

SFH610A/617A

5.3 kV TRIOS® Optocoupler

High Reliability

FEATURES

- **Variety of Current Transfer Ratios at $I_F=10$ mA**
 - SFH610A/617A-1, 40–80%
 - SFH610A/617A-2, 63–125%
 - SFH610A/617A-3, 100–200%
 - SFH610A/617A-4, 160–320%
- **Low CTR Degradation**
- **Good CTR Linearity Depending on Forward Current**
- **Withstand Test Voltage, 5300 V_{RMS}**
- **High Collector-Emitter Voltage, $V_{CE0}=70$ V**
- **Low Saturation Voltage**
- **Fast Switching Times**
- **Field-Effect Stable by TRIOS (TRansparent IOn Shield)**
- **Temperature Stable**
- **Low Coupling Capacitance**
- **End-Stackable, .100" (2.54 mm) Spacing**
- **High Common-Mode Interference Immunity (Unconnected Base)**
- **Underwriters Lab File #52744**
-  **VDE 0884 Available with Option 1**

DESCRIPTION

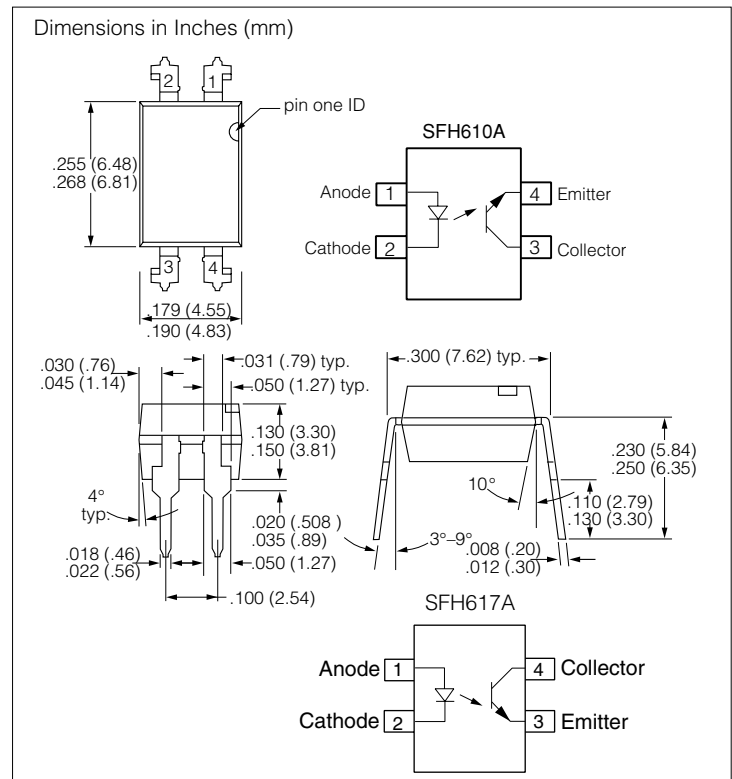
The SFH61XA features a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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

The couplers are end-stackable with 2.54 mm spacing.

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.

Specifications subject to change.



Maximum Ratings

Emitter

Reverse Voltage.....	6.0 V
DC Forward Current.....	60 mA
Surge Forward Current ($t_p \leq 10 \mu s$).....	2.5 A
Total Power Dissipation.....	100 mW

Detector

Collector-Emitter Voltage.....	70 V
Emitter-Collector Voltage.....	7.0 V
Collector Current.....	50 mA
Collector Current ($t_p \leq 1.0$ 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.....	≥ 7.0 mm
Clearance.....	≥ 7.0 mm
Insulation Thickness between Emitter and Detector.....	≥ 0.4 mm
Comparative Tracking Index per DIN IEC 112/VDE 0 303, part 1.....	≥ 175
Isolation Resistance	
$V_{IO}=500$ V, $T_A=25^\circ C$	$\geq 10^{12} \Omega$
$V_{IO}=500$ V, $T_A=100^\circ C$	$\geq 10^{11} \Omega$
Storage Temperature Range.....	-55 to $+150^\circ C$
Ambient Temperature Range.....	-55 to $+100^\circ C$
Junction Temperature.....	$100^\circ C$
Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥ 1.5 mm).....	$260^\circ C$

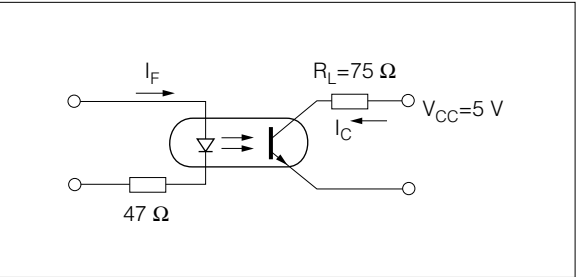
Characteristics (T_A=25°C)

Description	Symbol		Unit	Condition
Emitter (IR GaAs)				
Forward Voltage	V _F	1.25 (≤1.65)	V	I _F =60 mA
Reverse Current	I _R	0.01 (≤10)	μA	V _R =6.0 V
Capacitance	C ₀	13	pF	V _R =0 V, f=1.0 MHz
Thermal Resistance	R _{thJA}	750	K/W	
Detector (Si Phototransistor)				
Capacitance	C _{CE}	5.2	pF	V _{CE} =5 V, f=1.0 MHz
Thermal Resistance	R _{thJA}	500	K/W	
Package				
Collector-Emitter Saturation Voltage	V _{CEsat}	0.25 (≤0.4)	V	I _F =10 mA, I _C =2.5 mA
Coupling Capacitance	C _C	0.4	pF	

Current Transfer Ratio (I_C/I_F at V_{CE}=5.0 V) and Collector-Emitter Leakage Current by Dash Number

Description	-1	-2	-3	-4	
I _C /I _F (I _F =10 mA)	40–80	63–125	100–200	160–320	%
I _C /I _F (I _F =1.0 mA)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	
Collector-Emitter Leakage Current, I _{CEO} V _{CE} =10 V	2.0 (≤50)	2.0 (≤50)	5.0 (≤100)	5.0 (≤100)	nA

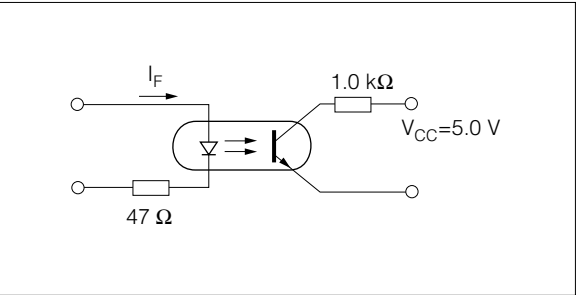
Figure 1. Switching Times (Typical)
Linear Operation (without saturation)



I_F=10 mA, V_{CC}=5.0 V, T_A=25°C

Load Resistance	R _L	75	Ω
Turn-on Time	t _{ON}	3.0	μs
Rise Time	t _R	2.0	
Turn-off Time	t _{OFF}	2.3	
Fall Time	t _F	2.0	
Cut-off Frequency	F _{CO}	250	kHz

Figure 2. Switching Operation
(with saturation)



Parameter	Sym.	Dash No.			Unit
		-1 I _F =20 mA	-2 and -3 I _F =10 mA	-4 I _F =5.0 mA	
Turn-on Time	t _{ON}	3.0	4.2	6.0	μs
Rise Time	t _R	2.0	3.0	4.6	
Turn-off Time	t _{OFF}	18	23	25	
Fall Time	t _F	11	14	15	

Figure 3. Current Transfer Ratio (typ.) vs. Temperature $I_F=10\text{ mA}$, $V_{CC}=5.0\text{ V}$

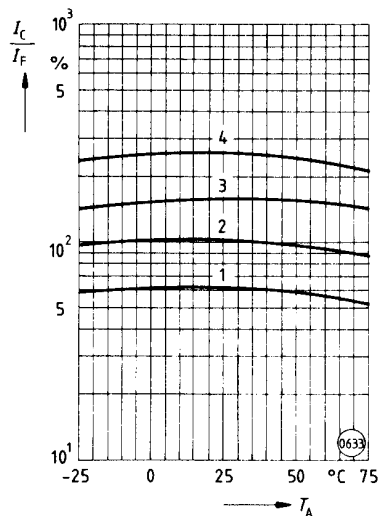


Figure 4. Output Characteristics (typ.) Collector Current vs. Collector-emitter Voltage $T_A=25^\circ\text{C}$

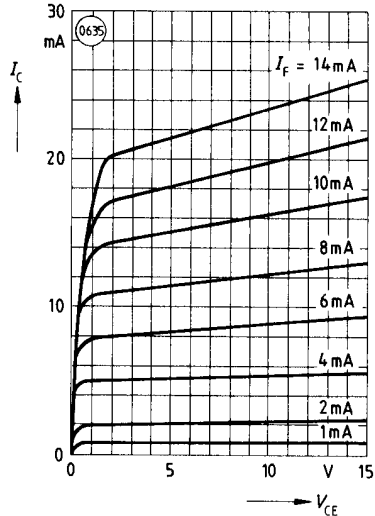


Figure 5. Diode Forward Voltage (typ.) vs. Forward Current

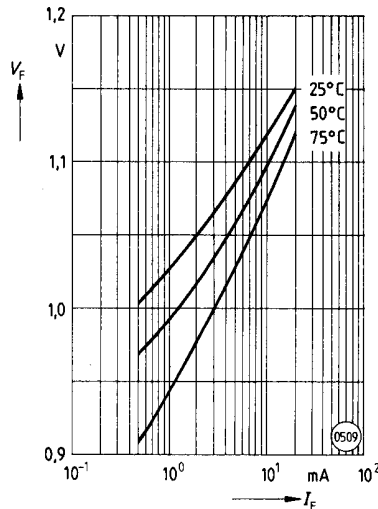


Figure 6. Transistor capacitance (typ.) vs. collector-emitter voltage $T_A=25^\circ\text{C}$, $f=1.0\text{ MHz}$

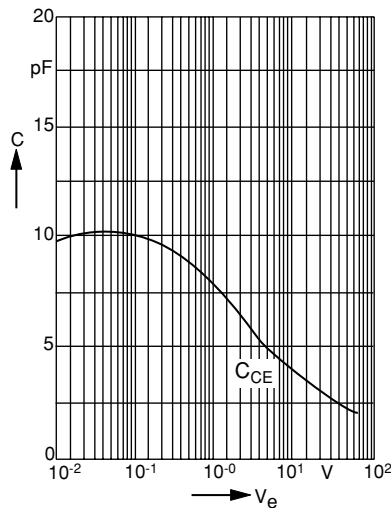


Figure 7. Permissible Pulse Handling Capability. Forward Current vs. Pulse Width Pulse cycle $D=\text{parameter}$, $T_A=25^\circ\text{C}$

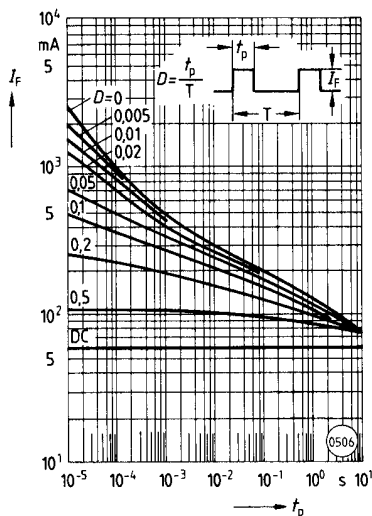


Figure 8. Permissible Power Dissipation vs. Ambient Temperature

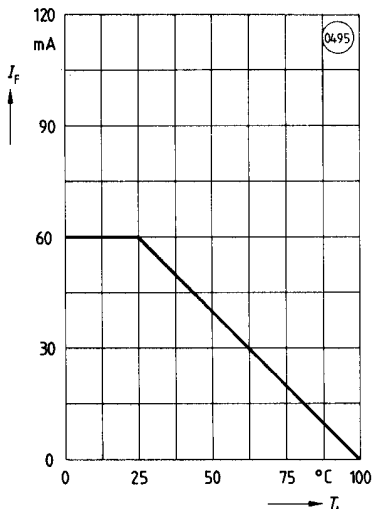


Figure 9. Permissible Diode Forward Current vs. Ambient Temperature

