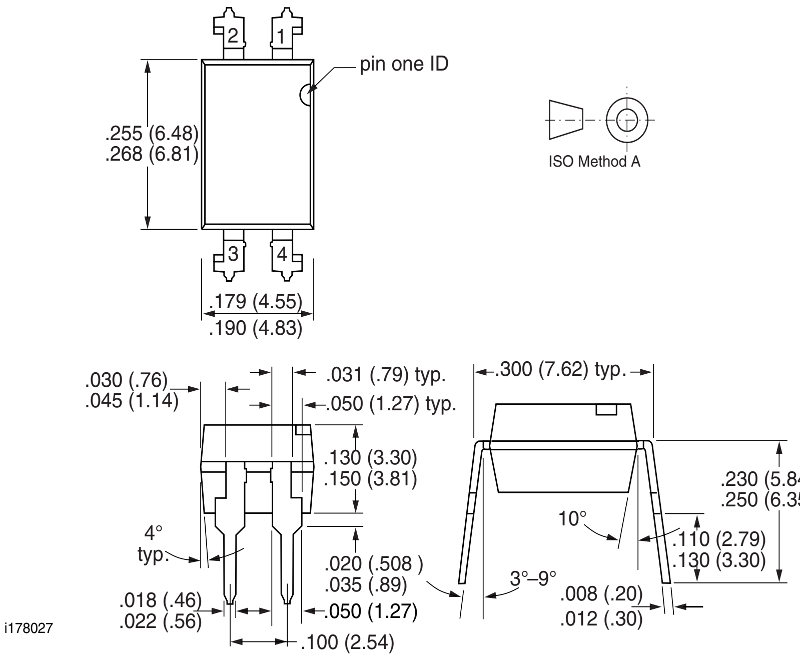


Figure 11. Switching times (typ.)

Package Dimensions in Inches (mm)





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 operatingsystems 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.

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