



# 6-Pin DIP Zero-Cross Optoisolators Triac Driver Output (800 Volts Peak)

The MOC3081, MOC3082 and MOC3083 devices consist of gallium arsenide infrared emitting diodes optically coupled to monolithic silicon detectors performing the function of Zero Voltage Crossing bilateral triac drivers.

They are designed for use with a triac in the interface of logic systems to equipment powered from 240 Vac lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances, etc.

- Simplifies Logic Control of 240 Vac Power
- Zero Voltage Crossing
- $dv/dt$  of 1500 V/ $\mu$ s Typical, 600 V/ $\mu$ s Guaranteed
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.**

### Recommended for 240 Vac(rms) Applications:

- Solenoid/Valve Controls
- Lighting Controls
- Static Power Switches
- AC Motor Drives
- Temperature Controls
- E.M. Contactors
- AC Motor Starters
- Solid State Relays

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
<b>INPUT LED</b>			
Reverse Voltage	$V_R$	6	Volts
Forward Current — Continuous	$I_F$	60	mA
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Negligible Power in Output Driver Derate above $25^\circ\text{C}$	$P_D$	120	mW
		1.41	mW/ $^\circ\text{C}$
<b>OUTPUT DRIVER</b>			
Off-State Output Terminal Voltage	$V_{DRM}$	800	Volts
Peak Repetitive Surge Current (PW = 100 $\mu$ s, 120 pps)	$I_{TSM}$	1	A
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150	mW
		1.76	mW/ $^\circ\text{C}$

### TOTAL DEVICE

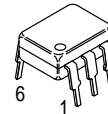
Isolation Surge Voltage <sup>(1)</sup> (Peak ac Voltage, 60 Hz, 1 Second Duration)	$V_{ISO}$	7500	Vac(pk)
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	250	mW
		2.94	mW/ $^\circ\text{C}$
Junction Temperature Range	$T_J$	-40 to +100	$^\circ\text{C}$
Ambient Operating Temperature Range <sup>(2)</sup>	$T_A$	-40 to +85	$^\circ\text{C}$
Storage Temperature Range <sup>(2)</sup>	$T_{stg}$	-40 to +150	$^\circ\text{C}$
Soldering Temperature (10 s)	$T_L$	260	$^\circ\text{C}$

1. Isolation surge voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.  
For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
  2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.
- Preferred** devices are Motorola recommended choices for future use and best overall value.  
GlobalOptoisolator is a trademark of Motorola, Inc.

**MOC3081**  
[IFT = 15 mA Max]  
**MOC3082**  
[IFT = 10 mA Max]  
**MOC3083\***  
[IFT = 5 mA Max]

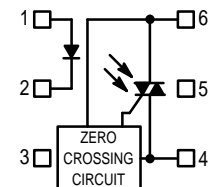
\*Motorola Preferred Device

### STYLE 6 PLASTIC



STANDARD THRU HOLE  
CASE 730A-04

### COUPLER SCHEMATIC



1. ANODE
2. CATHODE
3. NC
4. MAIN TERMINAL
5. SUBSTRATE  
DO NOT CONNECT
6. MAIN TERMINAL

# MOC3081 MOC3082 MOC3083

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>INPUT LED</b>					
Reverse Leakage Current ( $V_R = 6\text{ V}$ )	$I_R$	—	0.05	100	$\mu\text{A}$
Forward Voltage ( $I_F = 30\text{ mA}$ )	$V_F$	—	1.3	1.5	Volts
<b>OUTPUT DETECTOR (<math>I_F = 0</math>)</b>					
Leakage with LED Off, Either Direction ( $V_{\text{DRM}} = 800\text{ V}^{(1)}$ )	$I_{\text{DRM1}}$	—	80	500	nA
Critical Rate of Rise of Off-State Voltage <sup>(3)</sup>	dv/dt	600	1500	—	V/ $\mu\text{s}$
<b>COUPLED</b>					
LED Trigger Current, Current Required to Latch Output (Main Terminal Voltage = $3\text{ V}^{(2)}$ )	$I_{\text{FT}}$	—	—	15	mA
MOC3081		—	—	10	
MOC3082		—	—	5	
MOC3083		—	—	—	
Peak On-State Voltage, Either Direction ( $I_{\text{TM}} = 100\text{ mA}$ , $I_F = \text{Rated } I_{\text{FT}}$ )	$V_{\text{TM}}$	—	1.8	3	Volts
Holding Current, Either Direction	$I_H$	—	250	—	$\mu\text{A}$
Inhibit Voltage (MT1–MT2 Voltage above which device will not trigger) ( $I_F = \text{Rated } I_{\text{FT}}$ )	$V_{\text{INH}}$	—	5	20	Volts
Leakage in Inhibited State ( $I_F = \text{Rated } I_{\text{FT}}$ , $V_{\text{DRM}} = 800\text{ V}$ , Off State)	$I_{\text{DRM2}}$	—	300	500	$\mu\text{A}$

1. Test voltage must be applied within dv/dt rating.
2. All devices are guaranteed to trigger at an  $I_F$  value less than or equal to max  $I_{\text{FT}}$ . Therefore, recommended operating  $I_F$  lies between max  $I_{\text{FT}}$  (15 mA for MOC3081, 10 mA for MOC3082, 5 mA for MOC3083) and absolute max  $I_F$  (60 mA).
3. This is static dv/dt. See Figure 7 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.

### TYPICAL CHARACTERISTICS

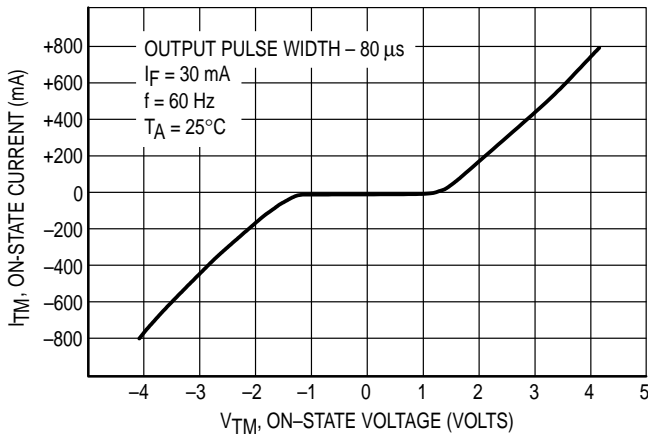


Figure 1. On-State Characteristics

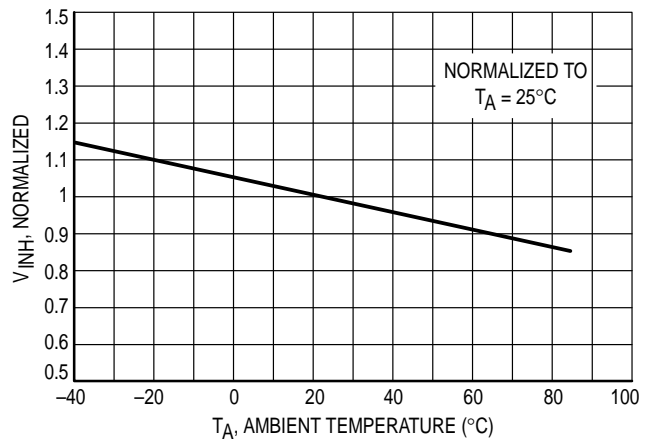


Figure 2. Inhibit Voltage versus Temperature

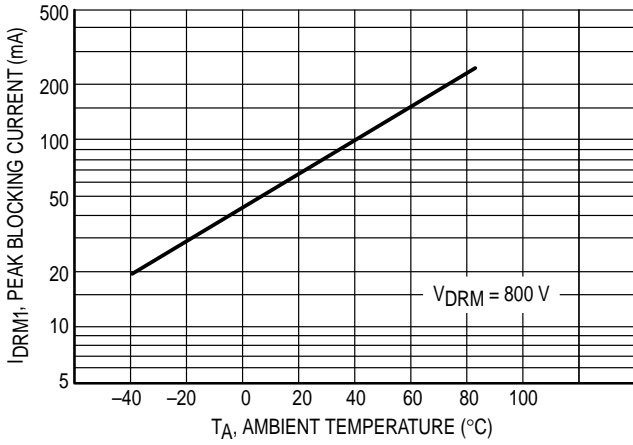


Figure 3. Leakage with LED Off versus Temperature

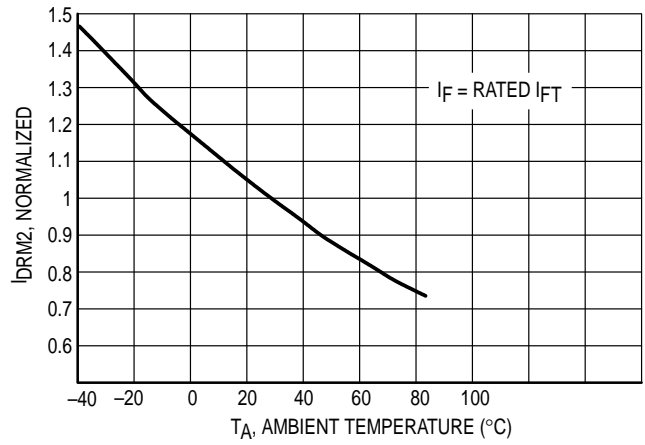


Figure 4. IDRM2, Leakage in Inhibit State versus Temperature

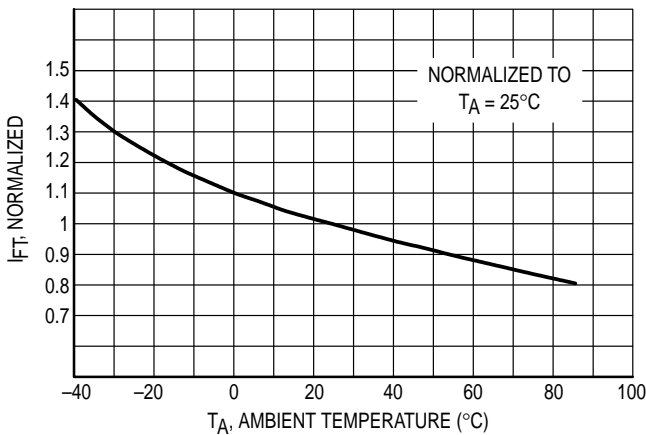


Figure 5. Trigger Current versus Temperature

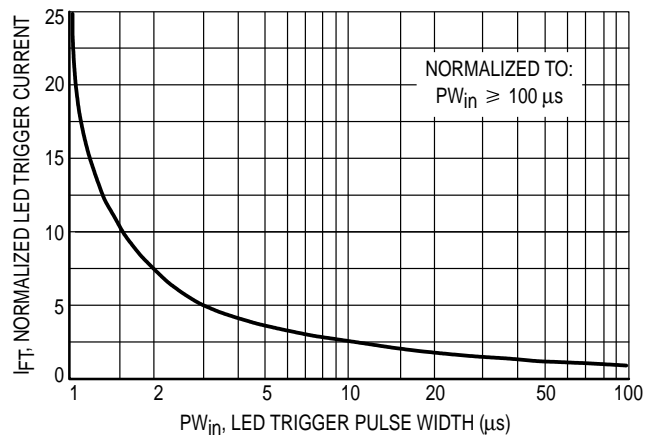
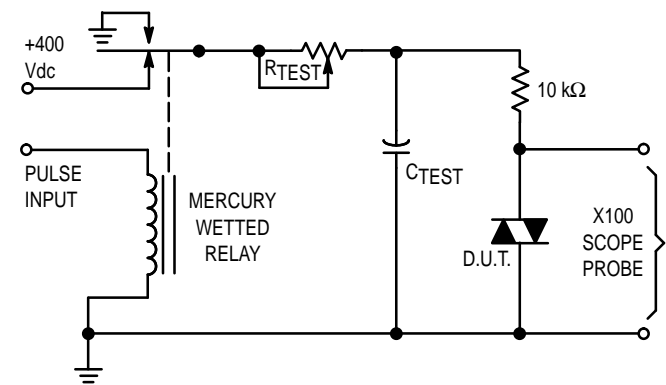


Figure 6. LED Current Required to Trigger versus LED Pulse Width



1. The mercury wetted relay provides a high speed repeated pulse to the D.U.T.
2. 100x scope probes are used, to allow high speeds and voltages.
3. The worst-case condition for static dv/dt is established by triggering the D.U.T. with a normal LED input current, then removing the current. The variable RTEST allows the dv/dt to be gradually increased until the D.U.T. continues to trigger in response to the applied voltage pulse, even after the LED current has been removed. The dv/dt is then decreased until the D.U.T. stops triggering.  $\tau_{RC}$  is measured at this point and recorded.

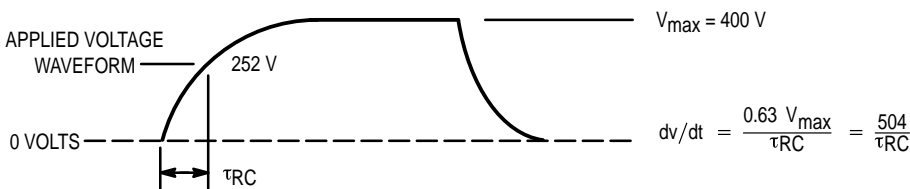
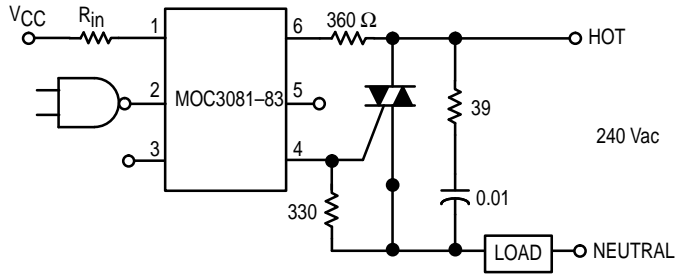


Figure 7. Static dv/dt Test Circuit

# MOC3081 MOC3082 MOC3083

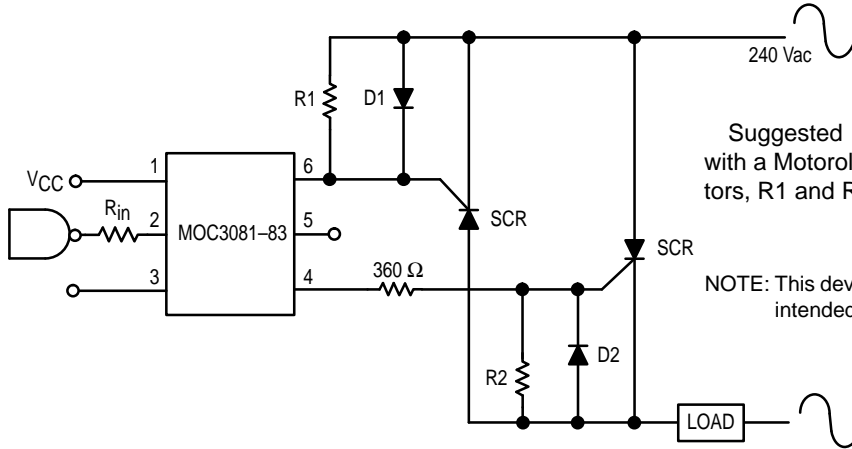


Typical circuit for use when hot line switching is required. In this circuit the "hot" side of the line is switched and the load connected to the cold or neutral side. The load may be connected to either the neutral or hot line.

$R_{in}$  is calculated so that  $I_F$  is equal to the rated  $I_{FT}$  of the part, 15 mA for the MOC3081, 10 mA for the MOC3082, and 5 mA for the MOC3083. The 39 ohm resistor and 0.01  $\mu$ F capacitor are for snubbing of the triac and may or may not be necessary depending upon the particular triac and load used.

\* For highly inductive loads (power factor < 0.5), change this value to 360 ohms.

**Figure 8. Hot-Line Switching Application Circuit**

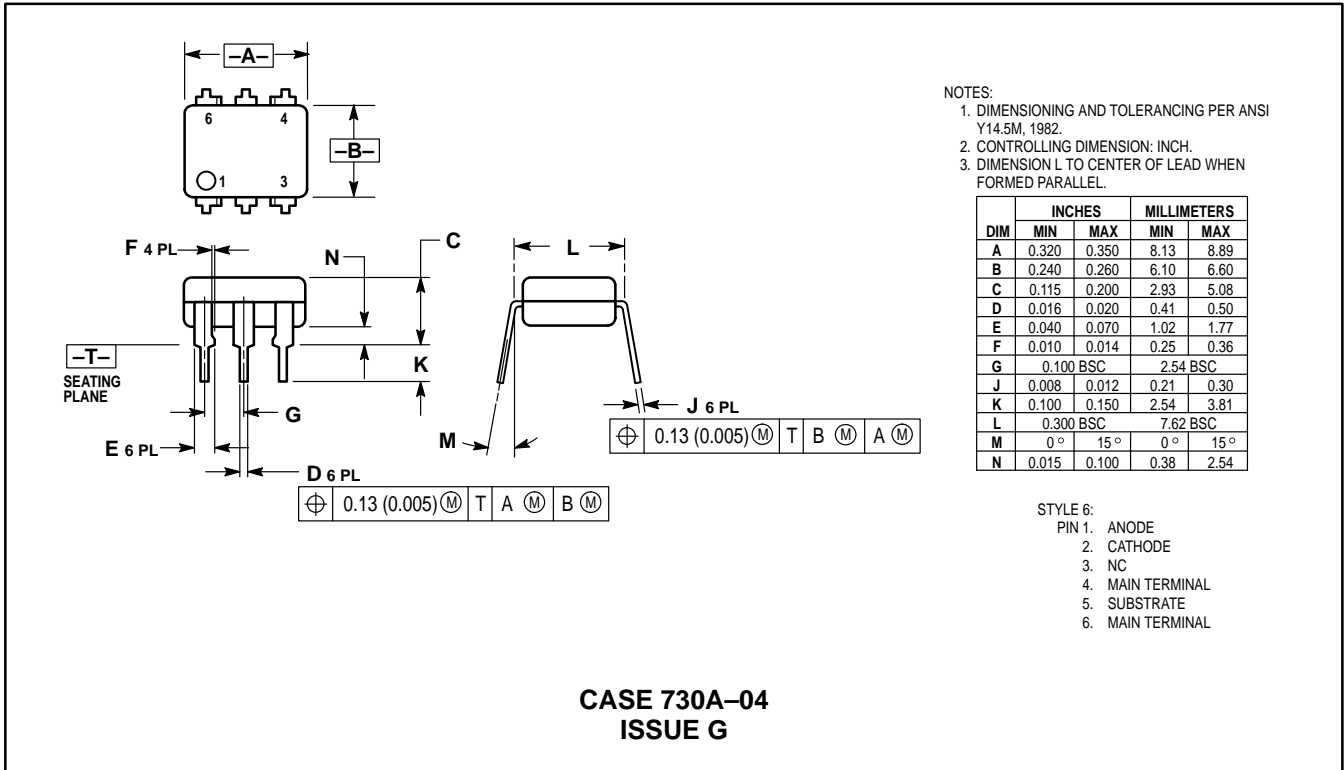


Suggested method of firing two, back-to-back SCR's, with a Motorola triac driver. Diodes can be 1N4001; resistors, R1 and R2, are optional 330 ohms.

NOTE: This device should not be used to drive a load directly. It is intended to be a trigger device only.

**Figure 9. Inverse-Parallel SCR Driver Circuit**

PACKAGE DIMENSIONS



# MOC3081 MOC3082 MOC3083



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.320	0.350	8.13	8.89
B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
J	0.008	0.012	0.21	0.30
K	0.100	0.150	2.54	3.81
L	0.400	0.425	10.16	10.80
N	0.015	0.040	0.38	1.02

**\*Consult factory for leadform option availability**

**CASE 730D-05  
ISSUE D**

⊕	0.13 (0.005)	M	T	A	M	B	M
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