SFH600

TRIOS® Phototransistor Optocoupler

FEATURES

- **High Current Transfer Ratios**
  SFH600-0, 40 to 80%
  SFH600-1, 63 to 125%
  SFH600-2, 100 to 200%
  SFH600-3, 160 to 320%
- **Isolation Test Voltage (1.0 s), 5300 V_{RMS}**
- **V_{CEsat} 0.25 (≤0.4) V, I_F=10 mA, I_C=2.5 mA**
- **High Quality Premium Device**
- **Long Term Stability**
- **Storage Temperature, –55° to +150°C**
- **Field Effect Stable by TRIOS (TRansparent IOn Shield)**
- **Underwriters Lab File #E52744**
- **VDE 0884 Available with Option 1**

DESCRIPTION

The SFH600 is an optocoupler with a GaAs LED emitter which is optically coupled with a silicon planar phototransistor detector. The component is packaged in a plastic plug-in case, 20 AB DIN 41866.

The coupler transmits signals between two electrically isolated circuits. The potential difference between the circuits to be coupled is not allowed to exceed the maximum permissible insulating voltage.

Maximum Ratings

Emitter

Reverse Voltage .... 6.0 V
DC Forward Current .... 60 mA
Surge Forward Current (t_p=10 µs) .... 2.5 A
Total Power Dissipation .... 100 mW

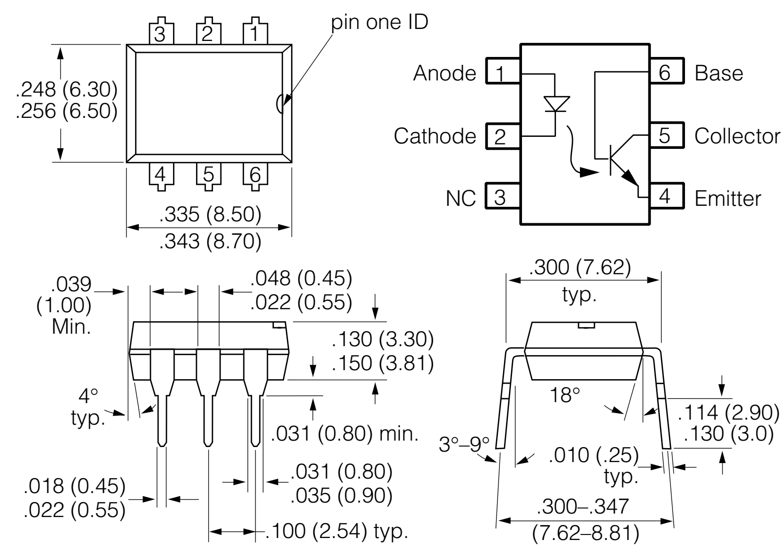
Detector

Collector-Emitter Voltage .... 70 V
Emitter-Base Voltage .... 7.0 V
Collector Currentt .... 50 mA
Collector Current (t=1 ms) .... 100 mA
Power Dissipation .... 150 mW

Package

Isolation Test Voltage (between emitter and detector referred to climate DIN 40046, part 2, Nov. 74) (t=1.0 s) .... 5300 V_{RMS}
Creepage .... ≥7.0 mm
Clearance .... ≥7.0 mm
Isolation Thickness between Emitter & Detector .... ≥0.4 mm
Comparative Tracking Index per DIN IEC 112/VDE0303, part 1 175
Isolation Resistance
V_{IO}=500 V, T_A=25°C .... $\geq 10^{12}\ \Omega$
V_{IO}=500 V, T_A=100°C .... $\geq 10^{11}\ \Omega$
Storage Temperature Range ...... –55°C to +150°C
Ambient Temperature Range ..... –55°C to +100°C
Junction Temperature .... 100°C
Soldering Temperature (max. 10 s, dip soldering: distance to seating plane ≥1.5 mm) .... 260°C

Dimensions in inches (mm)



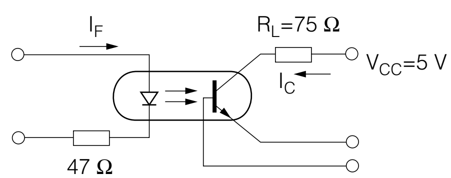
Characteristics (T_A=25°C)

	Symbol		Unit	Condition
Emitter				
Forward Voltage	V_F	1.25 (≤1.65)	V	I_F=60 mA
Breakdown Voltage	V_{BR}	≥6.0		I_R=10 µA
Reverse Current	I_R	0.01 (≤10)	µA	V_R=6.0 V
Capacitance	C_O	25	pF	V_F=0 V f=1.0 MHz
Thermal Resistance	R_{THJamb}	750	K/W	—
Detector				
Capacitance Collector-Emitter Collector-Base Emitter-Base	 C_{CE} C_{CB} C_{EB}	 5.2 6.5 9.5	pF	f=1.0 MHz V_{CE}=5.0 V V_{CB}=5.0 V V_{EB}=5.0 V
Thermal Resistance	R_{THJamb}	500	K/W	—
Package				
Saturation Voltage, Collector-Emitter	V_{CEsat}	0.25 (≤0.4)	V	I_F=10 mA, I_C=2.5 mA
Coupling Capacitance	C_{IO}	0.6	pF	V_{IO}=0 f=1.0 MHz

Table 1. Current Transfer Ratio and Collector-emitter Leakage Current by Dash Number

Parameter	Dash No.				Unit	Condition
	-0	-1	-2	-3		
I_C/I_F at V_{CE}=5.0 V	40-80	63-125	100-200	160-320	%	I_F=10 mA
I_C/I_F at V_{CE}=5.0 V	30 (>13)	45 (>22)	70 (>34)	90 (>56)		I_F=1.0 mA
Collector-Emitter Leakage Current (I_{CEO})	2.0 (≤ 35)	2.0 (≤ 35)	2.0 (≤ 35)	5.0 (≤ 70)	nA	V_{CE}=10 V

Figure 1. Linear Operation (without saturation)



I_F=10 mA, V_{CC}=5.0 V, T_A=25°C, Typical

Load Resistance	R_L	75	Ω
Turn-On Time	t_{ON}	3.2	µs
Rise Time	t_R	2.0	
Turn-Off Time	t_{OFF}	3.0	
Fall Time	t_f	2.5	
Cut-off Frequency	F_{CO}	250	kHz

Figure 2. Switching Operation (with saturation)

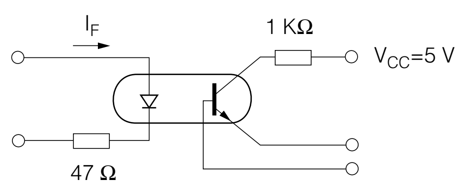


Table 2. Typical

Parameter		Dash No.			Unit
		-0 (I_F=20 mA)	-1 and -2 (I_F=10 mA)	-3 (I_F=5.0 mA)	
Turn-On Time	t_{ON}	3.7	4.5	5.8	µs
Rise Time	t_R	2.5	3.0	4.0	
Turn-Off Time	t_{OFF}	19	21	24	
Fall Time	t_F	11	12	14	
	V_{CESAT}	0.25 (≤0.4)			V

Figure 3. Current Transfer Ratio versus Diode Current (T_A=–25°C, V_{CE}=5.0 V)
I_C/I_F=f (I_F)

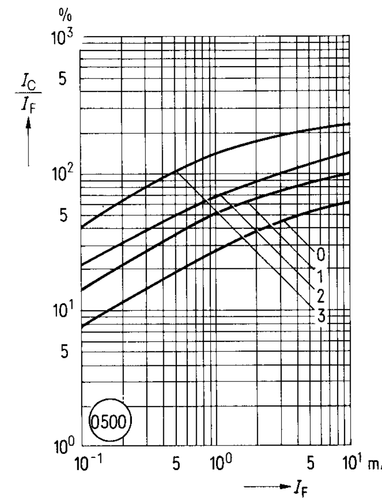


Figure 4. Current Transfer Ratio versus Diode Current (T_A=0°C, V_{CE}=5.0 V)
I_C/I_F=f (I_F)

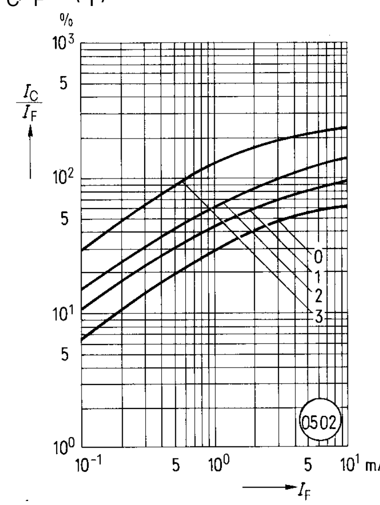


Figure 5. Current Transfer Ratio versus Diode Current (T_A=25°C, V_{CE}=5.0 V)
I_C/I_F=f (I_F)

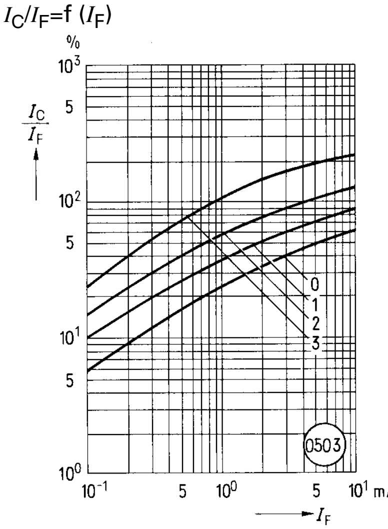


Figure 6. Current Transfer Ratio versus Diode Current (T_A=50°C, V_{CE}=5.0 V) I_C/I_F=f (I_F)

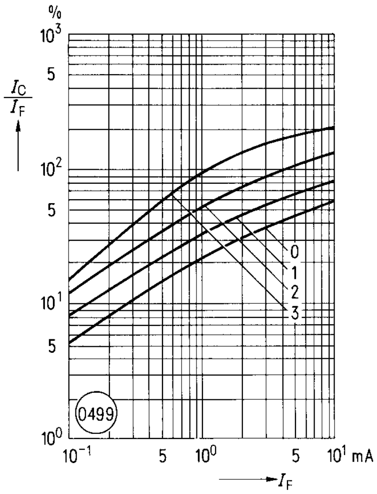


Figure 7. Current Transfer Ratio versus Diode Current (T_A=75°C, V_{CE}=5.0 V) I_C/I_F=f (I_F)

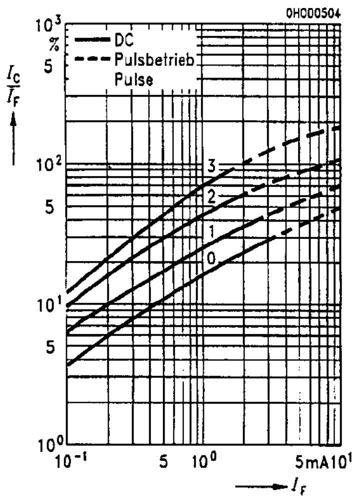


Figure 8. Current Transfer Ratio versus Temperature (I_F=10 mA, V_{CE}=5.0 V) I_C/I_F=f(T)

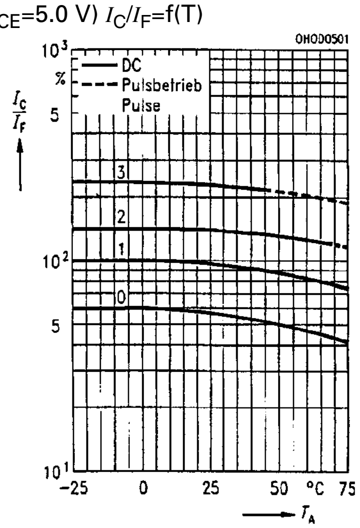


Figure 9. Transistor Characteristics (HFE =550) SFH600-2, -3 I_C=f(V_{CE}) (T_A=25°C, I_F=0)

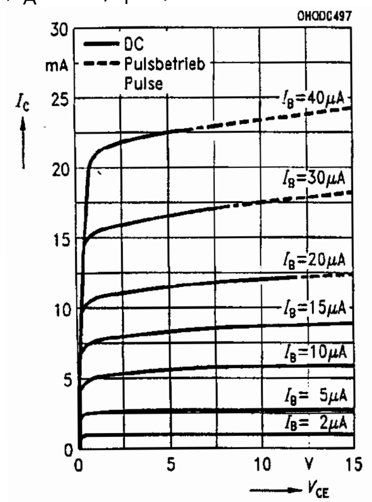


Figure 10. Output Characteristics SFH600-2, -3 (T_A=25°C) I_C=f(V_{CE})

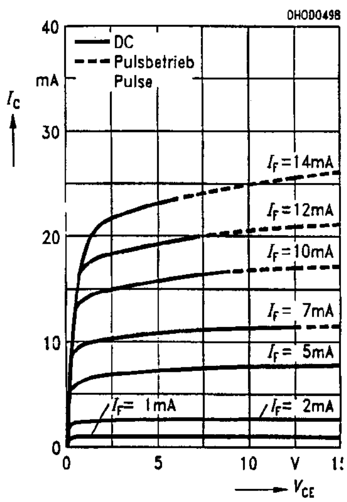


Figure 11. Forward Voltage V_F=f (I_F)

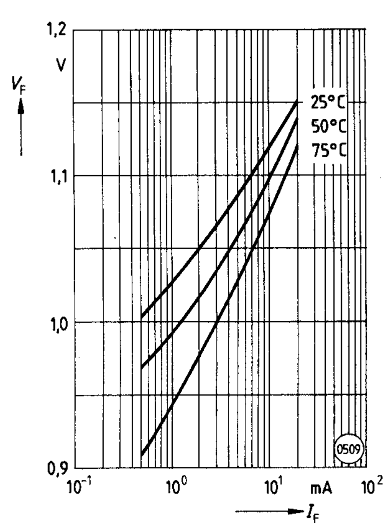


Figure 12. Collector Emitter Off-state Current I_{CEO}=f (V, T) (T_A=25°C, I_F=0)

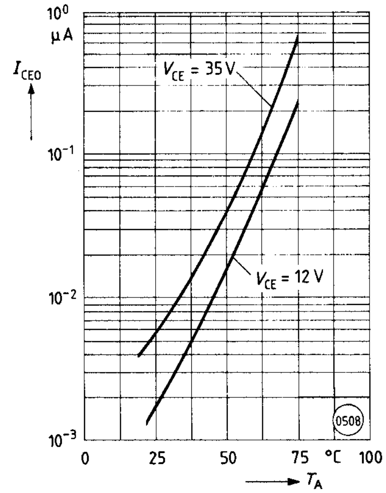


Figure 13. Saturation Voltage versus Collector Current and Modulation Depth SFH600-0 V_{CEsat}=f (I_C) (T_A=25°C)

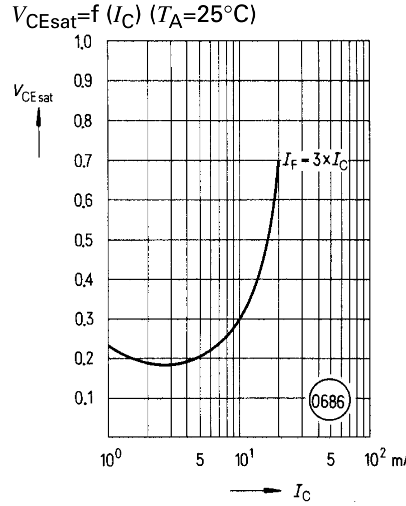


Figure 14. Saturation Voltage versus Collector Current and Modulation Depth SFH600-1 V_{CEsat}=f (I_C) (T_A=25°C)

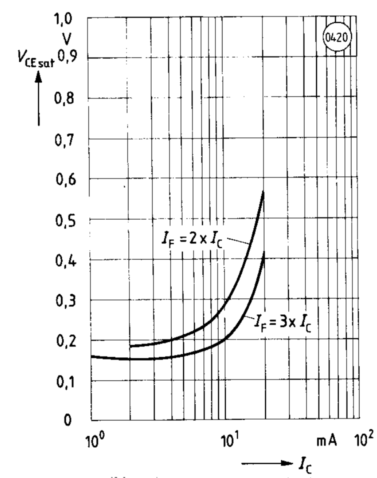


Figure 15. Saturation Voltage versus Collector Current and Modulation Depth SFH600-2 V_{CEsat}=f (I_C) (T_A=25°C)

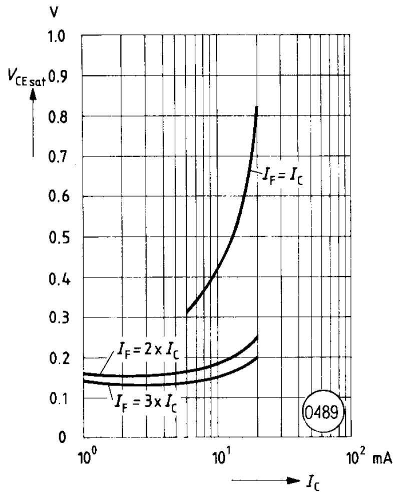


Figure 16. Saturation Voltage versus Collector Current and Modulation Depth SFH600-3 V_{CEsat}=f (I_C) (T_A=25°C)

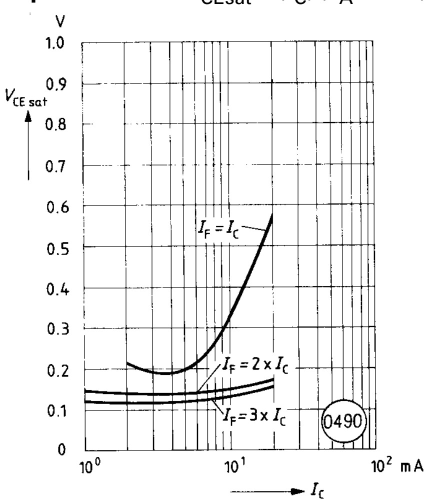


Figure 17. Permissible Pulse Load
D=parameter, T_A=25°C, I_F=f (t_p)

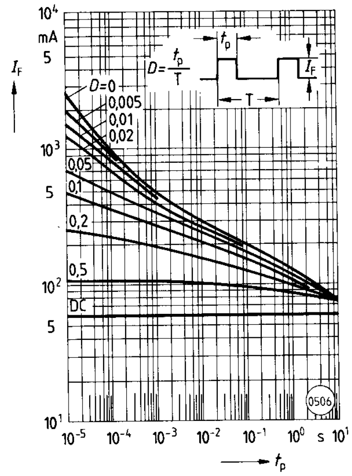


Figure 18. Permissible Power Dissipation for Transistor and Diode
P_{tot}=f (T_A)

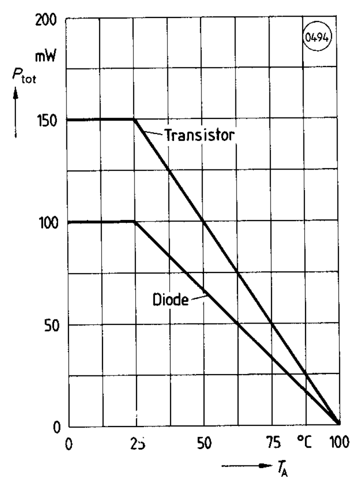


Figure 19. Permissible Forward Current Diode P_{tot}=f (T_A)

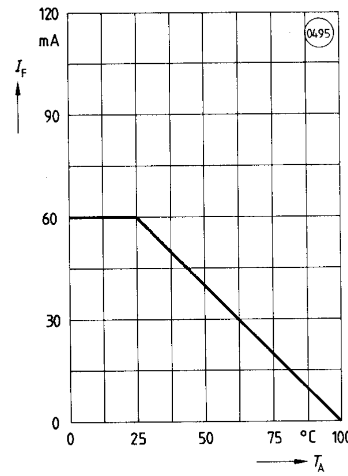


Figure 20. Transistor Capacitance
C=f(V_O) (T_A=25°C, f=1.0 MHz)