

#### 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,  $V_{CEO}=70$  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

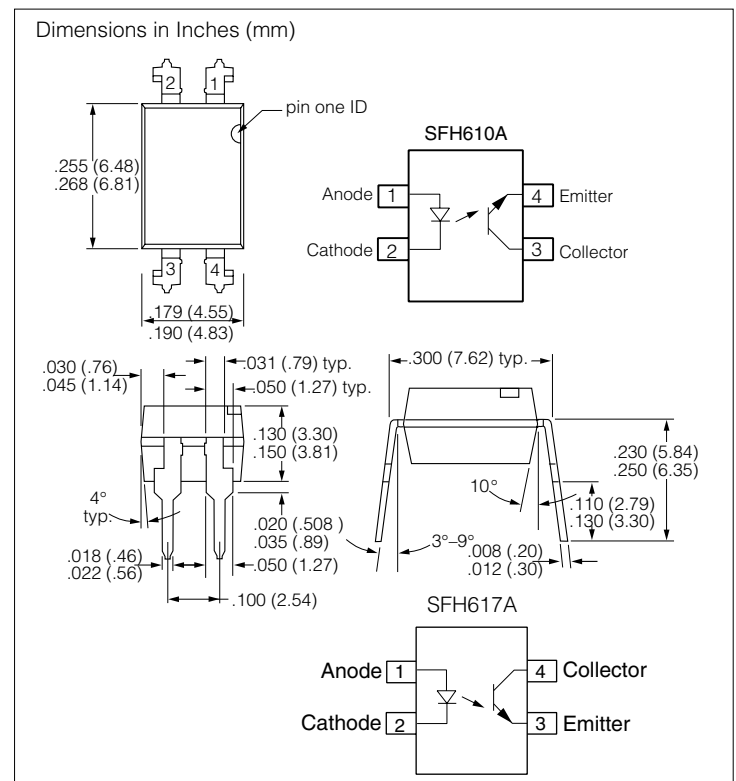
The SFH61XA features a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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.....	$\geq 7.0$ mm
Clearance .....	$\geq 7.0$ mm
Insulation Thickness between Emitter and Detector .....	$\geq 0.4$ mm
Comparative Tracking Index per DIN IEC 112/VDE0 303, part 1 .....	$\geq 175$
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 $\geq 1.5$ mm).....	$260^\circ C$

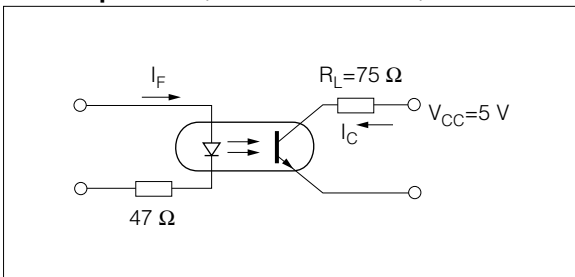
**Characteristics ( $T_A=25^\circ\text{C}$ )**

Description	Symbol		Unit	Condition
<b>Emitter (IR GaAs)</b>				
Forward Voltage	$V_F$	1.25 ( $\leq 1.65$ )	V	$I_F=60\text{ mA}$
Reverse Current	$I_R$	0.01 ( $\leq 10$ )	$\mu\text{A}$	$V_R=6.0\text{ V}$
Capacitance	$C_0$	13	pF	$V_R=0\text{ V}$ , $f=1.0\text{ MHz}$
Thermal Resistance	$R_{thJA}$	750	K/W	
<b>Detector (Si Phototransistor)</b>				
Capacitance	$C_{CE}$	5.2	pF	$V_{CE}=5\text{ V}$ , $f=1.0\text{ MHz}$
Thermal Resistance	$R_{thJA}$	500	K/W	
<b>Package</b>				
Collector-Emitter Saturation Voltage	$V_{CEsat}$	0.25 ( $\leq 0.4$ )	V	$I_F=10\text{ mA}$ , $I_C=2.5\text{ mA}$
Coupling Capacitance	$C_C$	0.4	pF	

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

Description	-1	-2	-3	-4	
$I_C/I_F$ ( $I_F=10\text{ mA}$ )	40–80	63–125	100–200	160–320	%
$I_C/I_F$ ( $I_F=1.0\text{ mA}$ )	30 (>13)	45 (>22)	70 (>34)	90 (>56)	
Collector-Emitter Leakage Current, $I_{CEO}$ $V_{CE}=10\text{ V}$	2.0 ( $\leq 50$ )	2.0 ( $\leq 50$ )	5.0 ( $\leq 100$ )	5.0 ( $\leq 100$ )	nA

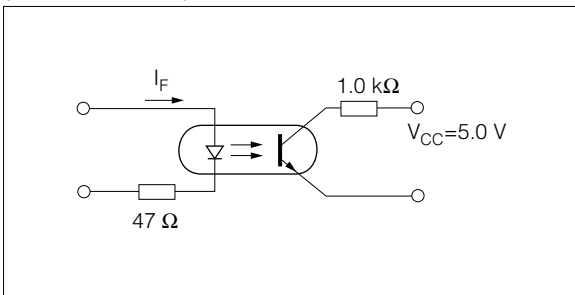
**Figure 1. Switching Times (Typical)  
Linear Operation (without saturation)**



$I_F=10\text{ mA}$ ,  $V_{CC}=5.0\text{ V}$ ,  $T_A=25^\circ\text{C}$

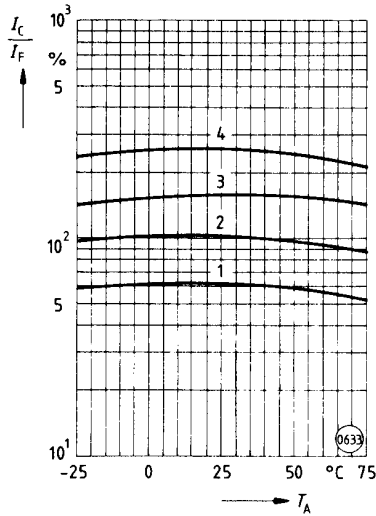
Load Resistance	$R_L$	75	$\Omega$
Turn-on Time	$t_{ON}$	3.0	$\mu\text{s}$
Rise Time	$t_R$	2.0	
Turn-off Time	$t_{OFF}$	2.3	
Fall Time	$t_F$	2.0	
Cut-off Frequency	$F_{CO}$	250	kHz

**Figure 2. Switching Operation  
(with saturation)**

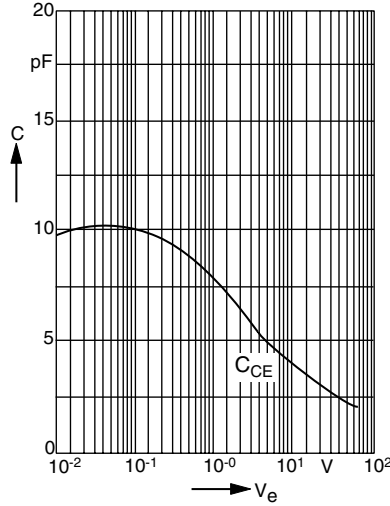


Parameter	Sym.	Dash No.			Unit
		-1 $I_F=20\text{ mA}$	-2 and -3 $I_F=10\text{ mA}$	-4 $I_F=5.0\text{ mA}$	
Turn-on Time	$t_{ON}$	3.0	4.2	6.0	$\mu\text{s}$
Rise Time	$t_R$	2.0	3.0	4.6	
Turn-off Time	$t_{OFF}$	18	23	25	
Fall Time	$t_F$	11	14	15	

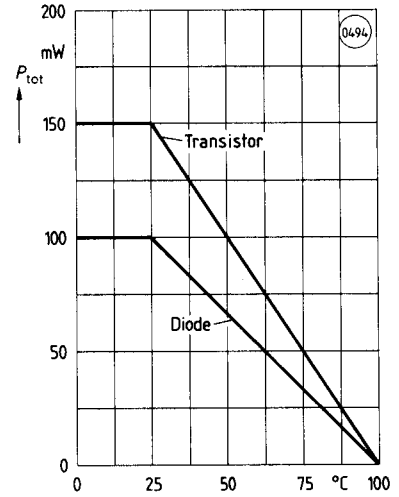
**Figure 3. Current Transfer Ratio (typ.) vs. Temperature**  $I_F=10\text{ mA}$ ,  $V_{CC}=5.0\text{ V}$



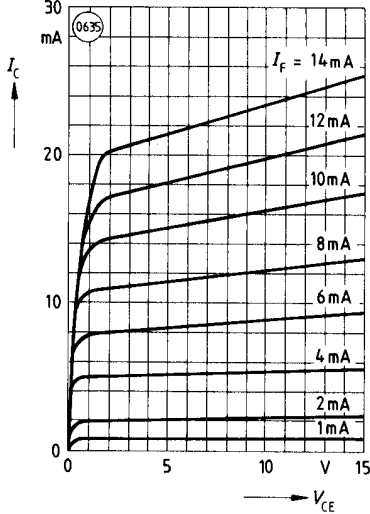
**Figure 6. Transistor capacitance (typ.) vs. collector-emitter voltage**  $T_A=25^\circ\text{C}$ ,  $f=1.0\text{ MHz}$



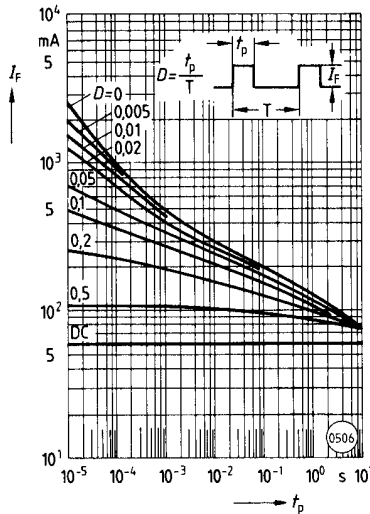
**Figure 9. Permissible Diode Forward Current vs. Ambient Temperature**



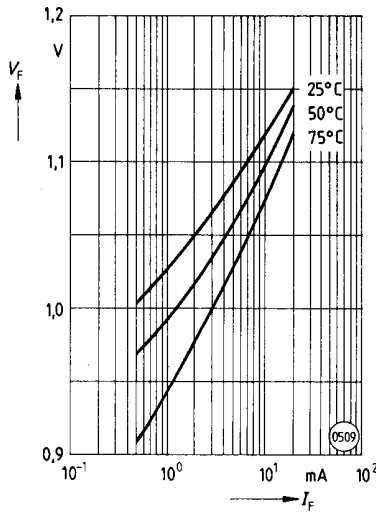
**Figure 4. Output Characteristics (typ.) Collector Current vs. Collector-emitter Voltage**  $T_A=25^\circ\text{C}$



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



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



**Figure 8. Permissible Power Dissipation vs. Ambient Temperature**

