


### FEATURES

- High Current Transfer Ratios  
at 10 mA: 40–320%  
at 1 mA: 60% typical (>13)
- Low CTR Degradation
- Good CTR Linearity Depending on Forward Current
- Withstand Test Voltage, 5300 VAC<sub>RMS</sub>
- High Collector-Emitter Voltage, V<sub>CEO</sub>=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
- SMD Option – See SFH6106/16/56 Data Sheet

### 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.

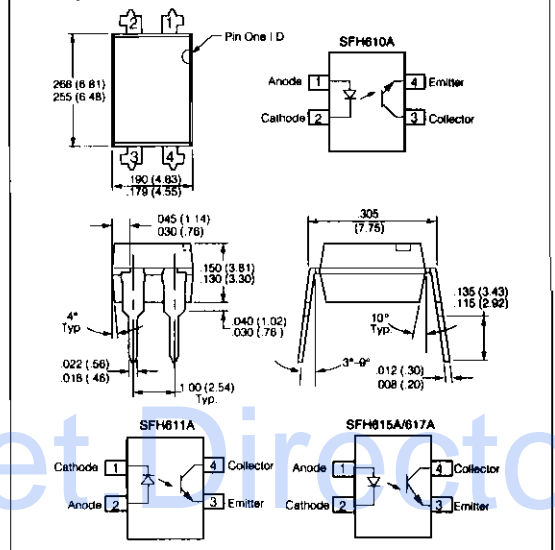
The coupling devices are designed for signal transmission between two electrically separated circuits.

The couplers are end-stackable with 2.54 mm spacing.

Creepage and clearance distances of >8 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<sub>RMS</sub> or DC.

*Specifications subject to change.*

Package Dimensions in Inches (mm)



### Maximum Ratings

#### Emitter

Reverse Voltage	6 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 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. 74	5300 VAC <sub>RMS</sub>
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 1	≥175
Isolation Resistance	
V <sub>IO</sub> =500 V, T <sub>A</sub> =25°C	≥10 <sup>12</sup> Ω
V <sub>IO</sub> =500 V, T <sub>A</sub> =100°C	≥10 <sup>11</sup> Ω
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<sub>A</sub>=25°C)**

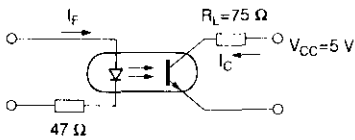
Description	Symbol		Unit	Condition
<b>Emitter (IR GaAs)</b>				
Forward Voltage	V <sub>F</sub>	1.25 (≤1.65)	V	I <sub>F</sub> =60 mA
Reverse Current	I <sub>R</sub>	0.01 (≤10)	μA	V <sub>R</sub> =6 V
Capacitance	C <sub>D</sub>	13	pF	V <sub>R</sub> =0 V, f=1 MHz
Thermal Resistance	R <sub>thJA</sub>	750	K/W	
<b>Detector (Si Phototransistor)</b>				
Capacitance	C <sub>CE</sub>	5.2	pF	V <sub>CE</sub> =5 V, f=1 MHz
Thermal Resistance	R <sub>thJA</sub>	500	K/W	
<b>Package</b>				
Collector-Emitter Saturation Voltage	V <sub>CESAT</sub>	0.25 (≤0.4)	V	I <sub>F</sub> =10 mA, I <sub>C</sub> =2.5 mA
Coupling Capacitance	C <sub>C</sub>	0.4	pF	

**Current Transfer Ratio (I<sub>C</sub>/I<sub>F</sub> at V<sub>CE</sub>=5 V) and Collector-Emitter Leakage Current by Dash Number**

Description	-1	-2	-3	-4	
I <sub>C</sub> /I <sub>F</sub> (I <sub>F</sub> =10 mA)	40-80	63-125	100-200	160-320	%
I <sub>C</sub> /I <sub>F</sub> (I <sub>F</sub> =1 mA)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%
Collector-Emitter Leakage Current, I <sub>CEO</sub> V <sub>CE</sub> =10 V	2 (≤50)	2 (≤50)	5 (≤100)	5 (≤100)	nA

**Switching Times (Typical)**

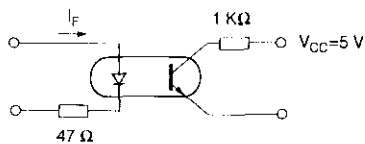
Linear Operation (without saturation)



I<sub>F</sub>=10 mA, V<sub>CC</sub>=5 V, T<sub>A</sub>=25°C

Load Resistance	R <sub>L</sub>	75	Ω
Turn-on Time	t <sub>ON</sub>	3.0	μs
Rise Time	t <sub>R</sub>	2.0	μs
Turn-off Time	t <sub>OFF</sub>	2.3	μs
Fall Time	t <sub>F</sub>	2.0	μs
Cut-off Frequency	F <sub>CO</sub>	250	kHz

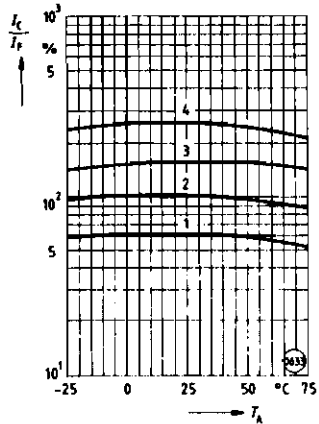
Switching Operation (with saturation)



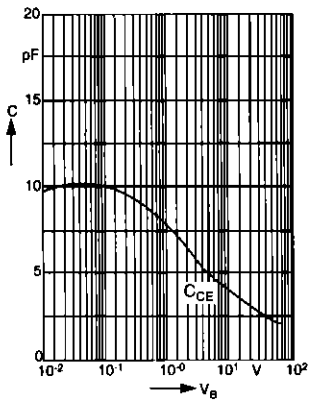
		-1 I <sub>F</sub> =20 mA	-2 and -3 I <sub>F</sub> =10 mA	-4 I <sub>F</sub> =5 mA	
Turn-on Time	t <sub>ON</sub>	3.0	4.2	6.0	μs
Rise Time	t <sub>R</sub>	2.0	3.0	4.6	μs
Turn-off Time	t <sub>OFF</sub>	18	23	25	μs
Fall Time	t <sub>F</sub>	11	14	15	μs

**Figure 1. Current transfer ratio (typ.) vs. temperature**

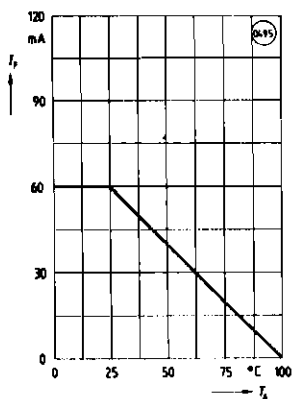
$I_F = 10 \text{ mA}$ ,  $V_{CE} = 0.5 \text{ V}$



**Figure 4. Transistor capacitance (typ.) vs. collector-emitter voltage**  
 $T_A = 25^{\circ}\text{C}$ ,  $f = 1 \text{ MHz}$

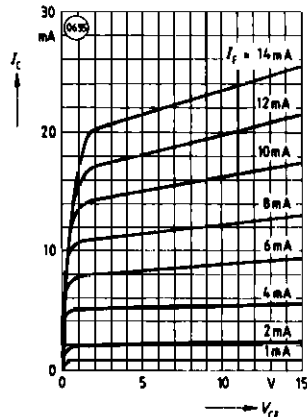


**Figure 7. Permissible diode forward current vs. ambient temp.**

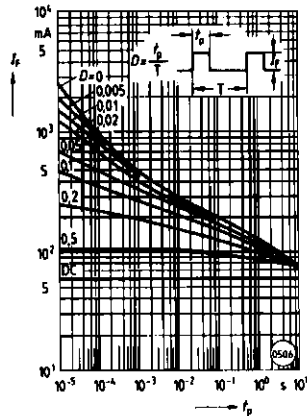


**Figure 2. Output characteristics (typ.) Collector current vs. collector-emitter voltage**

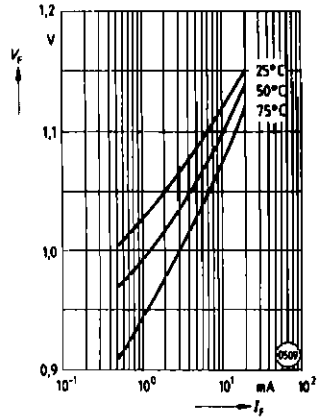
$T_A = 25^{\circ}\text{C}$



**Figure 5. Permissible pulse handling capability. Fwd. current vs. pulse width**  
 Pulse cycle  $D = \text{parameter}$ ,  $T_A = 25^{\circ}\text{C}$



**Figure 3. Diode forward voltage (typ.) vs. forward current**



**Figure 6. Permissible power dissipation vs. ambient temp.**

