FAIRCHILD
SEMICONDUCTOR®

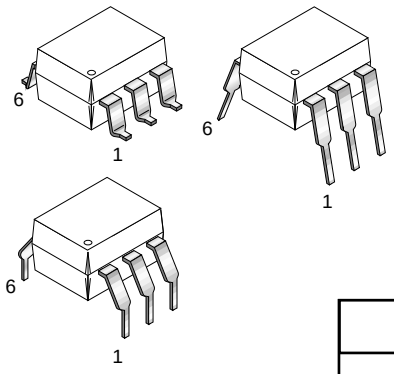
6-PIN DIP ZERO-CROSS OPTOISOLATORS TRIAC DRIVER OUTPUT (250/400 VOLT PEAK)

MOC3031M MOC3032M MOC3033M MOC3041M MOC3042M MOC3043M

DESCRIPTION

The MOC303XM and MOC304XM devices consist of a AlGaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver.

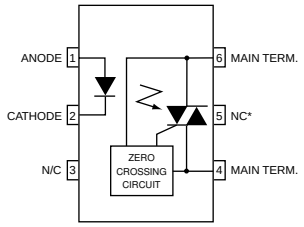
They are designed for use with a triac in the interface of logic systems to equipment powered from 115 VAC lines, such as teletypewriters, CRTs, solid-state relays, industrial controls, printers, motors, solenoids and consumer appliances, etc.



FEATURES

- Simplifies logic control of 115 VAC power
- Zero voltage crossing
- dv/dt of 2000 V/µs typical, 1000 V/µs guaranteed
- VDE recognized (File # 94766)
  -ordering option V (e.g., MOC3043VM)

SCHEMATIC



APPLICATIONS

- Solenoid/valve controls
- Static power switches
- Temperature controls
- AC motor starters
- Lighting controls
- AC motor drives
- E.M. contactors
- Solid state relays

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

Parameters	Symbol	Device	Value	Units
TOTAL DEVICE Storage Temperature	T_{STG}	All	-40 to +150	°C
Operating Temperature	T_{OPR}	All	-40 to +85	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°C
Junction Temperature Range	T_J	All	-40 to +100	°C
Isolation Surge Voltage[1] (peak AC voltage, 60Hz, 1 sec duration)	V_{ISO}	All	7500	Vac(pk)
Total Device Power Dissipation @ 25°C	P_D	All	250	mW
Derate above 25°C			2.94	mW/°C
EMITTER Continuous Forward Current	I_F	All	60	mA
Reverse Voltage	V_R	All	6	V
Total Power Dissipation 25°C Ambient	P_D	All	120	mW
Derate above 25°C			1.41	mW/°C
DETECTOR Off-State Output Terminal Voltage	V_{DRM}	MOC3031M/2M/3M	250	V
		MOC3041M/2M/3M	400	
Peak Repetitive Surge Current (PW = 100 µs, 120 pps)	I_{TSM}	All	1	A
Total Power Dissipation @ 25°C Ambient	P_D	All	150	mW
Derate above 25°C		All	1.76	mW/°C

Note

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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameters	Test Conditions	Symbol	Device	Min	Typ	Max	Units
EMITTER							
Input Forward Voltage	I_F = 30 mA	V_F	All		1.25	1.5	V
Reverse Leakage Current	V_R = 6 V	I_R	All		0.01	100	µA
DETECTOR							
Peak Blocking Current,Either Direction	Rated V_{DRM}, I_F = 0 (note 1)	I_{DRM1}	All			100	nA
Peak On-State Voltage,Either Direction	I_{TM} = 100 mA peak, I_F = 0	V_{TM}	All		1.8	3	V
Critical Rate of Rise of Off-State Voltage	I_F = 0 (figure 9, note 3)	dv/dt	All	1000			V/µs

TRANSFER CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
LED Trigger Current	Main terminal voltage = 3V (note 2)	I_{FT}	MOC3031M/MOC3041M			15	mA
			MOC3032M/MOC3042M			10	
			MOC3033M/MOC3043M			5	
Holding Current, Either Direction		I_H	All		400		µA

ZERO CROSSING CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Inhibit Voltage	I_F = rated I_{FT}, MT1-MT2 voltage above which device will not trigger off-state	V_{IH}	All			20	V
Leakage in Inhibited State	I_F = rated I_F, rated V_{DRM}, off-state	I_{DRM2}	All			500	µA

Note

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_{FT}. Therefore, recommended operating I_F lies between max I_{FT} (15 mA for MOC3031M & MOC3041M, 10 mA for MOC3032M & MOC3042M, 5 mA for MOC3033M & MOC3043M) and absolute max I_F (60 mA).
3. This is static dv/dt. See Figure 9 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.

Figure 1. LED Forward Voltage vs. Forward Current

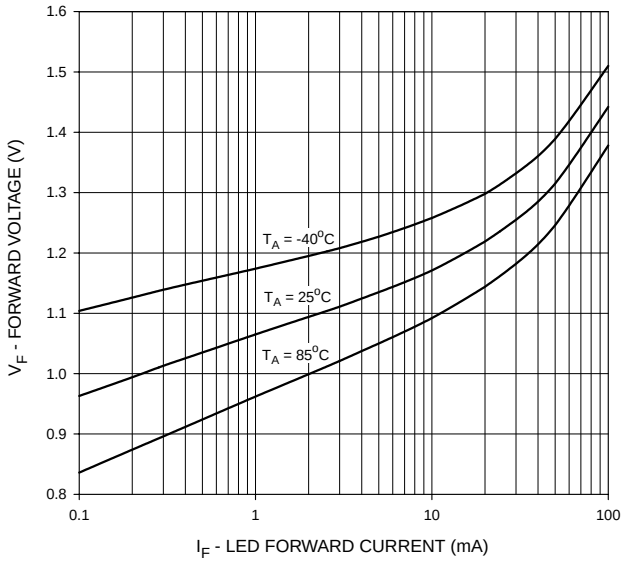


Figure 2. On-State Characteristics

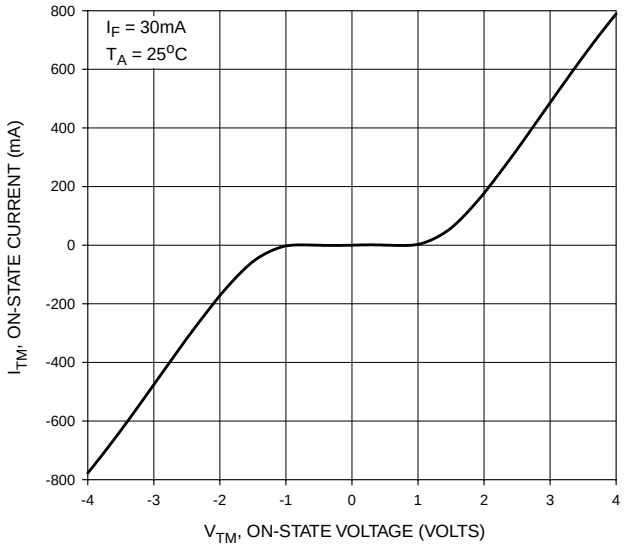


Figure 3. Trigger Current vs. Temperature

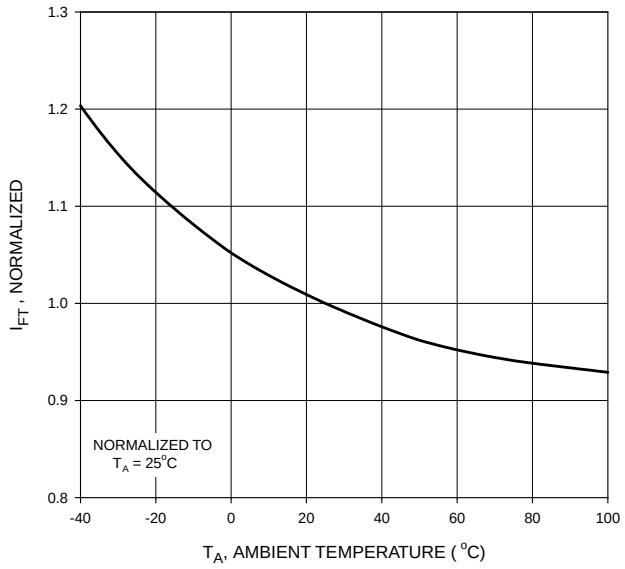


Figure 4. Leakage Current, I_{DRM} vs. Temperature

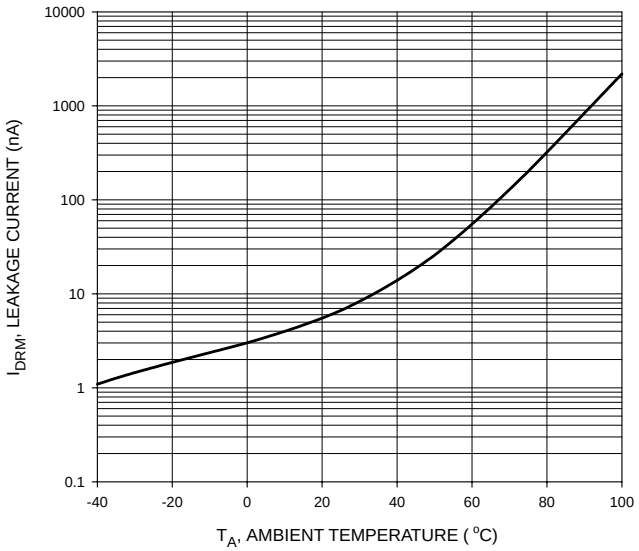


Figure 5. I_{DRM2} - Leakage in Inhibit State vs. Temperature

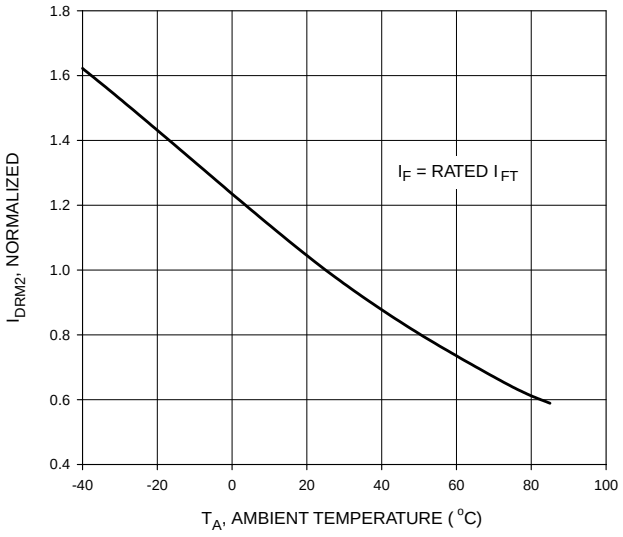


Figure 6. LED Current Required to Trigger vs. LED Pulse Width

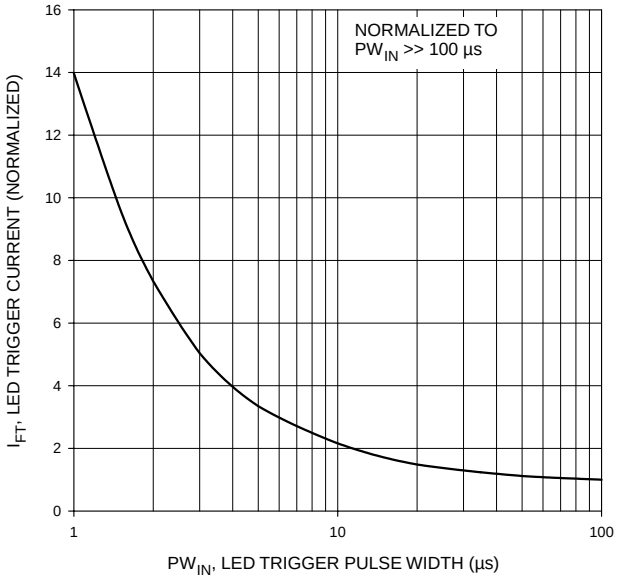


Figure 7. Holding Current, I_H vs. Temperature

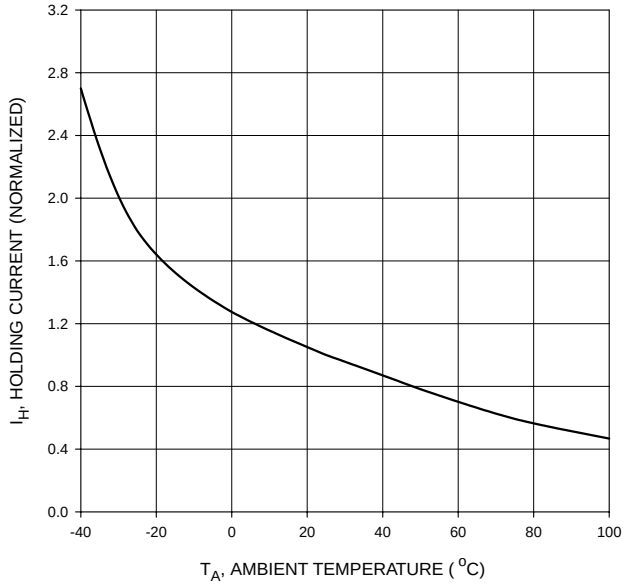
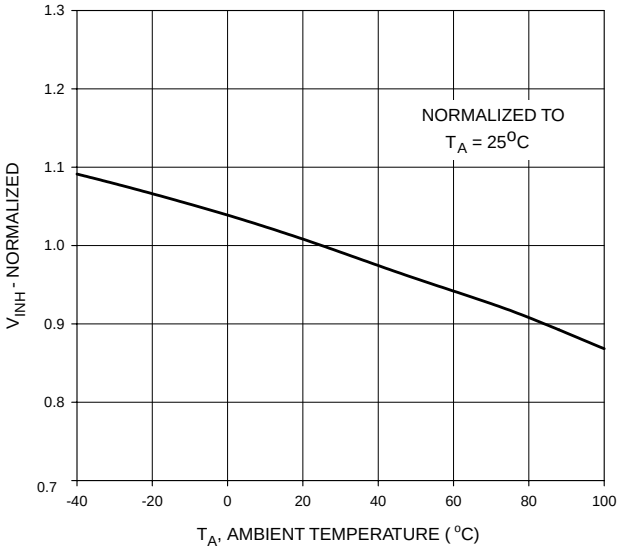


Figure 8. Inhibit Voltage vs. Temperature



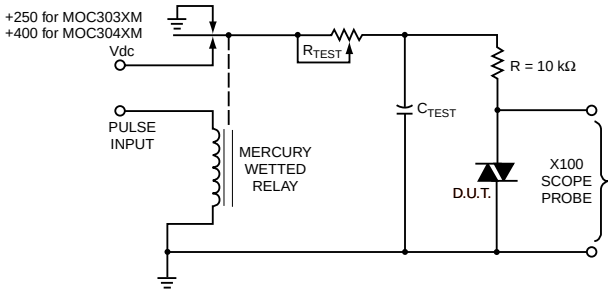


Figure 9. Static dv/dt Test Circuit

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 R_{TEST} 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. τRC is measured at this point and recorded.

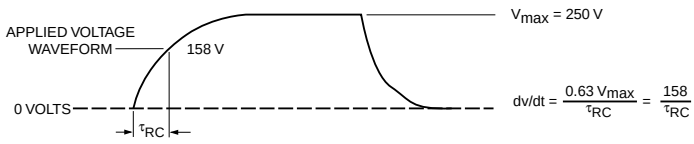


Figure 10. Static dv/dt Test Waveform (MOC3031M, MOC3032M, MOC3033M)

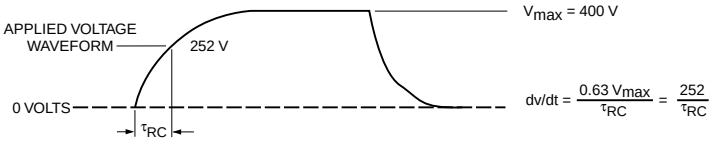
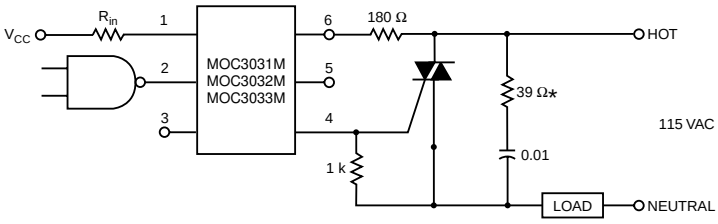


Figure 11. Static dv/dt Test Waveform (MOC3041M, MOC3042M, MOC3043M)

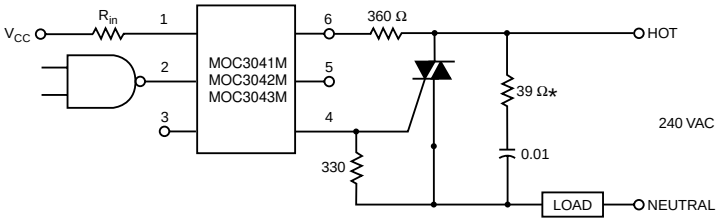
Typical circuit (Fig 12, 13) for use when hot line switching is required. In this circuit the “hot” side of the line is switched and the load connected to the cold or neutral side. The load may be connected to either the neutral or hot line.

R_{in} is calculated so that I_F is equal to the rated I_{FT} of the part, 5 mA for the MOC3033M and MOC3043M, 10 mA for the MOC3032M and MOC3042M, or 15 mA for the MOC3031M and MOC3041M. The 39 ohm resistor and 0.01 µF 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 12. Hot-Line Switching Application Circuit (MOC3031M, MOC3032M, MOC3033M)



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

Figure 13. Hot-Line Switching Application Circuit (MOC3041M, MOC3042M, MOC3043M)

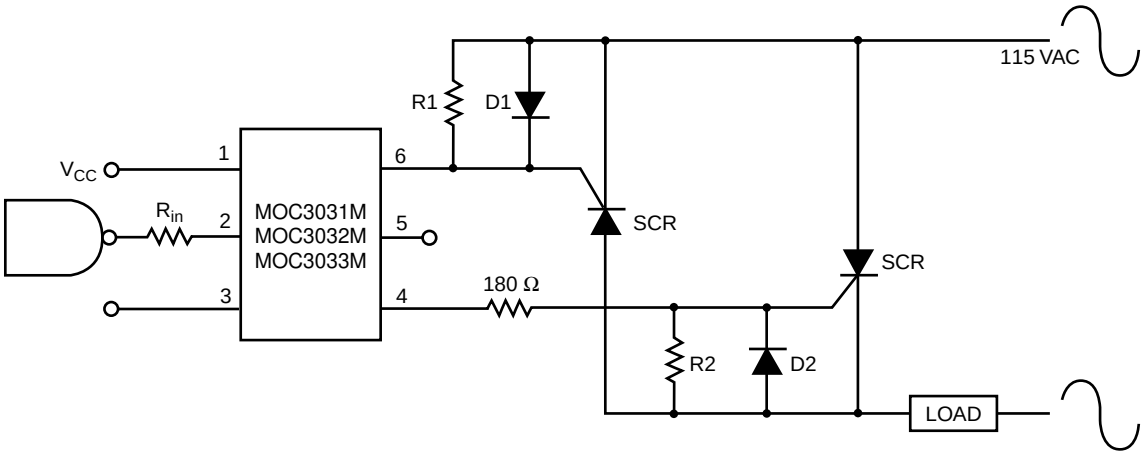


Figure 14. Inverse-Parallel SCR Driver Circuit (MOC3031M, MOC3032M, MOC3033M)

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

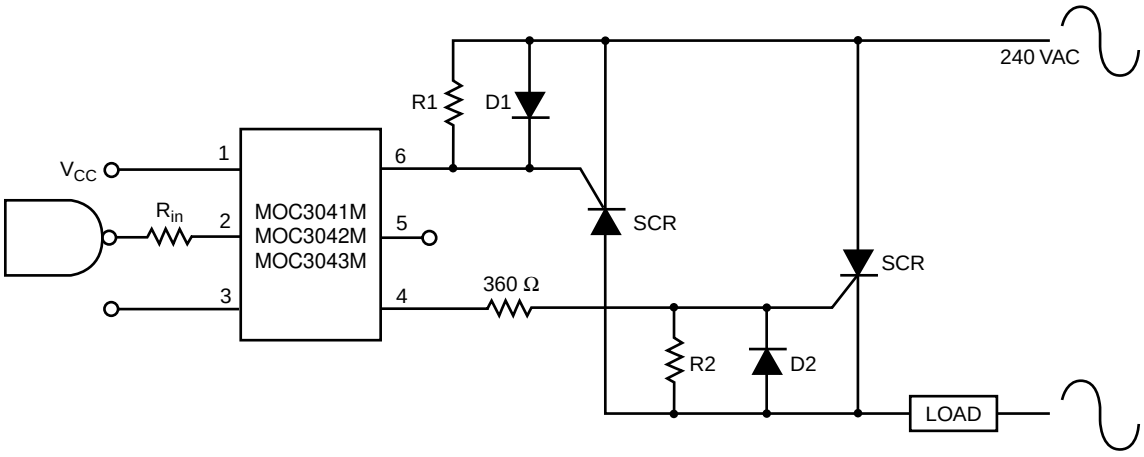


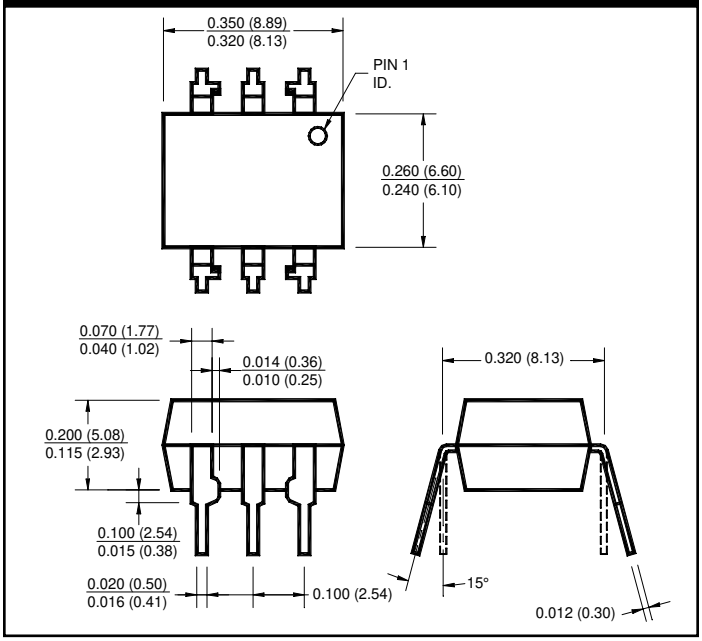
Figure 15. Inverse-Parallel SCR Driver Circuit (MOC3041M, MOC3042M, MOC3043M)

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

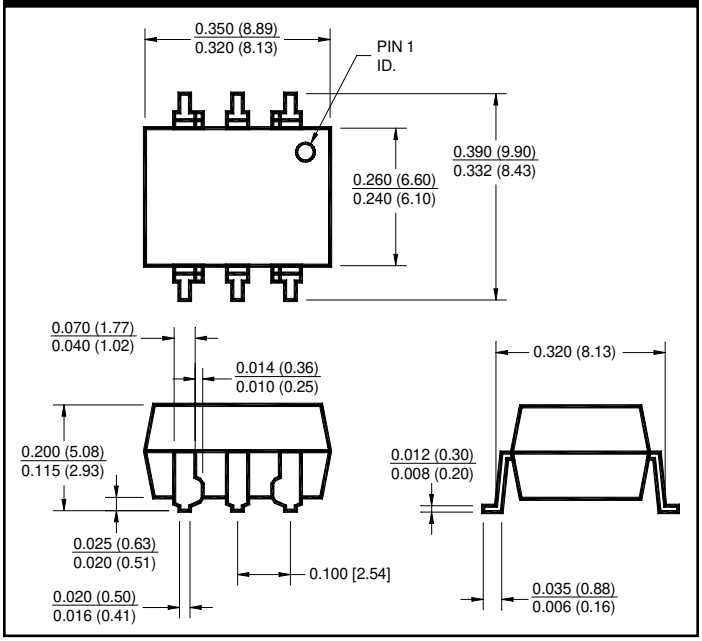
Note: This optoisolator should not be used to drive a load directly. It is intended to be a trigger device only.

6-PIN DIP ZERO-CROSS OPTOISOLATORS TRIAC DRIVER OUTPUT (250/400 VOLT PEAK)

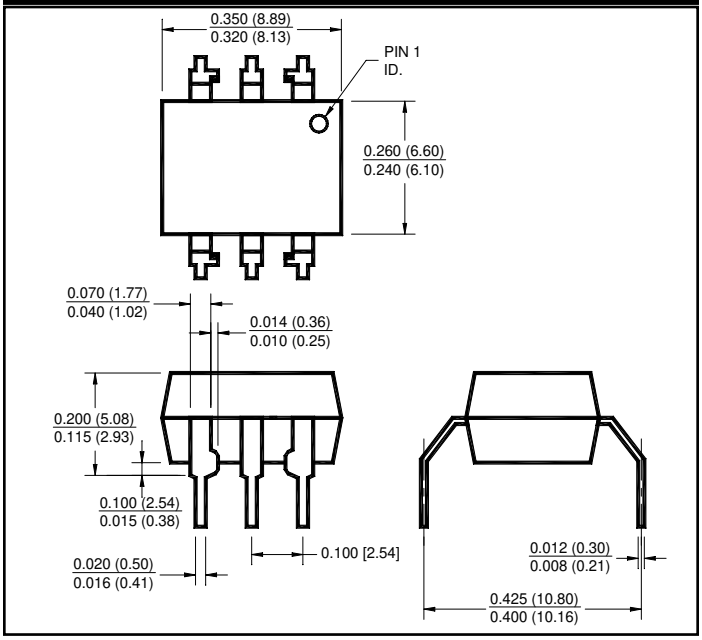
Package Dimensions (Through Hole)



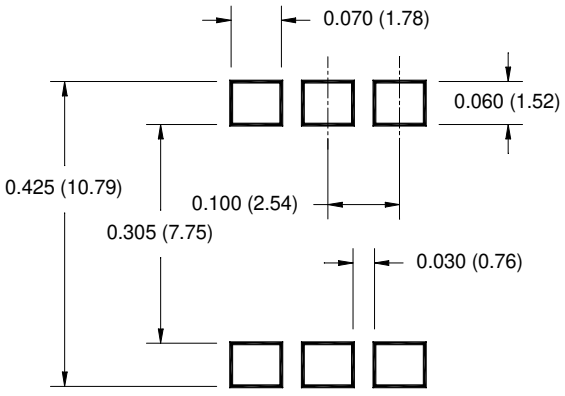
Package Dimensions (Surface Mount)



Package Dimensions (0.4”Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



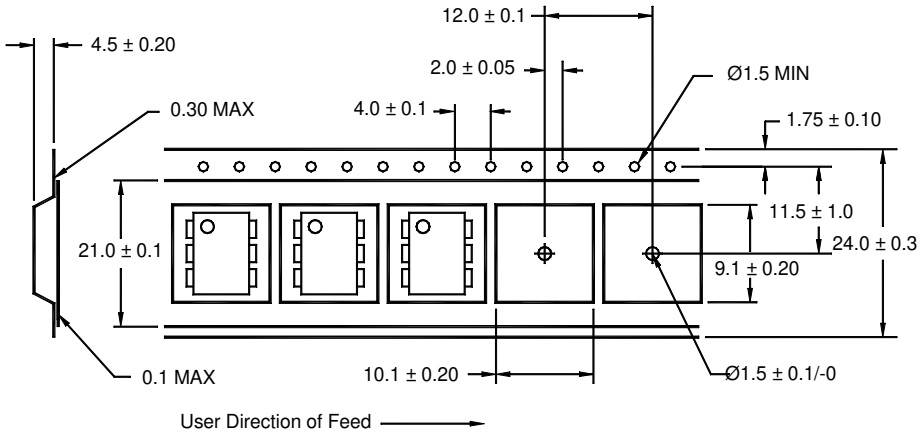
NOTE

All dimensions are in inches (millimeters)

ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	S	Surface Mount Lead Bend
SR2	SR2	Surface Mount; Tape and reel
T	T	0.4” Lead Spacing
V	V	VDE 0884
TV	TV	VDE 0884, 0.4” Lead Spacing
SV	SV	VDE 0884, Surface Mount
SR2V	SR2V	VDE 0884, Surface Mount, Tape & Reel

Carrier Tape Specifications (“D” Taping Orientation)



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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body,or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

MOC3031-M
6-Pin 250V Zero Crossing Triac Driver Output
6-PIN, DIP

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General description

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Features

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- ordering option V (e.g. MOC3043VM)

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- AC motor drives
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- E.M. contractor
- AC motor starters
- Solid state relays

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Ordering information

The following options can be ordered with this part:

Option	Order Entry Identifier	Description
F	F	Low profile, surface mount
S	S	Surface mount
T	T	0.4" Lead bend
V	V	VDE 0884
FV	FV	Low profile, surface mount; VDE 0884
SV	SV	Surface mount; VDE 0884
TV	TV	0.4" Lead bend; VDE 0884
FR2	FR2	Low profile, surface mount; T&R
FR2V	FR2V	Low profile, surface mount; T&R; VDE 0884
SR2	SR2	Surface mount; T&R
SR2V	SR2V	Surface mount; T&R; VDE 0884

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Product status/pricing/packaging

Product	Product status	Pricing*	Inventory check & ordering	Package type	Leads	Packing method
MOC3031-M	Full Production	$0.369	Purchase	N/A	N/A	BULK
MOC3031S-M	Full Production	$0.369	Purchase	DIP	6	BULK
MOC3031T-M	Full Production	$0.369	Purchase	DIP	6	BULK
MOC3031FR2-M	Full Production	$0.395	Purchase	DIP	6	TAPE REEL

MOC3031SDM	Full Production	N/A	Purchase	DIP	6	TAPE REEL
MOC3031SV-M	Full Production	$0.369	Purchase	DIP	6	BULK
MOC3031TV-M	Full Production	$0.369	Purchase	N/A	N/A	BULK
MOC3031F-M	Full Production	$0.387	Purchase	N/A	N/A	BULK
MOC3031SR2-M	Full Production	$0.378	Purchase	DIP	6	TAPE REEL
MOC3031FV-M	Full Production	$0.387	Purchase	N/A	N/A	BULK
MOC3031SR2V-M	Full Production	$0.378	Purchase	DIP	6	TAPE REEL
MOC3031FR2V-M	Full Production	$0.395	Purchase	DIP	6	TAPE REEL
MOC3031V-M	Full Production	$0.369	Purchase	N/A	N/A	BULK

* Fairchild 1,000 piece Budgetary Pricing

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Safety agency certificates

Cetificate	Agency	
310983-01 (95 K)	DEMKO	DEMKO Testing & Certification
P01101866 (383 K)	NEMKO	NEMKO
CR/0117 (424 K)	BABT	British Approvals Board of Telecommunications
102497 (1629 K)	VDE	VDE Pruf-und Zertifizierungsinstitut
1113639 (111 K)	CSA	Canadian Standards Association
0134082 (136 K)	SEMKO	SEMKO
FI 17434 (47 K)	FIMKO	FIMKO
E90700, Vol. 2 (254 K)	UL	Underwriters Laboratories Inc.

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MOC3032-M
6-Pin 250V Zero Crossing Triac Driver Output
6-PIN, DIP

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SV	SV	Surface mount; VDE 0884
TV	TV	0.4" Lead bend; VDE 0884
FR2	FR2	Low profile, surface mount; T&R
FR2V	FR2V	Low profile, surface mount; T&R; VDE 0884
SR2	SR2	Surface mount; T&R
SR2V	SR2V	Surface mount; T&R; VDE 0884

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Product status/pricing/packaging

Product	Product status	Pricing*	Inventory check & ordering	Package type	Leads	Packing method
MOC3032FR2V-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3032F-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3032SR2V-M	Full Production	$0.395	Purchase	DIP	6	TAPE REEL
MOC3032T-M	Full Production	$0.387	Purchase	DIP	6	BULK

MOC3032V-M	Full Production	$0.387	Purchase	N/A	N/A	BULK
MOC3032SV-M	Full Production	$0.387	Purchase	DIP	6	BULK
MOC3032-M	Full Production	$0.387	Purchase	N/A	N/A	BULK
MOC3032TV-M	Full Production	$0.387	Purchase	N/A	N/A	BULK
MOC3032FR2-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3032SR2-M	Full Production	$0.395	Purchase	DIP	6	TAPE REEL
MOC3032S-M	Full Production	$0.387	Purchase	DIP	6	BULK
MOC3032FV-M	Full Production	$0.405	Purchase	N/A	N/A	BULK

* Fairchild 1,000 piece Budgetary Pricing

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Safety agency certificates

Cetificate	Agency	
310983-01 (95 K)	DEMKO	DEMKO Testing & Certification
P01101866 (383 K)	NEMKO	NEMKO
CR/0117 (424 K)	BABT	British Approvals Board of Telecommunications
102497 (1629 K)	VDE	VDE Pruf-und Zertifizierungsinstitut
1113639 (111 K)	CSA	Canadian Standards Association
0134082 (136 K)	SEMKO	SEMKO
FI 17434 (47 K)	FIMKO	FIMKO
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General description

The MOC303XM and MOC304XM devices consist of a AlGaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver.

They are designed for use with a triac in the interface of logic systems to equipment powered from 115 VAC lines such as teletypewriters, CTRs, solid-state relays, industrial controls, printers, motors, solenoids and consumer appliances, etc.

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Features

- Simplifies logic control of 115 VAC power
- Zero voltage crossing
- dv/dt of 2000 V/µs typical, 1000 V/µs guaranteed
- VDE recognized - File #94766

- ordering option V (e.g. MOC3043VM)

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Applications

- Solenoid/Valve controls
- Lighting controls
- Static power switches
- AC motor drives
- Temperature controls
- E.M. contractor
- AC motor starters
- Solid state relays

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Ordering information

The following options can be ordered with this part:

Option	Order Entry Identifier	Description
F	F	Low profile, surface mount
S	S	Surface mount
T	T	0.4" Lead bend
V	V	VDE 0884
FV	FV	Low profile, surface mount; VDE 0884
SV	SV	Surface mount; VDE 0884
TV	TV	0.4" Lead bend; VDE 0884
FR2	FR2	Low profile, surface mount; T&R
FR2V	FR2V	Low profile, surface mount; T&R; VDE 0884
SR2	SR2	Surface mount; T&R
SR2V	SR2V	Surface mount; T&R; VDE 0884

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Product status/pricing/packaging

Product	Product status	Pricing*	Inventory check & ordering	Package type	Leads	Packing method
MOC3033FR2V-M	Full Production	$0.431	Purchase	DIP	6	TAPE REEL
MOC3033FV-M	Full Production	$0.422	Purchase	N/A	N/A	BULK
MOC3033T-M	Full Production	$0.405	Purchase	DIP	6	BULK
MOC3033S-M	Full Production	$0.405	Purchase	DIP	6	BULK

MOC3033V-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3033SR2-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3033TV-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3033SV-M	Full Production	$0.405	Purchase	DIP	6	BULK
MOC3033SR2V-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3033-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3033FR2-M	Full Production	$0.431	Purchase	DIP	6	TAPE REEL
MOC3033F-M	Full Production	$0.422	Purchase	N/A	N/A	BULK

* Fairchild 1,000 piece Budgetary Pricing

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Safety agency certificates

Cetificate	Agency	
310983-01 (95 K)	DEMKO	DEMKO Testing & Certification
P01101866 (383 K)	NEMKO	NEMKO
CR/0117 (424 K)	BABT	British Approvals Board of Telecommunications
102497 (1629 K)	VDE	VDE Pruf-und Zertifizierungsinstitut
1113639 (111 K)	CSA	Canadian Standards Association
0134082 (136 K)	SEMKO	SEMKO
FI 17434 (47 K)	FIMKO	FIMKO
E90700, Vol. 2 (254 K)	UL	Underwriters Laboratories Inc.

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MOC3041-M
6-Pin 400V Zero Crossing Triac Driver Output
6-PIN, DIP

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FR2V	FR2V	Low profile, surface mount; T&R; VDE 0884
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SR2V	SR2V	Surface mount; T&R; VDE 0884

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MOC3041SR2-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3041V-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3041SV-M	Full Production	$0.405	Purchase	DIP	6	BULK

MOC3041FR2V-M	Full Production	$0.431	Purchase	DIP	6	TAPE REEL
MOC3041-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3041SR2V-M	Full Production	$0.413	Purchase	DIP	6	TAPE REEL
MOC3041F-M	Full Production	$0.422	Purchase	N/A	N/A	BULK
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MOC3041TV-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3041T-M	Full Production	$0.405	Purchase	DIP	6	BULK
MOC3041FR2-M	Full Production	$0.431	Purchase	DIP	6	TAPE REEL

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MOC3042FV-M	Full Production	$0.422	Purchase	N/A	N/A	BULK
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MOC3042T-M	Full Production	$0.405	Purchase	DIP	6	BULK
MOC3042TV-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3042F-M	Full Production	$0.422	Purchase	N/A	N/A	BULK
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MOC3042-M	Full Production	$0.405	Purchase	N/A	N/A	BULK
MOC3042V-M	Full Production	$0.405	Purchase	N/A	N/A	BULK

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