# SIEMENS

# SFH 608

## PHOTOTRANSISTOR, 5.3 KV, TRIOS® LOW CURRENT OPTOCOUPLER

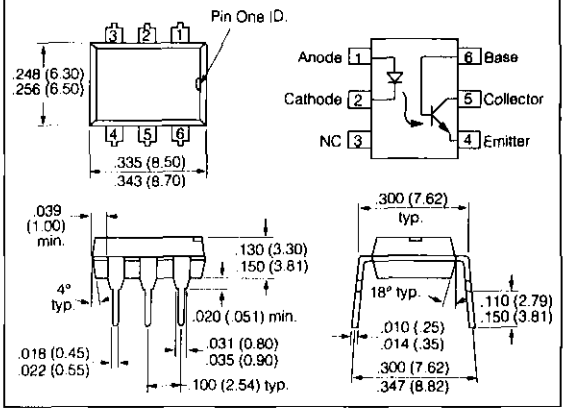
### FEATURES

- **Very High CTR at $I_F$=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.

Package Dimensions in Inches (mm)




**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 |

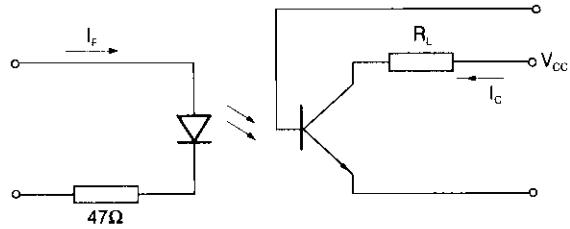
**Detector**

| | |
|---|---|
| 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 detectorreferred 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 |

***TRIOS**–**TR**ansparent **I**O**n** **S**hield

**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** | | | | |
| Collector-Emitter Voltage | $V_{CEO}$ | ≥ 55 | V | $I_{CE}$=10 µA |
| Emitter-Base Voltage | $V_{EBO}$ | ≥ 7 | V | $I_{EB}$=10 µA |
| Capacitance | $C_{CE}$ | 10 | pF | $V_{CE}$=5 V, f=1 MHz |
| Capacitance | $C_{CB}$ | 16 | pF | $V_{CB}$=5 V, f=1 MHz |
| Capacitance | $C_{EB}$ | 10 | pF | $V_{EB}$=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 |
| Collector-Emitter Saturation Voltage | | | | |
| 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 |
| Collector-Emitter Leakage Current | $I_{CEO}$ | 10 (≤ 200) | nA | $V_{CE}$=10 V |




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

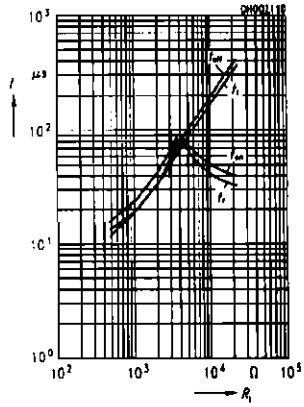



**Figure 2. Current transfer ratio (typ.)** $V_{CE}$=0.5 V, CTR=f($T_A$, $I_F$)

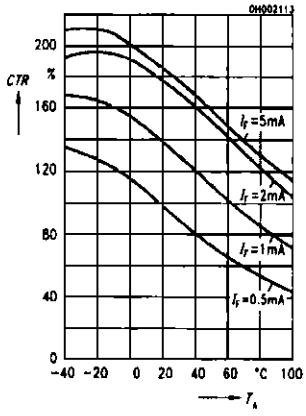



**Figure 3. Current transfer ratio (typ.)** $V_{CE}$=1.5 V, CTR=f($T_A$, $I_F$)

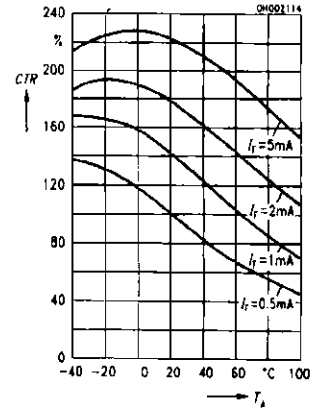


**Figure 4. Diode forward voltage (typ.)**
$T_A$=25°C, $V_F$=f($I_F$)

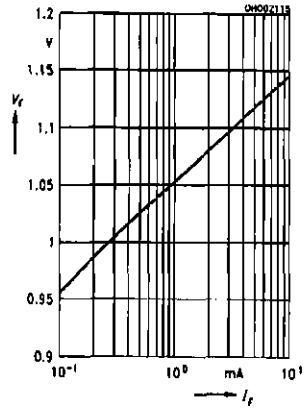



**Figure 5. Diode forward voltage (typ.)** $I_F$ =1 mA, $V_F$=f($T_A$)

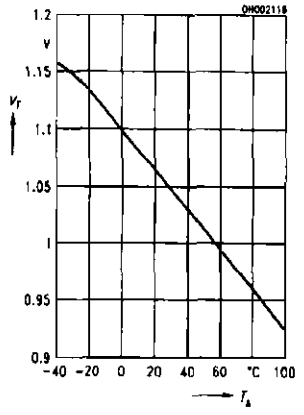



**Figure 6. Output characteristics (typ.)**
$T_A$=25°C, $I_{CE}$=f($V_{CE}$, $I_B$)

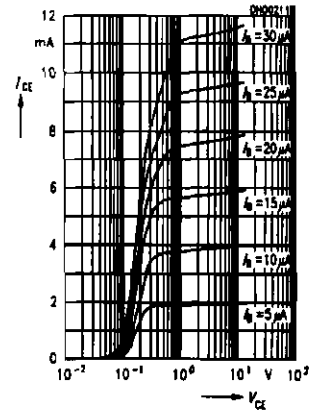



**Figure 7. Output characteristics (typ.)**
$T_A$=25°C, $I_{CE}$=f($V_{CE}$, $I_F$)

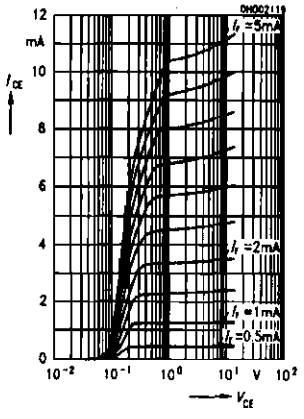



**Figure 8. Permissible forward current diode** $I_F$=f($T_A$)

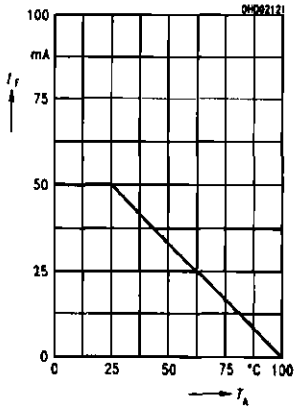



**Figure 9. Permissible power dissipation** $P_{tot}$=f($T_A$)

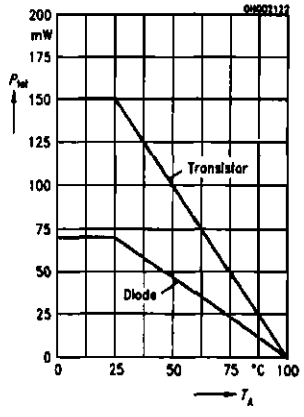



**Figure 10. Transistor capacitance (typ.)** $T_A$=25°C, f=1 MHz, $C_{CE}$=f($V_{CE}$) $C_{CB}$=f ($V_{CB}$), $C_{EB}$=f ($V_{EB}$)

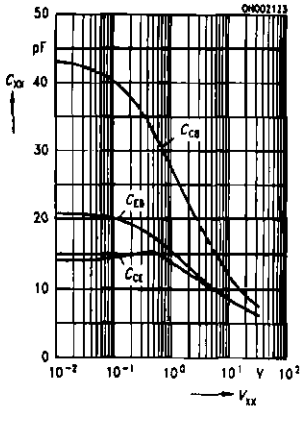



**Figure 11. Collector-emitter leakage current** $I_F$=0, $V_{CE}$=10 V, $I_{CEO}$=f($T_A$)