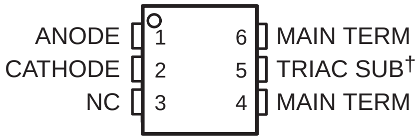
MOC3020 THRU MOC3023
OPTOCOUPLERS/OPTOISOLATORS

SOES025A – OCTOBER 1986 – REVISED APRIL 1998

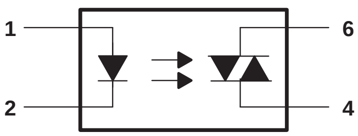
- **400 V Phototriac Driver Output**
- **Gallium-Arsenide-Diode Infrared Source and Optically-Coupled Silicon Traic Driver (Bilateral Switch)**
- **UL Recognized . . . File Number E65085**
- **High Isolation . . . 7500 V Peak**
- **Output Driver Designed for 220 Vac**
- **Standard 6-Terminal Plastic DIP**
- **Directly Interchangeable with Motorola MOC3020, MOC3021, MOC3022, and MOC3023**

MOC3020 – MOC3023 . . . PACKAGE
(TOP VIEW)



† Do not connect this terminal
NC – No internal connection

logic diagram



typical 115/240 Vac(rms) applications

- **Solenoid/Valve Controls**
- **Lamp Ballasts**
- **Interfacing Microprocessors to 115/240 Vac Peripherals**
- **Motor Controls**
- **Incandescent Lamp Dimmers**

absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)†

Input-to-output peak voltage, 5 s maximum duration, 60 Hz (see Note 1)	7.5 kV
Input diode reverse voltage	3 V
Input diode forward current, continuous	50 mA
Output repetitive peak off-state voltage	400 V
Output on-state current, total rms value (50-60 Hz, full sine wave): T_A = 25°C	100 mA
T_A = 70°C	50 mA
Output driver nonrepetitive peak on-state current (t_W = 10 ms, duty cycle = 10%, see Figure 7)	1.2 A
Continuous power dissipation at (or below) 25°C free-air temperature:	
Infrared-emitting diode (see Note 2)	100 mW
Phototriac (see Note 3)	300 mW
Total device (see Note 4)	330 mW
Operating junction temperature range, T_J	–40°C to 100°C
Storage temperature range, T_{stg}	–40°C to 150°C
Lead temperature 1,6 (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

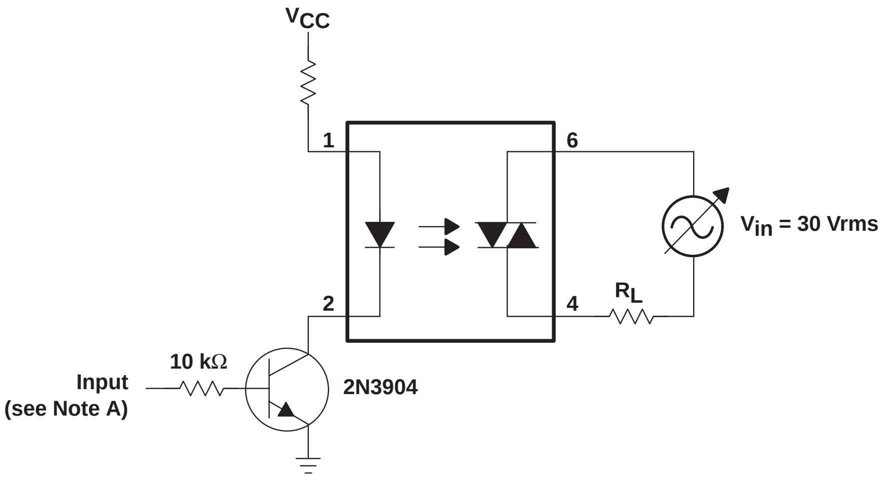
NOTES: 1. Input-to-output peak voltage is the internal device dielectric breakdown rating.
2. Derate linearly to 100°C free-air temperature at the rate of 1.33 mW/°C.
3. Derate linearly to 100°C free-air temperature at the rate of 4 mW/°C.
4. Derate linearly to 100°C free-air temperature at the rate of 4.4 mW/°C.

electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_R	Static reverse current		V_R = 3 V		0.05	100	µA
V_F	Static forward voltage		I_F = 10 mA		1.2	1.5	V
$I_{(DRM)}$	Repetitive off-state current, either direction		$V_{(DRM)}$ = 400 V, See Note 5		10	100	nA
dv/dt	Critical rate of rise of off-state voltage		See Figure 1		100		V/µs
dv/dt(c)	Critical rate of rise of commutating voltage		I_O = 15 mA, See Figure 1		0.15		V/µs
I_{FT}	Input trigger current, either direction	MOC3020	Output supply voltage = 3 V		15	30	mA
		MOC3021			8	15	
		MOC3022			5	10	
		MOC3023			3	5	
V_{TM}	Peak on-state voltage, either direction		I_{TM} = 100 mA		1.4	3	V
I_H	Holding current, either direction				100		µA

NOTE 5: Test voltage must be applied at a rate no higher than 12 V/µs.

PARAMETER MEASUREMENT INFORMATION



NOTE A. The critical rate of rise of off-state voltage, dv/dt, is measured with the input at 0 V. The frequency of V_{in} is increased until the phototriac turns on. This frequency is then used to calculate the dv/dt according to the formula:

$$dv/dt = 2\sqrt{2}\pi f V_{in}$$

The critical rate of rise of commutating voltage, dv/dt(c), is measured by applying occasional 5-V pulses to the input and increasing the frequency of V_{in} until the phototriac stays on (latches) after the input pulse has ceased. With no further input pulses, the frequency of V_{in} is then gradually decreased until the phototriac turns off. The frequency at which turn-off occurs may then be used to calculate the dv/dt(c) according to the formula shown above.

Figure 1. Critical Rate of Rise Test Circuit

TYPICAL CHARACTERISTICS

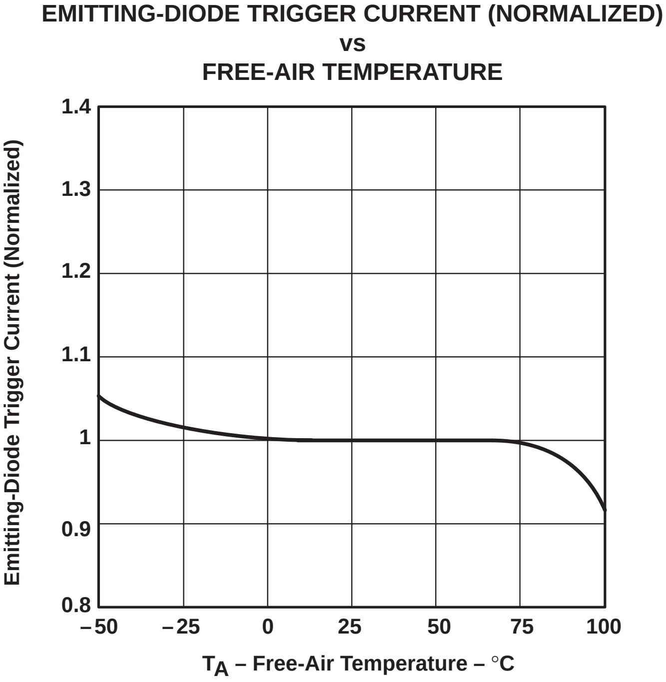


Figure 2

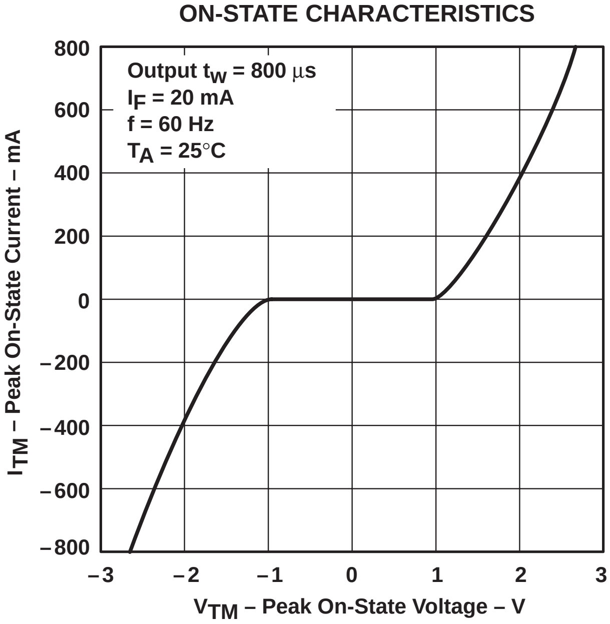


Figure 3

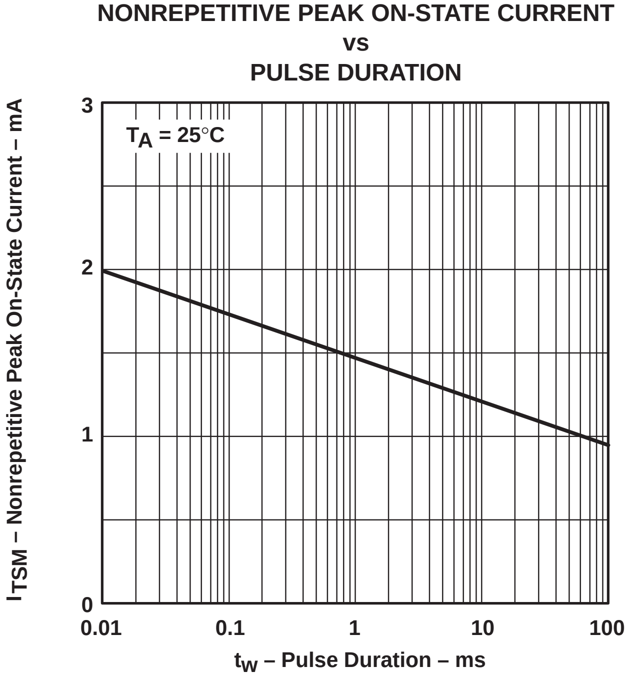


Figure 4

APPLICATIONS INFORMATION

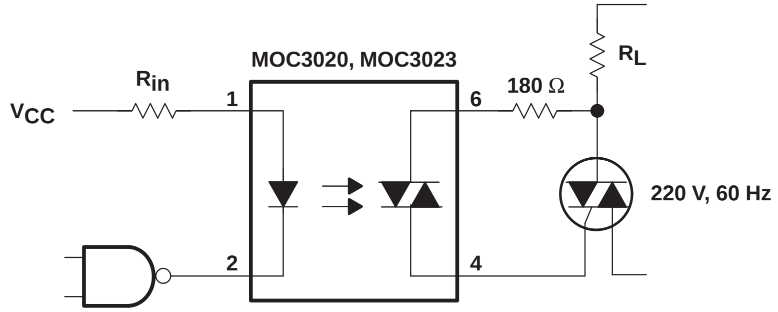
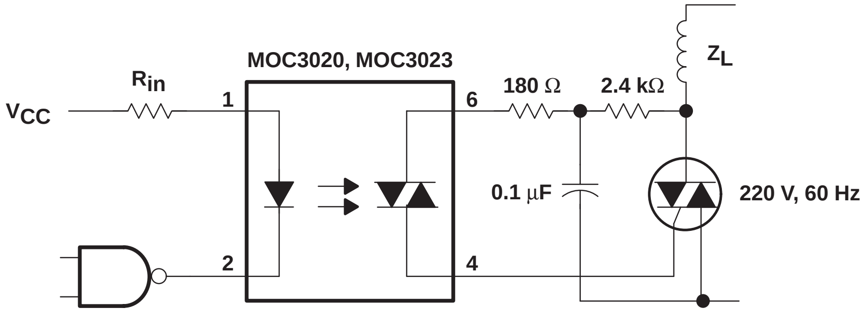
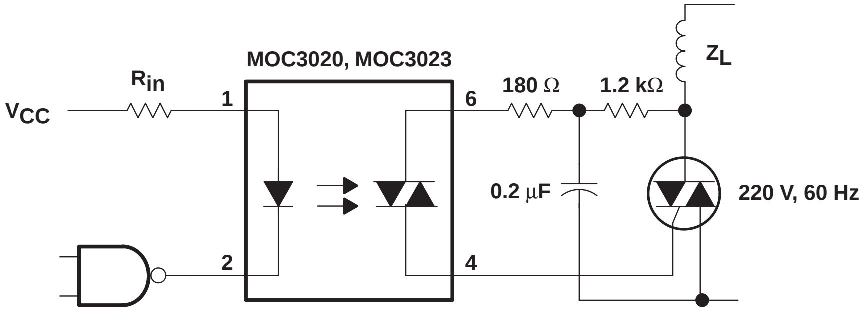


Figure 5. Resistive Load



$I_{GT} \le 15$ mA

Figure 6. Inductive Load With Sensitive-Gate Triac

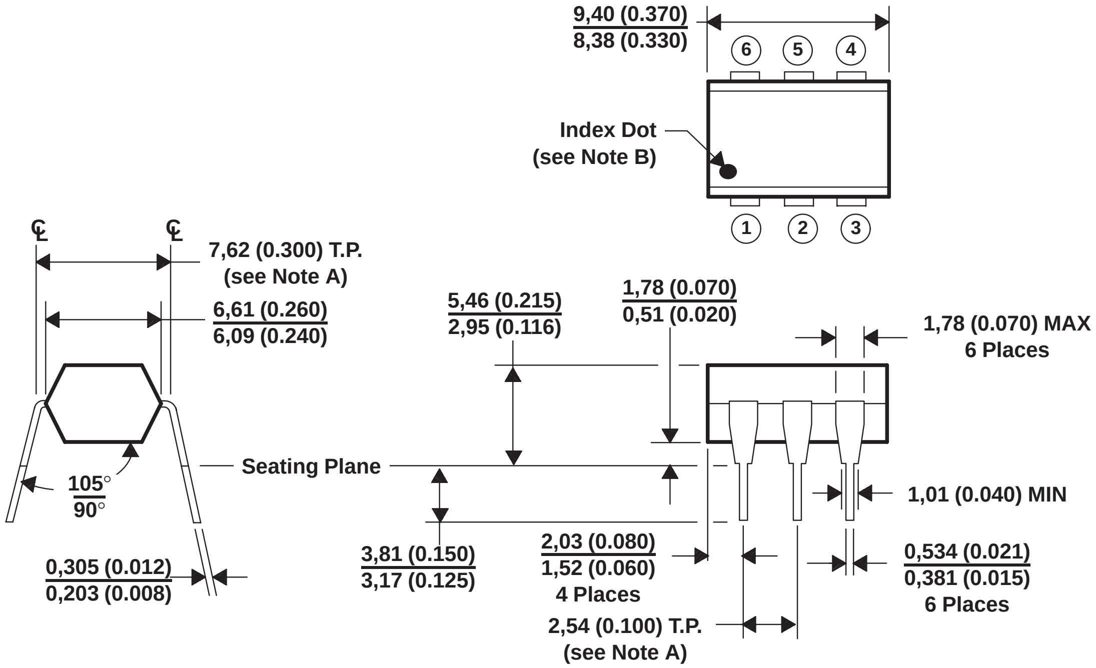


15 mA < I_{GT} < 50 mA

Figure 7. Inductive Load With Nonsensitive-Gate Triac

MECHANICAL INFORMATION

Each device consists of a gallium-arsenide infrared-emitting diode optically coupled to a silicon phototriac mounted on a 6-terminal lead frame encapsulated within an electrically nonconductive plastic compound. The case can withstand soldering temperature with no deformation and device performance characteristics remain stable when operated in high-humidity conditions.



NOTES:
- A. Leads are within 0,13 (0.005) radius of true position (T.P.) with maximum material condition and unit installed.
- B. Pin 1 identified by index dot.
- C. The dimensions given fall within JEDEC MO-001 AM dimensions.
- D. All linear dimensions are given in millimeters and parenthetically given in inches.

Figure 8. Packaging Specifications

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