SFH690AT/690BT/690ABT

Phototransistor Optocoupler
Miniflat SOP Package

FFEATURES

- **Current Transfer Ratios**
  - **SFH690AT, 50%–150%**
  - **SFH690BT, 100%–300%**
  - **SFH690ABT, 50%–300%**
- **SOP (Small Outline Package)**
- **Isolation Test Voltage, 3750 V_{RMS} (1.0 s)**
- **High Collector-Emitter Breakdown 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**
- **Underwriters Lab File #52744**

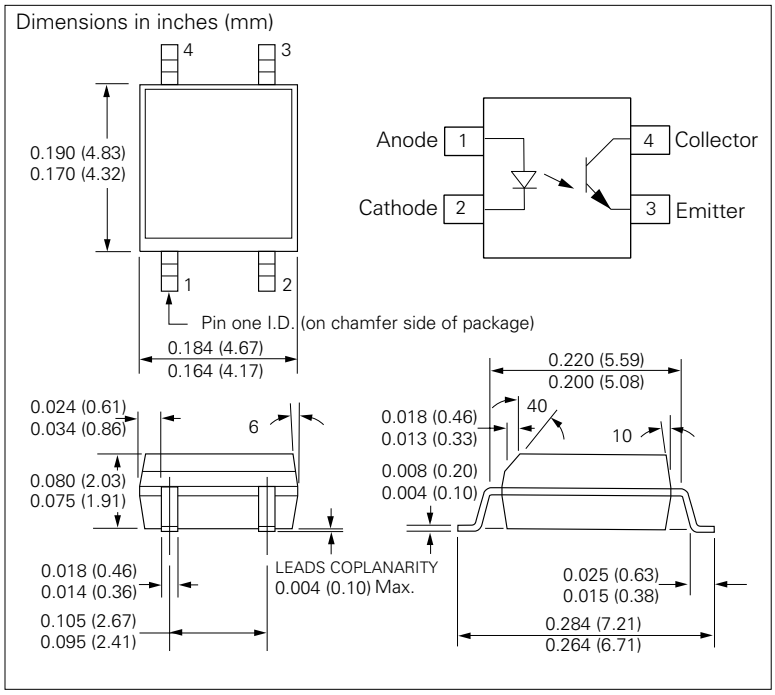
APPLICATIONS

- **High density mounting or space sensitive PCBs**
- **PLCs**
- **Telecommunication**

DESCRIPTION

The SFH690xT family has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4 pin 100 mil lead pitch miniflat package. It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

The coupling devices are designed for signal transmission between two electrically separated circuits.
The SFH690xT will be offered in tape and reel format only. There are 2000 parts per reel. For the SFH690AT, the product will be marked as SFH690A and the SFH690BT will be marked as SFH690B. The SFH690ABT will be marked as SFH690A or SFH690B.



Absolute Maximum Ratings, T_A=25°C (except where noted)

Emitter

Reverse Voltage ..... 6.0 V
DC Forward Current ..... 50 mA
Surge Forward Current (t_P≤10 µs) ..... 2.5 A
Total Power Dissipation ..... 80 mW

Detector

Collector-Emitter Voltage ..... 70 V
Emitter-Collector Voltage ..... 7.0 V
Collector Current ..... 50 mA
Collector Current (t_P≤1.0 ms) ..... 100 mA
Total Power Dissipation ..... 150 mW

Package

Isolation Test Voltage between Emitter and Detector (1.0 s) ..... 3750 V_{RMS}
Creepage ..... ≥5.33 mm
Clearance ..... ≥5.08 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

Table 1. Electrical Characteristics, T_A=25°C (except where noted)

Description	Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter (IR GaAs)						
Forward Voltage	V_F	—	1.15	1.4	V	I_F=5 mA
Reverse Current	I_R	—	0.01	10	µA	V_R=6.0 V
Capacitance	C_0	—	14	—	pF	V_R=0.0 V, f=1.0 MHz
Thermal Resistance	R_{thJA}	—	750	—	K/W	—
Detector (Si Phototransistor)						
Leakage Current, Collector-emitter	I_{CEO}	—	—	100	nA	V_{CE}=20 V
Capacitance	C_{CE}	—	2.8	—	pF	V_{CE}=5.0 V, f=1.0 MHz
Thermal Resistance	R_{thJA}	—	500	—	K/W	—
Package						
Collector-emitter Saturation Voltage	V_{CESAT}	—	0.1	0.3	V	I_F=10 mA, I_C=2.0 mA
Coupling Capacitance	C_C	—	0.3	—	pF	f=1.0 MHz

Table 2. Current Transfer Ratio (I_C/I_F at V_{CE}=5.0 V)

Description	A	B	AB
I_C/I_F (I_F=5.0 mA)	50 to 150%	100 to 300%	50 to 300%

Switching Times (Typical)

Figure 1. Switching Operation (without saturation)

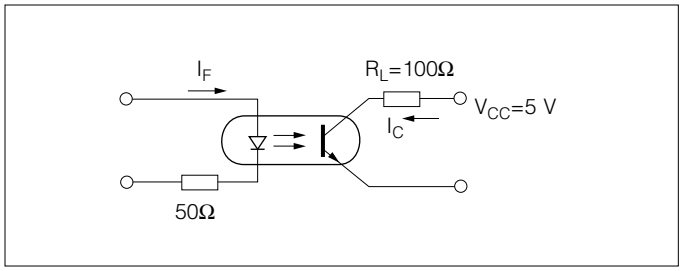


Table 3. Switching Times
I_C=2.0 mA, V_{CC}=5.0 V, T_A=25°C

Parameter	Symbol	Value	Unit
Load Resistance	R_L	100	Ω
Rise Time	t_R	3.0	µs
Fall Time	t_F	4.0	
Turn on Time	t_{ON}	5.0	
Turn off Time	t_{OFF}	3.0	

Figure 2. Diode Forward Voltage vs. Forward Current

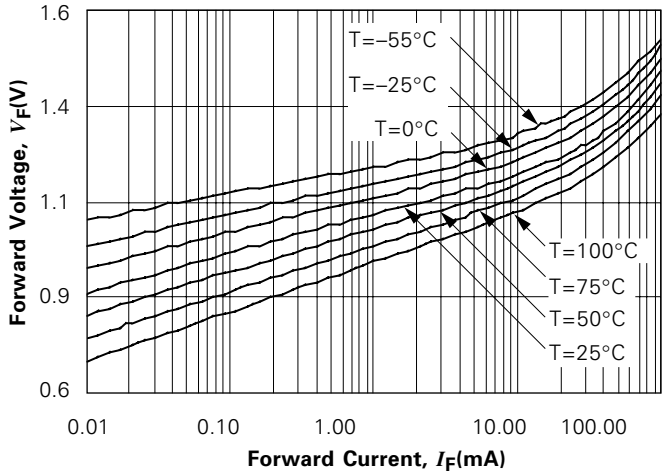


Figure 3. Collector Current vs. Collector Emitter Voltage

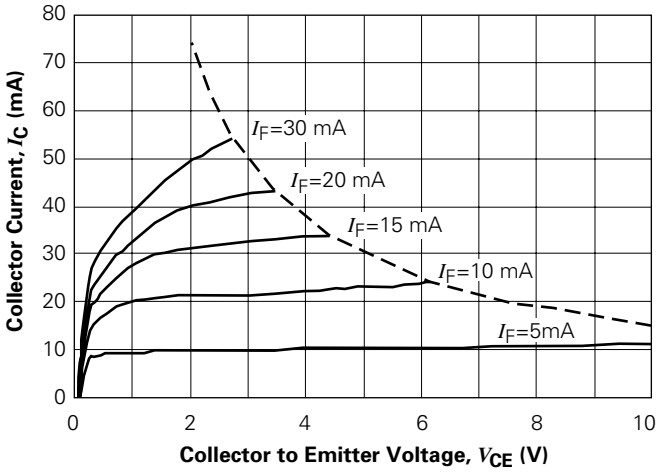


Figure 4. Collector to Emitter Dark Current vs. Ambient Temperature

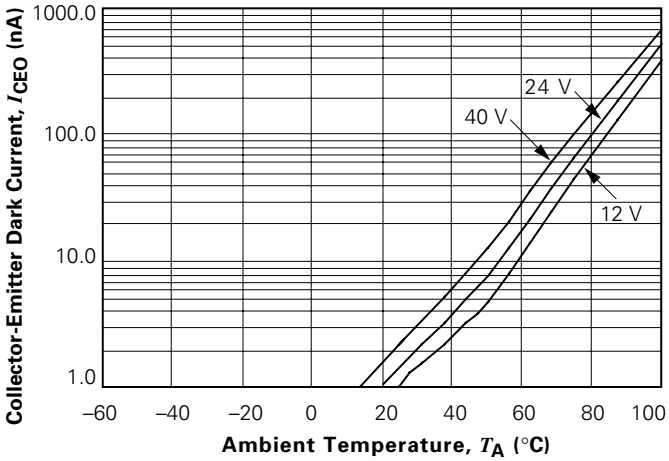


Figure 5. Collector Current vs. Collector-Emitter Saturation Voltage

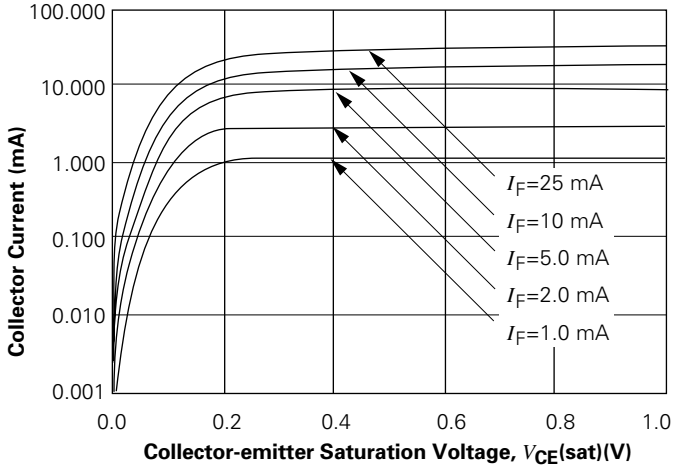


Figure 6. Normalized Output Current vs. Ambient Temperature

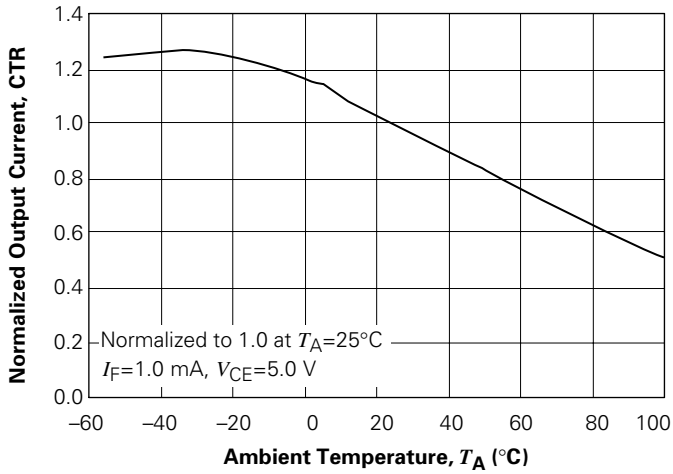


Figure 7. Normalized Output Current vs. Ambient Temperature

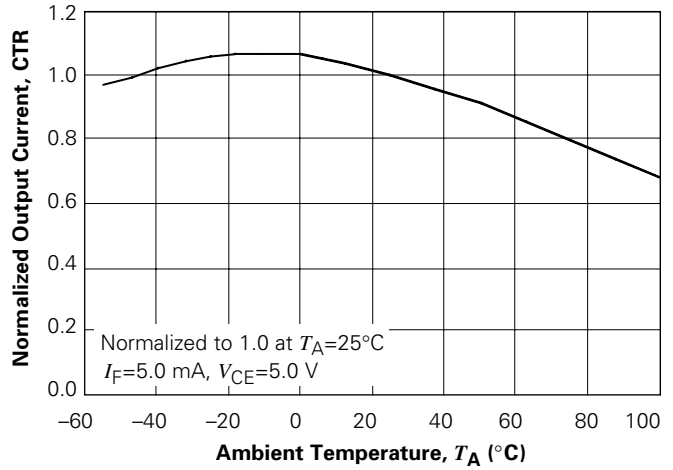


Figure 8. Current Transfer Ratio vs. Forward Current

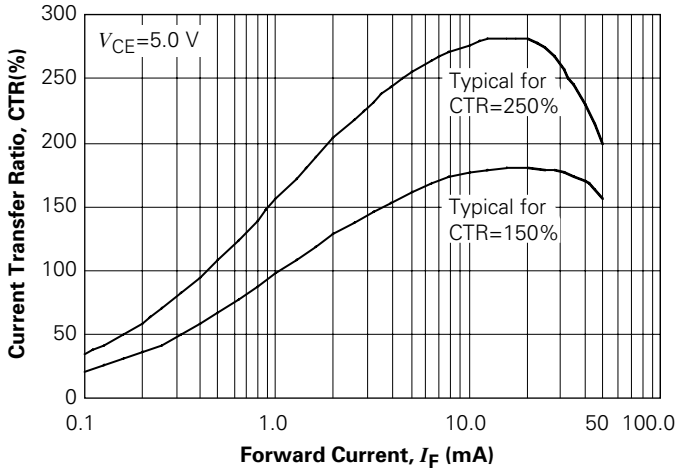


Figure 9. Switching Time vs. Load Resistance

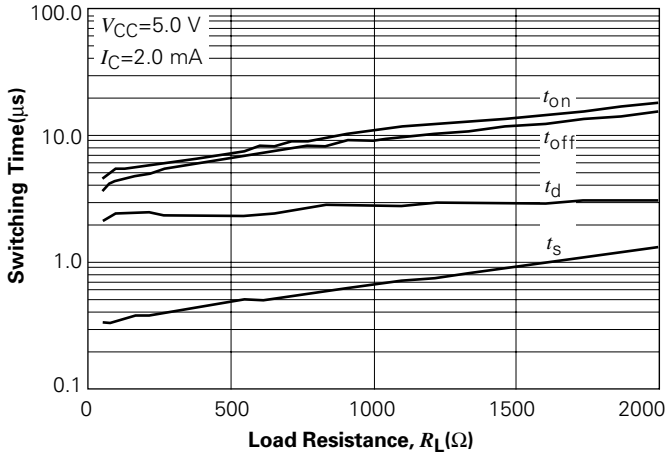


Figure 10. Switching Time vs. Load Resistance