


## FEATURES

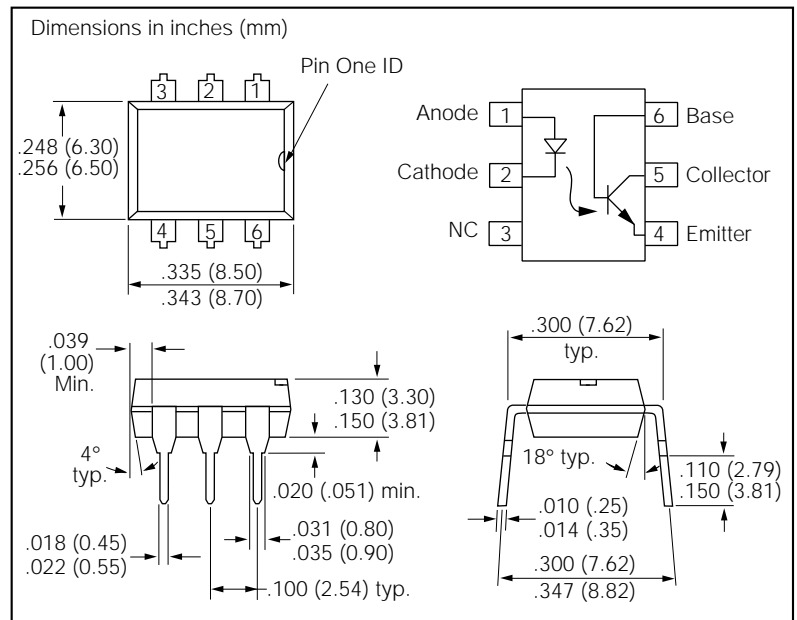
- CTR at I<sub>F</sub>=10 mA, V<sub>CE</sub>=10 V  
SFH640-1, 40-80%  
SFH640-2, 63-125%  
SFH640-3\*, 100-200%
- Good CTR Linearity with Forward Current
- Low CTR Degradation
- Very High Collector-Emitter Breakdown Voltage, BV<sub>CER</sub>=300 V
- Isolation Test Voltage: 5300 VAC<sub>RMS</sub>
- Low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

## DESCRIPTION

The SFH 640 is an optocoupler with very high BV<sub>CER</sub>, 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 guaranteed due to unforeseeable yield spread.

\*TRIOS-Transparent IO Shield



## Maximum Ratings (T<sub>A</sub>=25°C)

### Emitter

Reverse Voltage .....	6 V
DC Forward Current .....	60 mA
Surge Forward Current (t <sub>p</sub> ≤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 (t <sub>p</sub> ≤1 ms) .....	100 mA
Total Power Dissipation .....	300 mW

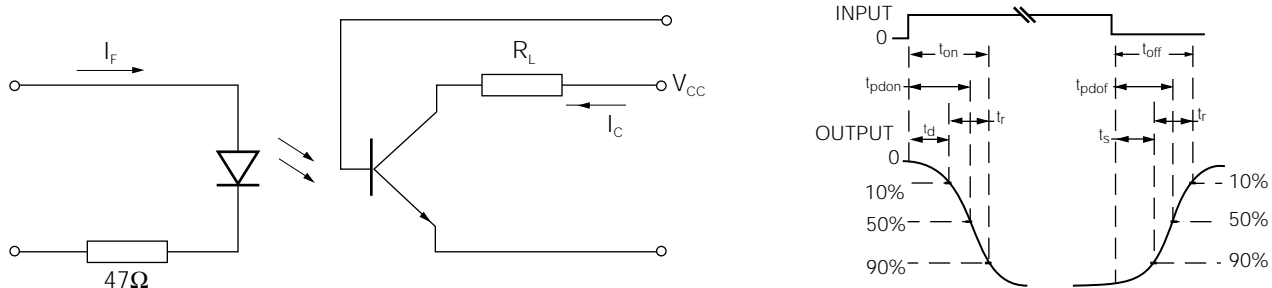
### Package

Isolation Test Voltage (between emitter and detector, refer to climate DIN 40046 part 2 Nov. 74) .....	5300 VAC <sub>RMS</sub> /7500 VAC <sub>PK</sub>
Isolation Resistance	
V <sub>IO</sub> =500 V, T <sub>A</sub> =25°C .....	≥10 <sup>12</sup> Ω
V <sub>IO</sub> =500 V, T <sub>A</sub> =100°C .....	≥10 <sup>11</sup> 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** ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

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

**Figure 1. Switching times measurement-test circuit and waveform**

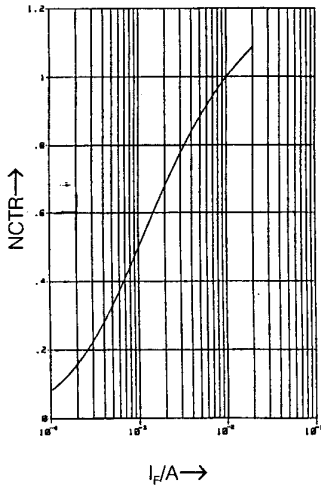


**Switching Times (Typical)**

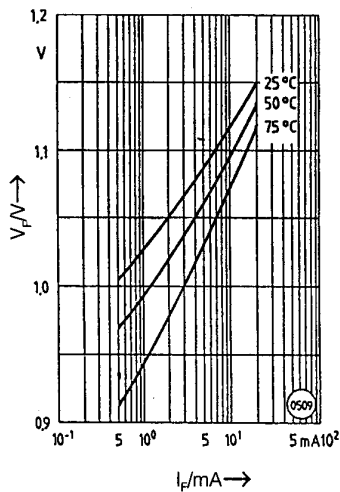
$I_C=2\text{ mA}$  (to adjust by  $I_F$ ),  $R_L=100\ \Omega$ ,  $T_A=25^\circ\text{C}$ ,  $V_{CC}=10\text{ V}$

Description	Symbol	Values	Unit
Turn-On Time	$t_{ON}$	5	$\mu\text{s}$
Rise Time	$t_R$	2.5	$\mu\text{s}$
Turn-Off Time	$t_{OFF}$	6	$\mu\text{s}$
Fall Time	$t_F$	5.5	$\mu\text{s}$

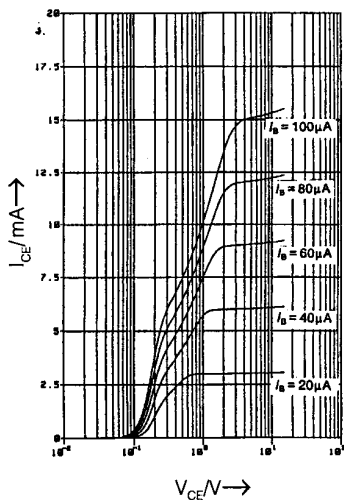
**Figure 2. Current transfer ratio (typ.)**  
 $V_{CE}=10\text{ V}$ ,  $T_A=25^\circ\text{C}$ , normalized to  
 $I_F=10\text{ mA}$ ,  $NCTR=f(I_F)$



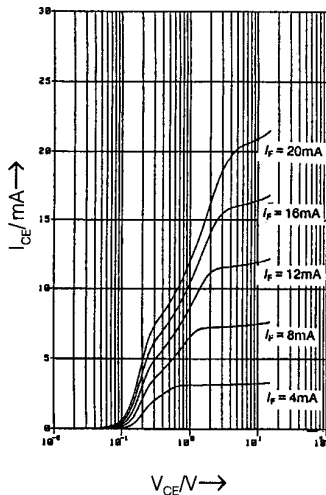
**Figure 3. Diode forward voltage (typ.)**  
 $V_F=f(I_F, T_A)$



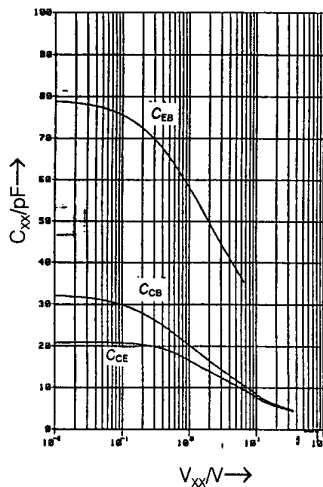
**Figure 4. Output characteristics (typ.)**  
 $T_A=25^\circ\text{C}$ ,  $I_{CE}=f(V_{CE}, I_B)$



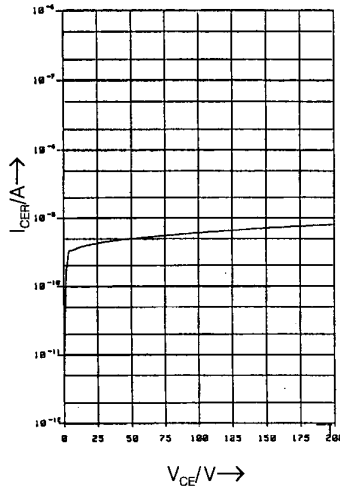
**Figure 5. Output characteristics (typ.)**  $T_A=25^\circ\text{C}$ ,  $I_{CE}=f(V_{CE}, I_F)$



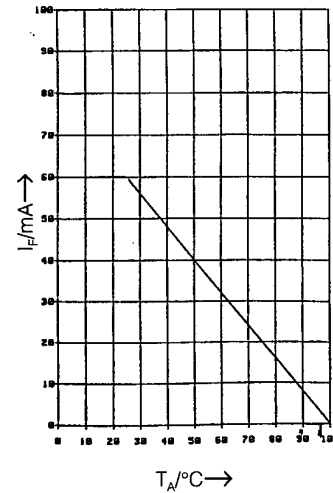
**Figure 6. Transistor capacitances (typ.)**  $T_A=25^\circ\text{C}$ ,  $f=1\text{ MHz}$ ,  $C_{CE}=f(V_{CE})$   
 $C_{CB}=f(V_{CB})$ ,  $C_{EB}=f(V_{EB})$



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



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



**Figure 9. Permissible power dissipation**  $P_{TOT}=f(T_A)$

