SIEMENS

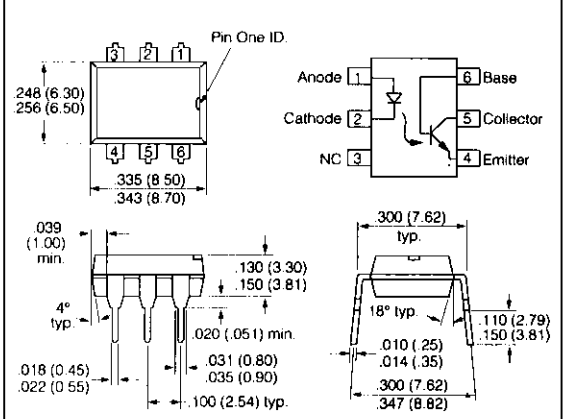
SFH601 SERIES

TRIOS®* PHOTOTRANSISTOR OPTOCOUPLER

FEATURES

- **High Current Transfer Ratios**
  SFH601-1, 40 to 80%
  SFH601-2, 63 to 125%
  SFH601-3, 100 to 200%
  SFH601-4, 160 to 320%
- **Isolation Test Voltage (1 Sec.), 5300 VAC_{RMS}**
- **V_{CEsat} 0.25 (≤0.4) V at I_F=10 mA, I_C=2.5 mA**
- **Built to Conform to VDE Requirements**
- **Highest Quality Premium Device**
- **Long Term Stability**
- **Storage Temperature: −55° to +150°C**
- **Underwriters Lab File #E52744**
- **CECC Approved**
- **VDE 0884 Available with Option 1**

Package Dimensions in Inches (mm)



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	100 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 and 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	≥10^{12} Ω
V_{IO}=500 V, T_A=100°C	≥10^{11} Ω

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 sealing plane ≥1.5 mm)	260°C

DESCRIPTION

The SFH601 is an optocoupler with a Gallium Arsenide LED emitter which is optically coupled with a silicon planar phototransistor detector. The component is packaged in a plastic plug-in case 20 A8 DIN 41866.

The coupler transmits signals between two electrically isolated circuits.

Characteristics (T_A=25°C)

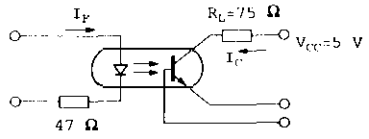
	Symbol		Unit	Condition
Emitter				
Forward Voltage	V_F	1.25 (≤1.65)	V	I_F=60 mA
Breakdown Voltage	V_{BR}	≥6	V	I_R=10 µA
Reverse Current	I_R	0.01 (≤10)	µA	V_R=6 V
Capacitance	C_{J0}	25	pF	V_F=0 V, f=1 MHz
Thermal Resistance	R_{THJamb}	750	°C/W	
Detector				
Capacitance			pF	f=1 MHz
Collector-Emitter	C_{CE}	6.8		V_{CE}=5 V
Collector-Base	C_{CB}	8.5		V_{CB}=5 V
Emitter-Base	C_{EB}	11		V_{EB}=5 V
Thermal Resistance	R_{THJamb}	500	°C/W	
Package				
Collector-Emitter Saturation Voltage	V_{CEsat}	0.25 (<0.4)		I_F=10 mA, I_C=2.5 mA
Coupling Capacitance	C_{IO}	0.6	pF	V_{I-O}=0, f=1 MHz

*TRIOS–TRansparent IOn Shield

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

	-1	-2	-3	-4	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 (≤ 50)	2 (≤ 50)	5 (≤ 100)	5 (≤ 100)	nA

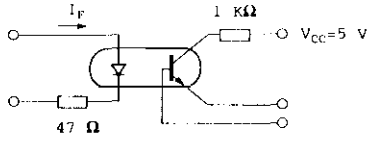
Linear Operation (without saturation)



I_F=10 mA, V_{CC}=5 V, T_A=25°C, Typical

Load Resistance	R_L	75	Ω
Turn-On Time	t_{ON}	3.0	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)



Typical

	-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
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)

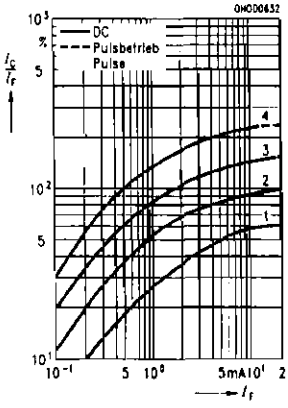


Figure 2. Current transfer ratio versus diode current (T_A=0°C, V_{CE}=5 V) I_C/I_F=f (I_F).

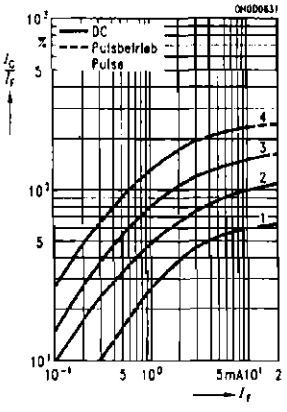


Figure 3. Current transfer ratio versus diode current (T_A=25°C, V_{CE}=5 V) I_C/I_F=f (I_F).

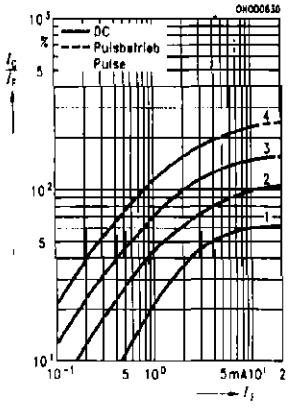


Figure 4. Current transfer ratio versus diode current (T_A=50°C, V_{CE}=5 V) I_C/I_F=f (I_F).

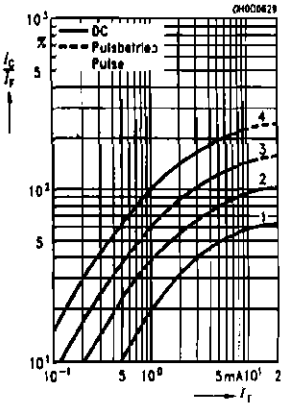


Figure 5. Current transfer ratio versus diode current (T_A=75°C, V_{CE}=5 V) I_C/I_F=f (I_F)

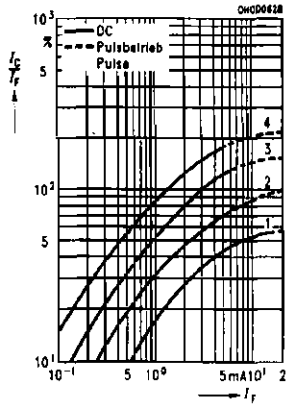


Figure 6. Current transfer ratio versus temperature (I_F=10 mA, V_{CE}=5 V) I_C/I_F=f (T)

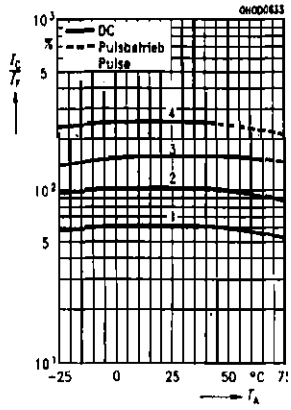


Figure 7. Transistor characteristics (HFE=550) I_C=f(V_{CE}) (T_A=25°C, I_F=0)

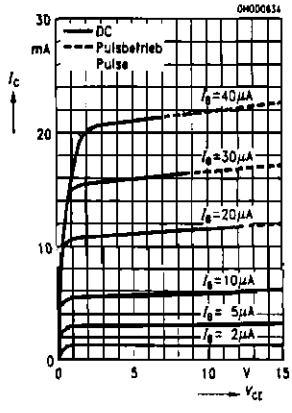


Figure 8. Output characteristics I_C=f (V_{CE}) (T_A=25°C)

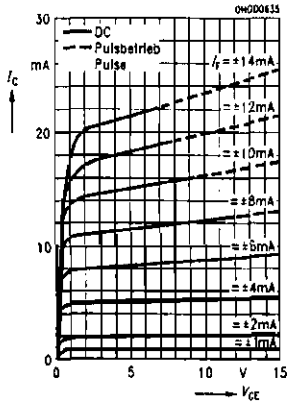


Figure 9. Forward voltage V_F=f (I_F)

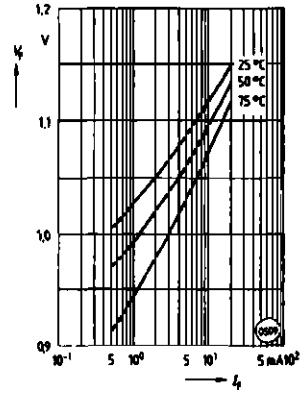


Figure 10. Collector emitter off-state current I_{CEO}=f (V, T) (T_A=25°C, I_F=0)

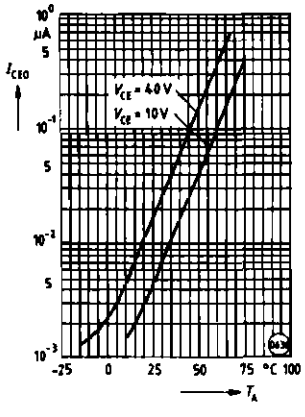


Figure 11. Saturation voltage versus collector current and modulation depth SFH601-1 V_{CEsat}=f (I_C) (T_A=25°C)

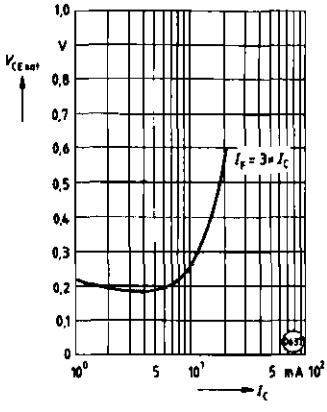


Figure 12. Saturation voltage versus collectorcurrent and modulation depth SFH601-2 V_{CEsat}=f (I_C) (T_A=25°C)

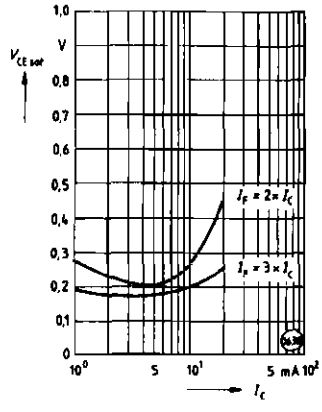


Figure 13. Saturation voltage versus collector current and modulation depth
SFH601-3 $V_{CEsat}=f(I_C)$ ($T_A=25°C$)

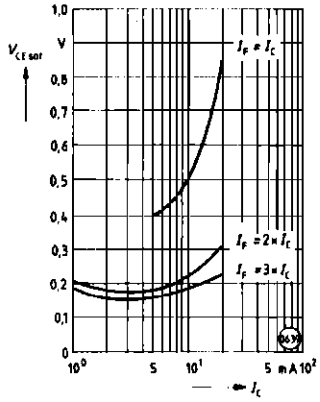


Figure 14. Saturation voltage versus collector current and modulation depth
SFH601-4 $V_{CEsat}=f(I_C)$ ($T_A=25°C$)

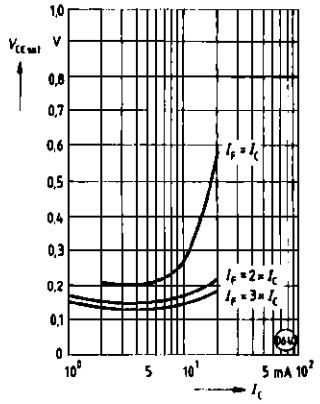


Figure 15. Permissible pulse load
D=parameter, $T_A=25°C$, $I_F=f(t)$

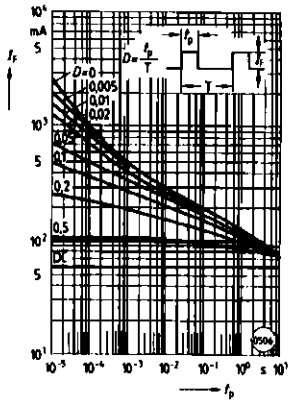


Figure 16. Permissible power dissipation for transistor and diode $P_{tot}=f(T_A)$

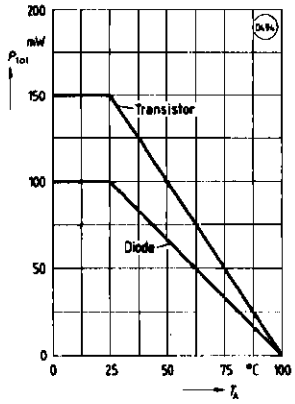


Figure 17. Permissible forward current diode $P_{tot}=f(T_A)$

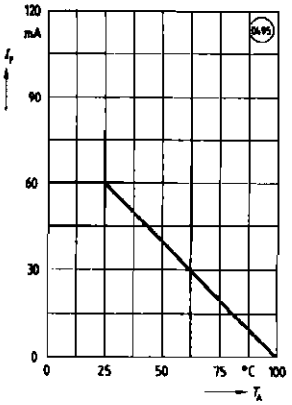


Figure 18. Transistor capacitance
$C=f(V_O)$ ($T_A=25°C$, f=1 MHz)