SIEMENS

SFH 640

PHOTOTRANSISTOR
5.3 KV TRIOS® HIGH BV_{CER} VOLTAGE OPTOCOUPLER

FEATURES

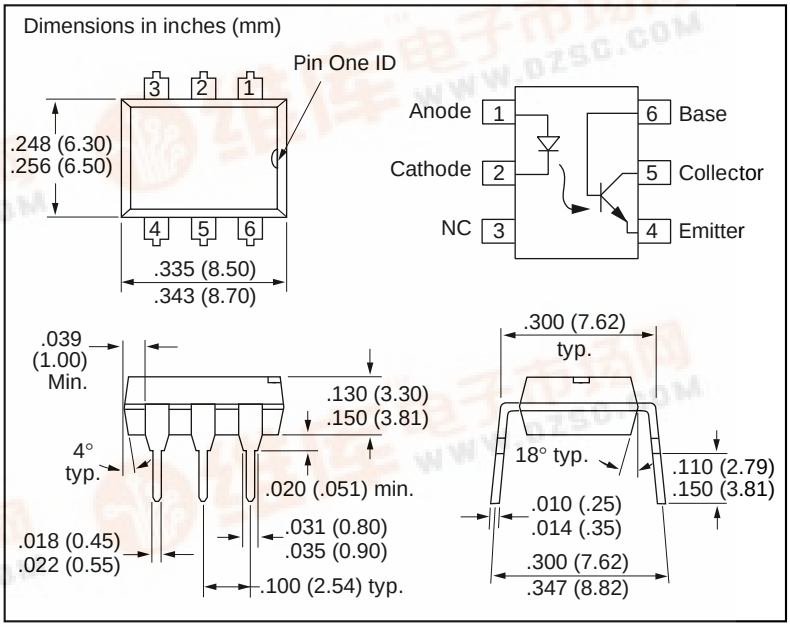
- **CTR at I_F=10 mA, V_{CE}=10 V**
  SFH640-1, 40-80%
  SFH640-2, 63-125%
  SFH640-3*, 100-200%
- **Good CTR Linearity with Forward Current**
- **Low CTR Degradation**
- **Very High Collector-Emitter Breakdown Voltage, BV_{CER}=300 V**
- **Isolation Test Voltage: 5300 VAC_{RMS}**
- **Low Coupling Capacitance**
- **High Common Mode Transient Immunity**
- **Phototransistor Optocoupler**
  6 Pin DIP Package with Base Connection
- **Field Effect Stable: TRIOS+**
- **VDE 0884 Available with Option 1**
- **Underwriters Lab File #E52744**

DESCRIPTION

The SFH 640 is an optocoupler with very high BVCER, a minimum of 300 volts. It is intended for telecommunications applications or any DC application requiring a high blocking voltage. The SFH640 is a “better than” replacement for H11D1.

*Supplies from this group can't always be guranteed due to unforseeable yield spread.

+**TRIOS**–**TR**ansparent **IO**n **S**hield



Maximum Ratings (T_A=25°C)

Emitter

Reverse Voltage ..... 6 V
DC Forward Current ..... 60 mA
Surge Forward Current (tp≤10 µs) ..... 2.5 A
Total Power Dissipation ..... 100 mW

Detector

Collector-Emitter Voltage ..... 300 V
Collector-Base Voltage ..... 300 V
Emitter-Base Voltage ..... 7 V
Collector Current ..... 50 mA
Surge Collector Current (tp≤1 ms) ..... 100 mA
Total Power Dissipation ..... 300 mW

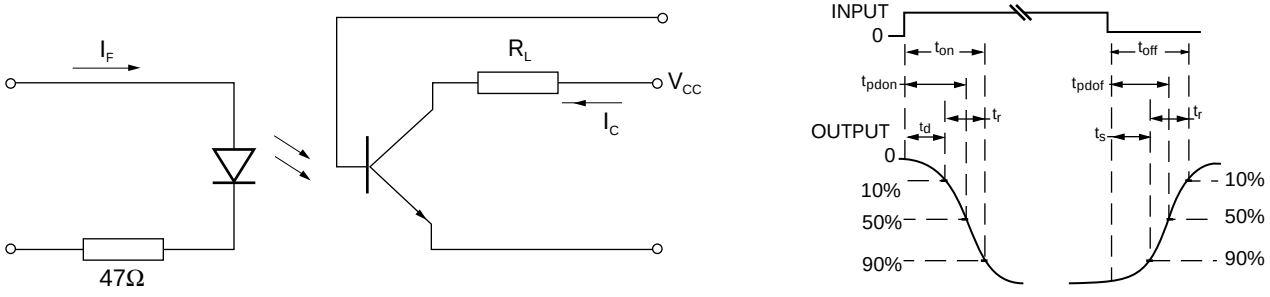
Package

Isolation Test Voltage (between emitter and detector, refer to climate DIN 40046 part 2 Nov. 74) ..... 5300 VAC_{RMS}/7500 VAC_{PK}
Isolation Resistance
V_{IO}=500 V, T_A=25°C ..... ≥10^{12} Ω
V_{IO}=500 V, T_A=100°C ..... ≥10^{11} Ω
Insulation Thickness between Emitter and Detector ..... ≥0.4 mm
Creepage ..... ≥7 mm
Clearance ..... ≥7 mm
Comparative Tracking Index per DIN IEC 112/VDE 0303, part1 175
Storage Temperature Range ..... -55°C to +150°C
Operating Temperature Range ..... -55°C to +100°C
Junction Temperature ..... 100°C
Soldering Temperature (max. 10 sec., dip soldering: distance to seating plane≥1.5 mm) ..... 260°C

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

	Symbol	Min	Typ	Max	Unit	Condition
Emitter						
Forward Voltage	V_F		1.1	1.5	V	I_F=10 mA
Reverse Voltage	V_R	6			V	I_R= 10 µA
Reverse Current	I_R		0.01	10	µA	V_R=6 V
Capacitance	C_O		25		pF	V_R=0 V, f=1 MHz
Thermal Resistance	R_{thJA}		750		K/W	
Detector						
Voltage Collector-Emitter Emitter-Base	 BV_{CER} BV_{BEO}	 300 7			 V V	 I_{CE}=1 mA, R_{BE}=1 MΩ I_{EB}=10 µA
Capacitance	C_{CE} C_{CB} C_{EB}		7 8 38		pF pF pF	V_{CE}=10 V, f=1 MHz V_{CB}=10 V, f=1 MHz V_{EB}=5 V, f=1 MHz
Thermal Resistance	R_{thJA}		250		K/W	
Package						
Coupling Capacitance	C_C		0.6		pF	
Coupling Transfer Ratio SFH 640-1 SFH 640-2 SFH 640-3	 I_C/I_F I_C/I_F I_C/I_F	 40 13 63 22 100 34	 30 45 70	 80 125 200	 % % %	 I_F=10 mA, V_{CE}=10 V I_F=1 mA, V_{CE}=10 V I_F=10 mA, V_{CE}=10 V I_F=1 mA, V_{CE}=10 V I_F=10 mA, V_{CE}=10 V I_F=1 mA, V_{CE}=10 V
Saturation Voltage, Collector-Emitter SFH 640-1 SFH 640-2 SFH 640-3	 V_{CEsat} V_{CEsat} V_{CEsat}		 0.25 0.25 0.25	 0.4 0.4 0.4	 V V V	 I_F= 10 mA, I_C=2 mA I_F= 10 mA, I_C=3.2 mA I_F=10 mA, I_C=5 mA
Leakage Current, Collector-Emitter	I_{CER}		1	100	nA	V_{CE}=200 V, R_{BE}=1 MΩ

Figure 1. Switching times measurement-test circuit and waveform



Switching Times (Typical)

I_C=2 mA (to adjust by I_F), R_L=100 Ω, T_A=25°C, V_{CC}=10 V

Description	Symbol	Values	Unit
Turn-On Time	t_{ON}	5	µs
Rise Time	t_R	2.5	µs
Turn-Off Time	t_{OFF}	6	µs
Fall Time	t_F	5.5	µs

Figure 2. Current transfer ratio (typ.) V_{CE}=10 V, T_A=25°C, normalized to I_F=10 mA, NCTR=f(I_F)

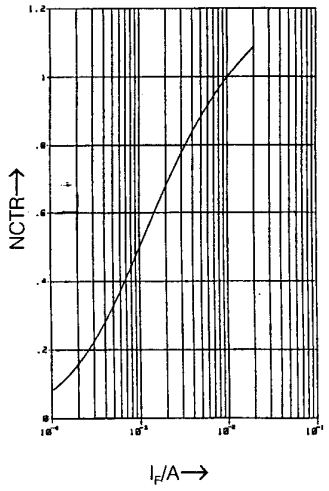


Figure 3. Diode forward voltage (typ.) V_F=f(I_F, T_A)

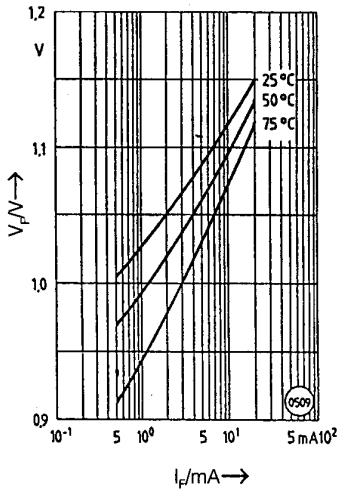


Figure 4. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_B)

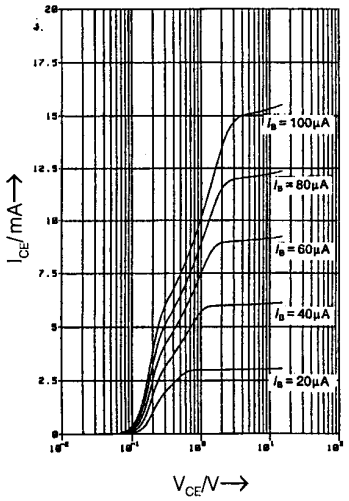


Figure 5. Output characteristics (typ.) T_A=25°C, I_{CE}=f(V_{CE}, I_F)

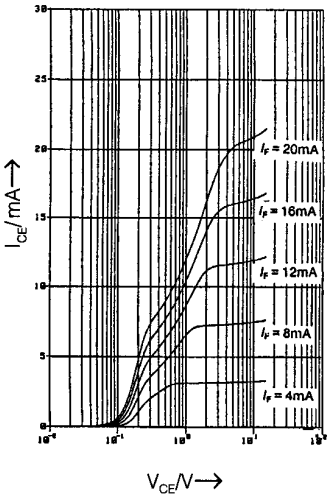


Figure 6. Transistor capacitances (typ.) T_A=25°C, f=1 MHz, C_{CE}=f(V_{CE}) C_{CB}=f (V_{CB}), C_{EB}=f (V_{EB})

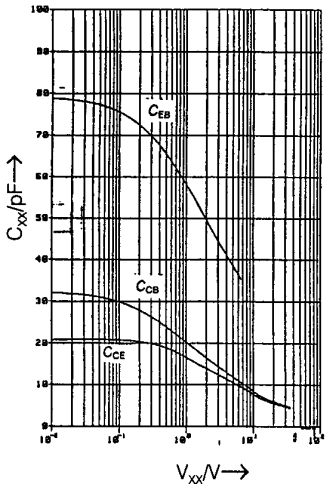


Figure 7. Collector-emitter leakage current (typ.) I_F=0, R_{BE}=1 MW, I_{CER}=f(V_{CE})

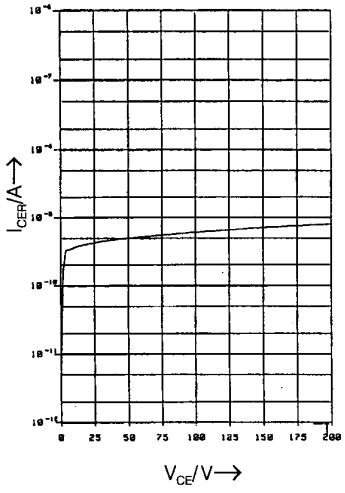


Figure 8. Permissible loss diode I_F= f(T_A)

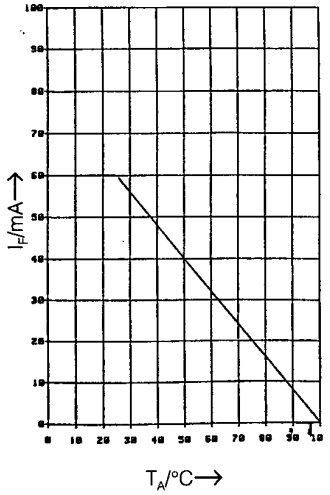


Figure 9. Permissible power dissipation P_{IOT}=f(T_A)