

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 (1.0 s), 5300 V_{RMS}**
- **V_{CEsat} 0.25 (≤0.4) V, 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**
- **Field Effect Stable by TRIOS (TRansparent IO Shield)**
- **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

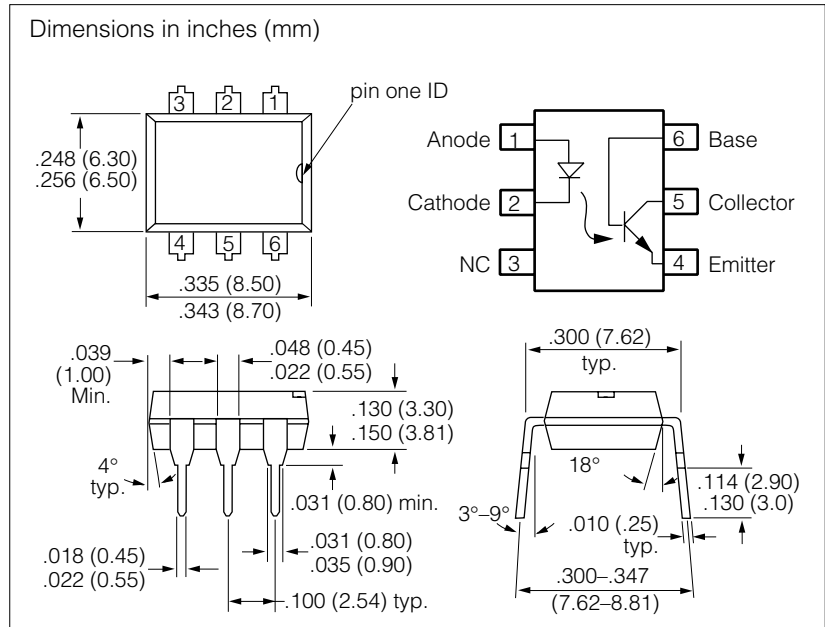
Reverse Voltage 6.0 V
DC Forward Current 60 mA
Surge Forward Current (t_p = 10 μs) 2.5 A
Total Power Dissipation 100 mW

Detector

Collector-Emitter Voltage 100 V
Emitter-Base Voltage 7.0 V
Collector Current 50 mA
Collector Current (t = 1.0 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 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 ≥10¹² Ω
V_{IO}=500 V, T_A=100°C ≥10¹¹ 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°C)

	Symbol		Unit	Condition
Emitter				
Forward Voltage	V _F	1.25 (≤1.65)	V	I _F =60 mA
Breakdown Voltage	V _{BR}	≥6.0	V	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			pF	f=1.0 MHz
Collector-Emitter	C _{CE}	6.8		V _{CE} =5.0 V
Collector-Base	C _{CB}	8.5		V _{CB} =5.0 V
Emitter-Base	C _{EB}	11		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
	-1	-2	-3	-4		
I_C/I_F at $V_{CE}=5.0\text{ V}$	40-80	63-125	100-200	160-320	%	$I_F=10\text{ mA}$
I_C/I_F at $V_{CE}=5.0\text{ V}$	30 (>13)	45 (>22)	70 (>34)	90 (>56)	%	$I_F=1.0\text{ mA}$
Collector-Emitter Leakage Current (I_{CEO})	2.0 (≤ 50)	2.0 (≤ 50)	5.0 (≤ 100)	5.0 (≤ 100)	nA	$V_{CE}=10\text{ V}$

Figure 1. Linear Operation (without saturation)

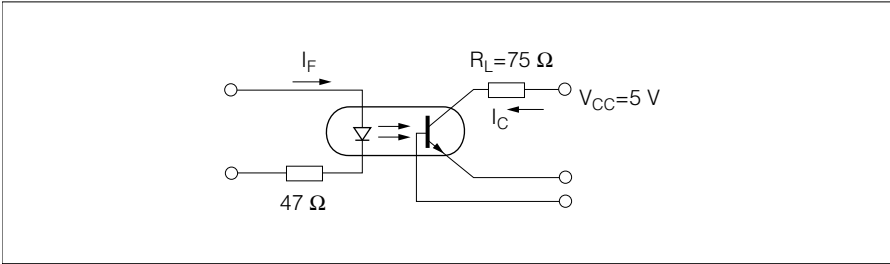


Table 2. $I_F=10\text{ mA}$, $V_{CC}=5.0\text{ V}$, $T_A=25^\circ\text{C}$, Typical

Load Resistance	R_L	75	Ω
Turn-On Time	t_{ON}	3.0	μs
Rise Time	t_R	2.0	
Turn-Off Time	t_{OFF}	2.3	
Fall Time	t_f	2.0	
Cut-off Frequency	F_{CO}	250	kHz

Figure 2. Switching Operation (with saturation)

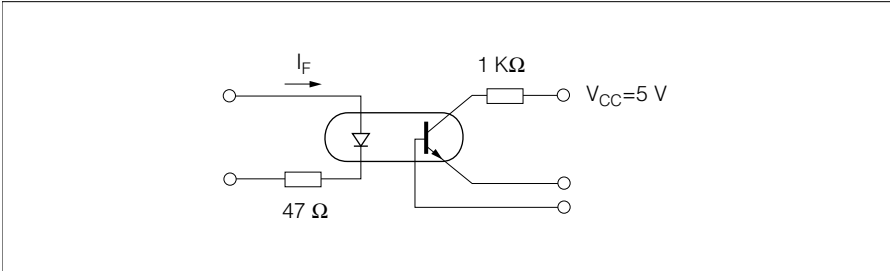


Table 3. Typical

Parameter		Dash No.			Unit
		-1 ($I_F=20\text{ mA}$)	-2 and -3 ($I_F=10\text{ mA}$)	-4 ($I_F=5.0\text{ mA}$)	
Turn-On Time	t_{ON}	3.0	4.2	6.0	μs
Rise Time	t_R	2.0	3.0	4.6	
Turn-Off Time	t_{OFF}	18	23	25	
Fall Time	t_F	11	14	15	
	V_{CESAT}	0.25 (≤ 0.4)			V

Figure 3. Current Transfer Ratio versus Diode Current ($T_A=-25^\circ\text{C}$, $V_{CE}=5.0\text{ V}$)

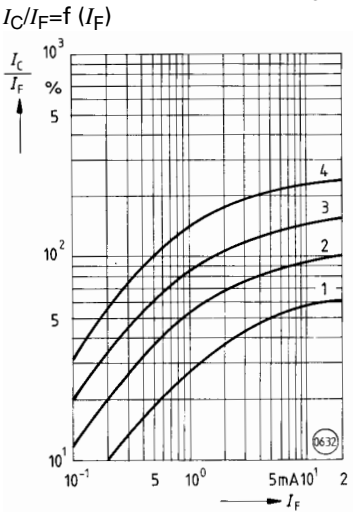


Figure 4. Current Transfer Ratio versus Diode Current ($T_A=0^\circ\text{C}$, $V_{CE}=5.0\text{ V}$)

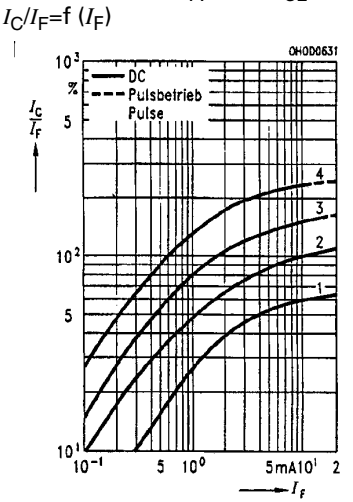


Figure 5. Current Transfer Ratio versus Diode Current ($T_A=25^\circ\text{C}$, $V_{CE}=5.0\text{ V}$)

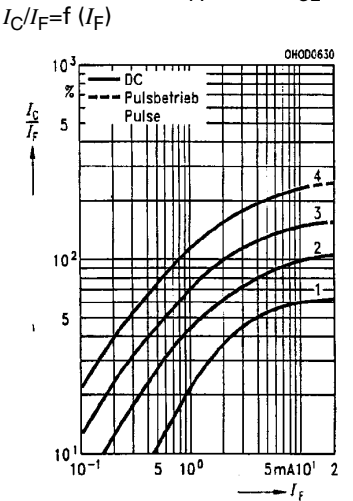


Figure 6. Current Transfer Ratio versus Diode Current ($T_A=50^\circ\text{C}$, $V_{CE}=5.0\text{ V}$) $I_C/I_F=f(I_F)$

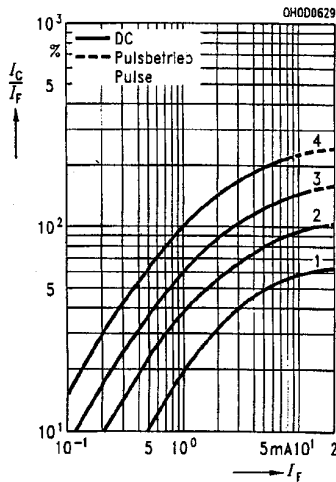


Figure 7. Current Transfer Ratio versus Diode Current ($T_A=75^\circ\text{C}$, $V_{CE}=5.0\text{ V}$) $I_C/I_F=f(I_F)$

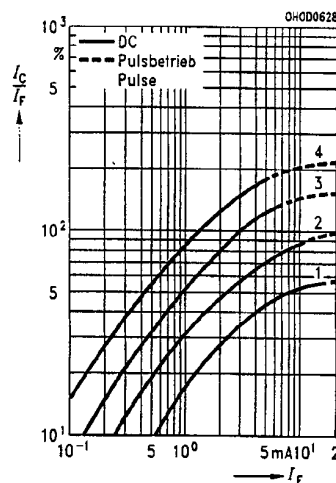


Figure 8. Current Transfer Ratio versus Temperature ($I_F=10\text{ mA}$, $V_{CE}=5.0\text{ V}$) $I_C/I_F=f(T)$

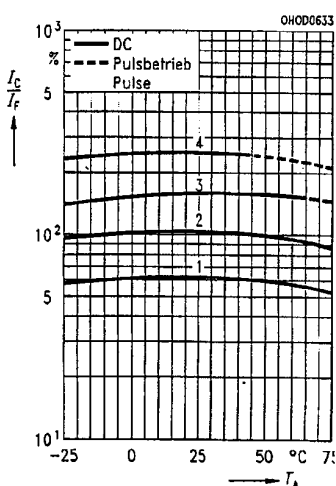


Figure 9. Transistor Characteristics (HFE=550) $I_C=f(V_{CE})$ ($T_A=25^\circ\text{C}$, $I_F=0$)

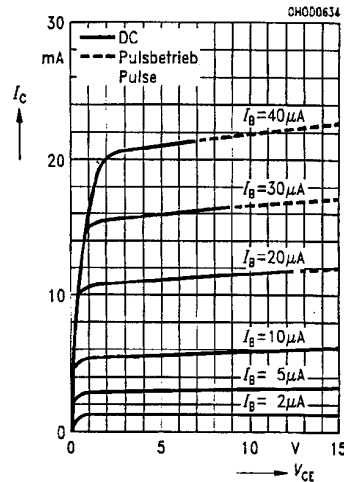


Figure 10. Output Characteristics ($T_A=25^\circ\text{C}$) $I_C=f(V_{CE})$

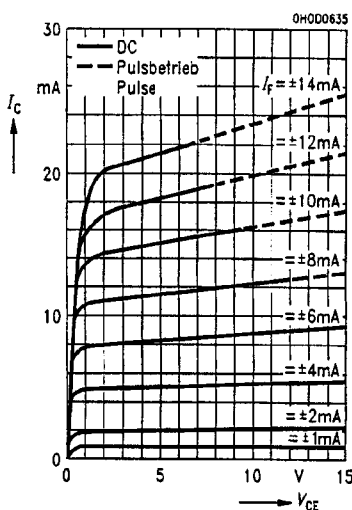


Figure 11. Forward Voltage $V_F=f(I_F)$

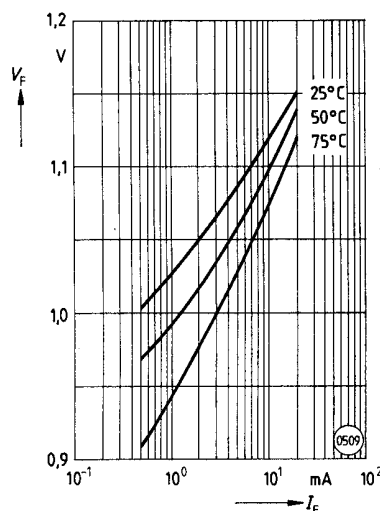


Figure 12. Collector Emitter Off-state Current $I_{CEO}=f(V, T)$ ($T_A=25^\circ\text{C}$, $I_F=0$)

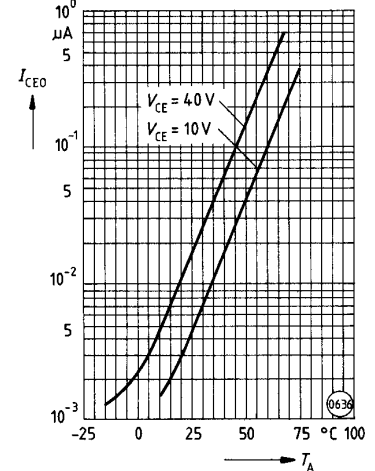


Figure 13. Saturation Voltage versus Collector Current and Modulation Depth SFH601-1 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

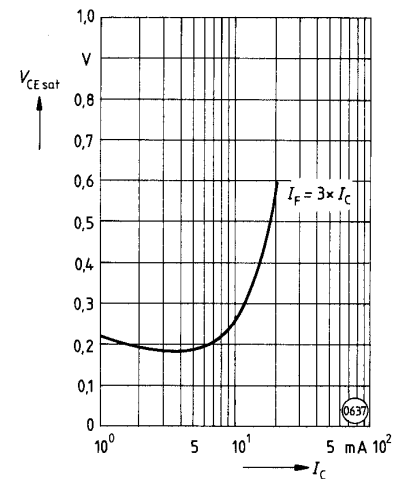


Figure 14. Saturation Voltage versus Collector Current and Modulation Depth SFH601-2 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

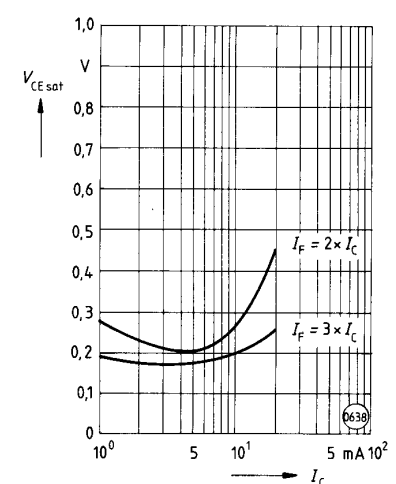


Figure 15. Saturation Voltage versus Collector Current and Modulation Depth SFH601-3 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

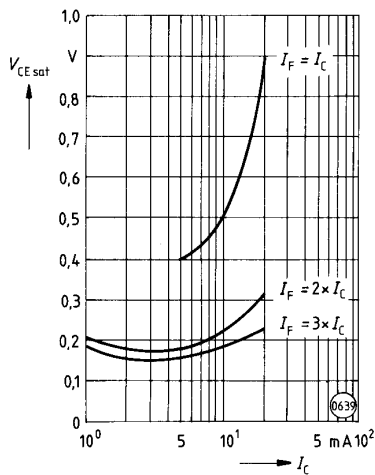


Figure 16. Saturation Voltage versus Collector Current and Modulation Depth SFH601-4 $V_{CEsat}=f(I_C)$ ($T_A=25^\circ\text{C}$)

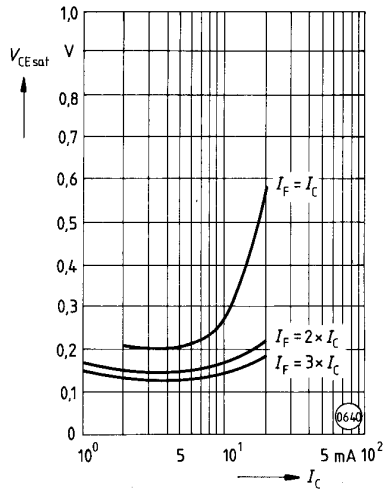


Figure 17. Permissible Pulse Load $D=\text{parameter}$, $T_A=25^\circ\text{C}$, $I_F=f(t_p)$

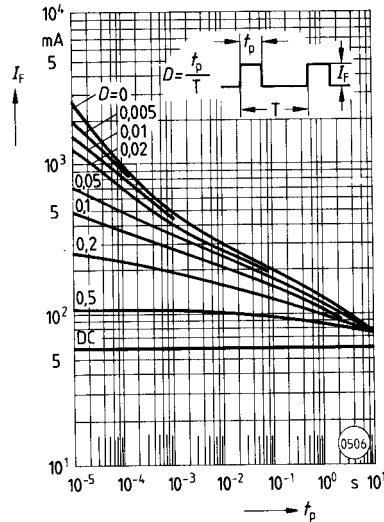


Figure 18. Permissible Power Dissipation for Transistor and Diode $P_{tot}=f(T_A)$

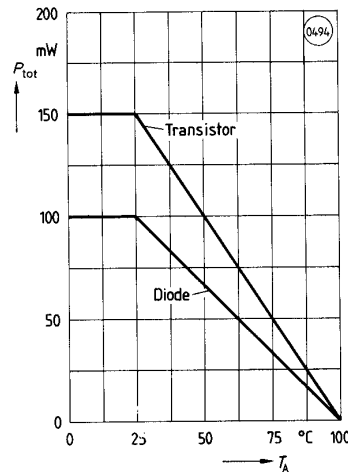


Figure 19. Permissible Forward Current Diode $P_{tot}=f(T_A)$

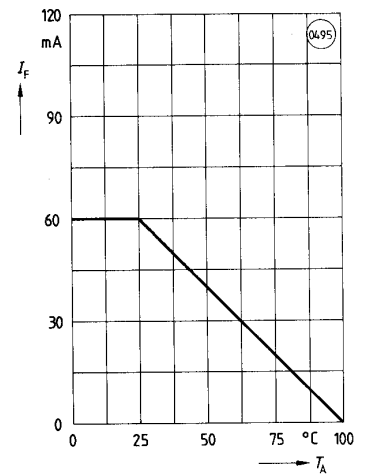


Figure 20. Transistor Capacitance $C=f(V_O)$ ($T_A=25^\circ\text{C}$, $f=1.0\text{ MHz}$)

