

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}**
- **VCEsat 0.25 (≤ 0.4) V, IF=10 mA, IC=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**

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 AB DIN 41866.

The coupler transmits signals between two electrically isolated circuits.

Maximum Ratings

Emitter

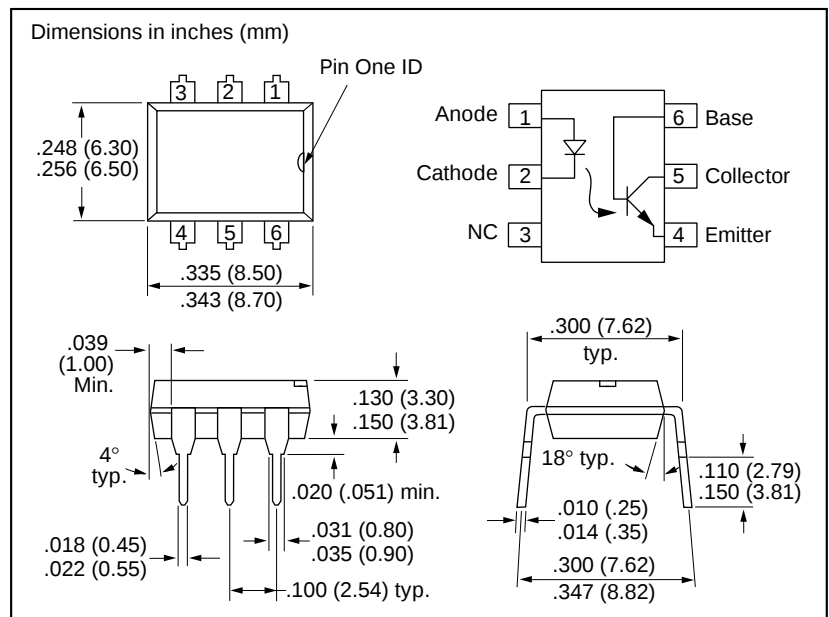
Reverse Voltage.....	6 V
DC Forward Current.....	60 mA
Surge Forward Current ($t_p=10\ \mu s$).....	2.5 A
Total Power Dissipation.....	100 mW

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
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



Characteristics ($T_A=25^{\circ}\text{C}$)

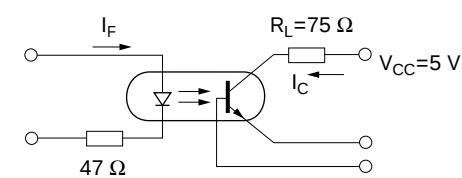
	Symbol		Unit	Condition
Emitter				
Forward Voltage	V_F	1.25 (≤ 1.65)	V	$I_F=60\text{ mA}$
Breakdown Voltage	V_{BR}	≥ 6	V	$I_R=10\text{ }\mu\text{A}$
Reverse Current	I_R	0.01 (≤ 10)	μA	$V_R=6\text{ V}$
Capacitance	C_O	25	pF	$V_F=0\text{ V}$, $f=1\text{ MHz}$
Thermal Resistance	R_{THJamb}	750	$^{\circ}\text{C/W}$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

***TRIOS—TRansparent IO n Shield**

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

	-0	-1	-2	-3	Unit
I_C/I_F at $V_{CE}=5\text{ V}$ ($I_F=10\text{ mA}$)	40-80	63-125	100-200	160-320	%
I_C/I_F at $V_{CE}=5\text{ V}$ ($I_F=1\text{ mA}$)	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%
Collector-Emitter Leakage Current ($V_{CE}=10\text{ V}$) (I_{CEO})	2 (≤ 50)	2 (≤ 50)	5 (≤ 100)	5 (≤ 100)	nA

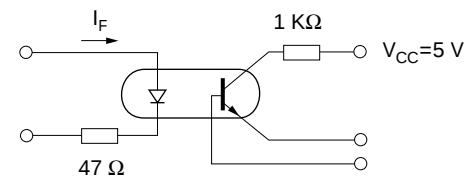
Figure 1. Linear operation (without saturation)



$I_F=10\text{ mA}$, $V_{CC}=5\text{ V}$, $T_A=25\text{ }^\circ\text{C}$, 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

Figure 2. Switching operation (with saturation)



Typical

		-1 ($I_F=20\text{ mA}$)	-2 and -3 ($I_F=10\text{ mA}$)	-4 ($I_F=5\text{ mA}$)	
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_{CE-SAT}	0.25 (≤ 0.4)			V

Figure 3. Current transfer ratio versus diode current

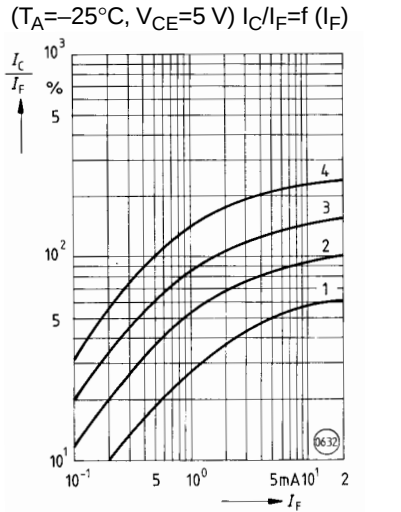


Figure 4. Current transfer ratio versus diode current ($T_A=0^\circ\text{C}$, $V_{CE}=5\text{ V}$)

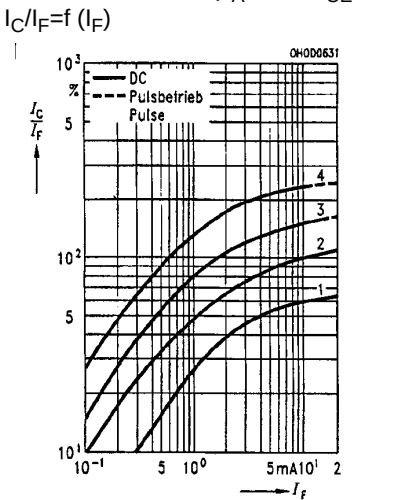


Figure 5. Current transfer ratio versus diode current ($T_A=25^\circ\text{C}$, $V_{CE}=5\text{ V}$)

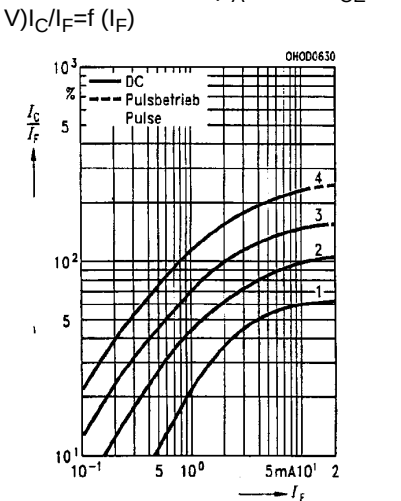


Figure 6. Current transfer ratio versus diode current ($T_A=50^\circ\text{C}$) $V_{CE}=5\text{ V}$, $I_C/I_F=f(I_F)$

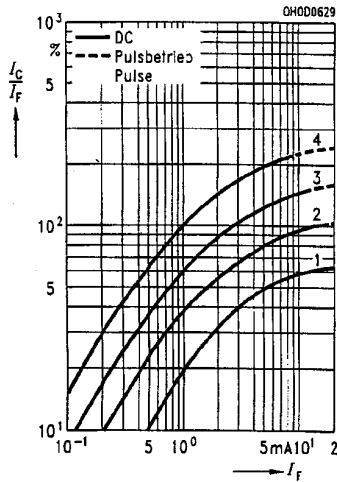


Figure 7. Current transfer ratio versus diode current ($T_A=75^\circ\text{C}$, $V_{CE}=5\text{ V}$) $I_C/I_F=f(I_F)$

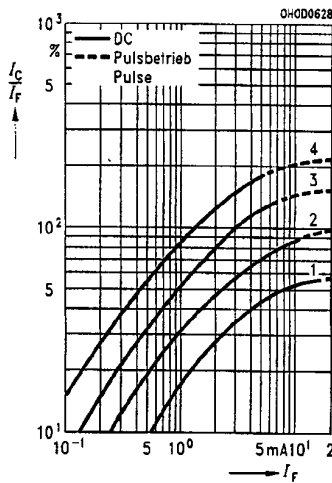


Figure 8. Current transfer ratio versus temperature ($I_F=10\text{ mA}$, $V_{CE}=5\text{ V}$) $I_C/I_F=f(T)$

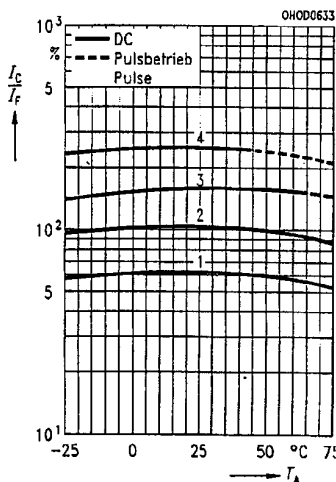


Figure 9. Transistor characteristics ($HFE=550$) $I_C=f(V_{CE})$ ($T_A=25^\circ\text{C}$, $I_F=0$)

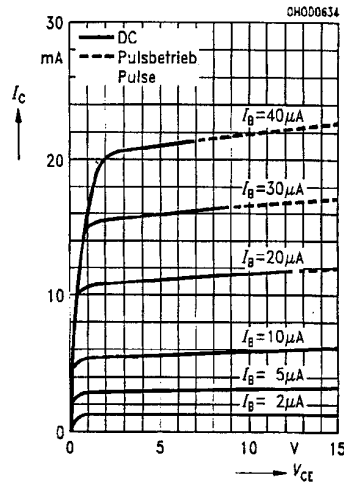


Figure 10. Output characteristics $I_C=f(V_{CE})$ ($T_A=25^\circ\text{C}$)

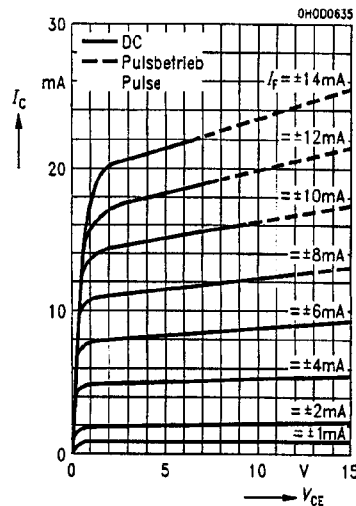


Figure 11. Forward voltage $V_F=f(I_F)$

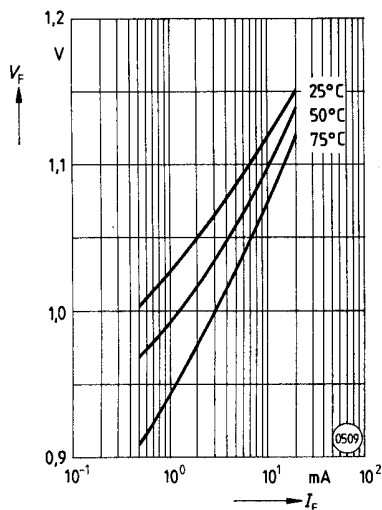


Figure 12. Collector emitter off-state current $I_{CEO}=f(V, T)$ ($T_A=25^\circ\text{C}$, $I_F=0$)

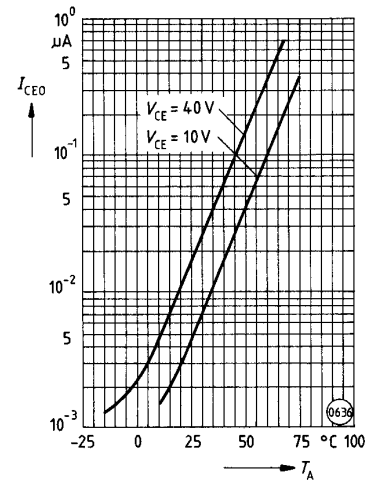


Figure 13. Saturation voltage versus collector current and modulation depthSFH601-1 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

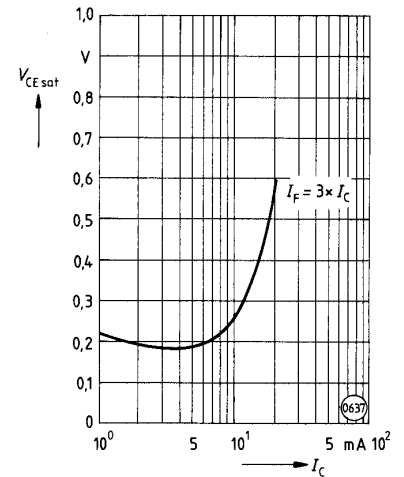


Figure 14. Saturation voltage versus collector current and modulation depthSFH601-2 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

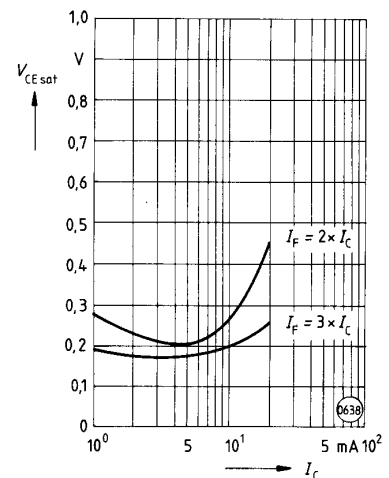


Figure 15. Saturation voltage versus collector current and modulation depth SFH601-3
 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

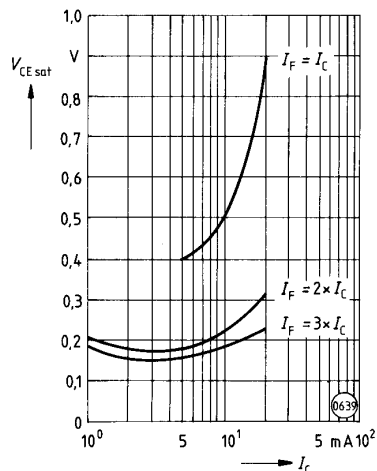


Figure 16. Saturation voltage versus collector current and modulation depth SFH601-4
 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

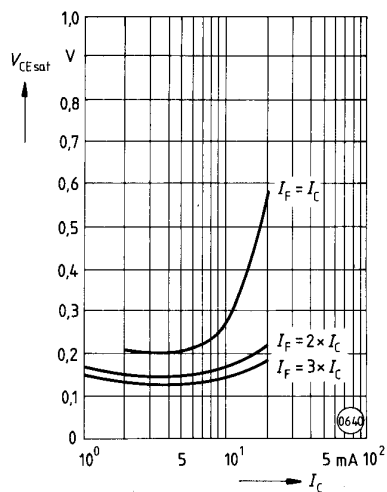


Figure 17. Permissible pulse load
 $D=\text{parameter}$, $T_A=25^\circ\text{C}$, $I_F=f(t_p)$

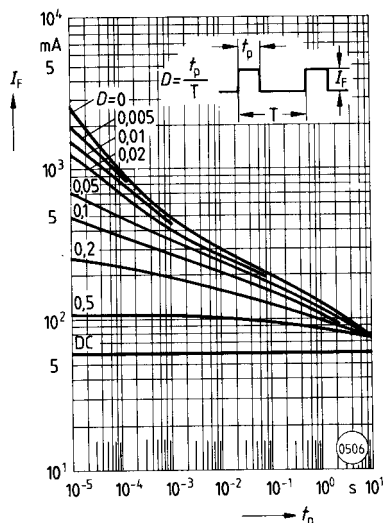


Figure 18. Permissible power dissipation for transistor and diode
 $P_{tot}=f(T_A)$

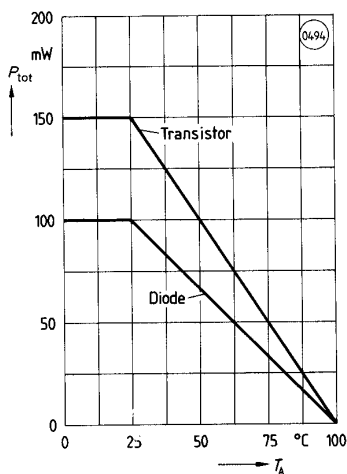


Figure 19. Permissible forward current diode
 $P_{tot}=f(T_A)$

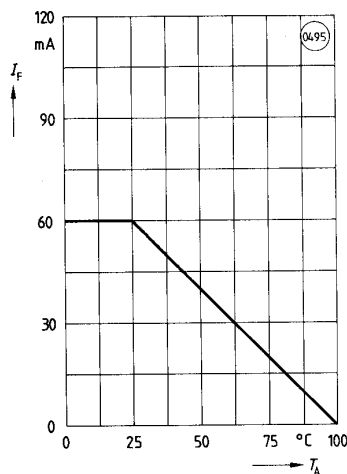


Figure 20. Transistor capacitance
 $C=f(V_O)$ ($T_A=25^\circ\text{C}$, $f=1\text{ MHz}$)

