SIEMENS

NEW

# SFH6941

## LOW CURRENT INPUT MINI OPTOCOUPLER

**Preliminary Data Sheet**

### FEATURES

- **Transistor Optocoupler in SOT223 Package**
- **End Stackable, 1.27 mm Spacing**
- **Low Current Input**
- **Very High CTR, 150% Typical at $I_F$=1 mA, $V_{CE}$=0.5V**
- **Good CTR Linearity Versus Forward Current**
- **Minor CTR Degradation**
- **Field Effect Stable by TRIOS® (TRansparent IOn Shield)**
- **High Collector-Emitter Voltage, $V_{CEO}$=70 V**
- **Low Coupling Capacitance**
- **High Common Mode Transient Immunity**
- **Isolation Test Voltage: 2500 VDC**

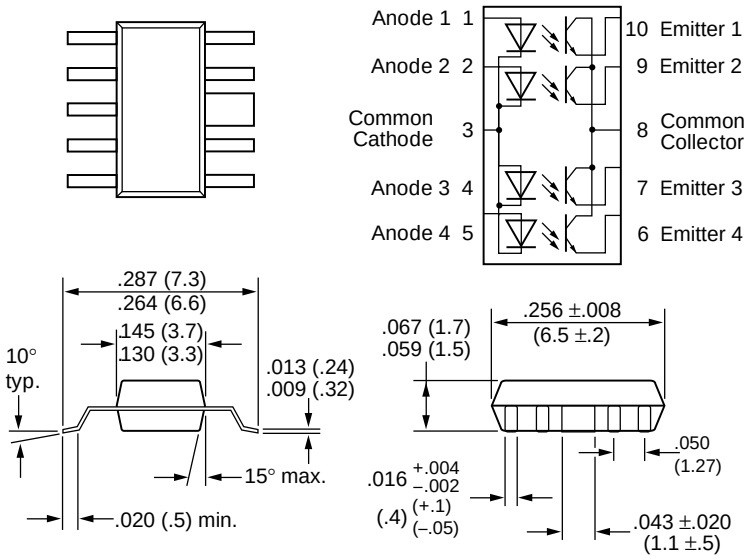
### APPLICATIONS

- **Telecommunication**
- **SMT**
- **PCMCIA**
- **Instrumentation**

### DESCRIPTION

The SFH6941 is a four channel mini-optocoupler suitable for high density packaged PCB application. It has a minimum of 2500 VDC isolation from input to output. The device consists of four phototransistors as detectors. Each channel is individually controlled. The optocoupler is housed in a SOT223 package. All the cathodes of the input LEDs and all the collectors of the output transistors are commoned enabling a pin count reduction from 16 pins to 10 pins—a significant space savings as compared to four channels that are electrically isolated individually.

Package Dimensions in Inches (mm)




### Absolute Maximum Ratings

**Emitter(GaAlAs)**

Reverse Voltage ..... 3 V
DC Forward Current ..... 5 mA
Surge Forward Current ($t_P$≤10 µs) ..... 100 mA
Total Power Dissipation ..... 10 mW

**Detector (Si Phototransistor)**

Collector-Emitter Voltage ..... 70 V
Emitter-Collector Voltage ..... 7 V
Collector Current ..... 10 mA
Surge Collector Current ($t_P$<1 ms) ..... 20 mA
Total Power Dissipation ..... 20 mW

**Package Insulation**

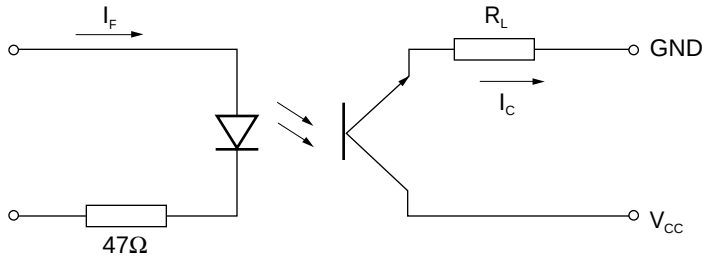
Isolation Test Voltage (between emitter and detector, refer to climate DIN 40046, part 2, Nov. 74) ..... 2500 VDC
Creepage ..... ≥4 mm
Clearance ..... ≥4 mm
Comparative Tracking Index per DIN IEC 112/VDE0303, part 1 ..... 175
Isolation Resistance
$V_{IO}$=100 V, $T_A$=25°C ..... $\geq 10^{11}\ \Omega$
$V_{IO}$=100 V, $T_A$=100°C ..... $\geq 10^{10}\ \Omega$
Storage Temperature Range ..... –55 to +150°C
Ambient Temperature Range ..... –55 to +100°C
Junction Temperature ..... 100°C
Soldering Temperature (t=10 sec. max.) ..... 260°C
Dip soldering plus reflow soldering processes

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

| Description | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **Emitter (IR GaAs)** | | | | | |
| Forward Voltage, $I_F$=5 mA | $V_F$ | | 1.25 | | V |
| Reverse Current, $V_R$=3 V | $I_R$ | | 0.01 | 10 | µA |
| Capacitance, $V_R$=0 V, f=1 MHz | $C_0$ | | 5 | | pF |
| Thermal Resistance | $R_{thJA}$ | | 1000 | | °K/W |
| **Detector (Si Phototransistor)** | | | | | |
| Collector-Emitter Voltage, $I_{CE}$=10 µA | $V_{CEO}$ | 70 | | | V |
| Emitter-Collector Voltage, $I_{EC}$=10 µA | $V_{ECO}$ | 7 | | | V |
| Capacitance, $V_{CE}$=5 V, f=1 MHz | $C_{CE}$ | | 6 | | pF |
| Thermal Resistance | $R_{thJA}$ | | 500 | | °K/W |
| **Package** | | | | | |
| Coupling Capacitance | $C_C$ | | 1 | | pF |

| Description | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | -3 | -4 | -5 | |
| Coupling Transfer Ratio<br>$I_F$=1 mA, $V_{CE}$=0.5 V<br>$I_F$=0.5 mA, $V_{CE}$=1.5 V | <br>$I_C/ I_F$<br>$I_C/ I_F$ | <br>100–200<br>120 (≥50) | <br>160–320<br>200 (≥80) | <br>250–500<br>300 (≥125) | % |
| Collector-Emitter Saturation Voltage<br>$I_F$=1 mA | $V_{CEsat}$ | 0.25 (≤0.4)<br>($I_C$=0.5 mA) | 0.25 (≤0.4)<br>($I_C$=0.8 mA) | 0.25 (≤0.4)<br>($I_C$=1.25 mA) | V |
| Collector-Emitter Leakage Current<br>$V_{CE}$=10 V | $I_{CEO}$ | 50 | 50 | 50 | nA |

**Switching times, typical**




| Description | Symbol | Values | Unit | Test Conditions |
|---|---|---|---|---|
| Turn-on Time | $t_{on}$ | 3 | µs | $I_F$=2 mA<br>$R_L$=100 Ω<br>$T_A$=25°C<br>$V_{CC}$=5 V |
| Rise Time | $t_r$ | 2.6 | | |
| Turn-off Time | $t_{off}$ | 3.1 | | |
| Fall Time | $t_f$ | 2.8 | | |

**Figure 1. LED current versus LED voltage** $V_F=f(I_F)$

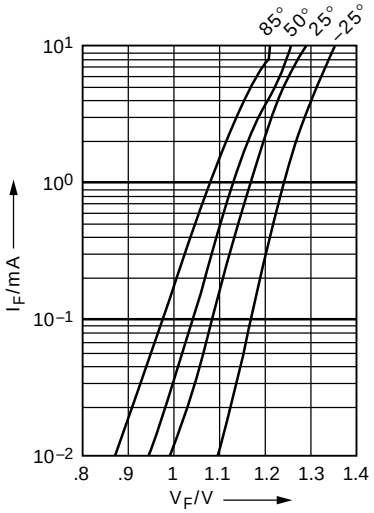



**Figure 2. Saturated current transfer ratio** normalized to $I_F$=1 mA, NCTR=f($I_F$)

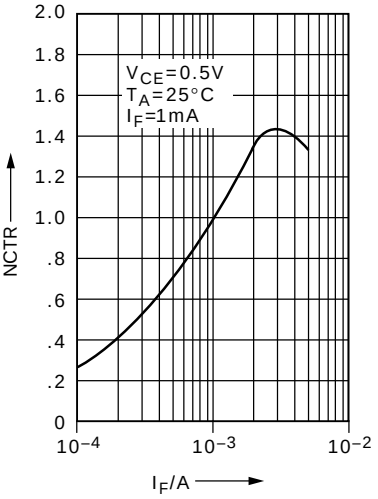



**Figure 3. Non-saturated current transfer** normalized to $I_F$=1 mA, NCTR=f($I_F$)

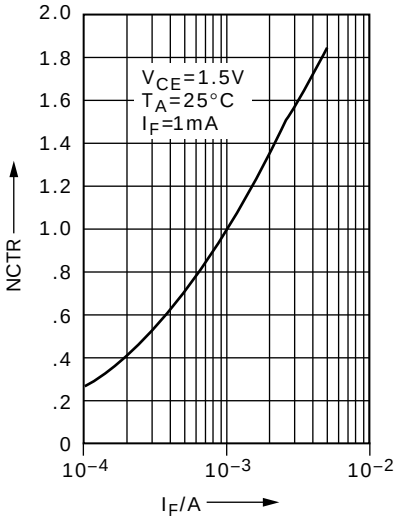



**Figure 4. Transistor output characteristics** $T_A$=25°C, $I_{CE}=f(V_{CE}, I_F)$

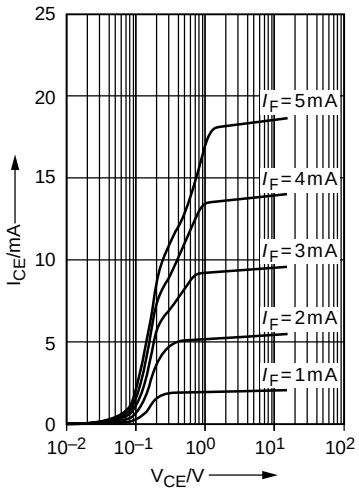



**Figure 5. Transistor capacitance (typ.)** $T_A$=25°C, f=1MHz, $C_{CE}=f(V_{CE})$

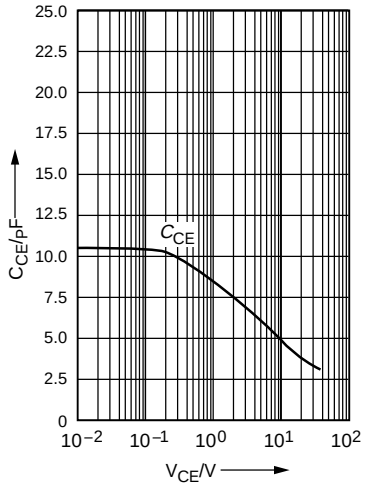



**Figure 6. Collector-emitter leakage-current (typ.)** $I_F$=0, $T_A$=25°C, $I_{CEO}=f(V_{CE})$

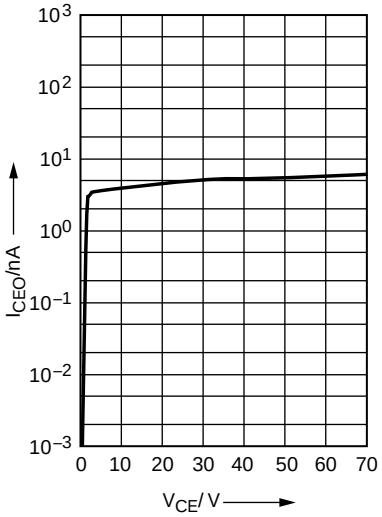



**Figure 7. Permissible forward current diode** $I_F=f(T_A=25°C)$

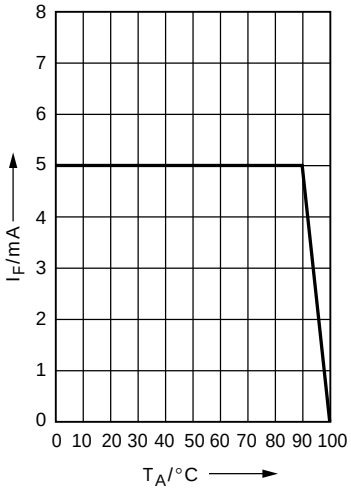



**Figure 8. Permissible power dissipation** $P_{tot}=f(T_A)$

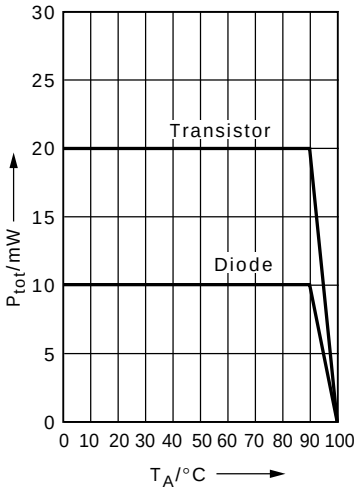



**Figure 9. $T_A$=25°C, $I_F$=1 mA, $V_{CC}$=5 V,** $t_{on}$, $t_r$, $t_{off}$,$t_t=f(R_L)$