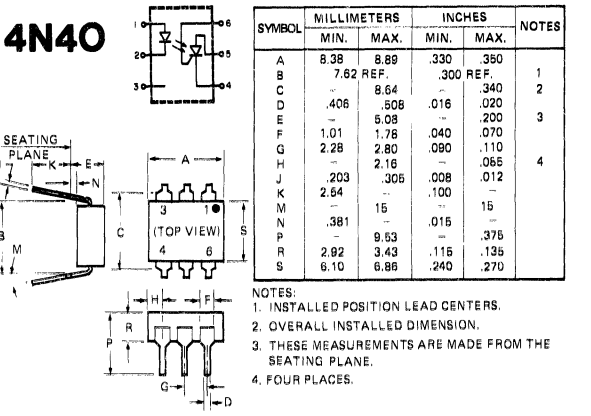
Photon Coupled Isolator 4N39, 4N40

Ga As Infrared Emitting Diode & Light Activated SCR

The GE Solid State 4N39 and 4N40 consist of a gallium arsenide, infrared emitting diode coupled with a light activated silicon controlled rectifier in a dual in-line package. These devices are also available in surface-mount packaging.



SYMBOL	MILLIMETERS MIN.	MILLIMETERS MAX.	INCHES MIN.	INCHES MAX.	NOTES
A	8.38	8.89	.330	.350	
B	7.62 REF.		.300 REF.		1
C	–	8.64	–	.340	2
D	.406	.508	.016	.020	
E	–	5.08	–	.200	3
F	1.01	1.78	.040	.070	
G	2.28	2.80	.090	.110	
H	–	2.16	–	.085	4
J	.203	.305	.008	.012	
K	2.64	–	.100	–	
M	–	15	–	15	
N	.381	–	.015	–	
P	–	9.53	–	.375	
R	2.92	3.43	.115	.135	
S	6.10	6.86	.240	.270	

NOTES:
1. INSTALLED POSITION LEAD CENTERS.
2. OVERALL INSTALLED DIMENSION.
3. THESE MEASUREMENTS ARE MADE FROM THE SEATING PLANE.
4. FOUR PLACES.

absolute maximum ratings

INFRARED EMITTING DIODE		
†Power Dissipation (-55°C to 50°C)	*100	milliwatts
†Forward Current (Continuous) (-55°C to 50°C)	60	milliamps
†Forward Current (Peak) (-55°C to 50°C) (100 μsec 1% duty cycle)	1	ampere
†Reverse Voltage (-55°C to 50°C)	6	volts

*Derate 2.0mW/°C above 50°C.

PHOTO-SCR			
†Off-State and Reverse Voltage (-55°C to +100°C)	4N39	200	volts
	4N40	400	volts
†Peak Reverse Gate Voltage (-55°C to 50°C)		6	volts
†Direct On-State Current (-55°C to 50°C)		300	milliamps
†Surge (non-rep) On-State Current (100μsec) (-55°C to 50°C)		10	amps
†Peak Gate Current (-55°C to 50°C)		10	milliamps
†Output Power Dissipation (-55°C to 50°C)**		400	milliwatts

**Derate 8mW/°C above 50°C.

TOTAL DEVICE
†Storage Temperature Range -55°C to 150°C
†Operating Temperature Range -55°C to 100°C
†Normal Temperature Range (No Derating) -55°C to 50°C
†Soldering Temperature (1/16″ from case, 10 seconds) 260°C
†Total Device Dissipation (-55°C to 50°C), 450 milliwatts
†Linear Derating Factor (above 50°C), 9.0mW/°C
†Surge Isolation Voltage (Input to Output). $1500V_{(peak)}$ $1060V_{(RMS)}$
†Steady-State Isolation Voltage (Input to Output). $950V_{(peak)}$ $660V_{(RMS)}$

individual electrical characteristics (25°C) (unless otherwise specified)

INFRARED EMITTING DIODE		TYP.	MAX.	UNITS
†Forward Voltage (I_F = 10mA)	V_F	1.1	1.5	volts
†Reverse Current (V_R = 3V)	I_R	–	10	microamps
Capacitance (V = 0, f = 1MHz)		50	–	picofarads

PHOTO-SCR		MIN.	MAX.	UNITS
†Peak Off-State Voltage – V_{DM} (R_{GK} = 10KΩ, T_A = 100°C)	4N39	200	–	volts
	4N40	400	–	volts
†Peak Reverse Voltage – V_{RM} (T_A = 100°C)	4N39	200	–	volts
	4N40	400	–	volts
†On-State Voltage – V_T (I_T = 300mA)		–	1.3	volts
†Off-State Current – I_D (V_D=200V, T_A=100°C, I_F=0, R_{GK}=10K)	4N39	–	50	microamps
†Off-State Current – I_D (V_D=400V, T_A=100°C, I_F=0, R_{GK}=10K)	4N40	–	150	microamps
†Reverse Current – I_R (V_R = 200V, T_A = 100°C, I_F = 0)	4N39	–	50	microamps
†Reverse Current – I_R (V_R = 400V, T_A = 100°C, I_F = 0)	4N40	–	150	microamps
†Holding Current – I_H (V_{FX} = 50V, R_{GK} = 27KΩ)		–	1.0	milliamps

coupled electrical characteristics (25°C)

			MIN.	MAX.	UNITS
†Input Current to Trigger	V_{AK} = 50V, R_{GK} = 10KΩ	I_{FT}	–	30	milliamps
	V_{AK} = 100V, R_{GK} = 27KΩ	I_{FT}	–	14	milliamps
†Isolation Resistance (Input to Output)	V_{io} = 500V_{DC}	r_{io}	100	–	gigaohms
†Turn-On Time – V_{AK} = 50V, I_F = 30mA, R_{GK} = 10KΩ, R_L = 200Ω		t_{on}	–	50	microseconds
Coupled dv/dt, Input to Output (See Figure 13)			500	–	volts/microsec.
Input to Output Capacitance (Input to Output Voltage = 0, f = 1MHz)			–	2	picofarads

†Indicates JEDEC Registered Values. Covered under U.L. component recognition program, reference file E51868

VDE Approved to 0883/6.80 0110b Certificate # 35025

TYPICAL CHARACTERISTICS

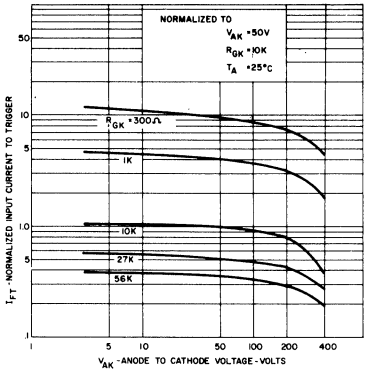


FIGURE 1. INPUT CURRENT TO TRIGGER VS. ANODE-CATHODE VOLTAGE

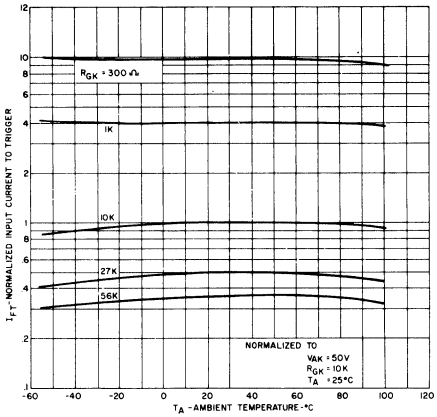


FIGURE 2. INPUT CURRENT TO TRIGGER VS. TEMPERATURE

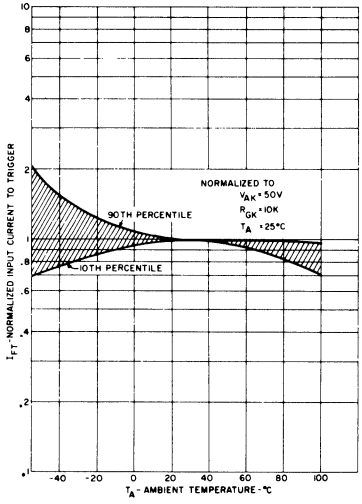


FIGURE 3. INPUT CURRENT TO TRIGGER DISTRIBUTION VS. TEMPERATURE

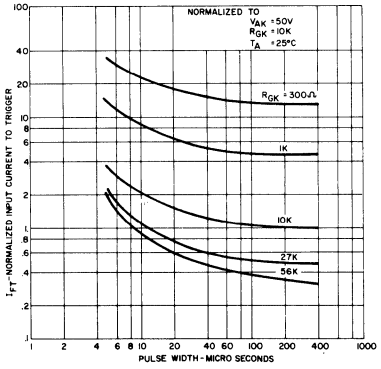


FIGURE 4. INPUT CURRENT TO TRIGGER VS. PULSE WIDTH

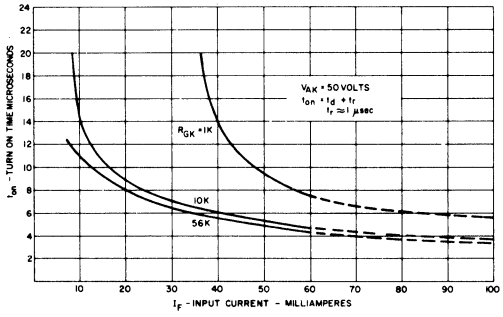


FIGURE 5. TURN-ON TIME VS. INPUT CURRENT

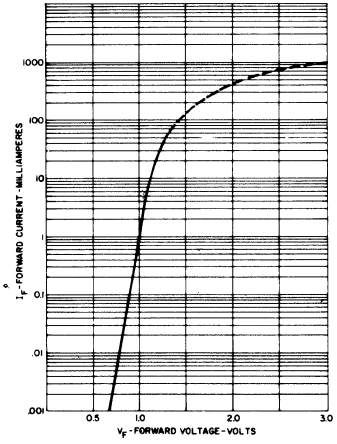


FIGURE 6. INPUT CHARACTERISTICS I_F VS. V_F

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TYPICAL CHARACTERISTICS OF OUTPUT (SCR)

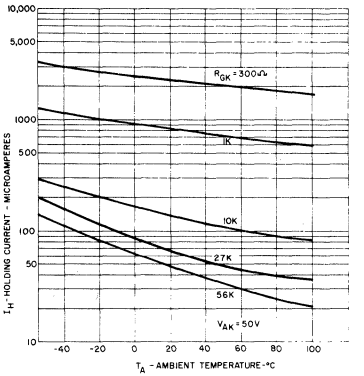


FIGURE 7. HOLDING CURRENT VS. TEMPERATURE

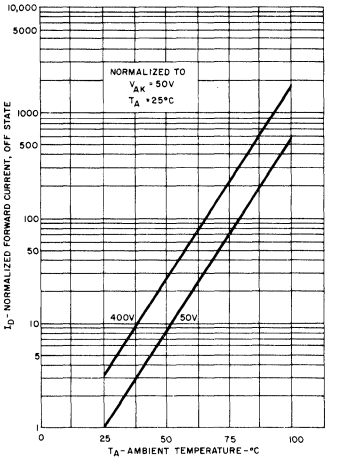


FIGURE 9. OFF-STATE FORWARD CURRENT VS. TEMPERATURE

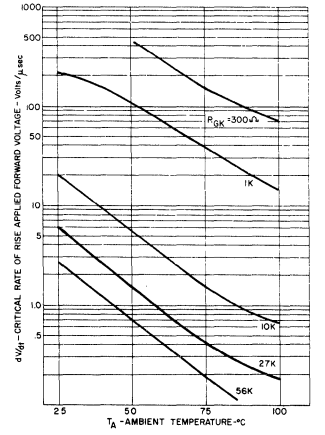


FIGURE 11. dv/dt VS. TEMPERATURE

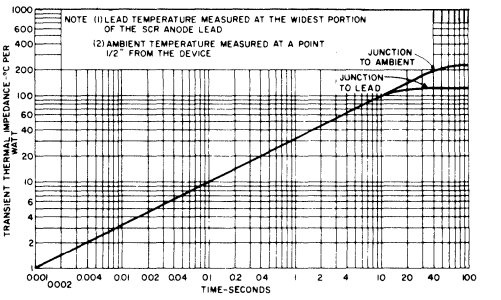


FIGURE 8. MAXIMUM TRANSIENT THERMAL IMPEDANCE

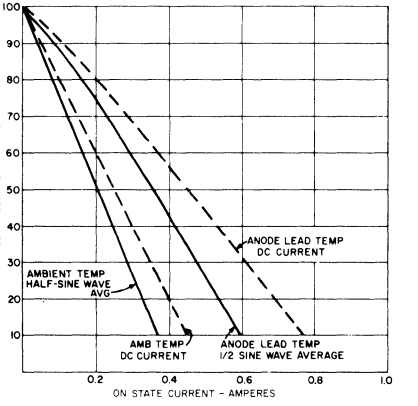


FIGURE 10. ON-STATE CURRENT VS. MAXIMUM ALLOWABLE TEMPERATURE

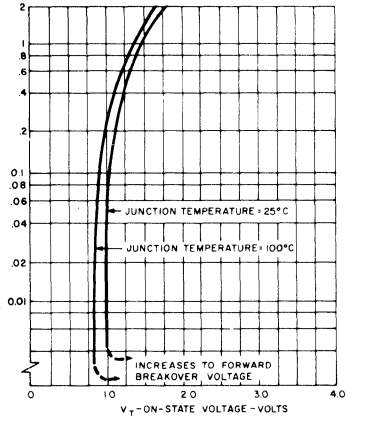
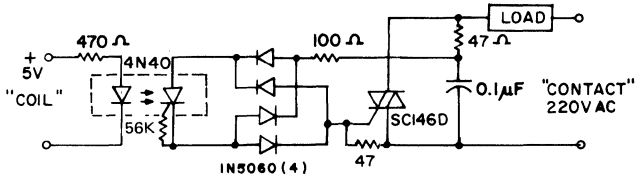


FIGURE 12. ON-STATE CHARACTERISTICS

TYPICAL APPLICATIONS

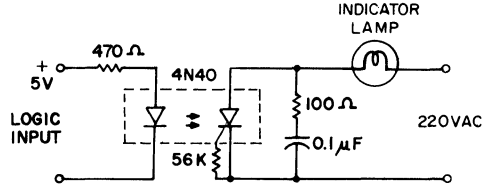
10A, T^2L COMPATIBLE, SOLID STATE RELAY

Use of the 4N40 for high sensitivity, 2500V isolation capability, provides this highly reliable solid state relay design. This design is compatible with 74, 74S and 74H series T^2L logic systems inputs and 220V AC loads up to 10A.



25W LOGIC INDICATOR LAMP DRIVER

The high surge capability and non-reactive input characteristics of the 4N40 allow it to directly couple, without buffers, T^2L and DTL logic to indicator and alarm devices, without danger of introducing noise and logic glitches.



400V SYMMETRICAL TRANSISTOR COUPLER

Use of the high voltage PNP portion of the 4N40 provides a 400V transistor capable of conducting positive and negative signals with current transfer ratios of over 1%. This function is useful in remote instrumentation, high voltage power supplies and test equipment. Care should be taken not to exceed the 400 mW power dissipation rating when used at high voltages.

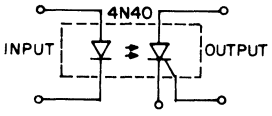


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FIGURE 13
COUPLED dv/dt – TEST CIRCUIT

V_p = 800 Volts
t_p = .010 Seconds
f = 25 Hertz
T_A = 25° C