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**

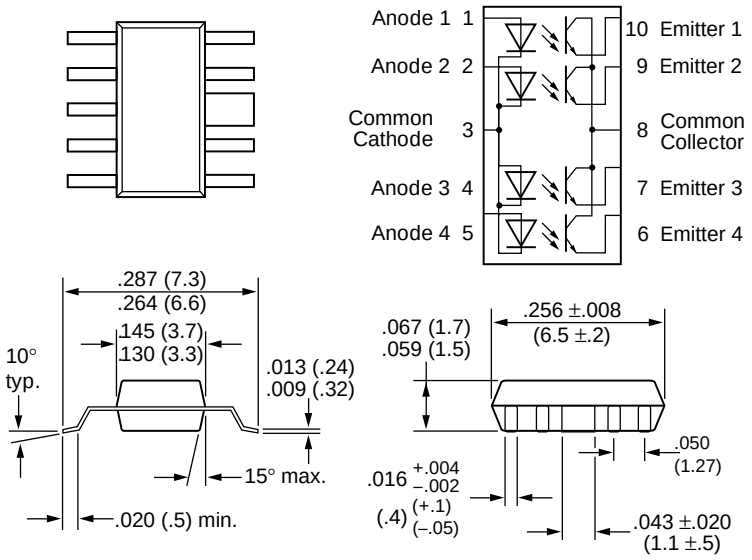
APPLICATIONS

- **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

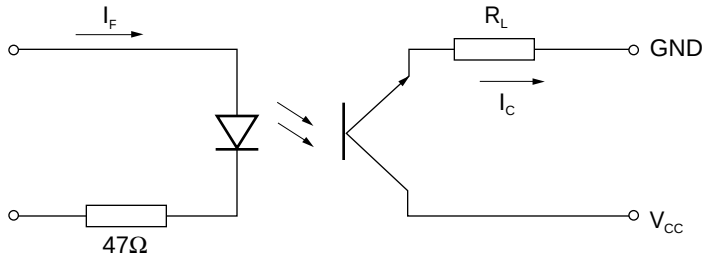
Isolation Test Voltage (between emitter and detector, refer to climate DIN 40046, part 2, Nov. 74) ..... 2500 VDC
Creepage ..... ≥4 mm
Clearance ..... ≥4 mm
Comparative Tracking Index per DIN IEC 112/VDE0303, part 1 175
Isolation Resistance
V_{IO}=100 V, T_A=25°C ..... $\geq 10^{11}\ \Omega$
V_{IO}=100 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 I_F=1 mA, V_{CE}=0.5 V I_F=0.5 mA, V_{CE}=1.5 V	 I_C/ I_F I_C/ I_F	 100–200 120 (≥50)	 160–320 200 (≥80)	 250–500 300 (≥125)	%
Collector-Emitter Saturation Voltage I_F=1 mA	V_{CEsat}	0.25 (≤0.4) (I_C=0.5 mA)	0.25 (≤0.4) (I_C=0.8 mA)	0.25 (≤0.4) (I_C=1.25 mA)	V
Collector-Emitter Leakage Current 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 R_L=100 Ω T_A=25°C 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 $V_F=f(I_F)$

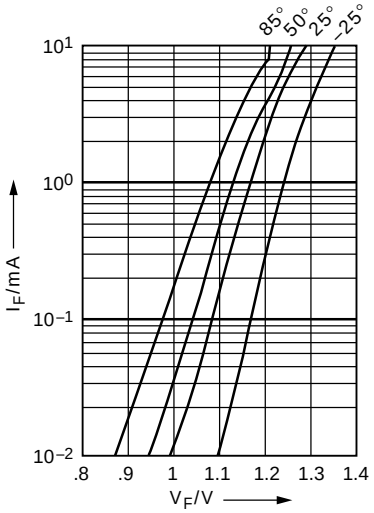


Figure 2. Saturated current transfer ratio normalized to I_F=1 mA, NCTR=f(I_F)

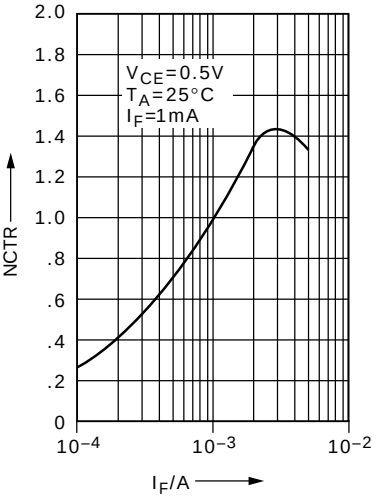


Figure 3. Non-saturated current transfer normalized to I_F=1 mA, NCTR=f(I_F)

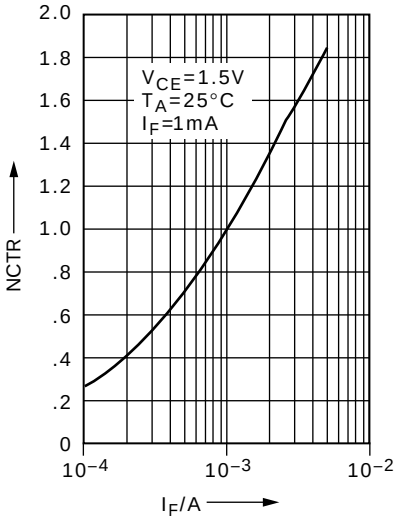


Figure 4. Transistor output characteristics T_A=25°C, $I_{CE}=f(V_{CE}, I_F)$

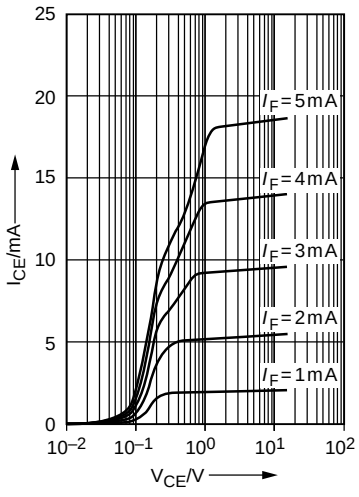


Figure 5. Transistor capacitance (typ.) T_A=25°C, f=1MHz, $C_{CE}=f(V_{CE})$

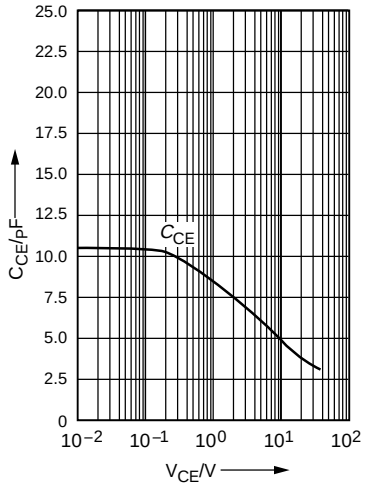


Figure 6. Collector-emitter leakage-current (typ.) I_F=0, T_A=25°C, $I_{CEO}=f(V_{CE})$

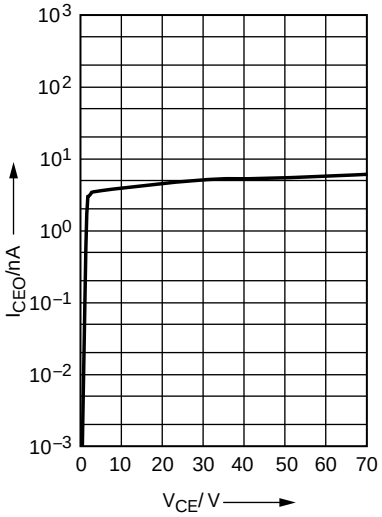


Figure 7. Permissible forward current diode $I_F=f(T_A=25°C)$

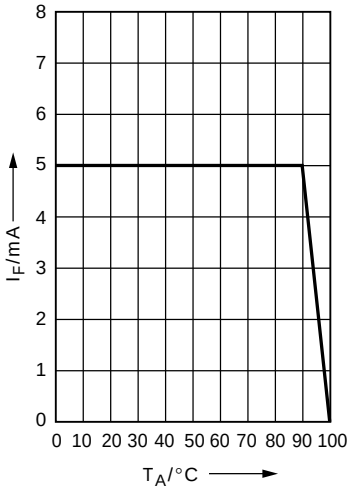


Figure 8. Permissible power dissipation $P_{tot}=f(T_A)$

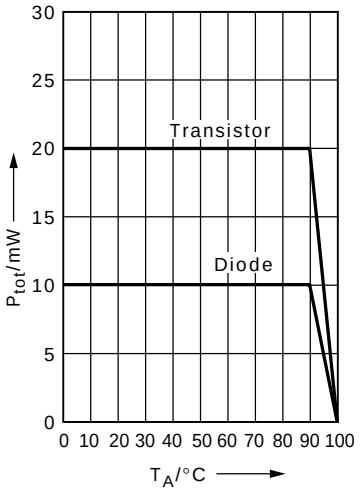


Figure 9. T_A=25°C, I_F=1 mA, V_{CC}=5 V, t_{on}, t_r, t_{off},$t_t=f(R_L)$