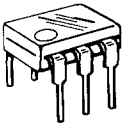
6-Pin DIP Optoisolators
SCR Output

4N39
4N40

6-PIN DIP
OPTOISOLATORS
SCR OUTPUT
200 and 400 VOLTS

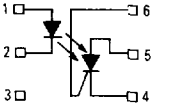
These devices consist of a gallium-arsenide infrared emitting diode optically coupled to a photo sensitive silicon controlled rectifier (SCR). They are designed for applications requiring high electrical isolation between low voltage control circuitry and the ac line.

- High Blocking Voltage of 200 V for 120 Vac lines, or 400 V for 240 Vac Lines
- Very High Isolation Voltage: V_{ISO} = 7500 Vac Min
- Standard 6-Pin DIP
- UL Recognized, File Number E54915
- Meets or Exceeds All JEDEC Registered Values
- VDE approved per standard 0883/6.80 (Certificate number 41853), with additional approval to DIN IEC380/VDE0806, IEC435/VDE0805, IEC65/VDE0860, VDE110b, covering all other standards with equal or less stringent requirements, including IEC204/VDE0113, VDE0160, VDE0832, VDE0833, etc. 883
- *Various lead form options available. Consult "Optoisolator Lead Form Options" data sheet for details.*



CASE 730A-02
PLASTIC

SCHEMATIC



1. ANODE
2. CATHODE
3. N.C.
4. SCR CATHODE
5. SCR ANODE
6. SCR GATE

MAXIMUM RATINGS* (T_A = 25°C unless otherwise noted)

Rating		Symbol	Value	Unit
INPUT LED				
Reverse Voltage		V_R	6	Volts
Forward Current — Continuous — Peak (PW = 100 μs, 1% duty cycle)		I_F $I_{F(pk)}$	60 1	mA A
Power Dissipation Derate above 50°C		P_D	100 2	mW mW/°C
OUTPUT DRIVER				
Peak Forward Blocking Voltage (−55° to +100°C)	4N39 4N40	V_{DM}	200 400	Volts
Forward RMS Current (Full Cycle, 50 to 60 Hz)		$I_{T(RMS)}$	300	mA
Peak Nonrepetitive Surge Current (PW = 100 μs)		I_{TSM}	10	A
Peak Reverse Gate Voltage		V_{GR}	6	Volts
Peak Gate Input Current		$I_{G(pk)}$	100	mA
Power Dissipation Derate above 25°C		P_D	400 8	mW mW/°C
TOTAL DEVICE				
Isolation Surge Voltage (1) (Peak ac Voltage, 60 Hz, 5 Second Duration)		V_{ISO}	7500	Vac
Total Device Power Dissipation Derate above 50°C		P_D	450 9	mW mW/°C
Junction Temperature Range		T_J	−40 to +100	°C
Ambient Operating Temperature Range		T_A	−55 to +100	°C
Storage Temperature Range		T_{stg}	−55 to +150	°C
Soldering Temperature (10 s)		—	260	°C

(1) Isolation surge voltage, V_{ISO}, is an internal device dielectric breakdown rating.
* Indicates JEDEC registered values.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
INPUT LED						
Reverse Leakage Current (V_R = 3 V)		I_R	—	0.05	10	μA
Forward Voltage (I_F = 10 mA)		V_F	—	1.2	1.5	Volts
Capacitance (V = 0 V, f = 1 MHz)		C_J	—	50	—	pF
OUTPUT DETECTOR						
Peak Off-State Voltage (R_{GK} = 10 kΩ, T_A = 100°C)	4N39 4N40	V_{DM}	200 400	— —	— —	Volts
Peak Reverse Voltage (T_A = 100°C)	4N39 4N40	V_{RM}	200 400	— —	— —	Volts
On-State Voltage (I_{TM} = 0.3 A)		V_{TM}	—	1.1	1.3	Volts
Off-State Current (V_{DM} = Rated Voltage, R_{GK} = 10 kΩ, I_F = 0, T_A = 100°C)	4N39 4N40	I_{DM}	— —	— —	50 150	μA
Reverse Current (V_{RM} = Rated Voltage, I_F = 0, T_A = 100°C)	4N39 4N40	I_{RM}	— —	— —	50 150	μA
Holding Current (VFX = 50 V, R_{GK} = 27 kΩ)		I_H	—	—	200	μA
Capacitance (V = 0 V, f = 1 MHz) Anode — Gate Gate — Cathode		C_J	 — —	 20 350	 — —	pF
COUPLED						
LED Current Required to Trigger (V_{AK} = 50 V, R_{GK} = 10 kΩ) (V_{AK} = 100 V, R_{GK} = 27 kΩ)		I_{FT}	 — —	 15 8	 30 14	mA
Isolation Resistance Input to Output (V_{IO} = 500 Vdc)		R_{ISO}	100	—	—	GΩ
Capacitance Input to Output (V_{IO} = 0, f = 1 MHz)		C_{ISO}	—	2	—	pF
Turn-On Time (V_{AK} = 50 V, I_F = 30 mA, R_{GK} = 10 kΩ, R_L = 200 Ω)		t_{on}	—	—	50	μs
Coupled dv/dt, Input to Output (See Figure 8)		dv/dt	—	500	—	Volts/μs
Isolation Surge Voltage (1) (Peak ac Voltage, 60 Hz, 5 Second Duration)		V_{ISO}	7500	—	—	Vac(pk)

(1) Isolation surge voltage, V_{ISO}, is an internal device dielectric breakdown rating.
* Indicates JEDEC registered values.

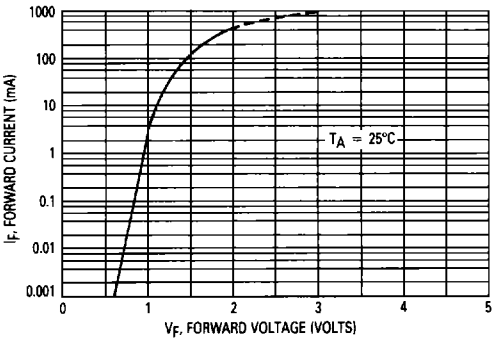


Figure 1. Forward Current versus LED Forward Voltage

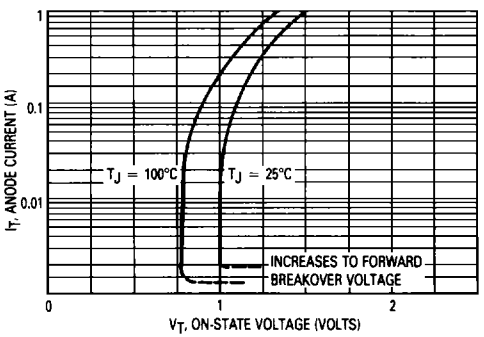


Figure 2. On-State Characteristics

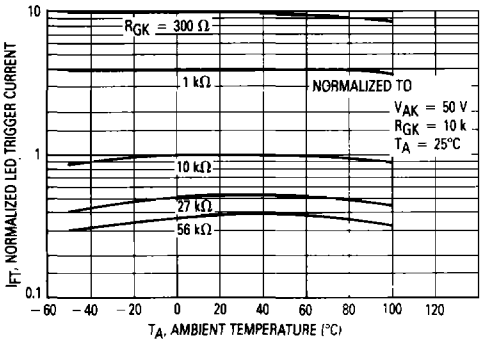


Figure 3. LED Trigger Current versus Temperature

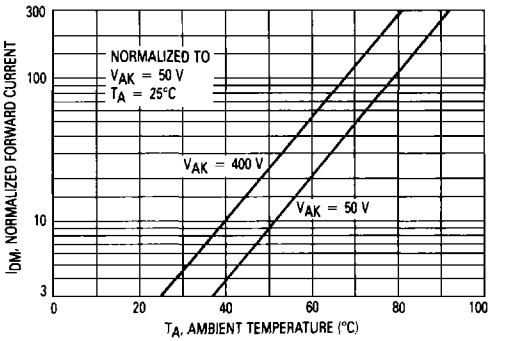
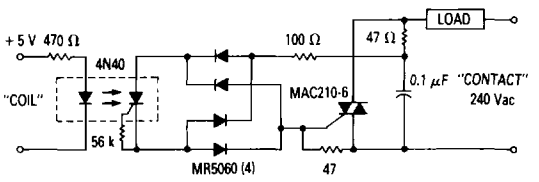


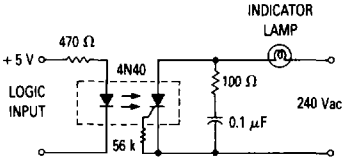
Figure 4. Forward Leakage Current versus Temperature

TYPICAL APPLICATIONS



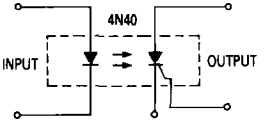
Use of the 4N40 for high sensitivity, 7500 V isolation capability, provides this highly reliable solid state relay design. This design is compatible with 74, 74S and 74H series T^2L logic systems inputs and 240 Vac loads up to 10 A.

Figure 5. 10 A, T^2L Compatible, Solid State Relay



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.

Figure 6. 25 W Logic Indicator Lamp Driver



Use of the high voltage PNP portion of the 4N40, provides a 400 V 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 device 400 mW power dissipation rating when used at high voltages.

Figure 7. 400 V Symmetrical Transistor Coupler

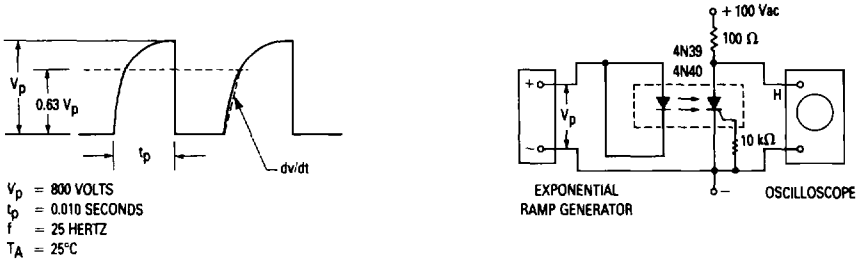
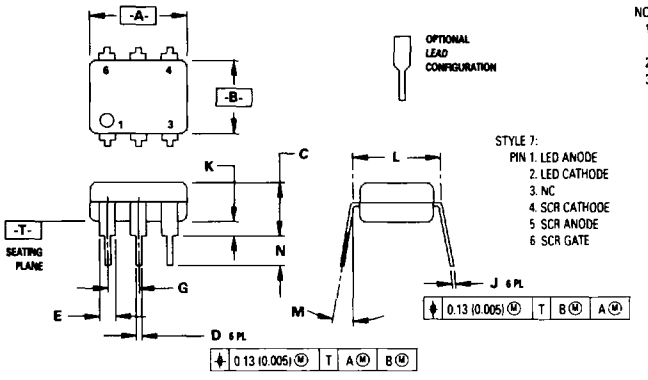


Figure 8. Coupled dv/dt — Test Circuit

OUTLINE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM L TO CENTER OF LEAD WHEN FORMED PARALLEL.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.21	0.30	0.008	0.012
K	0.38	2.54	0.015	0.100
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	2.54	3.81	0.100	0.150

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