VISHAY

SFH618A/628A

Phototransistor, 5.3 kV TRIOS®
Low Current Input
Optocoupler

FEATURES

- **Very High CTR at I_F=1.0 mA, V_{CE}=0.5 V**
  - **SFH618A-2, 63–125%**
  - **SFH618A-3, 100–200%**
  - **SFH618A-4, 160–320%**
  - **SFH618A-5, 250–500%**
  - **SFH628A-2, 63–200%**
  - **SFH628A-3, 100–320%**
  - **SFH628A-4, 160–500%**
- **Specified Minimum CTR at I_F=0.5 mA**
  - **SFH618A, V_{CE}=1.5 V: ≥32% (typical 120%)**
  - **SFH628A, V_{CE}=1.5 V: ≥50% (typical 160%)**
- **Good CTR Linearity Depending on Forward Current**
- **Low CTR Degradation**
- **High Collector-emitter Voltage, V_{CEO}=55 V**
- **Isolation Test Voltage, 5300 V_{RMS}**
- **Low Coupling Capacitance**
- **Field-Effect Stable by TRIOS (TRansparent IOn Shield)**
- **End-Stackable, 0.100" (2.54 mm) Spacing**
- **High Common-mode Interference Immunity (Unconnected Base)**
- **Underwriters Lab File #52744**
- **VDE 0884 Available with Option 1**
- **SMD Option — See SFH6186/6286 Data Sheet**

APPLICATIONS

- **Telecom**
- **Industrial Controls**
- **Battery Powered Equipment**
- **Office Machines**

DESCRIPTION

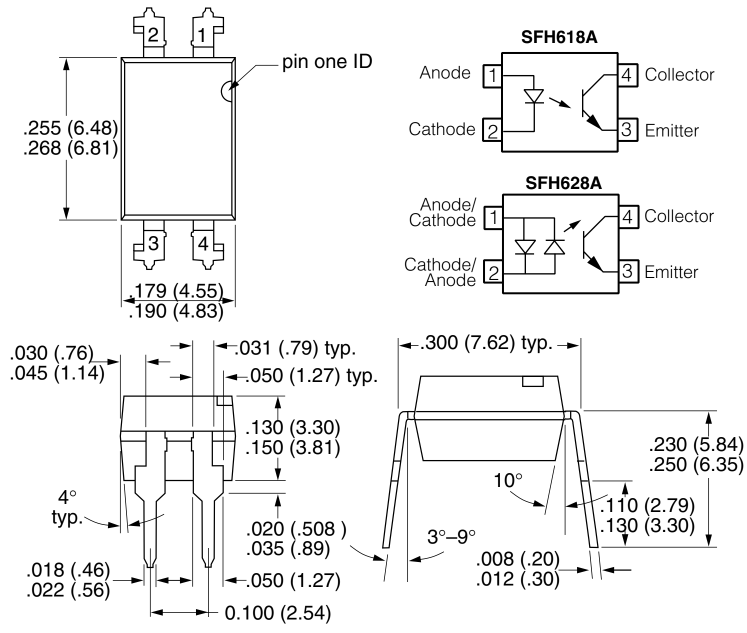
The SFH618A/628A feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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 up to an operation voltage of 400 V_{RMS} or DC.

Dimensions in Inches (mm)



Maximum Ratings

Emitter

Reverse Voltage (SFH618A) .... 6.0 V
DC Forward Current (SFH628A) .... ±50 mA
Surge Forward Current (t_p≤10 µs) (SFH628A) .... ±2.5 A
Total Power Dissipation .... 70 mW

Detector

Collector-emitter Voltage .... 55 V
Emitter-collector Voltage .... 7.0 V
Collector Current .... 50 mA
Collector Current (t_p≤1.0 ms) .... 100 mA
Total Power Dissipation .... 150 mW

Package

Isolation Test Voltage between Emitter and Detector, refer to Climate DIN 40046, part 2, Nov. 74 .... 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/VDE0 303, part 1 175
Isolation Resistance
V_{IO}=500 V, T_A=25°C .... $\geq 10^{12}\ \Omega$
V_{IO}=500 V, T_A=100°C .... $\geq 10^{11}\ \Omega$
Storage Temperature Range .... –55 to +150°C
Ambient Temperature Range .... –55 to +100°C
Junction Temperature .... 100°C
Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥1.5 mm) .... 260°C

Characteristics (T_A=25°C)

Description		Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter							
Forward Voltage		V_F	—	1.1	1.5	V	I_F=5.0 mA
Reverse Current	SFH618A	I_R	—	.01	10	µA	V_R=6.0 V
Capacitance	SFH618A SFH628A	C_0	—	25 45	—	pF	V_R=0 V, f=1.0 MHz
Thermal Resistance		R_{thJA}	—	1070	—	K/W	—
Detector							
Collector-emitter Leakage Current		I_{CEO}	—	10	200	nA	V_{CE}=10 V
Capacitance		C_{CE}	—	7	—	pF	V_{CE}=5.0 V, f=1.0 MHz
Thermal Resistance		R_{thJA}	—	500	—	K/W	—
Package							
Collector-emitter Saturation Voltage	SFH618A-2	V_{CEsat}	—	0.25	0.4	V	I_C=0.32 mA, I_F=1.0 mA
	SFH618A-3		—	0.25	0.4		I_C=0.5 mA, I_F=1.0 mA
	SFH618A-4		—	0.25	0.4		I_C=0.8 mA, I_F=1.0 mA
	SFH618A-5		—	0.25	0.4		I_C=1.25 mA, I_F=1.0 mA
Collector-emitter Saturation Voltage	SFH628A-2	V_{CEsat}	—	0.25	0.4	V	I_C=0.5 mA, I_F=±1.0 mA
	SFH628A-3		—	0.25	0.4		I_C=0.8 mA, I_F=±1.0 mA
	SFH628A-4		—	0.25	0.4		I_C=1.25 mA, I_F=±1.0 mA
Coupling Capacitance	—	C_C	—	0.25	—	pF	—
Coupling Transfer Ratio	SFH618A-2	I_C/I_F	63	—	125	%	I_F=1.0 mA, V_{CE}=0.5 V
	SFH618A-2		32	75	—		I_F=0.5 mA, V_{CE}=1.5 V
	SFH618A-3	I_C/I_F	100	—	200	%	I_F=1.0 mA, V_{CE}=0.5 V
	SFH618A-3		50	120	—		I_F=0.5 mA, V_{CE}=1.5 V
	SFH618A-4	I_C/I_F	160	—	320	%	I_F=1.0 mA, V_{CE}=0.5 V
	SFH618A-4		80	200	—		I_F=0.5 mA, V_{CE}=1.5 V
	SFH618A-5	I_C/I_F	250	—	500	%	I_F=1.0 mA, V_{CE}=0.5 V
	SFH618A-5		125	300	—		I_F=0.5 mA, V_{CE}=1.5 V
Coupling Transfer Ratio	SFH628A-2	I_C/I_F	63	—	200	%	I_F=±1.0 mA, V_{CE}=0.5 V
	SFH628A-2		32	100	—		I_F=±0.5 mA, V_{CE}=1.5 V
	SFH628A-3	I_C/I_F	100	—	320	%	I_F=±1.0 mA, V_{CE}=0.5 V
	SFH628A-3		50	160	—		I_F=±0.5 mA, V_{CE}=1.5 V
	SFH628A-4	I_C/I_F	160	—	500	%	I_F=±1.0 mA, V_{CE}=0.5 V
	SFH628A-4		80	250	—		I_F=±0.5 mA, V_{CE}=1.5 V

Figure 1. Current Transfer Ratio (typ.)
V_{CE}=0.5 V, C_{TR}=f(T_A)

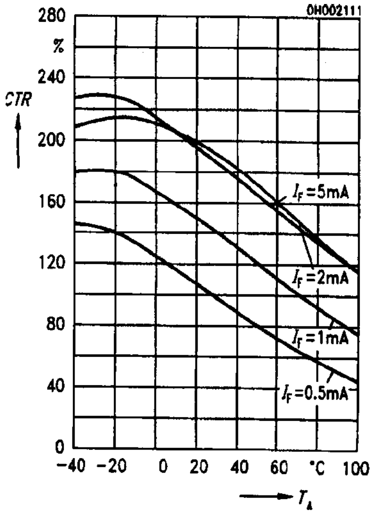


Figure 2. Current Transfer Ratio (typ.)
V_{CE}=1.5 V, C_{TR}=f(T_A)

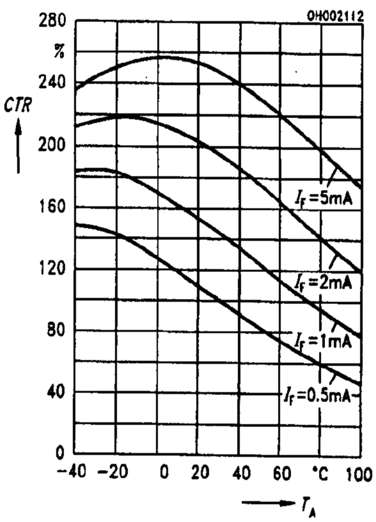


Figure 3. Diode Forward Voltage
T_A=25°C, V_F=f(I_F)

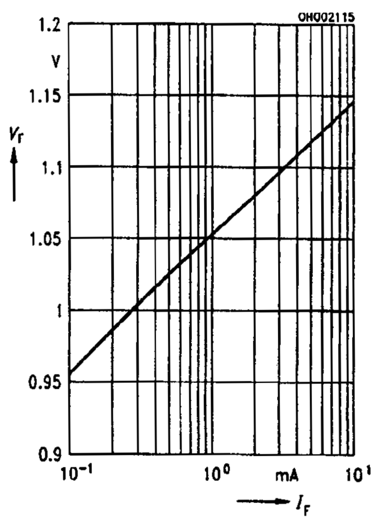


Figure 4. Diode Forward Voltage
I_F=1.0 mA, V_F=f(T_A)

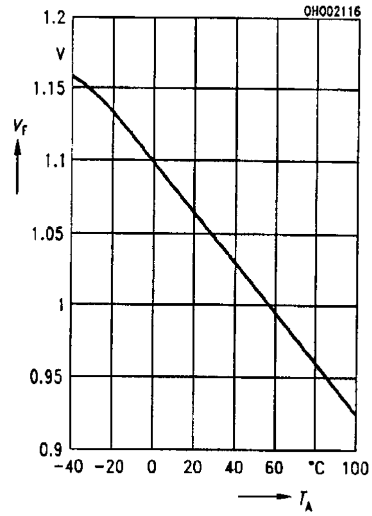


Figure 5. Transistor Capacitance
T_A=25°C, f=1.0 MHz, C_{CE}=f(V_{CE})

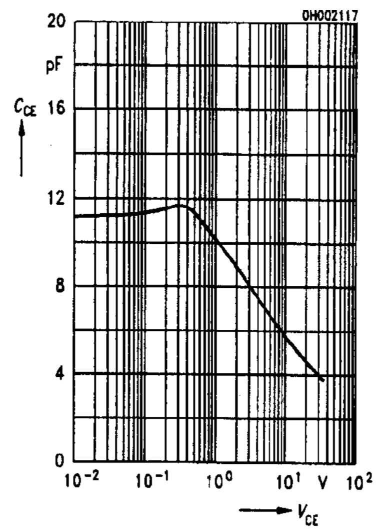


Figure 6. Output Characteristics
T_A=25°C, C_E=f(V_{CE}, I_F)

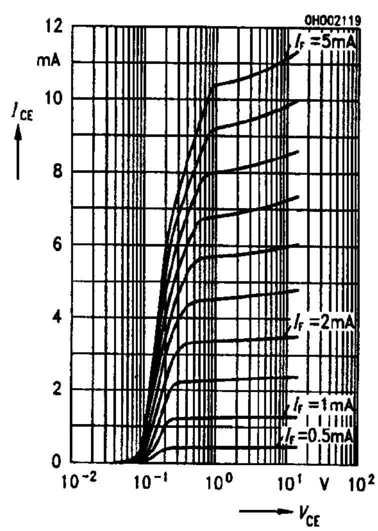


Figure 7. Permissible Forward Current Diode I_F=f(T_A)

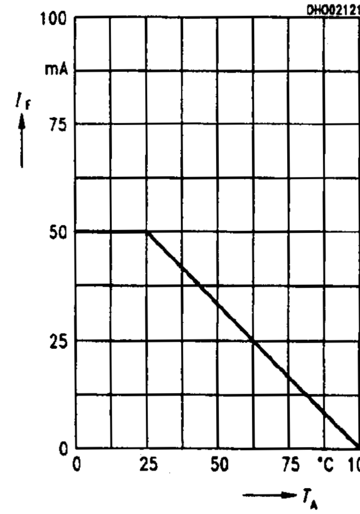


Figure 8. Permissible Power Dissipation P_{tot}=f(T_A)

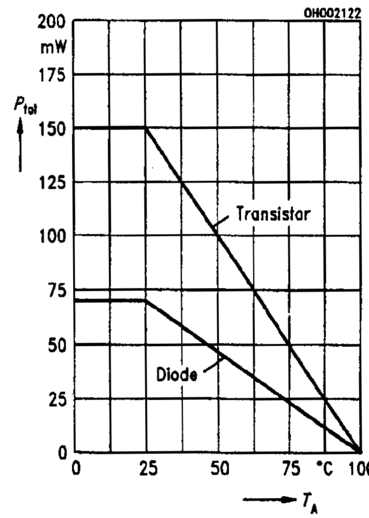
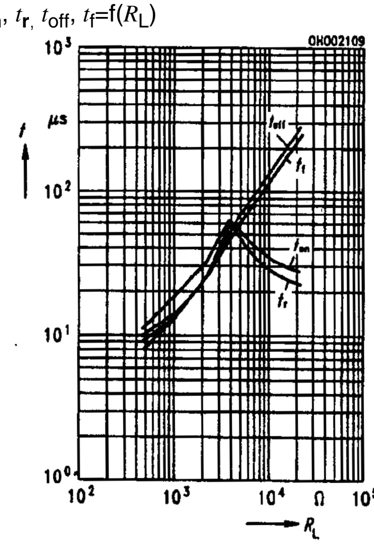


Figure 9. Switching Times (typ.)
T_A=25°C, I_F=1.0 mA, V_{CC}=5.0 V
t_{on}, t_r, t_{off}, t_f=f(R_L)



Switching Times, typical

V_{CC}=5.0 V, I_C=2.0 mA, R_L=100 Ω, T_A=25°C

Turn-on Time	t_{on}	6.0	µs
Rise Time	t_r	3.5	
Turn-off Time	t_{off}	5.5	
Fall Time	t_f	5.0	

Figure 10. Test Circuit—SFH618A

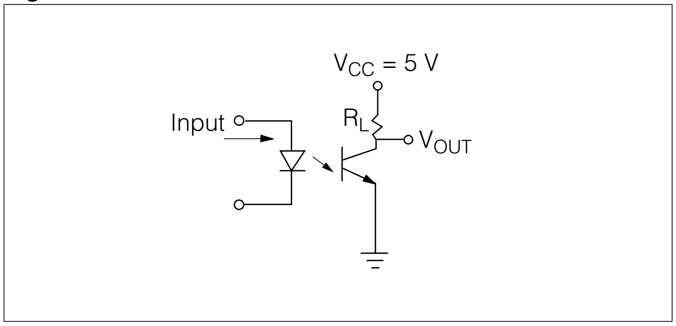


Figure 11. Test Circuit—SFH628A

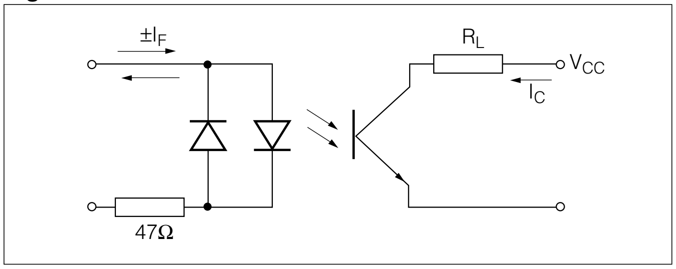


Figure 12. Test Circuit and Waveforms