



SFH610A/615A/617A

5.3 kV TRIOS® Optocoupler

High Reliability

FEATURES

- High Current Transfer Ratios
at 10 mA: 40–320%
at 1.0 mA: 60% typical (>13)
- 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
- SMD Option – See SFH6106/16/56 Data Sheet

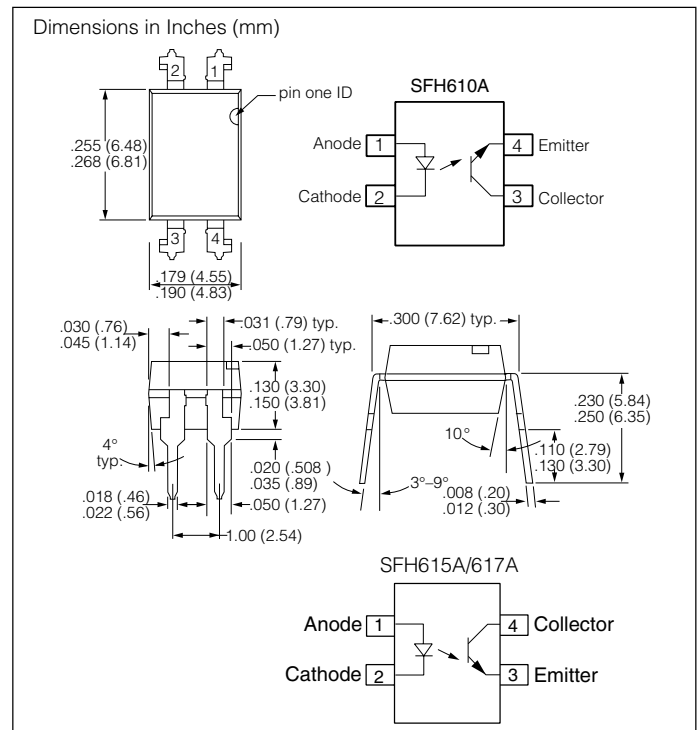
DESCRIPTION

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_{RMS} or DC. Specifications subject to change.



Maximum Ratings

Emitter

Reverse Voltage.....	6 V
DC Forward Current.....	60 mA
Surge Forward Current (t _p ≤10 μs).....	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 ≤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 V _{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 1	≥175
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 Temperature	100°C
Soldering Temperature (max. 10 s. Dip Soldering Distance to Seating Plane ≥1.5 mm).....	260°C

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

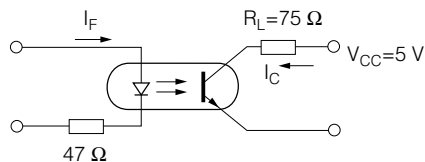
Description	Symbol		Unit	Condition
Emitter (IR GaAs)				
Forward Voltage	V_F	1.25 (≤ 1.65)	V	$I_F=60\text{ mA}$
Reverse Current	I_R	0.01 (≤ 10)	μA	$V_R=6\text{ V}$
Capacitance	C_0	13	pF	$V_R=0\text{ V}$, $f=1\text{ MHz}$
Thermal Resistance	R_{thJA}	750	K/W	
Detector (Si Phototransistor)				
Capacitance	C_{CE}	5.2	pF	$V_{CE}=5\text{ V}$, $f=1\text{ MHz}$
Thermal Resistance	R_{thJA}	500	K/W	
Package				
Collector-Emitter Saturation Voltage	V_{CESAT}	0.25 (≤ 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 $V_{CE}=5\text{ V}$) 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 ($I_F=1\text{ mA}$)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	
Collector-Emitter Leakage Current, I_{CEO} $V_{CE}=10\text{ V}$	2 (≤ 50)	2 (≤ 50)	5 (≤ 100)	5 (≤ 100)	nA

Switching Times (Typical)

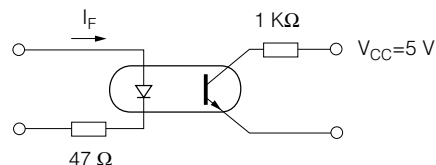
Linear Operation (without saturation)



$I_F=10\text{ mA}$, $V_{CC}=5\text{ V}$, $T_A=25^\circ\text{C}$

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

Switching Operation (with saturation)



Parameter	Sym.	Dash No.			Unit
		-1 $I_F=20\text{ mA}$	-2 and -3 $I_F=10\text{ mA}$	-4 $I_F=5\text{ mA}$	
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 1. Current transfer ratio (typ.) vs. temperature $I_F=10\text{ mA}$, $V_{CE}=5\text{ V}$

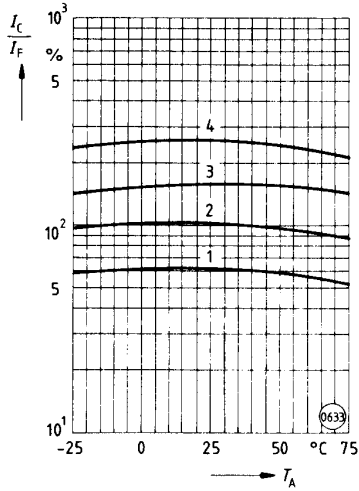


Figure 2. Output characteristics (typ.) Collector current vs. collector-emitter voltage $T_A=25^\circ\text{C}$

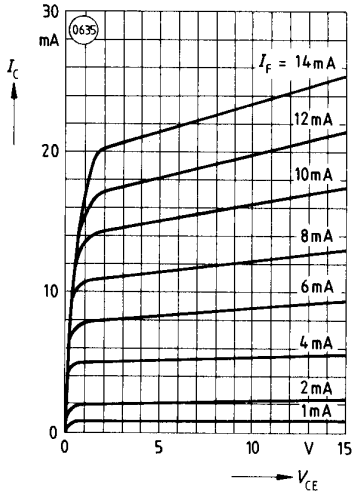


Figure 3. Diode forward voltage (typ.) vs. forward current

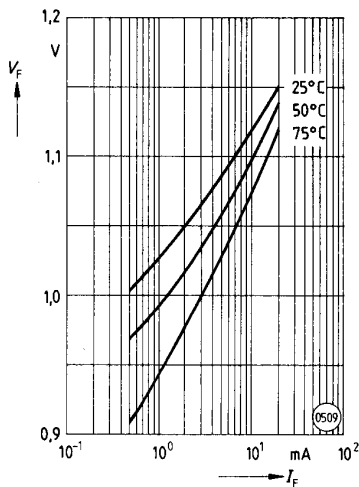


Figure 4. Transistor capacitance (typ.) vs. collector-emitter voltage $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$

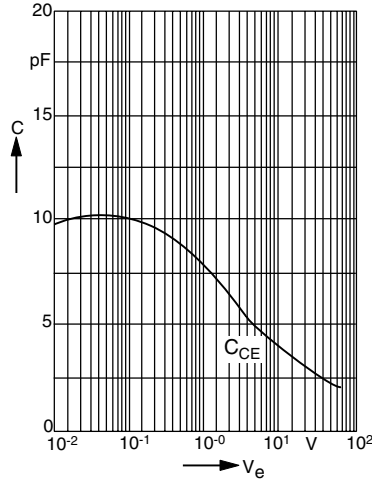


Figure 7. Permissible diode forward current vs. ambient temp.

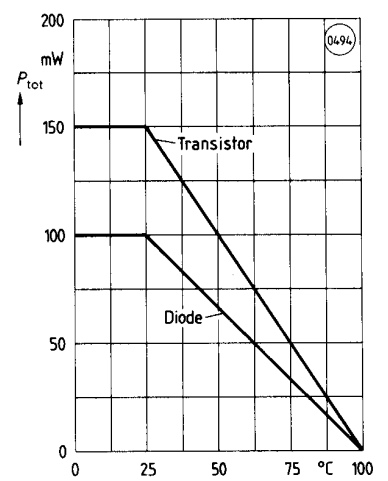


Figure 5. Permissible pulse handling capability. Forward current vs. pulse width Pulse cycle $D=\text{parameter}$, $T_A=25^\circ\text{C}$

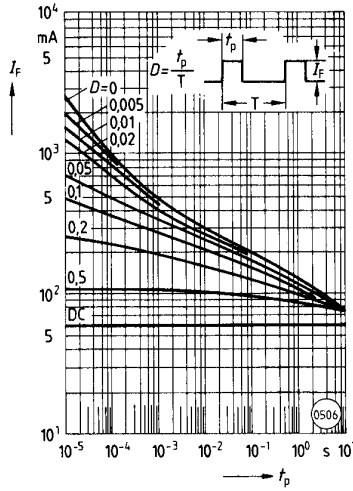


Figure 6. Permissible power dissipation vs. ambient temperature

