SFH6943

Low Current Input Mini Optocoupler

FEATURES

- **Transistor Optocoupler in SOT223/10 Package**
- **End Stackable, 1.27 mm Spacing**
- **Low Current Input**
- **Very High CTR, 150% Typical at I_F=1 mA, V_{CE}=5 V**
- **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: 1768 V_{RMS}**

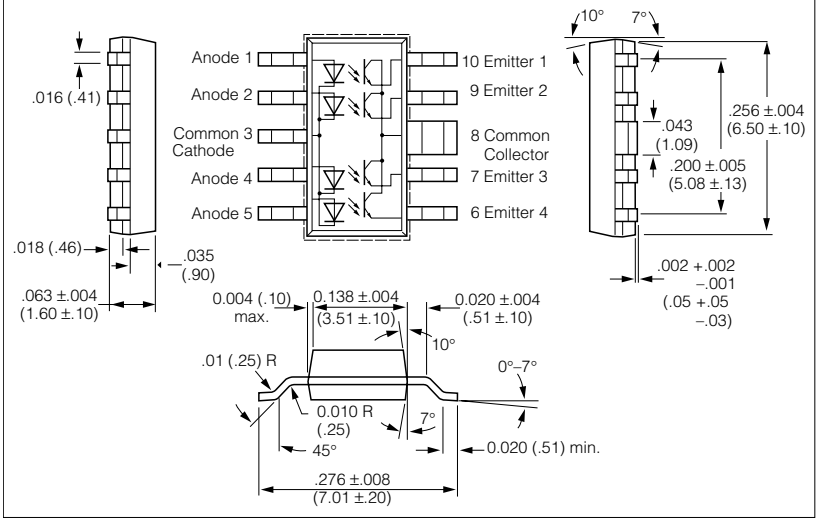
APPLICATIONS

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

DESCRIPTION

The SFH6943 is a four channel mini-optocoupler suitable for high density packaged PCB application. It has a minimum of 1768 V_{RMS} isolation from input to output. The device consists of four phototransistors as detectors. Each channel is individually controlled. The optocoupler is housed in a SOT223/10 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.

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), t=1 sec.	1768 V_{RMS}
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	≥10^{11} Ω
V_{IO}=100 V, T_A=100°C	≥10^{10} Ω
Storage Temperature Range	–55 to +150°C
Ambient Temperature Range	–55 to +100°C
Junction Temperature	100°C
Soldering Temperature (t=10 sec. max.)	
Dip soldering plus reflow soldering processes	260°C

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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	-2	-3	-4	Unit	Condition
Coupling Transfer Ratio	I_E/I_F	63–200	100–320	160–500	%	I_F=1 mA, V_{CE}=1.5 V
Coupling Transfer Ratio	I_E/I_F	typ, 100 (≥32)	typ, 160 (≥50)	typ, 250 (≥80)	%	I_F=0.5 mA, V_{CC}=5 V
Collector-Emitter Leakage Current	I_{CEO}	50	50	50	nA	V_{CE}=10 V

Figure 1. Switching times (non-saturated), typical

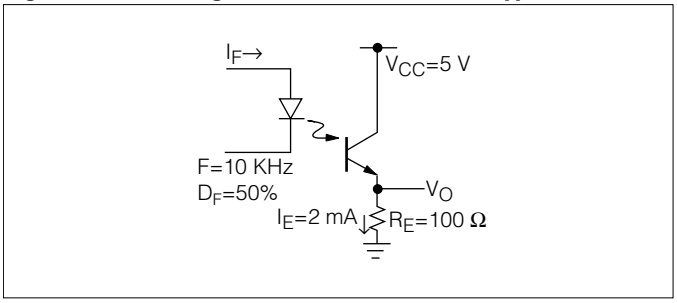
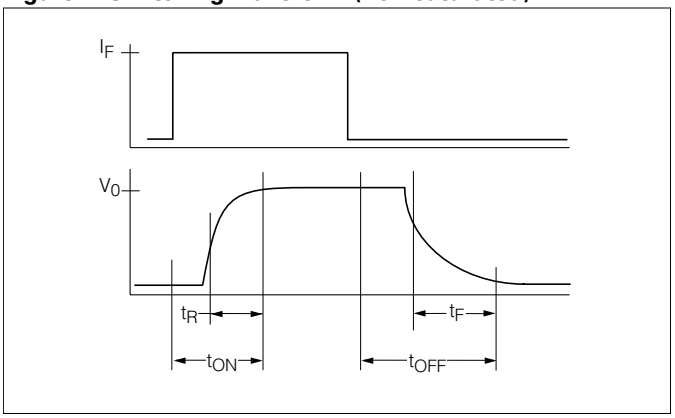


Figure 2. Switching waveform (non-saturated)



Description	Symbol	Value	Unit	Test Conditions
Turn-on Time	t_{on}	3	µs	I_E=2 mA R_E=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 3. LED current versus LED voltage $V_F=f(I_F)$

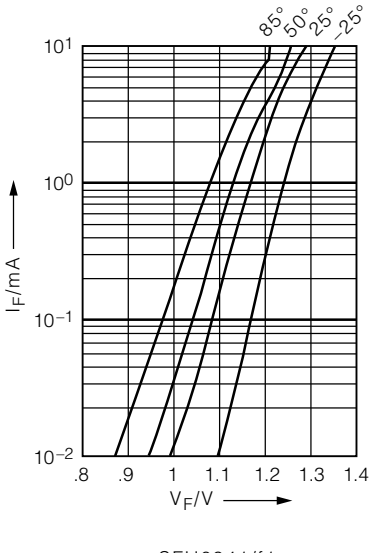


Figure 4. Non-saturated current transfer normalized to I_F=1 mA, NCTR=f(I_F)

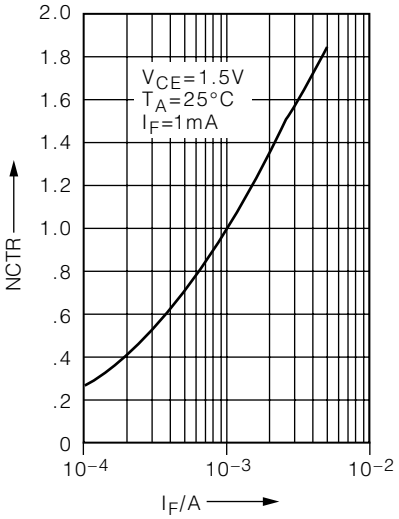


Figure 5. Transistor capacitance (typ.)T_A=25°C, f=1MHz, C_{CE}=f(V_{CE})

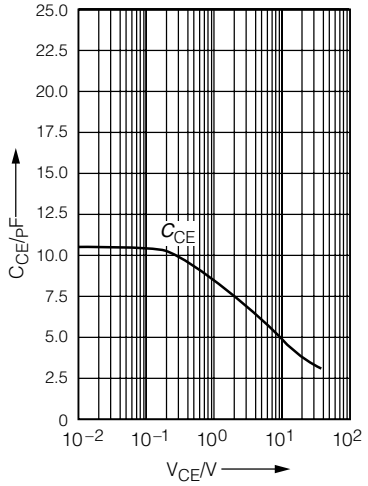


Figure 6. Collector-emitter leakage current (typ.) I_F=0, T_A=25°C, I_{CEO}=f(V_{CE})

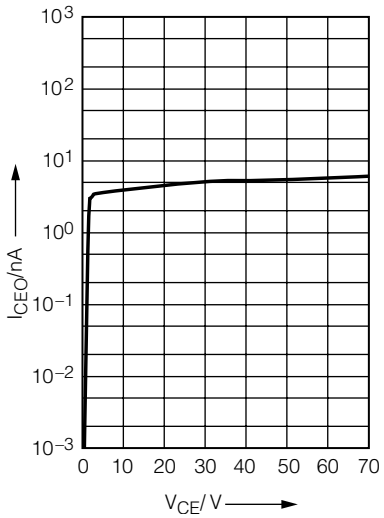


Figure 7. Permissible forward current diode $I_F=f(T_A=25°C)$

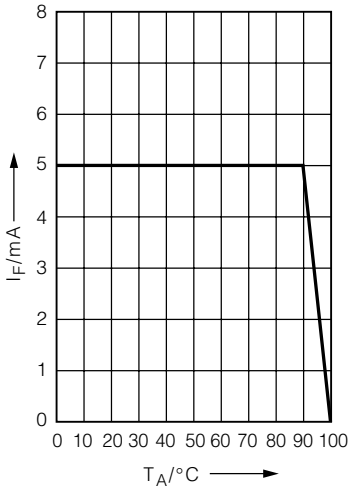


Figure 8. Permissible power dissipation $P_{tot}=f(T_A)$

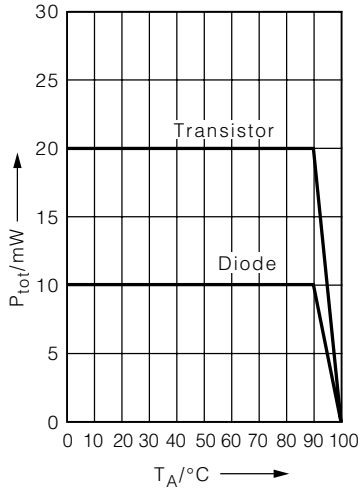


Figure 9. T_A=25°C, I_F=1 mA, V_{CC}=5 V, t_{on}, t_r, t_{off},t_t=f(R_L)

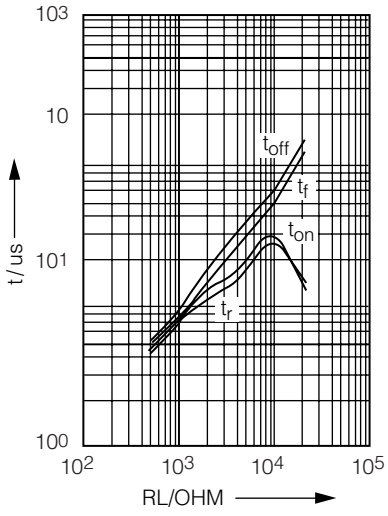


Figure 10. Transistor output characteristics T_A=25°C, I_{CE}=1 (V_{CE}, I_F)