

5.3 kV TRIOS® HIGH RELIABILITY OPTOCOUPLERS

FEATURES

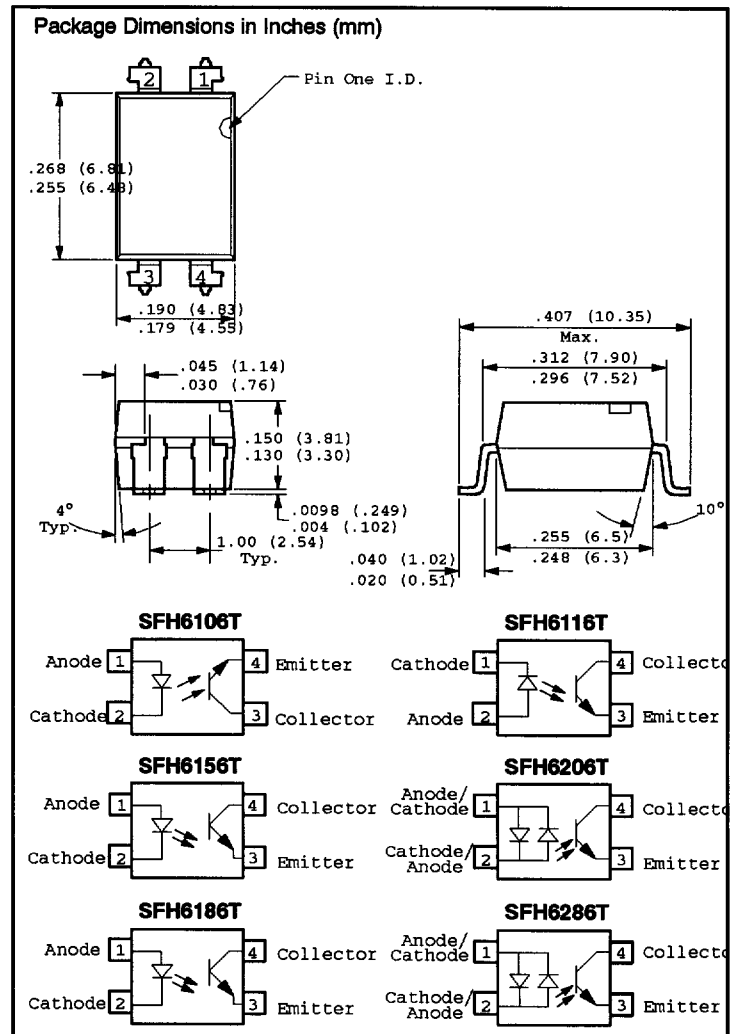
- SMD Versions of SFH610, 611, 615, 618, 620, 628
- Available on Tape and Reel (Suffix T)
- TRIOS — Transparent IOn Shield

DESCRIPTION

The SFH6106T, 6116T, 6156T, 6186T, 6206T, 6286T families of optocouplers are lead bent for SMD applications. They are electrically equivalent to the SFH610, 611, 615, 618, 620, and 628 families of optocouplers.

CROSS REFERENCE

SMD	Thru-hole	
	New Designs	Not for New Design
SFH6106T-1 SFH6106T-2 SFH6106T-3 SFH6106T-4	SFH610A-1 SFH610A-2 SFH610A-3 SFH610A-4	SFH610-1 SFH610-2 SFH610-3 SFH610-4
SFH6116T-1 SFH6116T-2 SFH6116T-3 SFH6116T-4	SFH611A-1 SFH611A-2 SFH611A-3 SFH611A-4	SFH611-1 SFH611-2 SFH611-3 SFH611-4
SFH6156T-1 SFH6156T-2 SFH6156T-3 SFH6156T-4	SFH615A-1 SFH615A-2 SFH615A-3 SFH615A-4	SFH615-1 SFH615-2 SFH615-3 SFH615-4
SFH6186T-2 SFH6186T-3 SFH6186T-4 SFH6186T-5	SFH618A-2 SFH618A-3 SFH618A-4 SFH618A-5	SFH618-2 SFH618-3 SFH618-4 SFH618-5
SFH6206T-1 SFH6206T-2 SFH6206T-3	SFH620A-1 SFH620A-2 SFH620A-3	SFH620-1 SFH620-2 SFH620-3
SFH6286T-2 SFH6286T-3 SFH6286T-4	SFH628A-2 SFH628A-3 SFH628A-4	SFH628-2 SFH628-3 SFH628-4



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_{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 SFH6106T/16/56T Data Sheet

DESCRIPTION

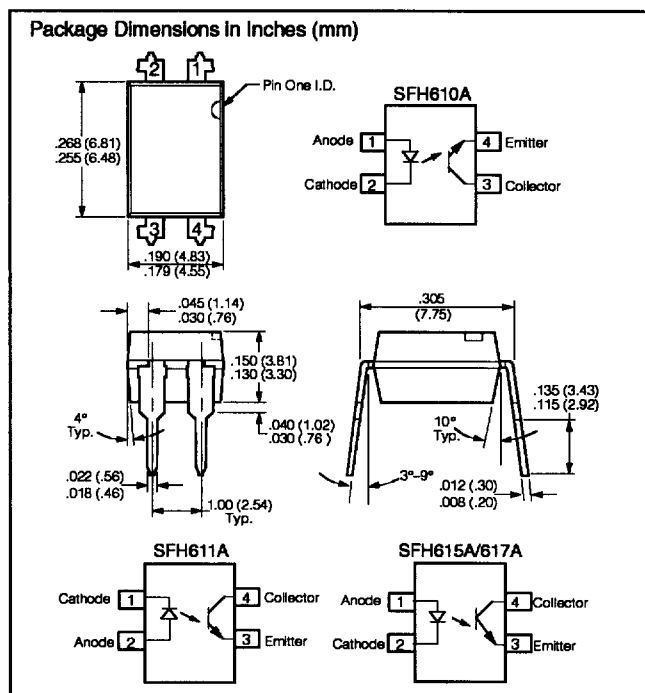
The SFH61XA features a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 package.

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 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 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°C)

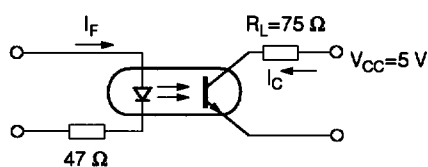
Description	Symbol		Unit	Condition
Emitter (IR GaAs)				
Forward Voltage	V _F	1.25 (≤1.65)	V	I _F =60 mA
Reverse Current	I _R	0.01 (≤10)	μA	V _R =6 V
Capacitance	C ₀	13	pF	V _R =0 V, f=1 MHz
Thermal Resistance	R _{thJA}	750	K/W	
Detector (Si Phototransistor)				
Capacitance	C _{CE}	5.2	pF	V _{CE} =5 V, f=1 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 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 mA)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%
Collector-Emitter Leakage Current, I _{CEO} V _{CE} =10 V	2 (≤50)	2 (≤50)	5 (≤100)	5 (≤100)	nA

Switching Times (Typical)

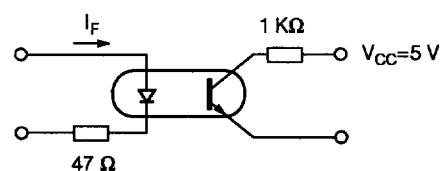
Linear Operation (without saturation)



I_F=10 mA, V_{CC}=5 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	μs
Turn-off Time	t _{OFF}	2.3	μs
Fall Time	t _F	2.0	μs
Cut-off Frequency	F _{CO}	250	kHz

Switching Operation (with saturation)



		-1 I _F =20 mA	-2 and -3 I _F =10 mA	-4 I _F =5 mA	
Turn-on Time	t _{ON}	3.0	4.2	6.0	μs
Rise Time	t _R	2.0	3.0	4.6	μs
Turn-off Time	t _{OFF}	18	23	25	μs
Fall Time	t _F	11	14	15	μs

Figure 1. Current transfer ratio (typ.) vs. temperature
 $I_F=10\text{ mA}$, $V_{CE}=0.5\text{ V}$

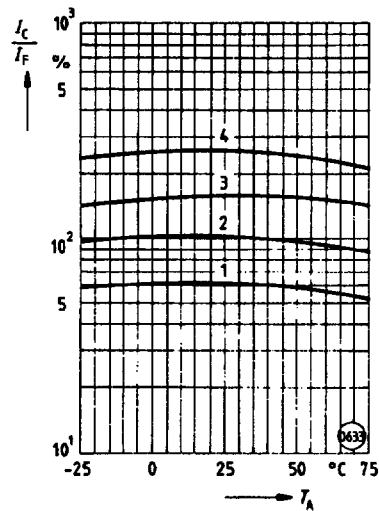


Figure 2. Output characteristics (typ.)
 Collector current vs. collector-emitter voltage $T_A=25^\circ\text{C}$

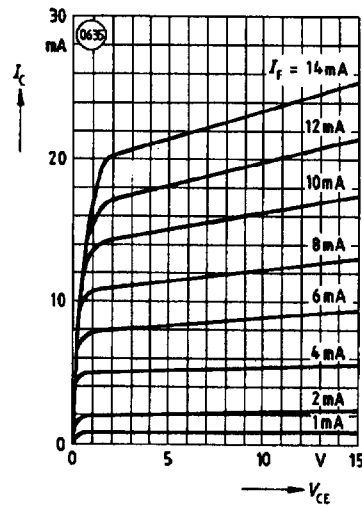


Figure 3. Diode forward voltage (typ.) vs. forward current

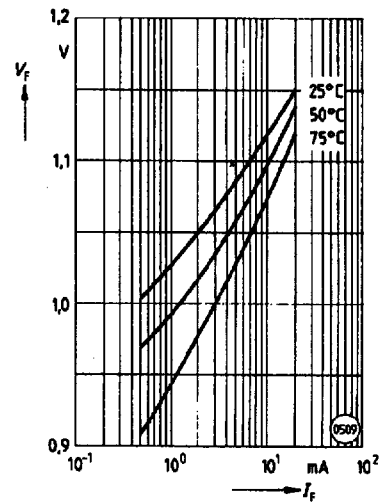


Figure 4. Transistor capacitance (typ.) vs. collector-emitter voltage
 $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$

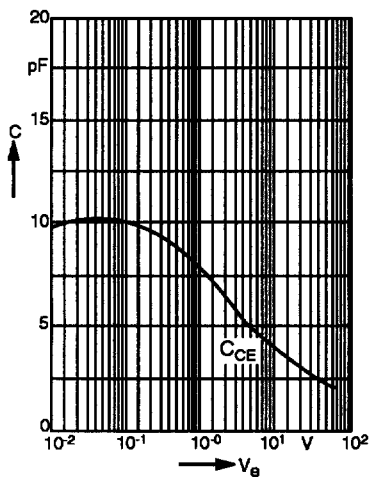


Figure 5. Permissible pulse handling capability. Fwd. current vs. pulse width
 Pulse cycle D=parameter, $T_A=25^\circ\text{C}$

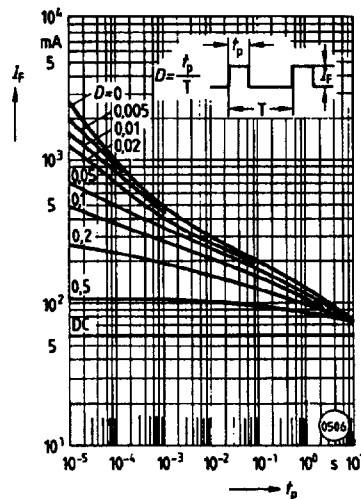


Figure 6. Permissible power dissipation vs. ambient temp.

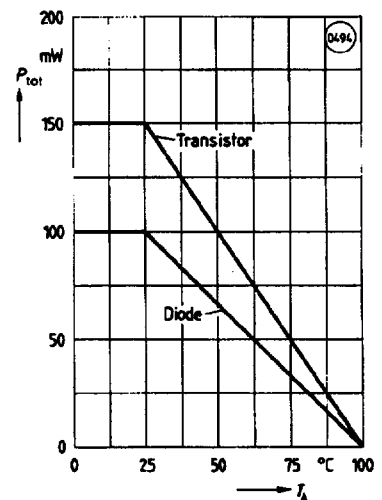


Figure 7. Permissible diode forward current vs. ambient temp.

