

FEATURES

- **High Current Transfer Ratio**
SFH612A=200% (min.)
SFH655A=600% (min.)
High Isolation Test Voltage 5300 V_{RMS}
- **Standard Plastic DIP-4 Package**
- **Underwriters Lab File #E52744**

DESCRIPTION

The SFH612A and SFH655A are optically coupled isolators with a Gallium Arsenide infrared LED and a silicon photodarlington detector. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits. These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

Maximum Ratings $T_A=25^\circ\text{C}$

Emitter

Peak Reverse Voltage	6.0 V
Continuous Forward Current	60 mA
Surge Forward Current ($t_p \leq 10 \mu\text{s}$)	2.5 A
Derate Linearly from 25°C	1.33 mW/ $^\circ\text{C}$
Power Dissipation at 25°C	100 mW

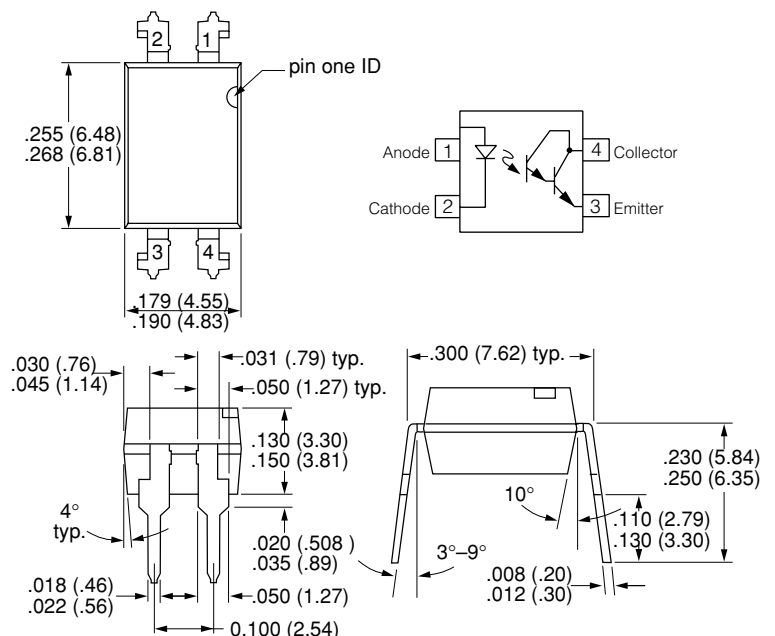
Detector

Collector-Emitter Breakdown Voltage	
BV_{CEO}	55 V
Emitter-Collector Breakdown Voltage	
BV_{ECO}	6.0 V
Collector (load) Current	125 mA
Derate Linearly from 25°C	2.00 mW/ $^\circ\text{C}$
Power Dissipation at 25°C	150 mW

Package

Derate Linearly from 25°C	3.33 mW/ $^\circ\text{C}$
Total Power Dissipation at 25°C	250 mW
Isolation Test Voltage between input and output, climate acc. to IEC 60068-1:1988 ($t=1.0 \text{ s}$)	5300 V _{RMS}
Creepage Distance	$\geq 7.0 \text{ mm}$
Clearance	$\geq 7.0 \text{ mm}$
Comparative Tracking Index acc. to DIN IEC 112/DE 0303, part 1:06-84]	≥ 175
Isolation Resistance $V_{IO}=500 \text{ V}/25^\circ\text{C}$	$\geq 10^{12} \Omega$
Isolation Resistance $V_{IO}=500 \text{ V}/100^\circ\text{C}$	$\geq 10^{11} \Omega$
Storage Temperature Range	-55°C to $+150^\circ\text{C}$
Operating Temperature Range	-55°C to $+100^\circ\text{C}$
Soldering Temperature (max. 10 s, dip soldering: distance to seating plane $\geq 1.5 \text{ mm}$)	260°C

Dimensions in inches (mm)



Electrical Characteristics $T_A=25^\circ\text{C}$ unless otherwise specified

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Emitter						
Forward Voltage	V_F	—	1.15	1.5	V	$I_F=10 \text{ mA}$
Reverse Current	I_R	—	0.02	10	μA	$V_R=6.0 \text{ V}$
Capacitance	C_O	—	14	—	pF	$V_R=0 \text{ V}$, $f=1.0 \text{ MHz}$
Detector						
Breakdown Voltage Collector-Emitter	BV_{CEO}	55	—	—	V	$I_{CE}=100 \mu\text{A}$
Breakdown Voltage Emitter-Collector	BV_{ECO}	6.0	—	—	V	$I_{EC}=10 \mu\text{A}$
Collector-Emitter Dark Current	I_{CEO}	—	12	400	nA	$V_{CE}=40 \text{ V}$
Capacitance Collector-Emitter	C_{CE}	—	13.5	—	pF	$V_{CE}=0 \text{ V}$, $f=1.0 \text{ MHz}$

Characteristics $T_A=25^\circ\text{C}$ (continued)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Package						
Current Transfer Ratio						
SFH612A	CTR	200	—	—	%	$I_F=1.0\text{ mA}$, $V_{CE}=2.0\text{ V}$
SFH655A		600				
Collector-Emitter Saturation Voltage						
SFH612A	V_{CEsat}	—	—	1.0	V	$I_F=1.0\text{ mA}$, $I_C=2.0\text{ mA}$
SFH655A						$I_F=20\text{ mA}$, $I_C=5.0\text{ mA}$
Coupling Capacitance	C_C	—	0.45	—	pF	$V_{I-O}=0\text{ V}$, $f=1.0\text{ MHz}$
Switching Time for SFH612A						
Turn-on Time	t_{on}	—	16	—	μs	$V_{CC}=10\text{ V}$, $I_C=2.0\text{ mA}$, $R_E=100\ \Omega$ (Fig. 10, Test Circuit 1)
Turn-off Time	t_{off}		15	—	μs	
Rise Time	t_r		14	—	μs	
Fall Time	t_f		14	—	μs	
Switching Time for SFH655A						
Turn-on Time	t_{on}	—	31	—	μs	$V_{CE}=2.0\text{ V}$, $I_C=10\text{ mA}$, $R_L=100\ \Omega$ (Fig. 10, Test Circuit 2)
Turn-off Time	t_{off}		55	—	μs	
Rise Time	t_r		27	250	μs	
Fall Time	t_f		56	200	μs	

Figure 1. Forward Voltage vs. Forward Current

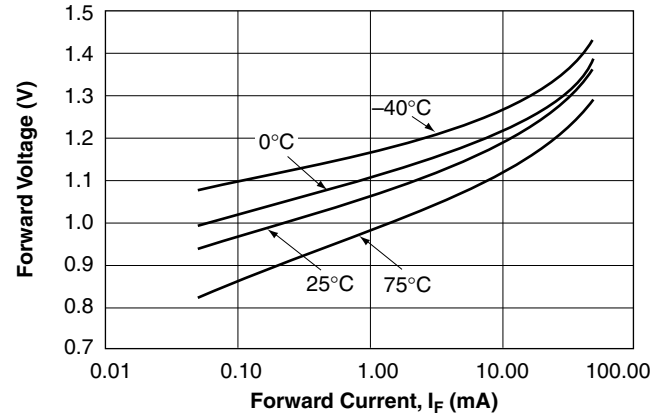


Figure 2. Collector-emitter Saturation Voltage vs. Temperature at $I_F=20\text{ mA}$, $I_C=5.0\text{ mA}$

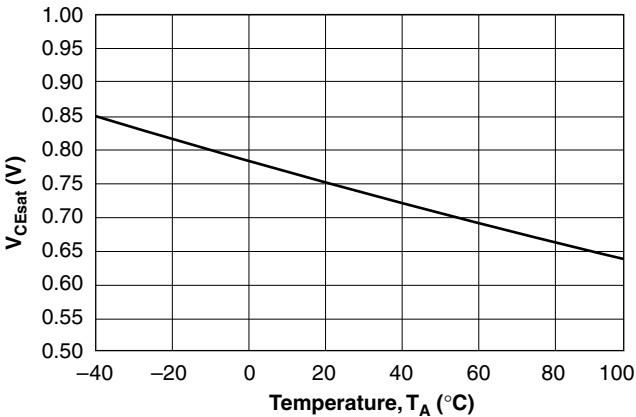


Figure 3. Normalized CTR vs. Temperature at $I_F=1.0\text{ mA}$, $V_{CE}=2.0\text{ V}$, $T_A=25^\circ\text{C}$

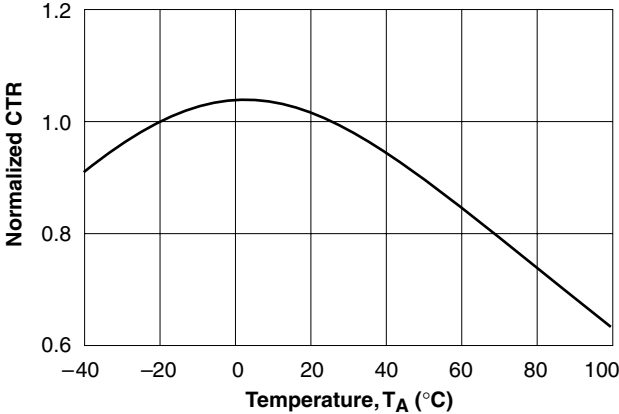


Figure 4. Normalized CTR vs. Forward Current at $I_F=1.0\text{ mA}$, $V_{CE}=2.0\text{ V}$, $T_A=25^\circ\text{C}$

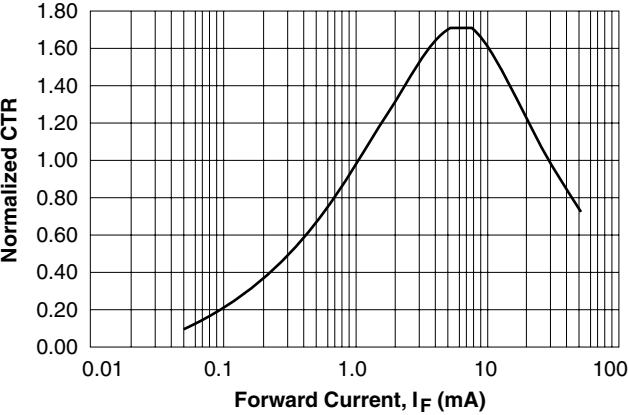


Figure 5. Collector current vs. Collector-emitter Voltage,
 $T_A=25^\circ\text{C}$

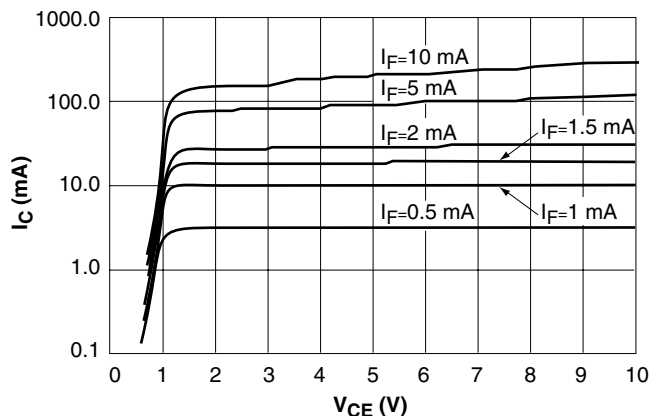


Figure 6. Collector Current vs. Collector-emitter Saturation Voltage,
 $T_A=25^\circ\text{C}$

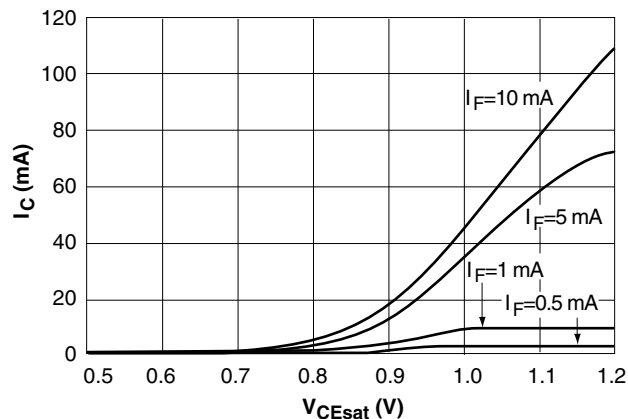


Figure 7. Collector-Emitter Dark Current vs. Collector-emitter Voltage over Temperature

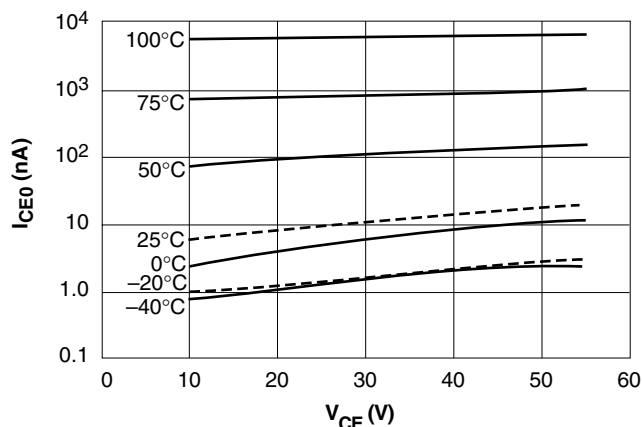


Figure 8. Switching Time, vs. Load Resistor at
 $I_C=2.0\text{ mA}$, $V_{CC}=10\text{ V}$, $T_A=25^\circ\text{C}$ (SFH612A)

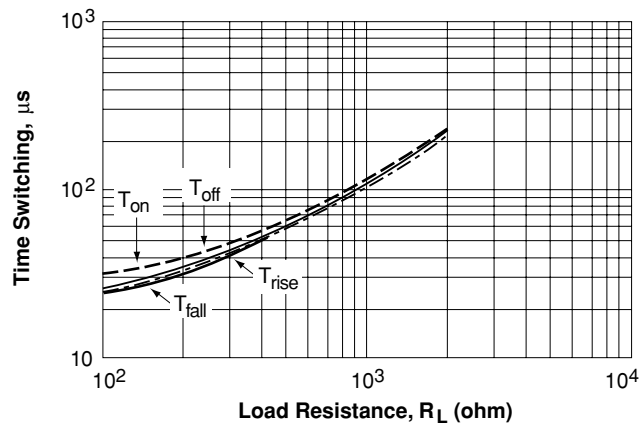


Figure 9. Switching Time vs. Load Resistor at
 $I_C=10\text{ mA}$, $V_{CE}=2.0\text{ V}$, $T_A=25^\circ\text{C}$ (SFH655A)

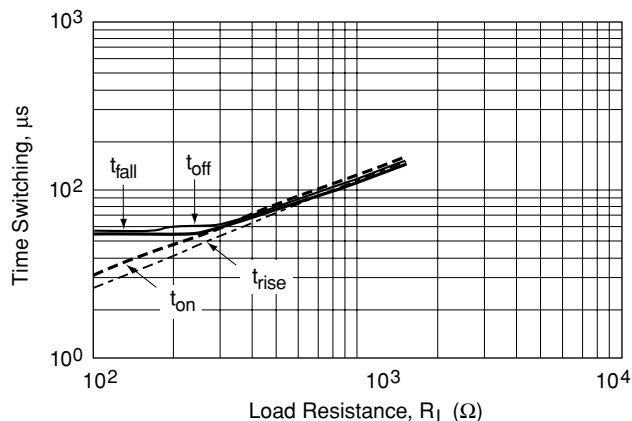


Figure 10. Switching Time Test Circuit and Waveforms

