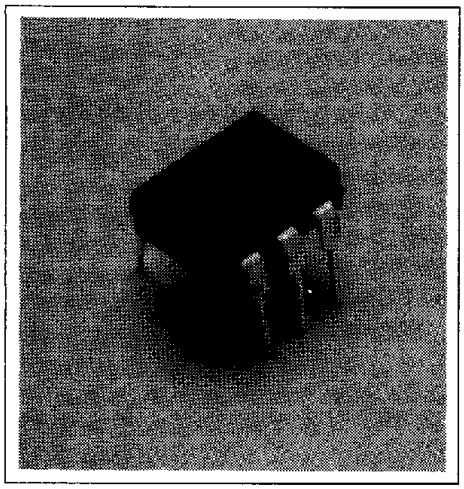
# SIEMENS

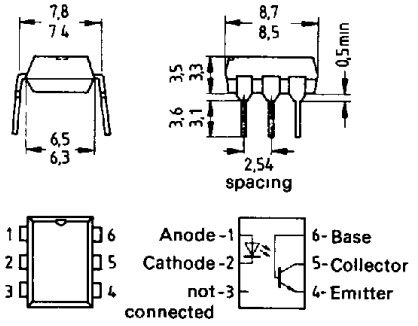
# SFH 606

## 5.3 kV TRIOS® OPTOCOUPLER HIGH REL/FAST TRANSISTOR

T-41-83



Package Dimensions mm




### FEATURES

- **Isolation Test Voltage: 5300 V**
- **High Current Transfer Ratios at 10 mA: 63-125% at 1 mA: >22%**
- **Fast Switching Times**
- **Minor CTR Degradation**
- **100% Burn-In**
- **Field-Effect Stable by TRIOS**
- **Temperature Stable**
- **Good CTR Linearity Depending on Forward Current**
- **High Collector-Emitter Voltage $V_{CEO}$=70 V**
- **Low Saturation Voltage**
- **Low Coupling Capacitance**
- **External Base Wiring Possible**
- **UL Approval #52744**
- **VDE Approval 0883**
- **VDE Approval 0884 (Optional with Option 1, add -X001 suffix)**

### DESCRIPTION

The optically coupled isolator SFH 606 features a high current transfer ratio as well as a high isolation voltage. It employs a GaAs infrared emitting diode as emitter, which is optically coupled to a silicon planar phototransistor acting as detector. The component is incorporated in a plastic plug-in DIP-6 package.

The coupling device is suitable for signal transmission between two electrically separated circuits. The difference in potential between the circuits to be coupled must not exceed the maximum permissible reference voltages.

*TRansparent IOn Shield

## Maximum Ratings

**Emitter** (GaAs Infrared Emitter)
Reverse Voltage ..... 6 V
DC Forward Current ..... 60 mA
Surge Forward Current ($t \leq 10$ µs) ..... 2.5 A
Total Power Dissipation ..... 100 mW

**Detector** (Silicon Phototransistor)
Collector-Emitter Voltage ..... 70 V
Emitter-Base Voltage ..... 7 V
Collector Current ..... 50 mA
Collector Current ($t \leq 1$ ms) ..... 100 mA
Total Power Dissipation ..... 150 mW

**Optocoupler**
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)[1] ..... 260°C
Isolation Test Voltage[2]
(between emitter and detector referred to standard climate 23/50 DIN 50014) ..... 5300 VDC
Leakage Path ..... ≥8.2 mm
Air path ..... ≥7.3 mm

**Tracking Resistance**
In Accordance with VDE 0110 §6, table 3, and DIN 53480/VDE 0303, part 1 ..... ≥100 (group 3)
Isolation Resistance ($V_{IO}$=500 V) ..... $10^{11}$ Ω

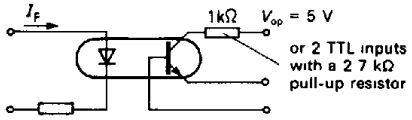
**Notes:**
1 Dip soldering Insertion depth ≤3.6 mm
2 DC test voltage in accordance with DIN 57883, draft 6/80

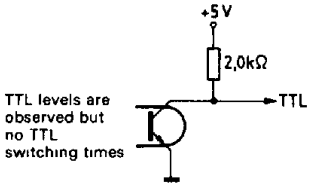
## Characteristics ($T_A$=25°C)

| | | | |
|---|---|---|---|
| **Emitter** (GaAs Infrared Emitter) | | | |
| Forward Voltage ($I_F$=60 mA) | $V_F$ | 1.25 (≤1.65) | V |
| Breakdown Voltage ($I_R$=10 µA) | BV | 30 (≥6) | V |
| Reverse Current ($V_R$=6 V) | $I_R$ | 0.01 (≤10) | µA |
| Capacitance ($V_R$=0 V, f=1 MHz) | $C_0$ | 25 | pF |
| Thermal Resistance | $R_{TH,JA}$ | 750 | K/W |
| **Detector** (Silicon Phototransistor) | | | |
| Capacitance | | | |
| ($V_{CE}$=5 V, f=1 MHz) | $C_{CE}$ | 5.2 | pF |
| ($V_{CB}$=5 V, f=1 MHz) | $C_{CB}$ | 6.5 | pF |
| ($V_{EB}$=5 V, f=1 MHz) | $C_{EB}$ | 9.5 | pF |
| Thermal Resistance | $R_{TH,JA}$ | 500 | K/W |
| **Optocoupler** | | | |
| Collector-Emitter Saturation Voltage | | | |
| ($I_F$=10 mA, $I_C$=2.5 mA) | $V_{CESAT}$ | 0.25 (≤0.4) | V |
| Coupling Capacitance | $C_K$ | 0.5 | pF |
| Current Transfer Ratio | | | |
| ($I_F$=10 mA) | $I_C$, $I_F$ | 63 – 125 | % |
| ($I_F$=1 mA) | $I_C$, $I_F$ | 45 (>22) | % |
| Collector-Emitter Leakage Current | | | |
| ($V_{CE}$=10 V) | $I_{CEO}$ | 2 (≤35) | nA |

## SWITCHING TIME

**Switching Operation** (with saturation)

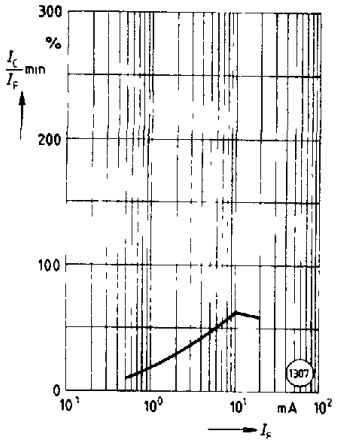


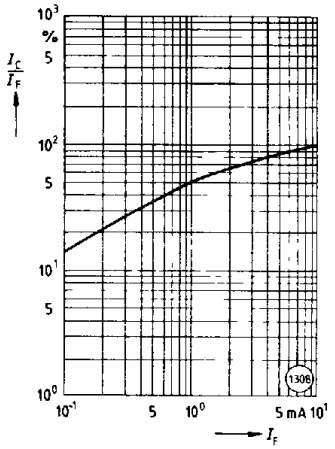

$I_F$=10 mA

| | | | |
|---|---|---|---|
| Turn-On Time | $t_{ON}$ | 3.8 (≤4.5) | µs |
| Rise Time | $t_R$ | 2.5 (≤3.0) | µs |
| Turn-Off Time | $t_{OFF}$ | 11 (≤14) | µs |
| Fall Time | $t_F$ | 8 (≤10) | µs |
| | $V_{CESAT}$ | ≤0.4 | V |

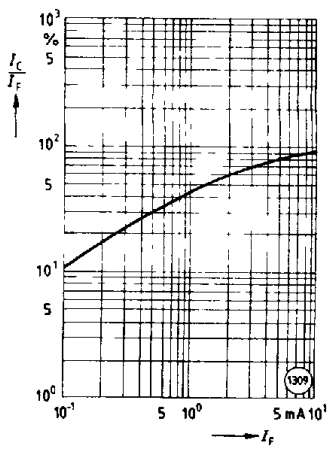
**Minimum current transfer ratio versus diode forward current**
($T_A$=25°C, $V_{CE}$=5 V)



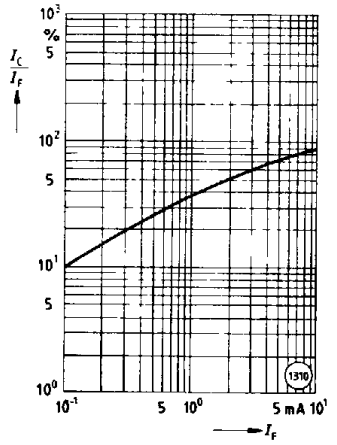

**Current transfer ratio (typ.) versus diode forward current**
($T_A$=25°C, $V_{CE}$=5 V)



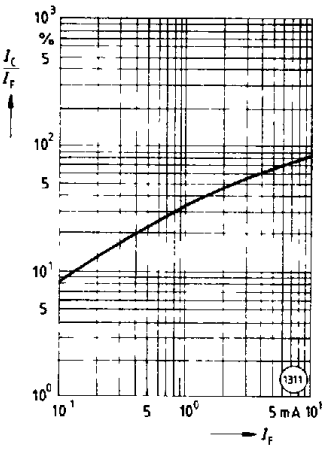

**Current transfer ratio (typ.) versus diode forward current**
($T_A$=0°C, $V_{CE}$=5 V)



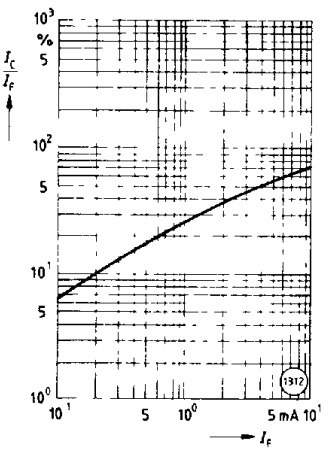

**Current transfer ratio (typ.) versus diode forward current**
($T_A$=25°C, $V_{CE}$=5 V)



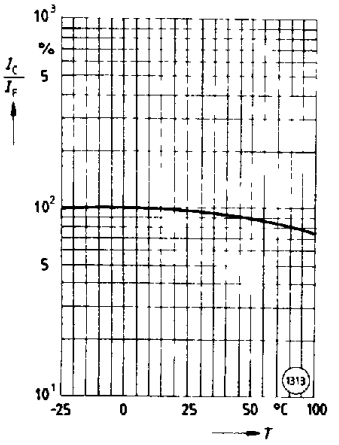

**Current transfer ratio (typ.) versus diode forward current**
($T_A$=50°C, $V_{CE}$=5 V)



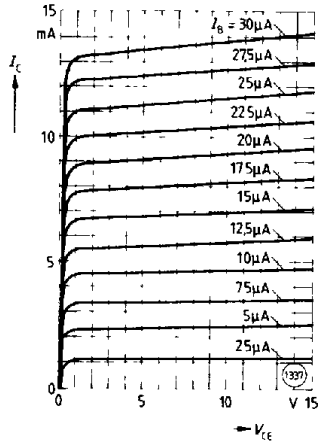

**Current transfer ratio (typ.) versus diode forward current**
($T_A$=75°C, $V_{CE}$=5 V)



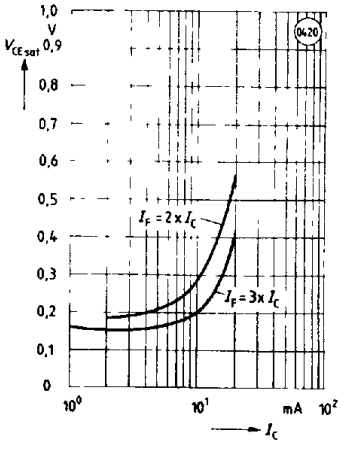

**Current transfer ratio (typ.) versus temperature**
($I_F$= 10 mA, $V_{CE}$=5 V)



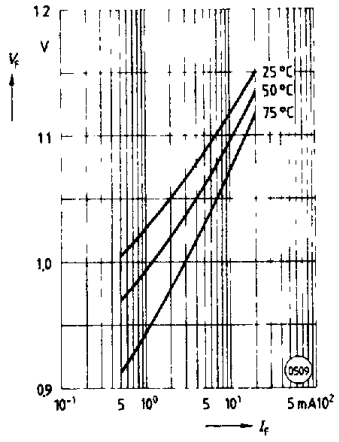

**Collector current versus collector-emitter voltage**
(Current gain B=550, $T_A$=25°C, $V_F$≤0 6 V)



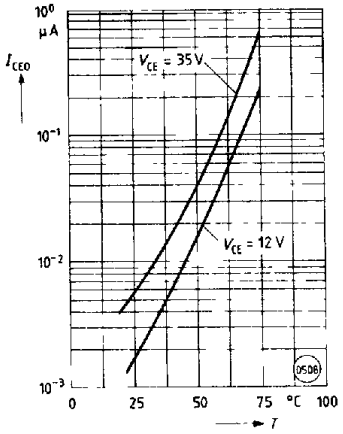

**Collector-emitter saturation voltage (typ.) versus collector current and control range** ($T_A$=25°C)



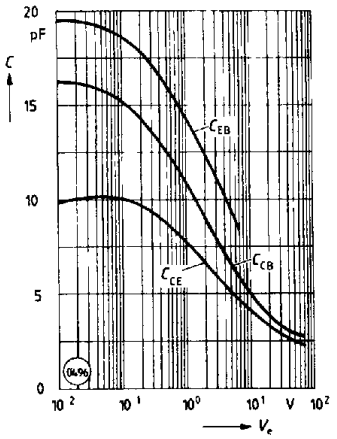
**Diode forward voltage (typ.) versus forward current**



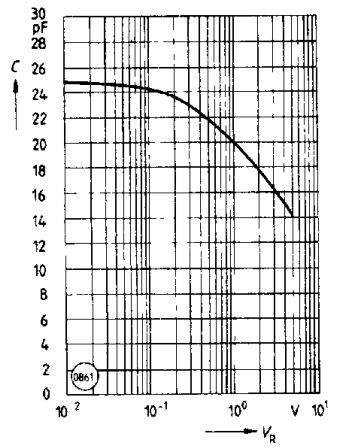

**Collector-emitter leakage current (typ.) of the transistor versus temperature ($I_F$=0)**



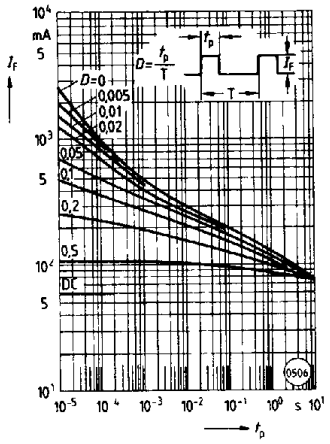

**Transistor capacitance (typ.) versus emitter voltage ($T_A$=25°C, f =1 MHz)**



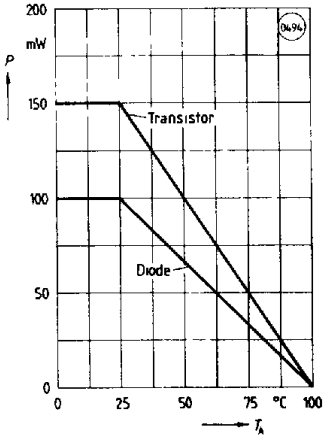

**Diode capacitance (typ.) versus reverse voltage ($T_A$=25°C, f =1 MHz)**



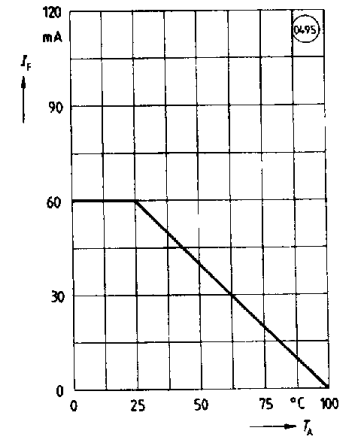

**Permissible pulse handling capability Forward current versus pulse width (D=parameter, $T_A$=25°C)**



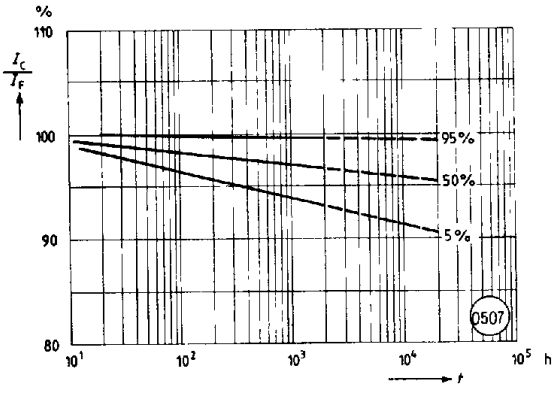

**Permissible power dissipation for transistor and diode versus ambient temperature**




**Permissible forward current of the diode versus ambient temperature**




**Current transfer ratio versus load time**
($V_{CE}$=5 V, $R_L$=1 kΩ, $T_A$=60°C, $I_F$=60 mA, Measuring current=10 mA, Confidence coefficient S=60%)




Optocouplers (Optoisolators)