

FEATURES

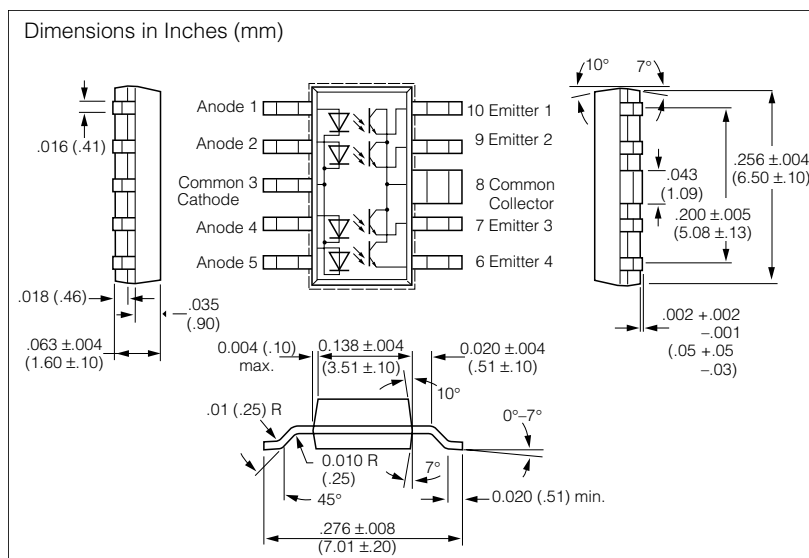
- Transistor Optocoupler in SOT223/10 Package
- End Stackable, 1.27 mm Spacing
- Low Current Input
- Very High CTR, 150% Typical at $I_F=1\text{ mA}$, $V_{CE}=5\text{ V}$
- Good CTR Linearity Versus Forward Current
- Minor CTR Degradation
- Field Effect Stable by TRIOS® (TRansparent IOn Shield)
- High Collector-Emitter Voltage, $V_{CEO}=70\text{ V}$
- 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.



Absolute Maximum Ratings

Emitter(GaAlAs)

Reverse Voltage	3 V
DC Forward Current	5 mA
Surge Forward Current ($t_P \leq 10 \mu s$)	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

Characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

Description	Symbol	Min.	Typ.	Max.	Unit	
Emitter (IR GaAs)						
Forward Voltage, $I_F=5\text{ mA}$	V_F	—	1.25	—	V	
Reverse Current, $V_R=3\text{ V}$	I_R	—	0.01	10	μA	
Capacitance, $V_R=0\text{ V}$, $f=1\text{ MHz}$	C_0	—	5	—	pF	
Thermal Resistance	R_{thJA}	—	1000	—	K/W	
Detector (Si Phototransistor)						
Collector-Emitter Voltage, $I_{CE}=10\text{ }\mu\text{A}$	V_{CEO}	70	—	—	V	
Emitter-Collector Voltage, $I_{EC}=10\text{ }\mu\text{A}$	V_{ECO}	7	—	—	V	
Capacitance, $V_{CE}=5\text{ V}$, $f=1\text{ MHz}$	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	%	$I_F=1\text{ mA}$, $V_{CE}=1.5\text{ V}$
Coupling Transfer Ratio	I_E/I_F	typ, 100 (≥ 32)	typ, 160 (≥ 50)	typ, 250 (≥ 80)	%	$I_F=0.5\text{ mA}$, $V_{CC}=5\text{ V}$
Collector-Emitter Leakage Current	I_{CEO}	50	50	50	nA	$V_{CE}=10\text{ V}$

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

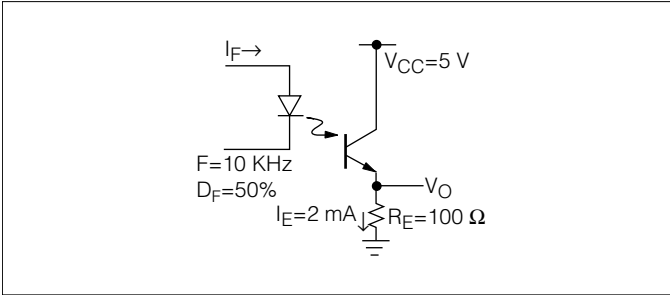
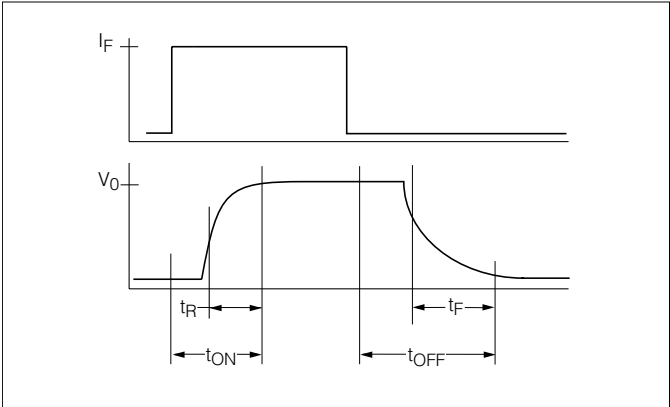


Figure 2. Switching waveform (non-saturated)



Description	Symbol	Value	Unit	Test Conditions
Turn-on Time	t_{on}	3	μs	$I_E=2\text{ mA}$ $R_E=100\text{ }\Omega$ $T_A=25^{\circ}\text{C}$ $V_{CC}=5\text{ V}$
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 $V_F=f(I_F)$

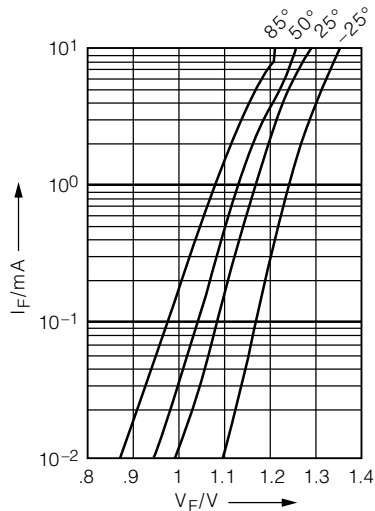


Figure 6. Collector-emitter leakage current (typ.) $I_F=0$, $T_A=25^\circ\text{C}$, $I_{CEO}=f(V_{CE})$

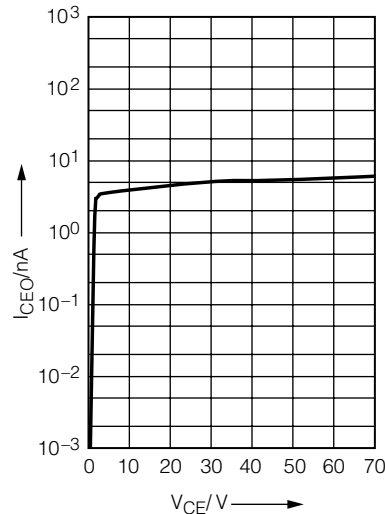


Figure 9. $T_A=25^\circ\text{C}$, $I_F=1\text{ mA}$, $V_{CC}=5\text{ V}$, t_{on} , t_r , t_{off} , $t_t=f(R_L)$

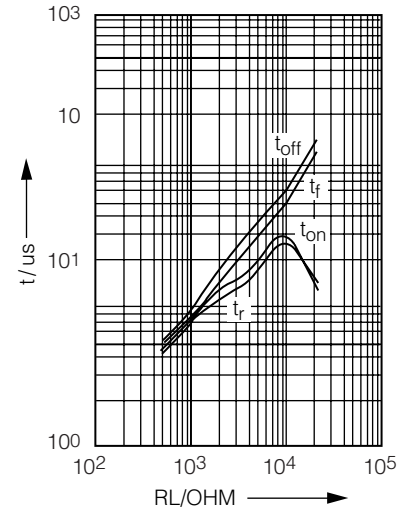


Figure 4. Non-saturated current transfer normalized to $I_F=1\text{ mA}$, $NCTR=f(I_F)$

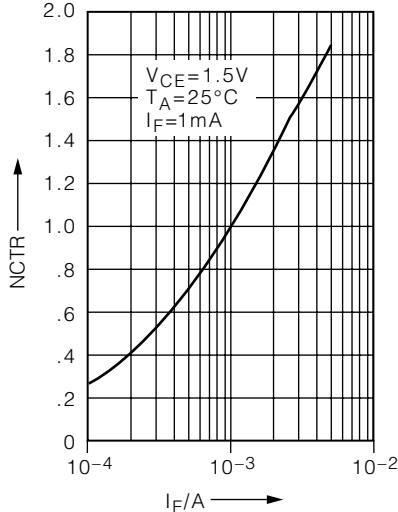


Figure 7. Permissible forward current diode $I_F=f(T_A=25^\circ\text{C})$

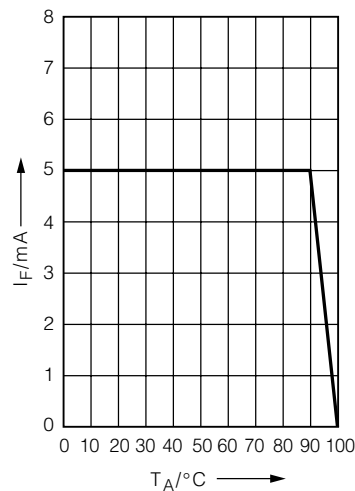


Figure 10. Transistor output characteristics $T_A=25^\circ\text{C}$, $I_{CE}=1$ (V_{CE} , I_F)

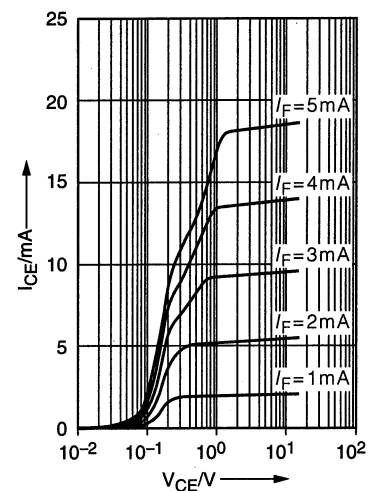


Figure 5. Transistor capacitance (typ.) $T_A=25^\circ\text{C}$, $f=1\text{ MHz}$, $C_{CE}=f(V_{CE})$

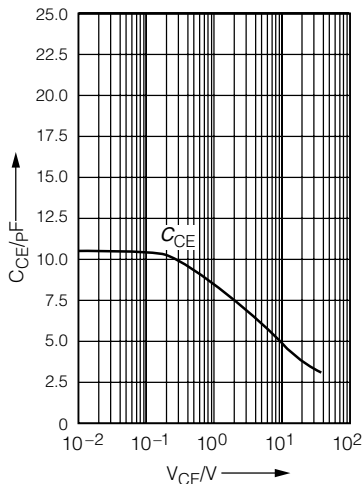


Figure 8. Permissible power dissipation $P_{tot}=f(T_A)$

