MOC3031M, MOC3032M, MOC3033M, MOC3041M, MOC3042M, MOC3043M
6-Pin DIP Zero-Cross Optoisolators Triac Driver Output (250/400 Volt Peak)

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)

Applications

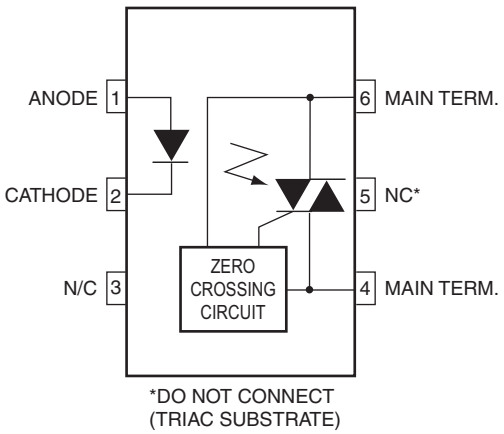
- Solenoid/valve controls
- Lighting controls
- Static power switches
- AC motor drives
- Temperature controls
- E.M. contactors
- AC motor starters
- Solid state relays

Description

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

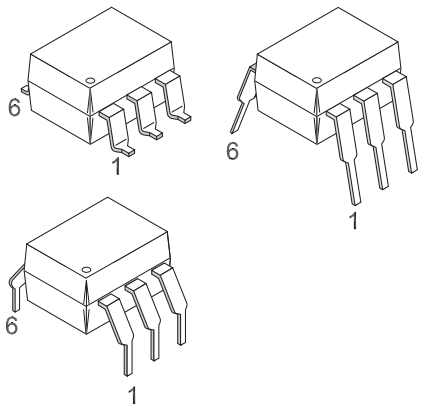
They are designed for use with a triac in the interface of logic systems to equipment powered from 115 VAC lines, such as teletypewriters, CRTs, solid-state relays, industrial controls, printers, motors, solenoids and consumer appliances, etc.

Schematic



*DO NOT CONNECT (TRIAC SUBSTRATE)

Package Outlines



Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

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

Symbol	Parameters	Test Conditions	Device	Min.	Typ.	Max.	Units
EMITTER							
V_F	Input Forward Voltage	I_F = 30mA	All		1.25	1.5	V
I_R	Reverse Leakage Current	V_R = 6V	All		0.01	100	µA
DETECTOR							
I_{DRM1}	Peak Blocking Current, Either Direction	Rated V_{DRM}, I_F = 0(2)	All			100	nA
V_{TM}	Peak On-State Voltage, Either Direction	I_{TM} = 100mA peak, I_F = 0	All		1.8	3	V
dv/dt	Critical Rate of Rise of Off-State Voltage	I_F = 0 (Figure 9)(4)	All	1000			V/µs

Transfer Characteristics

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

Zero Crossing Characteristics

Symbol	Characteristics	Test Conditions	Device	Min.	Typ.	Max.	Units
V_{IH}	Inhibit Voltage	I_F = rated I_{FT}, MT1-MT2 voltage above which device will not trigger off-state	All			20	V
I_{DRM2}	Leakage in Inhibited State	I_F = rated I_{FT}, rated V_{DRM} off-state	All			2	mA

Notes:

2. Test voltage must be applied within dv/dt rating.
3. 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} (15mA for MOC3031M & MOC3041M, 10mA for MOC3032M & MOC3042M, 5mA for MOC3033M & MOC3043M) and absolute max I_F (60mA).
4. This is static dv/dt. See Figure 9 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.

Safety and Insulation Ratings

As per IEC 60747-5-2, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

Symbol	Parameter	Min.	Typ.	Max.	Unit
	Installation Classifications per DIN VDE 0110/1.89 Table 1				
	For Rated Main Voltage < 150Vrms		I-IV		
	For Rated Main voltage < 300Vrms		I-IV		
	Climatic Classification		55/100/21		
	Pollution Degree (DIN VDE 0110/1.89)		2		
CTI	Comparative Tracking Index	175			
V_{PR}	Input to Output Test Voltage, Method b, V_{IORM} x 1.875 = V_{PR}, 100% Production Test with tm = 1 sec, Partial Discharge < 5pC	1594			V_{peak}
	Input to Output Test Voltage, Method a, V_{IORM} x 1.5 = V_{PR}, Type and Sample Test with tm = 60 sec, Partial Discharge < 5pC	1275			V_{peak}
V_{IORM}	Max. Working Insulation Voltage	850			V_{peak}
V_{IOTM}	Highest Allowable Over Voltage	6000			V_{peak}
	External Creepage	7			mm
	External Clearance	7			mm
	Insulation Thickness	0.5			mm
RIO	Insulation Resistance at Ts, V_{IO} = 500V	10^9			Ω

Typical Performance Curves

Figure 1. LED Forward Voltage vs. Forward Current

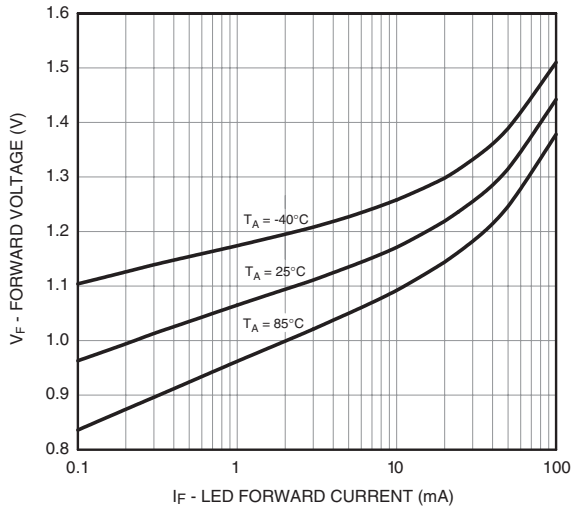


Figure 2. On-State Characteristics

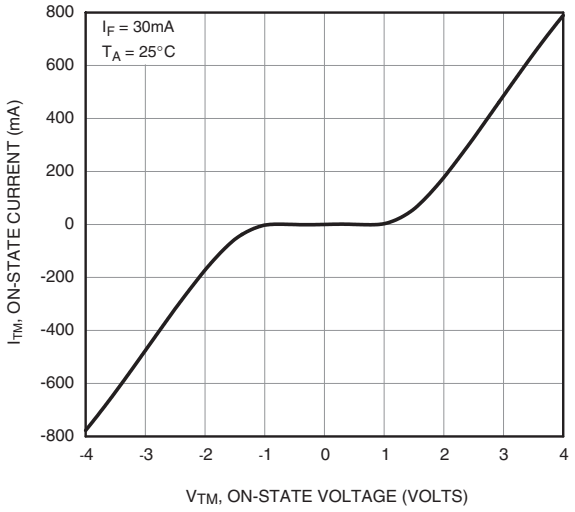


Figure 3. Trigger Current vs. Temperature

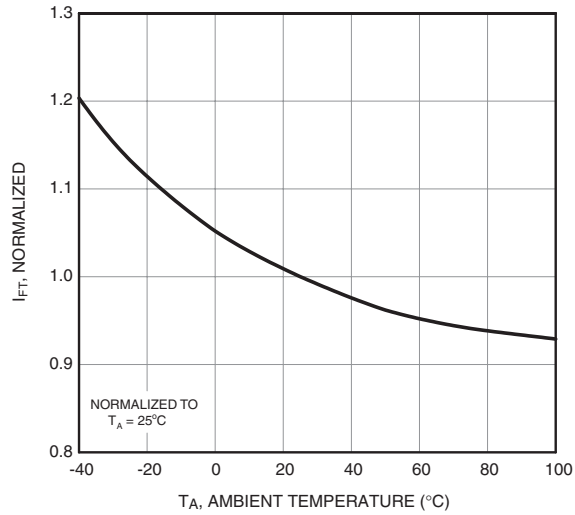
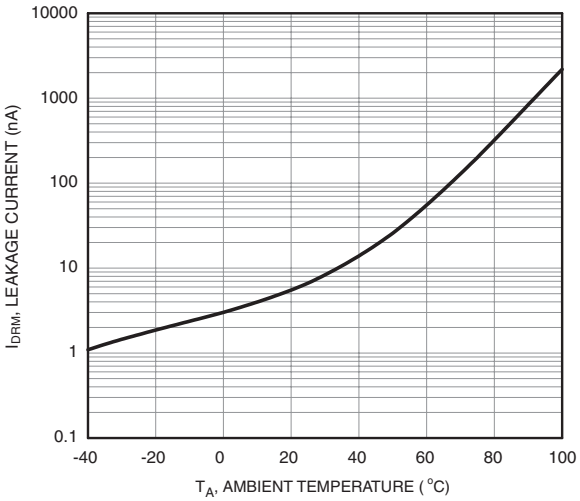


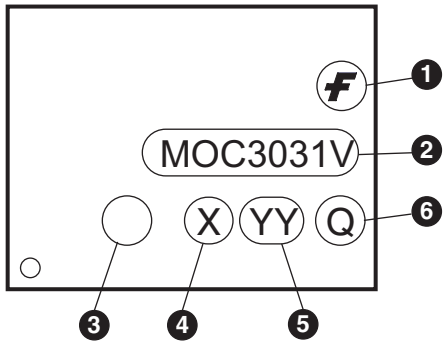
Figure 4. Leakage Current, I_{DRM} vs. Temperature



Ordering Information

Option	Order Entry Identifier (Example)	Description
No option	MOC3031M	Standard Through Hole Device
S	MOC3031SM	Surface Mount Lead Bend
SR2	MOC3031SR2M	Surface Mount; Tape and Reel
T	MOC3031TM	0.4" Lead Spacing
V	MOC3031VM	VDE 0884
TV	MOC3031TVM	VDE 0884, 0.4" Lead Spacing
SV	MOC3031SVM	VDE 0884, Surface Mount
SR2V	MOC3031SR2VM	VDE 0884, Surface Mount, Tape and Reel

Marking Information



Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

*Note – Parts that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in portrait format.