

SFH618A/628A PHOTOTRANSISTOR, 5.3 kV TRIOS® LOW CURRENT INPUT OPTOCOUPLER

FEATURES

- **Very High CTR at $I_F=1$ 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: $\geq 32\%$ (typical 120%)
 - SFH628A, $V_{CE}=1.5$ V: $\geq 50\%$ (typical 160%)
- **Good CTR Linearity Depending on Forward Current**
- **Low CTR Degradation**
- **High Collector-Emitter Voltage, $V_{CEO}=55$ V**
- **Isolation Test Voltage, 5300 VAC_{RMS}**
- **Low Coupling Capacitance**
- **Field-Effect Stable by TRIOS (TRansparent IO n 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

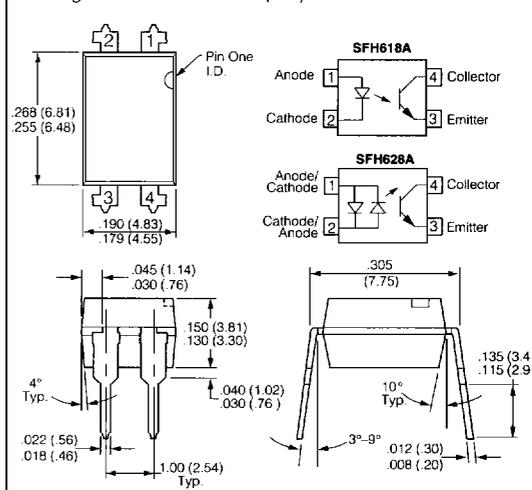
The SFH618A/628A feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

The coupling devices are designed for signal transmission between two electrically separated circuits.

The couplers are end-stackable with 2.54 mm spacing. Therefore multicouplers can easily be implemented and conventional multicouplers can be replaced.

Creepage and clearance distances of >8 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.

Package Dimensions in Inches (mm)



Maximum Ratings

Emitter

Reverse Voltage (SFH618A) 6 V
 DC Forward Current (SFH628A: \pm) 50 mA
 Surge Forward Current ($t_p \leq 10$ μ s) (SFH628A: \pm) 2.5 A
 Total Power Dissipation 70 mW

Detector

Collector-Emitter Voltage 55 V
 Emitter-Collector Voltage 7 V
 Collector Current 50 mA
 Collector Current ($t_p \leq 1$ ms) 100 mA
 Total Power Dissipation 150 mW

Package

Isolation Test Voltage between Emitter and Detector, refer to Climate DIN 40046, part 2, Nov. 745300 VAC_{RMS}
 Creepage ≥ 7 mm
 Clearance ≥ 7 mm
 Insulation Thickness between Emitter and Detector ≥ 0.4 mm
 Comparative Tracking Index per DIN IEC 112/VDE 0 303, part 1175
 Isolation Resistance
 $V_{IO}=500$ V, $T_A=25^\circ\text{C} \geq 10^{12} \Omega$
 $V_{IO}=500$ V, $T_A=100^\circ\text{C} \geq 10^{11} \Omega$
 Storage Temperature Range -55 to $+150^\circ\text{C}$
 Ambient Temperature Range -55 to $+100^\circ\text{C}$
 Junction Temperature 100°C
 Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥ 1.5 mm) 260°C

Specifications subject to change.

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 mA
Reverse Current		SFH618A I _R		.01	10		V _R =6 V
Capacitance		SFH618A SFH628A C _D		25 45		pF	V _R =0 V, f=1 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 V, f=1 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 mA
	SFH618A-3			0.25	0.4		I _C =0.5 mA, I _F =1 mA
	SFH618A-4			0.25	0.4		I _C =0.8 mA, I _F =1 mA
	SFH618A-5			0.25	0.4		I _C =1.25 mA, I _F =1 mA
Collector-Emitter Saturation Voltage	SFH628A-2	V _{CESAT}		0.25	0.4	V	I _C =0.5 mA, I _F =±1 mA
	SFH628A-3			0.25	0.4		I _C =0.8 mA, I _F =±1 mA
	SFH628A-4			0.25	0.4		I _C =1.25 mA, I _F =±1 mA
Coupling Capacitance		C _C		0.25		pF	
Coupling Transfer Ratio	SFH618A-2	I _C /I _F	63		125	%	I _F =1 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 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 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 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 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 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 mA, V _{CE} =0.5 V
	SFH628A-4		80	250			I _F =±0.5 mA, V _{CE} =1.5 V

Optocouplers
(Transistors)



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Switching Times Measurement

Figure 1. Test circuit—SFH618A

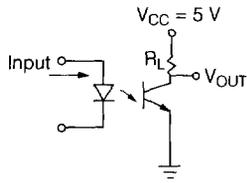


Figure 3. Switching times, typical
 $V_{CC}=5\text{ V}$, $I_C=2\text{ mA}$, $R_L=100\Omega$, $T_A=25^\circ\text{C}$

Turn-on Time	t_{ON}	6.0	μs
Rise Time	t_R	3.5	μs
Turn-off Time	t_{OFF}	5.5	μs
Fall Time	t_F	5.0	μs

Figure 2. Test circuit—SFH628A

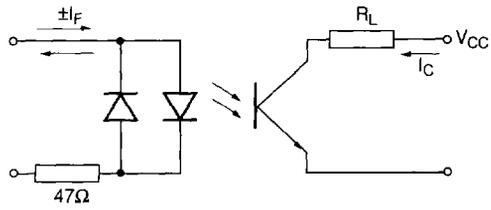


Figure 4. Test circuit and waveforms

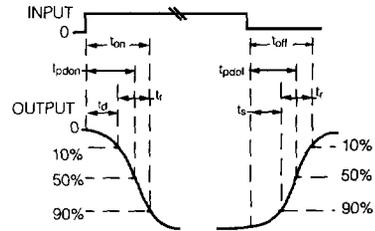


Figure 1. Current transfer ratio (typ.)
 $V_{CE}=0.5\text{ V}$, $CTR=f(T_A)$

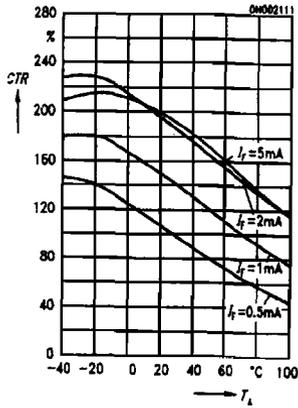


Figure 2. Current transfer ratio (typ.)
 $V_{CE}=1.5\text{ V}$, $CTR=f(T_A)$

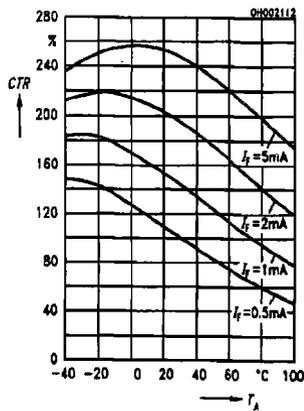


Figure 3. Diode forward voltage
 $T_A=25^\circ\text{C}$, $V_F=f(I_F)$

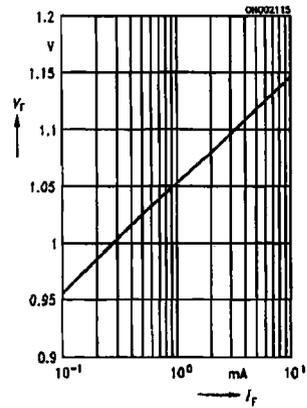


Figure 4. Diode forward voltage
 $I_F=1\text{ mA}$, $V_F=f(T_A)$

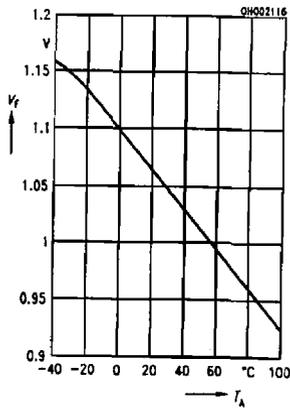


Figure 5. Transistor capacitance
 $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$, $C_{CE}=f(V_{CE})$

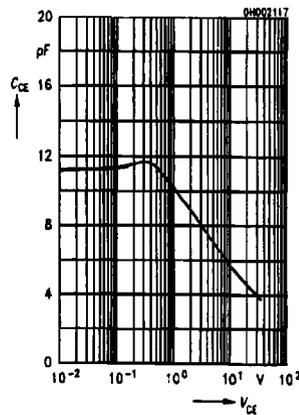


Figure 6. Output characteristics
 $T_A=25^\circ\text{C}$, $C_E=f(V_{CE}, I_F)$

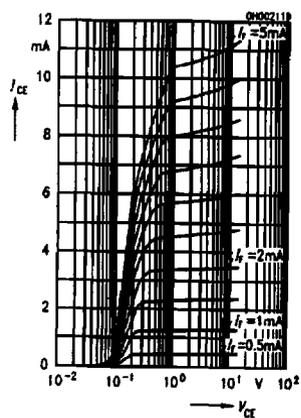


Figure 7. Permissible forward current diode
 $I_F=f(T_A)$

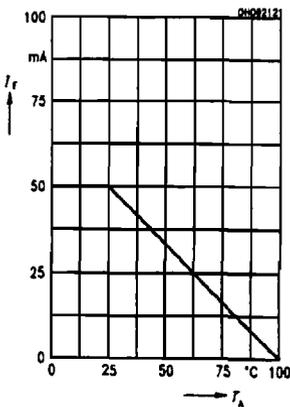


Figure 8. Permissible power dissipation
 $P_{TOT}=f(T_A)$

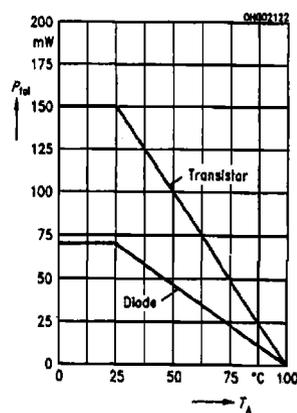


Figure 9. Switching times (typ.)
 $T_A=25^\circ\text{C}$, $I_F=1\text{ mA}$, $V_{CC}=5\text{ V}$
 t_{on} , t_r , t_{off} , $t_f=f(R_L)$

