SIEMENS

SFH608

5.3 KV, TRIOS®, Low Current Phototransistor Optocoupler

FEATURES

- **Very High CTR at IF=1 mA, V_{CE}=0.5 V**
  - **SFH608-2, 63-125%**
  - **SFH608-3, 100-200%**
  - **SFH608-4, 160-320%**
  - **SFH608-5, 250-500%**
- **Specified Minimum CTR at I_F=0.5 mA, V_{CE}=1.5 V: ≥ 32% (typ. 120%)**
- **Good CTR Linearity with Forward Current**
- **Low CTR Degradation**
- **High Collector-Emitter Voltage V_{CEO}=55 V**
- **Isolation Test Voltage: 5300 VAC_{RMS}**
- **Low Current Input**
- **Low Coupling Capacitance**
- **High Common Mode Transient Immunity**
- **Phototransistor Optocoupler in 6 Pin DIP Package**
- **Field Effect Stable: TRIOS***
- **VDE 0884 Available with Option 1**
- **Underwriters Lab File #E52744**

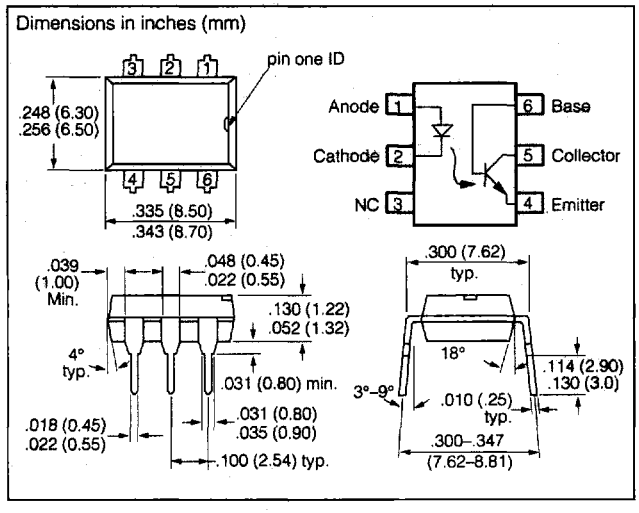
APPLICATIONS

- **Telecommunications**
- **Industrial Controls**
- **Office Machines**
- **Microprocessor System Interfaces**

DESCRIPTION

The SFH 608 is an optocoupler designed for high current transfer ratio at low input currents with the output transistor saturated. This makes the device ideal for low current switching applications. The SFH608 is packaged in a six pin plastic DIP.

***TRIOS**—**TR**ansparent **IO**n **S**hield



Maximum Ratings (T_A=25°C)

Emitter

Reverse Voltage	6 V
DC Forward Current	50 mA
Surge Forward Current (tp≤10 µs)	2.5 A
Total Power Dissipation	70 mW

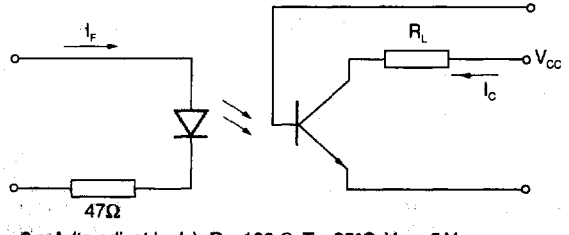
Detector

Collector-Emitter Voltage	55 V
Collector-Base Voltage	55 V
Emitter-Base Voltage	7 V
Collector Current	50 mA
Surge Collector Current (tp≤1 ms)	100 mA
Total Power Dissipation	150 mW
Isolation Test Voltage (between emitter and detector, refer to climate DIN 40046 part 2 Nov. 74) (t=1 sec.)	5300 VAC_{RMS}
Creepage	≥7 mm
Clearance	≥7 mm
Comparative Tracking Index per DIN IEC 112/VDE 0303, part1	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
Operating Temperature Range	-55°C to +100°C
Junction Temperature	100°C
Soldering Temperature (max. 10 sec., dip soldering: distance to seating plane≥1.5 mm)	260°C

Characteristics (T_A=25°C, unless otherwise specified)

	Symbol	Typ	Unit	Condition
Emitter				
Forward Voltage	V_F	1.1 (≤ 1.5)	V	I_F=5 mA
Reverse Voltage	V_R	(≥ 6)	V	I_R= 10 µA
Reverse Current	I_R	0.01 (≤ 10)	µA	V_R=6 V
Capacitance	C_O	25	pF	V_R=0 V, f=1 MHz
Thermal Resistance	R_{thJA}	1070	K/W	
Detector				
Voltage, Collector-Emitter	V_{CEO}	≥ 55	V	I_{CE}=10 µA
Voltage, Emitter-Base	V_{EBO}	≥ 7	V	I_{EB}=10 µA
Capacitance	C_{CE}	10	pF	V_{CE}=5 V, f=1 MHz
Capacitance	C_{CB}	16	pF	V_{CE}=5 V, f=1 MHz
Capacitance	C_{EB}	10	pF	V_{CE}=5 V, f=1 MHz
Thermal Resistance	R_{thJA}	500	K/W	
Package				
Coupling Capacitance	C_C	0.60	pF	
Coupling Transfer Ratio				
SFH 608-2	I_C/I_F	63-125	%	I_F=1 mA, V_{CE}=0.5 V
		75 (≥ 32)	%	I_F=0.5 mA, V_{CE}=1.5 V
SFH 608-3	I_C/I_F	100-200	%	I_F=1 mA, V_{CE}=0.5 V
		120 (≥ 50)	%	I_F=0.5 mA, V_{CE}=1.5 V
SFH 608-4	I_C/I_F	160-320	%	I_F=1 mA, V_{CE}=0.5 V
		200 (≥ 80)	%	I_F=0.5 mA, V_{CE}=1.5 V
SFH 608-5	I_C/I_F	250-500	%	I_F=1 mA, V_{CE}=0.5 V
		300 (≥ 125)	%	I_F=0.5 mA, V_{CE}=1.5 V
Saturation Voltage, Collector-Emitter				
SFH 608-2	V_{CEsat}	0.25 (≤ 0.4)	V	I_C=0.32 mA, I_F=1 mA
SFH 608-3	V_{CEsat}	0.25 (≤ 0.4)	V	I_C= 0.5 mA, I_F=1 mA
SFH 608-4	V_{CEsat}	0.25 (≤ 0.4)	V	I_C= 0.8 mA, I_F=1 mA
SFH 608-5	V_{CEsat}	0.25 (≤ 0.4)	V	I_C=1.25 mA, I_F=1 mA
Leakage Current, Collector-Emitter	I_{CEO}	10 (≤ 200)	nA	V_{CE}=10 V

Figure 1. Schematic



I_C=2 mA (to adjust by I_F), R_L=100 Ω, T_A=25°C, V_{CC}=5 V

Description	Symbol	Values	Unit
Turn-On Time	t_{ON}	8	µs
Rise Time	t_R	5	µs
Turn-Off Time	t_{OFF}	7.5	µs
Fall Time	t_F	7	µs

Figure 2. Switching times T_A=25°C, I_F=1 mA, V_{CC}=5 V, t_{ON}, t_R, t_{OFF}, t_F =f(R_L)

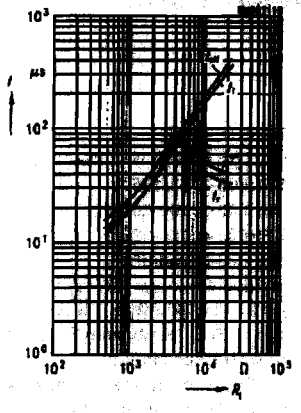


Figure 3. Current transfer ratio (typ.) V_{CE}=0.5 V, C_{TR}=f(T_A, I_F)

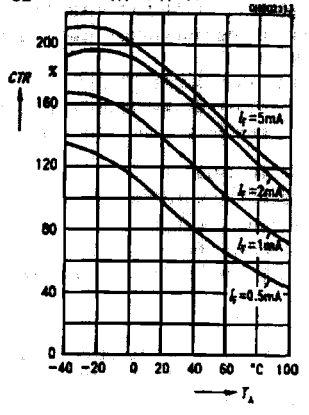


Figure 4. Current transfer ratio (typ.) V_{CE}=1.5 V, C_{TR}=f(T_A, I_F)

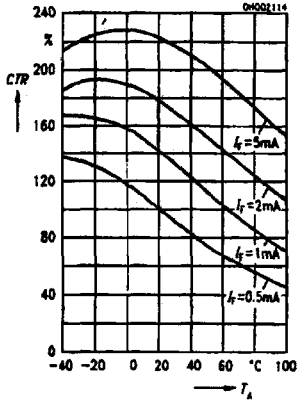


Figure 5. Diode forward voltage (typ.) T_A=25°C, $V_F=f(I_F)$

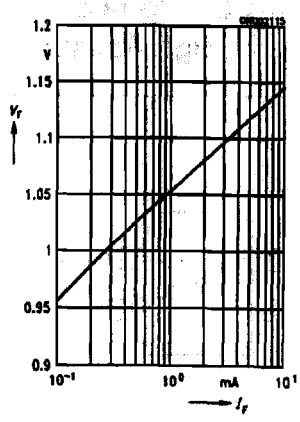


Figure 8. Output characteristics (typ.) T_A=25°C, $I_{CE}=f(V_{CE}, I_F)$

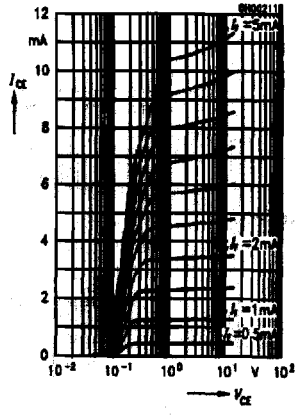


Figure 11. Transistor capacitance (typ.) T_A=25°C, f=1 MHz, $C_{CE}=f(V_{CE})$ $C_{CB}=f(V_{CB})$, $C_{EB}=f(V_{EB})$

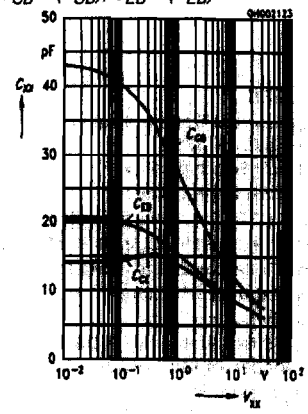


Figure 6. Diode forward voltage (typ.) I_F =1 mA, $V_F=f(T_A)$

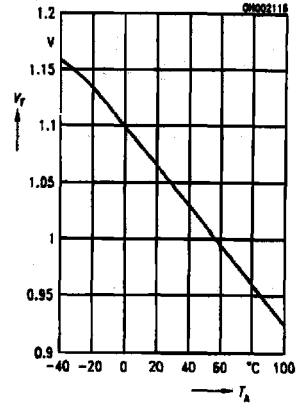


Figure 9. Permissible forward current diode $I_F=f(T_A)$

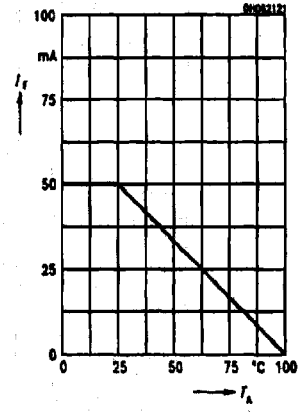


Figure 12. Collector-emitter leakage current I_F=0, V_{CE}=10 V, $I_{CEO}=f(T_A)$

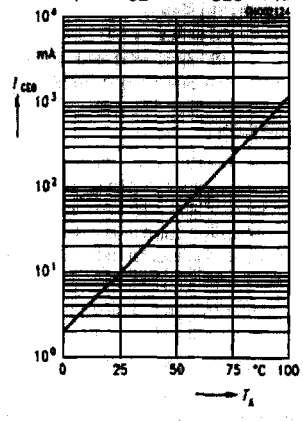


Figure 7. Output characteristics (typ.) T_A=25°C, $I_{CE}=f(V_{CE}, I_B)$

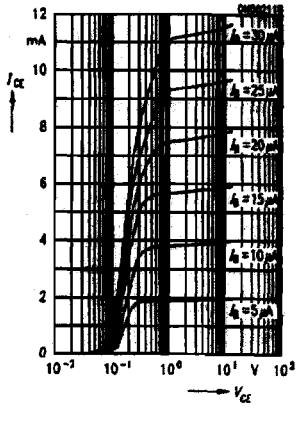


Figure 10. Permissible power dissipation $P_{TOT}=f(T_A)$