SIEMENS

SFH600 SERIES

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 Sec.), 5300 VAC_{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**
- **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 V
DC Forward Current ..... 60 mA
Surge Forward Current (I_p=10 µs) ..... 2.5 A
Total Power Dissipation ..... 100 mW

Detector

Collector-Emitter Voltage ..... 70 V
Emitter-Base Voltage ..... 7 V
Collector Current ..... 50 mA
Collector Current (t=1 ms) ..... 100 mA
Power Dissipation ..... 150 mW

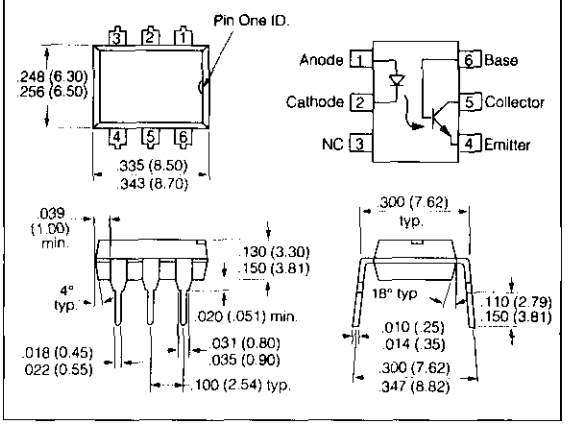
Package

Isolation Test Voltage (between emitter and detector referred to climate DIN 40046, part 2, Nov. 74) (t=1 sec.) ..... 5300 VAC_{RMS}
Creepage ..... ≥7 mm
Clearance ..... ≥7 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 ..... $\geq 10^{11}\,\Omega$

Package

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

Package Dimensions in Inches (mm)



Characteristics (T_A=25°C)

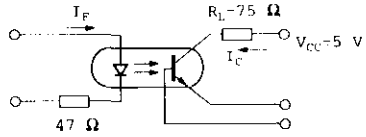
Emitter	Symbol		Unit	Condition
Forward Voltage	V_F	1.25 (≤1.65)	V	I_F=60 mA
Breakdown Voltage	V_{BR}	≥6	V	I_R=10 µA
Reverse Current	I_R	0.01 (≤10)	µA	V_R=6 V
Capacitance	C_O	25	pF	V_F=0 V, f=1 MHz
Thermal Resistance	R_{THJamb}	750	°C/W	
Detector				
Capacitance			pF	f=1 MHz
Collector-Emitter	C_{CE}	5.2		V_{CE}=5 V
Collector-Base	C_{CB}	6.5		V_{CB}=5 V
Emitter-Base	C_{EB}	9.5		V_{EB}=5 V
Thermal Resistance	R_{THJamb}	500	°C/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_{IO}	0.6	pF	V_{IO}=0, f=1 MHz

***TRIOS–TRansparent IOn Shield**

Current Transfer Ratio and Collector-Emitter Leakage Current by dash number

	–0	–1	–2	–3	Unit
I_C/I_F at V_{CE}=5 V (I_F=10 mA)	40–80	63–125	100–200	160–320	%
I_C/I_F at V_{CE}=5 V (I_F=1 mA)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%
Collector-Emitter Leakage Current (V_{CE}=10 V) (I_{CEO})	2 (≤ 35)	2 (≤ 35)	2 (≤ 35)	5 (≤ 70)	nA

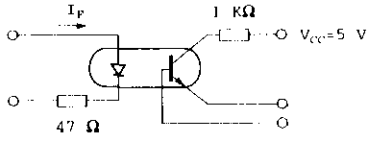
Linear Operation (without saturation)



I_F=10 mA, V_{CC}=5 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	µs
Turn-Off Time	t_{OFF}	3.0	µs
Fall Time	t_f	2.5	µs
Cut-Off Frequency	F_{CO}	250	kHz

Switching Operation (with saturation)



Typical

	–0 (I_F=20 mA)	–1 and –2 (I_F=10 mA)	–3 (I_F=5 mA)	
Turn-On Time t_{ON}	3.7	4.5	5.8	µs
Rise Time t_R	2.5	3.0	4.0	µs
Turn-Off Time t_{OFF}	19	21	24	µs
Fall Time t_f	11	12	14	µs
V_{CESAT}	0.25 (≤ 0.4)			V

Figure 1. Current transfer ratio versus diode current (T_A=–25°C, V_{CE}=5 V)
I_C/I_F=f (I_F)

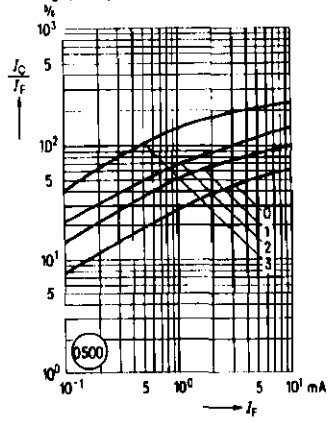


Figure 2. Current Transfer ratio versus diode current (T_A=0°C, V_{CE}=5 V)
I_C/I_F=f (I_F)

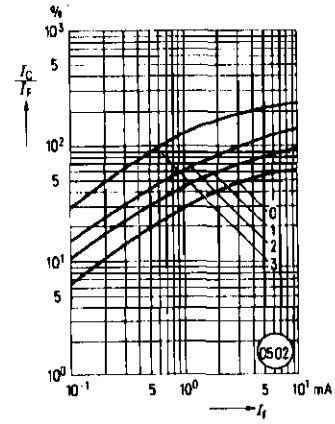


Figure 3. Current Transfer ratio versus diode current (T_A=25°C, V_{CE}=5 V)
I_C/I_F=f (I_F).

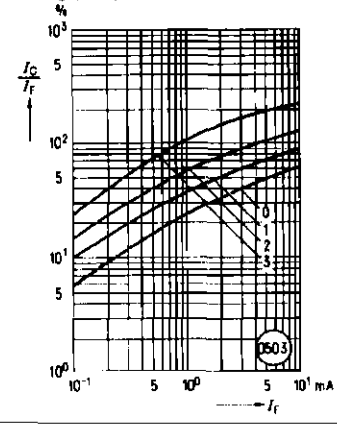


Figure 4. Current transfer ratio versus diode current (T_A=50°C) V_{CE}=5 V
$I_C/I_F=f(I_F)$

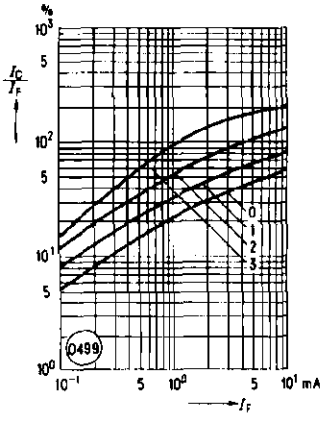


Figure 5. Current transfer ratio versus diode current (T_A=75°C) V_{CE}=5 V
$I_C/I_F=f(I_F)$

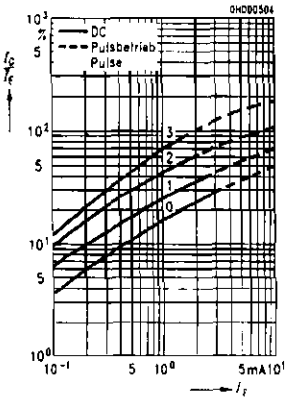


Figure 6. Current transfer ratio versus temperature (I_F=10 mA, V_{CE}=5 V)
$I_C/I_F=f(T)$

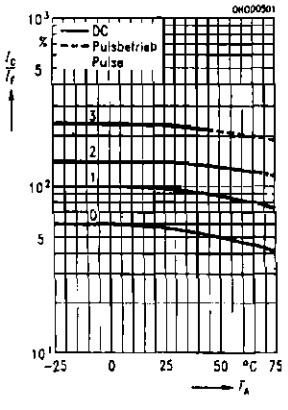


Figure 7. Transistor characteristics (HFE =550)
SFH600-2, -3 $I_C=f(V_{CE})$ (T_A=25°C, I_F=0)

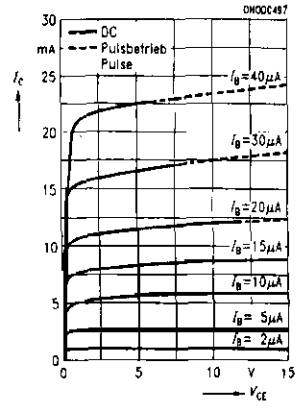


Figure 8. Output characteristics
SFH600-2, -3 (T_A=25°C) $IC=f(V_{CE})$

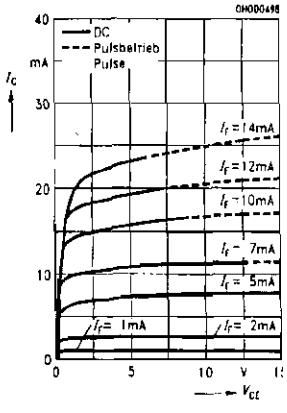


Figure 9. Forward voltage $V_F=f(I_F)$

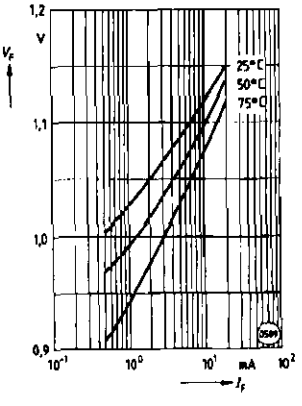


Figure 10. Collector emitter off-state current $I_{CEO}=f$ (V, T) (T_A=25°C, I_F=0)

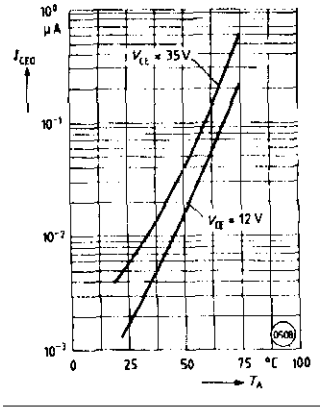


Figure 11. Saturation voltage versus collector current and modulation depth
SFH600-0 $V_{CEsat}=f(I_C)$ (T_A=25°C)

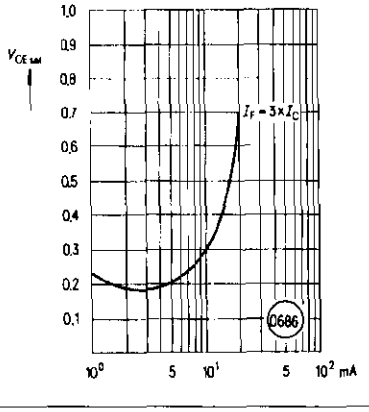


Figure 12. Saturation voltage versus collector current and modulation depth
SFH600-1 $V_{CEsat}=f(I_C)$ (T_A=25°C)

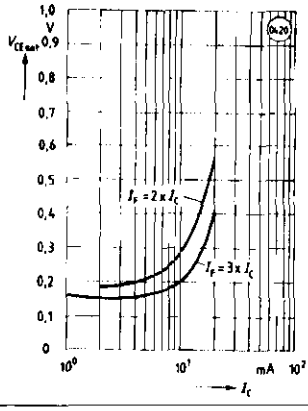


Figure 13. Saturation voltage versus collectorcurrent and modulation depth SFH600-2 V_{CEsat}=f (I_C) (T_A≈25°C)

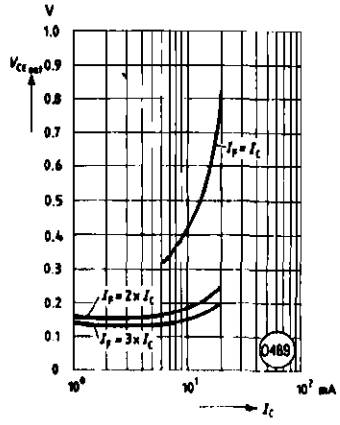


Figure 14. Saturation voltage versus collectorcurrent and modulation depth SFH600-3 V_{CEsat}=f (I_C) (T_A=25°C)

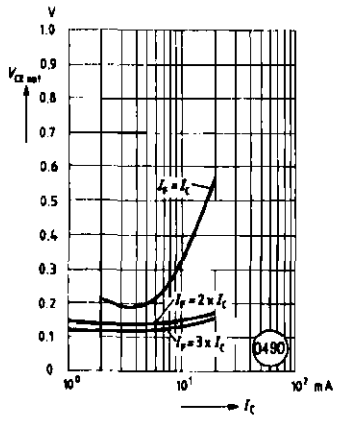


Figure 15. Permissible pulse load
D=parameter, T_A=25°C, I_F=f (t_p)

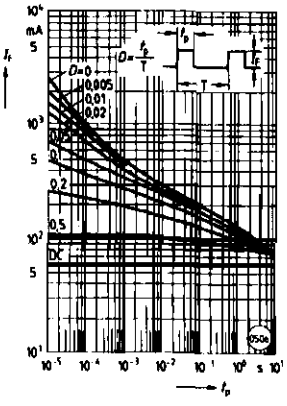


Figure 16. Permissible power dissipation for transistor and diode P_{tot}=f (T_A)

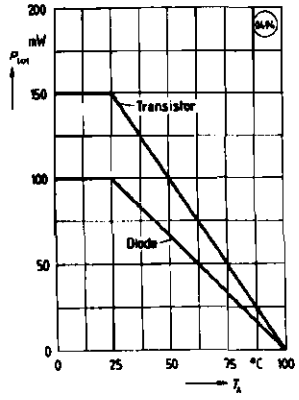


Figure 17. Permissible forward current diode P_{tot}=f (T_A)

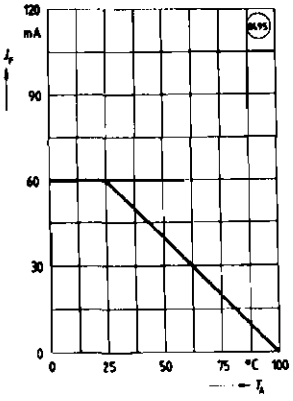


Figure 18. Transistor capacitance C=f(V_O) (T_A=25°C, f=1 MHz)