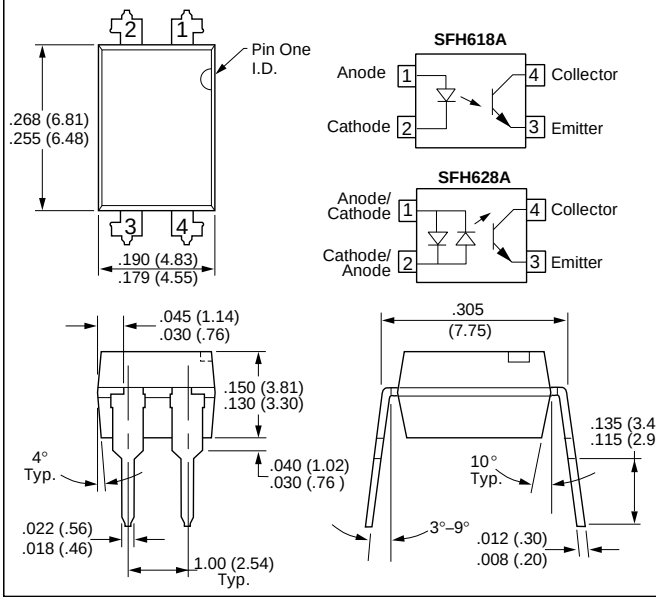
SIEMENS

SFH618A/628A

PHOTOTRANSISTOR, 5.3 kV TRIOS®
LOW CURRENT INPUT
OPTOCOUPLER

Package Dimensions in Inches (mm)



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: ≥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 VAC_{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 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.

Maximum Ratings

Emitter

Reverse Voltage (SFH618A)6 V
DC Forward Current (SFH628A: ±) 50 mA
Surge Forward Current (t_P≤10 µs) (SFH628A: ±)2.5 A
Total Power Dissipation70 mW

Detector

Collector-Emitter Voltage55 V
Emitter-Collector Voltage7 V
Collector Current50 mA
Collector Current (t_P≤1 ms)100 mA
Total Power Dissipation150 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/VDE0 303, part 1175
Isolation Resistance
V_{IO}=500 V, T_A=25°C≥10^{12} Ω
V_{IO}=500 V, T_A=100°C≥10^{11} Ω
Storage Temperature Range–55 to +150°C
Ambient Temperature Range–55 to +100°C
Junction Temperature100°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_0		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

Switching Times Measurement

Figure 1. Test circuit—SFH618A

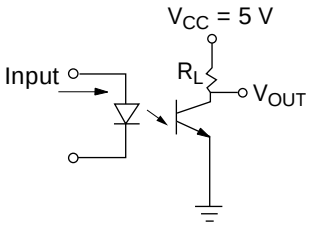


Figure 2. Test circuit—SFH628A

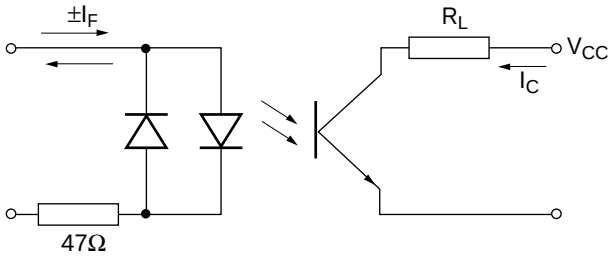


Figure 3. Switching times, typical
V_{CC}=5 V, I_C=2 mA, R_L=100Ω, T_A=25°C

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 4. Test circuit and waveforms

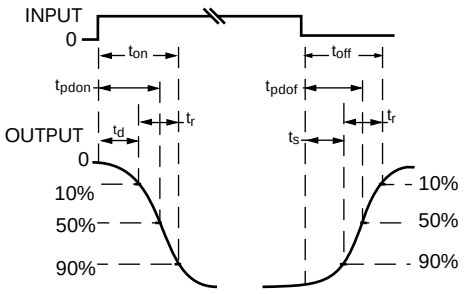


Figure 1. Current transfer ratio (typ.)
V_{CE}=0.5 V, CTR=f(T_A)

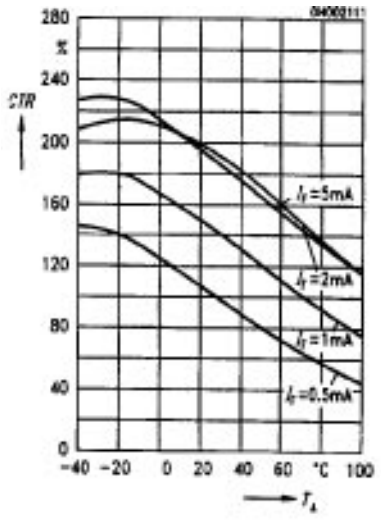


Figure 2. Current transfer ratio (typ.)
V_{CE}=1.5 V, CTR=f(T_A)

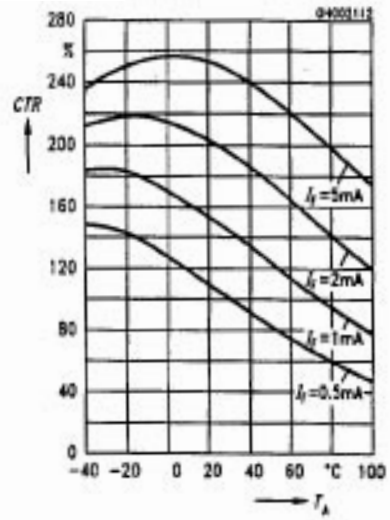


Figure 3. Diode forward voltage
T_A=25°C, V_F=f(I_F)

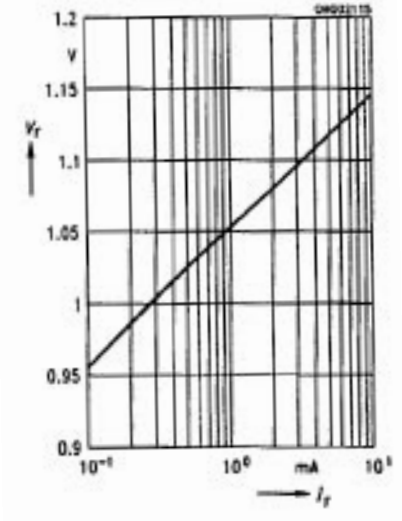


Figure 4. Diode forward voltage
I_F=1 mA, V_F=f(T_A)

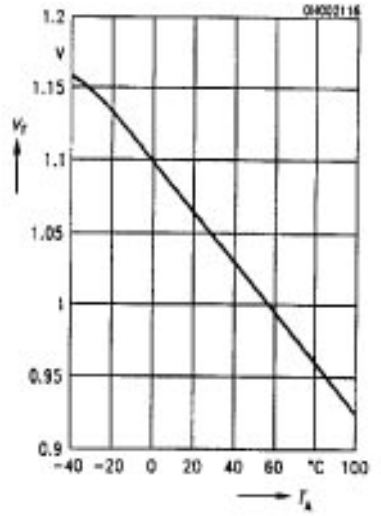


Figure 5. Transistor capacitance
T_A=25°C, f=1 MHz, C_{CE}=f(V_{CE})

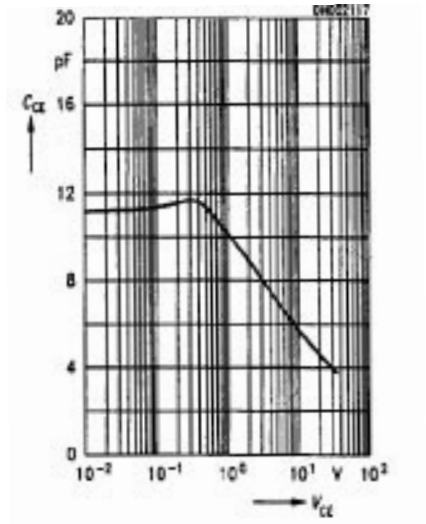


Figure 6. Output characteristics
T_A=25°C, $_{CE}$=f(V_{CE}, I_F)

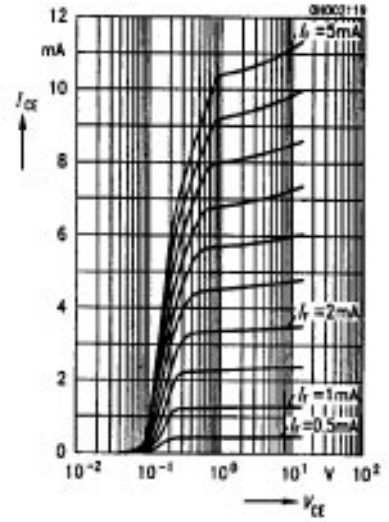


Figure 7. Permissible forward current diode I_F=f(T_A)

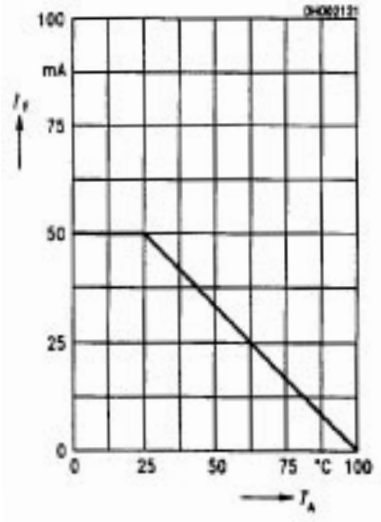


Figure 8. Permissible power dissipation P_{TOT}=f(T_A)

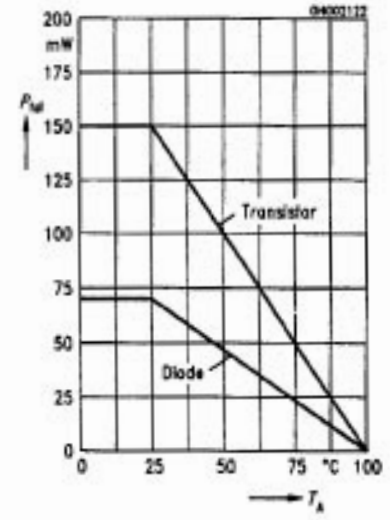


Figure 9. Switching times (typ.)
T_A=25°C, I_F=1 mA, V_{CC}=5 V
t_{on}, t_r, t_{off}, t_f=f(R_L)