

**Photodarlington
High Collector-emitter Voltage Optocoupler****FEATURES**

- **Very High Current Transfer Ratio, 1000% Min.**
- **High Collector-emitter Voltage ($V_{CEO}=300\text{ V}$)**
- **High Isolation Test Voltage, 5300 V_{RMS}**
- **Standard Plastic DIP-4 Package**
- **Compatible with Toshiba TLP627**
- **Underwriters Lab File #E52744**

DESCRIPTION

The SFH619A is optically coupled isolators with a Gallium Arsenide infrared LED and a silicon photodarlington sensor. 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**

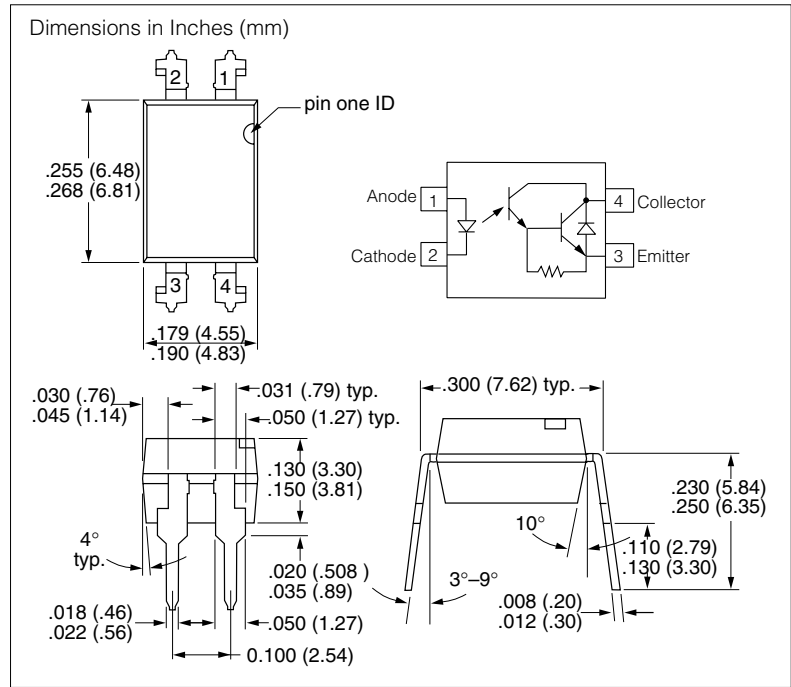
Peak Reverse Voltage	6.0 V
Continuous Forward Current	60 mA
Derate Linearly from 25°C	1.33 mW/°C
Power Dissipation at 25°C	100 mW

Detector

Collector-emitter Breakdown Voltage, BV_{CEO}	300 V
Emitter-collector Breakdown Voltage, BV_{ECO}	0.3 V
Collector (load) Current	125 mA
Derate Linearly from 25°C	2.00 mW/°C
Power Dissipation at 25°C	150 mW

Package

Derate Linearly from 25°C	3.33 mW/°C
Total Power Dissipation at 25°C	250 mW
Isolation Test Voltage ($t=1\text{ s}$)	5300 V_{RMS} (between emitter and detector, Standard Climate: 23°C/50% RH, DIN 50014)
Creepage	$\geq 7.0\text{ mm}$
Clearance	$\geq 7.0\text{ mm}$
Isolation Resistance	
$V_{IO}=500\text{ V}/25^\circ\text{C}$	$\geq 10^{12}\ \Omega$
$V_{IO}=500\text{ V}/100^\circ\text{C}$	$\geq 10^{11}\ \Omega$
Storage Temperature	-55°C to $+150^\circ\text{C}$
Operating Temperature	-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

**Table 1. Electrical Characteristics** ($T_A=25^\circ\text{C}$, unless otherwise specified)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Emitter						
Forward Voltage	V_F	—	1.2	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	$V_R=0\text{ V}$
Detector						
Breakdown Voltage Collector-emitter	BV_{CEO}	300	—	—	V	$I_{CE}=100\ \mu\text{A}$
Breakdown Voltage Emitter-collector	BV_{ECO}	0.3	—	—	V	$I_{EC}=100\ \mu\text{A}$
Collector-emitter Dark Current	I_{CEO}	—	10	200	nA	$V_{CE}=200\text{ V},$ $T_A=25^\circ\text{C}$
			—	20	μA	$V_{CE}=200\text{ V},$ $T_A=100^\circ\text{C}$
Capacitance Collector-emitter	C_{CE}	—	39	—	pF	$V_{CE}=0\text{ V},$ $f=1.0\text{ MHz}$

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

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Package						
Current Transfer Ratio	CTR	1000	—	—	%	$I_F=1.0\text{ mA}$, $V_{CE}=1.0\text{ V}$
Collector–Emitter Saturation Voltage	V_{CEsat}	—	—	1.0	V	$I_F=1.0\text{ mA}$, $I_C=10\text{ mA}$,
		0.3	—	1.2	V	$I_F=10\text{ mA}$, $I_C=100\text{ mA}$
Coupling Capacitance	C_C	—	0.6	—	pF	$V_{L0}=0\text{ V}$, $f=1.0\text{ MHz}$
Rise Time	t_r	—	3.5	—	μs	$V_{CC}=10\text{ V}$, $I_C=10\text{ mA}$ $R_L=100\ \Omega$
Fall Time	t_f	—	14.5	—		
Turn On Time	t_{on}	—	4.5	—		
Turn Off Time	t_{off}	—	29.0	—		
Rise Time	t_r	—	1.0	—	μs	$V_{CC}=10\text{ V}$, $I_F=16\text{ mA}$ $R_L=180\ \Omega$
Fall Time	t_f	—	20.5	—		
Turn On Time	t_{on}	—	1.5	—		
Turn Off Time	t_{off}	—	53.5	—		

Figure 1. Switching Waveform and Switching Schematic

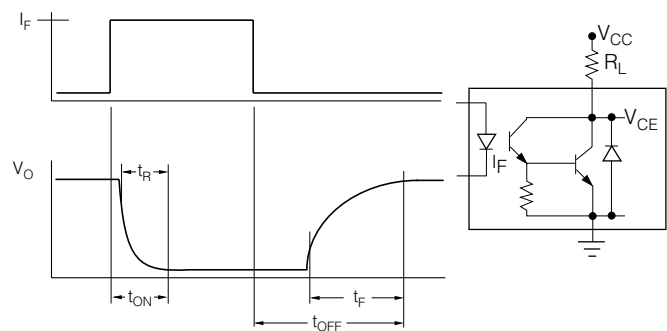


Figure 3. Collector Current (mA) vs. Forward Current (mA) at 25°C

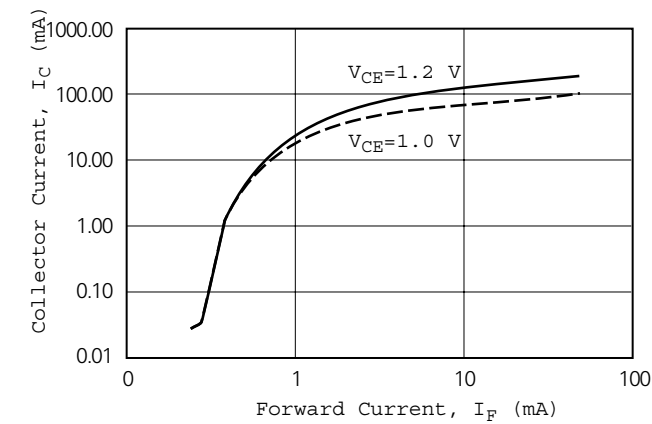


Figure 2. Forward Current (mA) vs. Forward Voltage (V) at 25°C

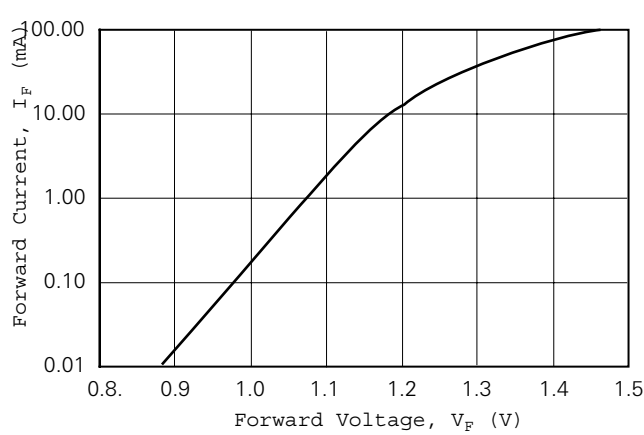


Figure 4. Collector Current (mA) vs. Forward Current (mA) at $V_{CE}=1.0\text{ V}$

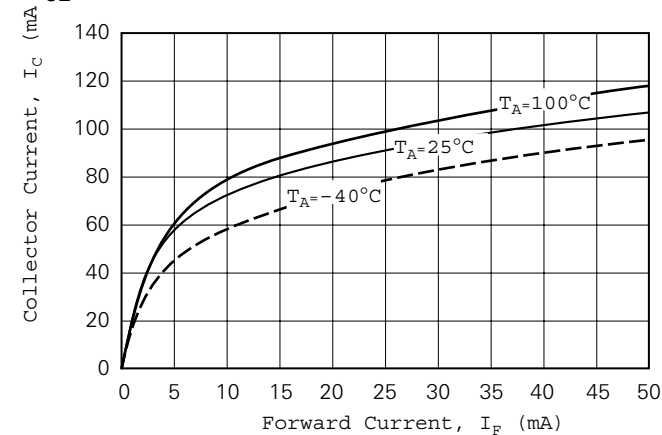


Figure 5. Collector Current vs. Temperature at $V_{CE}=1.0$ V

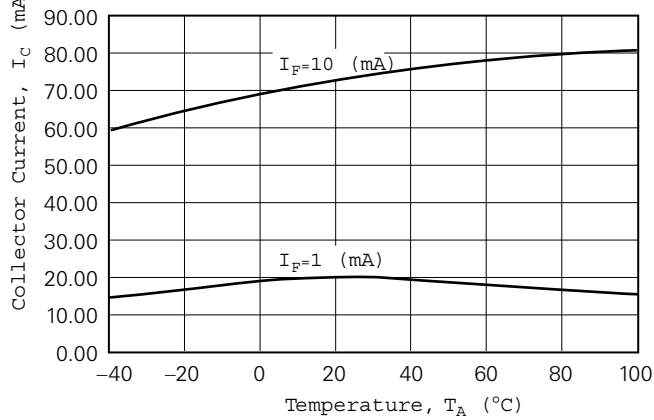


Figure 6. Collector Current (mA) vs. Collector-emitter Voltage (V) at 25°C

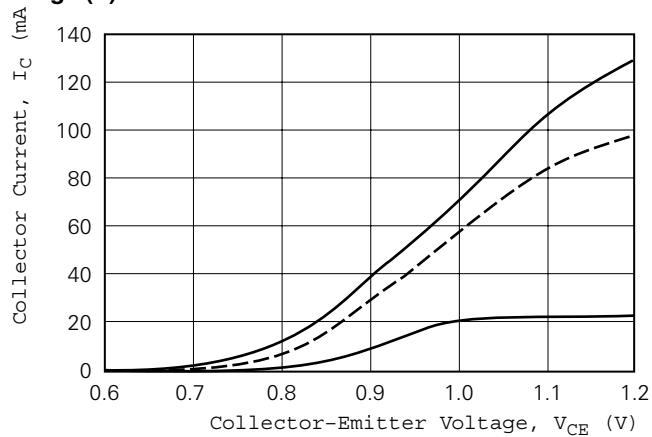


Figure 7. Collector-emitter Dark Current (nA) vs. Temperature vs. Collector-emitter Voltage (V)

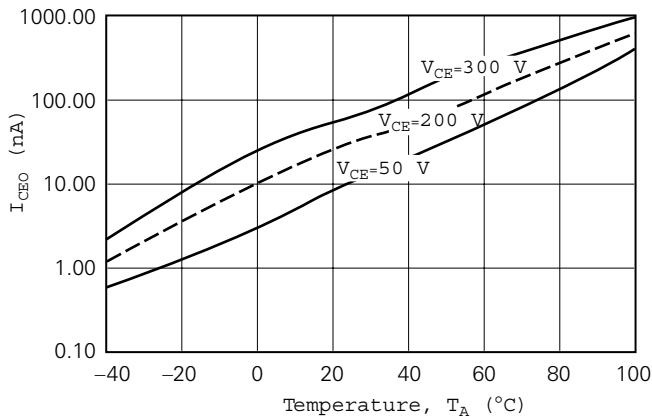


Figure 8. CTR vs. Forward Current (mA) at 25°C

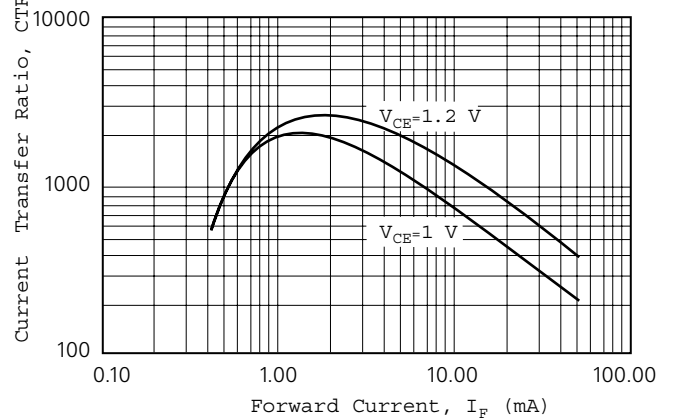


Figure 9. Normalized CTR vs. Temperature at $V_{CE}=1.0$ V

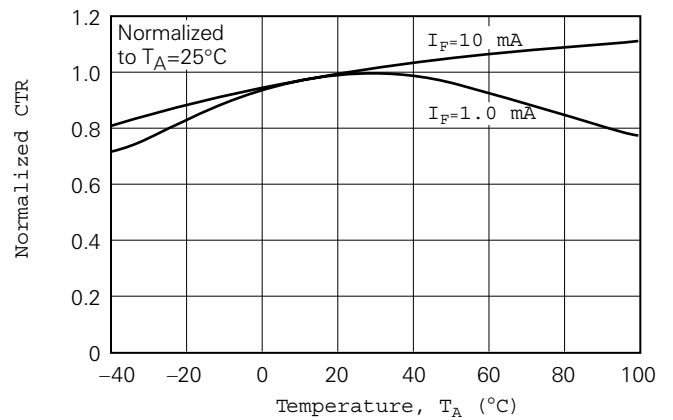


Figure 10. Time Switching vs. Load Resistor at $I_F=16$ mA, $V_{CC}=10$ V at 25°C

