THE DATASHEET OF

FODM3010R3V

FAIRCHILD SEMICONDUCTOR®

October 2005

FODM3010, FODM3011, FODM3012, FODM3021, FODM3022, FODM3023
4-Pin Full Pitch Mini-Flat Package Random-Phase Triac Driver Output Optocouplers

Features

- Compact 4-pin surface mount package (2.4 mm maximum standoff height)
- Peak blocking voltage
  250V (FODM301X)
  400V (FODM302X)
- Available in tape and reel quantities of 500 and 2500.
- Applicable to Infrared Ray reflow (230°C max, 30 seconds.)
- BSI, CSA and VDE certifications pending
- UL (File# E90700) certified

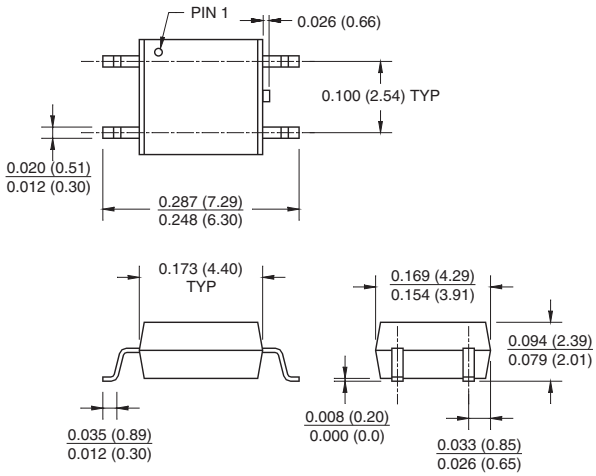
Description

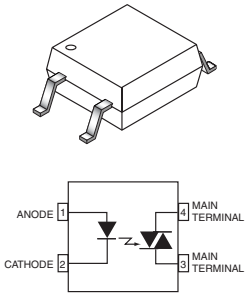
The FODM301X and FODM302X series consists of a GaAs infrared emitting diode driving a silicon bilateral switch housed in a compact 4-pin mini-flat package. The lead pitch is 2.54 mm. They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 115V/240V operations.

Applications

- Industrial controls
- Traffic lights
- Vending machines
- Solid state relay
- Lamp ballasts
- Solenoid/valve controls
- Static AC power switch
- Incandescent lamp dimmers
- Motor control

Package Dimensions





NOTE
All dimensions are in inches (millimeters)

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

Parameter		Symbol	Value	Units
TOTAL PACKAGE				
Storage Temperature		T_{STG}	-40 to +125	°C
Junction Temperature		T_J	125	°C
Operating Temperature		T_{OPR}	-40 to +100	°C
EMITTER				
Continuous Forward Current		$I_{F\ (avg)}$	60	mA
Peak Forward Current (1 µs pulse, 300 pps.)		$I_{F\ (pk)}$	1	A
Reverse Input Voltage		V_R	3	V
Power Dissipation (No derating required over operating temp. range)		P_D	100	mW
DETECTOR				
On-State RMS Current		$I_{T(RMS)}$	70	mA (RMS)
Off-State Output Terminal Voltage	FODM3010/1/2	V_{DRM}	250	V
	FODM3021/2/3		400	
Power Dissipation (No derating required over operating temp. range)		P_D	300	mW

Electrical Characteristics (T_A = 25°C)
Individual Component Characteristics

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
EMITTER							
Input Forward Voltage	I_F = 10 mA	V_F	All		1.20	1.5	V
Reverse Leakage Current	V_R = 3 V, T_A = 25°C	I_R	All		0.01	100	µA
DETECTOR							
Peak Blocking Current Either Direction	Rated V_{DRM}, I_F = 0 (note 1)	I_{DRM}	All		2	100	nA
Peak On-State Voltage Either Direction	I_{TM} = 100mA peak	V_{TM}	All		1.7	3	V
Critical Rate of Rise of Off-State Voltage	I_F = 0 (Figure 8, note 2)	dV/dt	All		10		V/µs

Transfer Characteristics (T_A = 25°C)

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
LED Trigger Current	Main Terminal Voltage = 3V (note 3)	I_{FT}	FODM3010			15	mA
			FODM3021				
			FODM3011			10	
			FODM3022				
			FODM3012			5	
			FODM3023				
Holding Current, Either Direction		I_H	All		300		µA

Isolation Characteristics

Characteristic	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Steady State Isolation Voltage	(1 Minute)	V_{ISO}	All	3750			VRMS

* All typicals at T_A = 25°C

Note
1. Test voltage must be applied within dv/dt rating.
2. This is static dv/dt. See Figure 1 for test circuit Commutating dv/dt is function of the load-driving thyristor(s) only.
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} (15 mA for FODM3010 and FODM3021, 10 mA for FODM3011 and FODM3022, 5 mA for FODM3012 and FODM3023) and absolute max I_F (60 mA).

Typical Performance Curves

Fig. 1 LED Forward Voltage vs. Forward Current

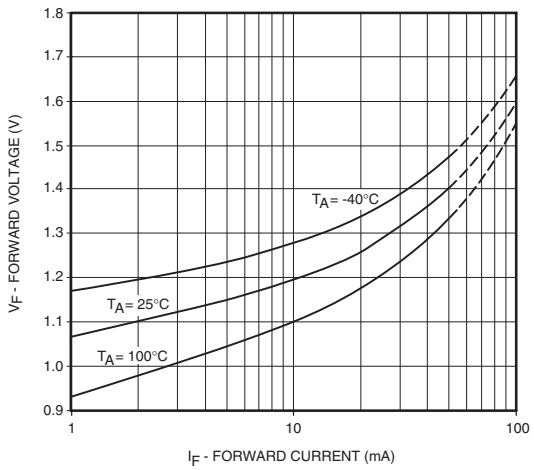


Fig. 2 Leakage Current vs. Ambient Temperature

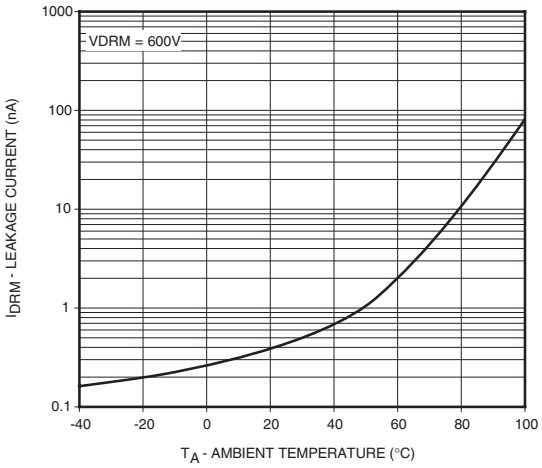


Fig. 3 Holding Current vs. Ambient Temperature

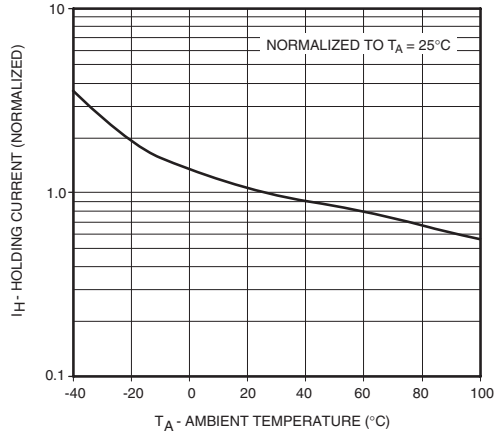
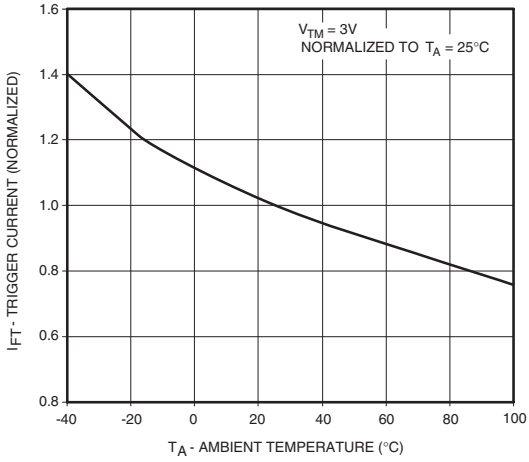


Fig. 4 Trigger Current vs. Ambient Temperature



Typical Performance Curves

Fig. 5 LED Current Required to Trigger vs. LED Pulse Width

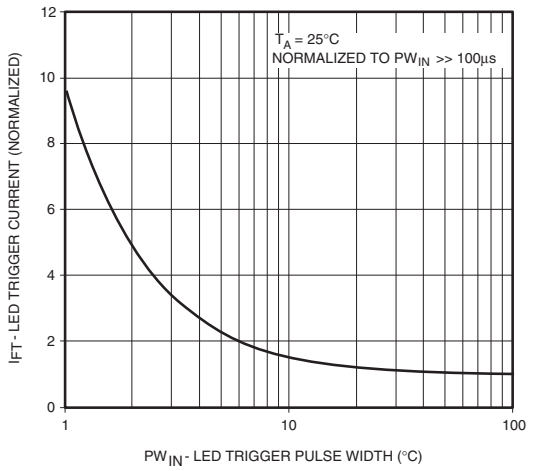


Fig. 6 Off-State Output Terminal Voltage vs. Ambient Temperature

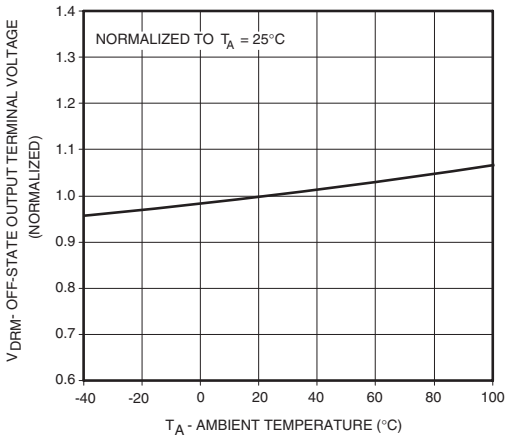
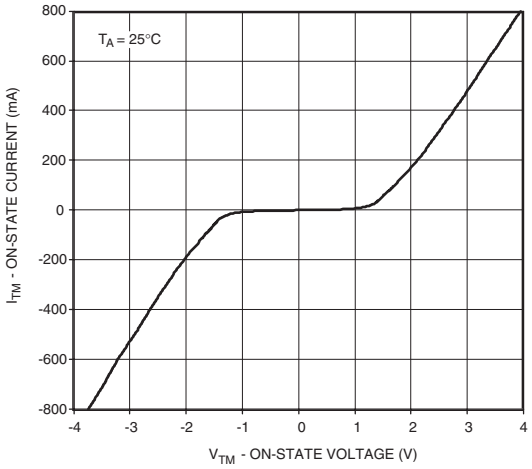
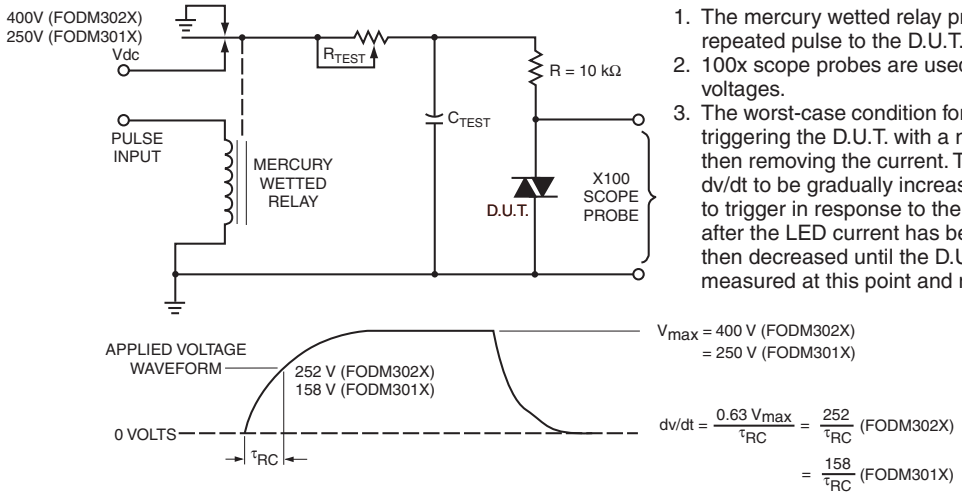


Fig. 7 On-State Characteristics



Typical Performance Curves



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. τ_{RC} is measured at this point and recorded.

Figure 8. Static dv/dt Test Circuit

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

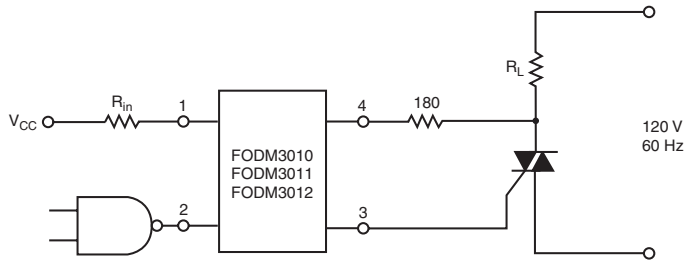


Figure 9. Resistive Load

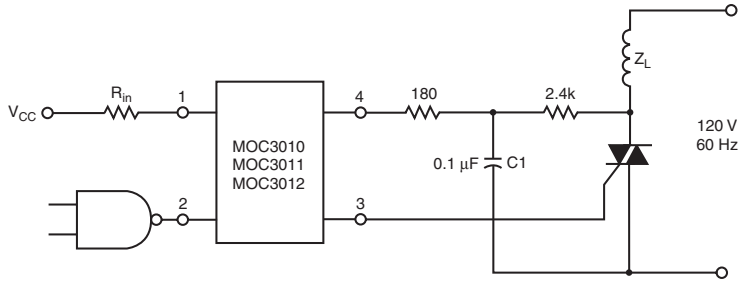


Figure 10. Inductive Load with Sensitive Gate Triac ($I_{GT} \leq 15$ mA)

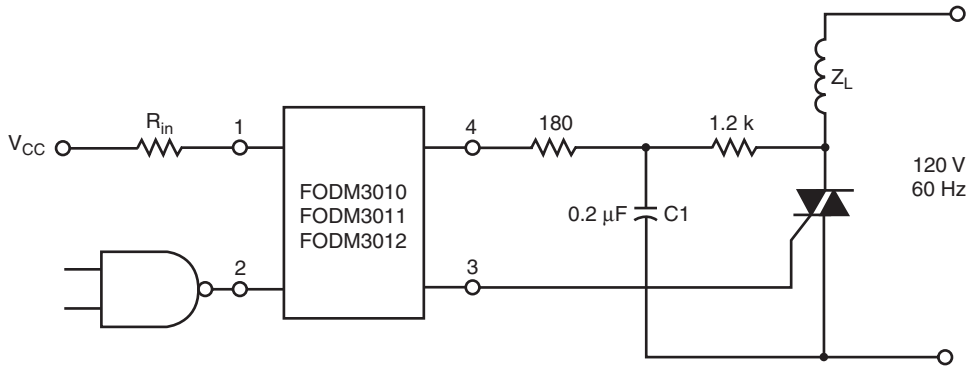
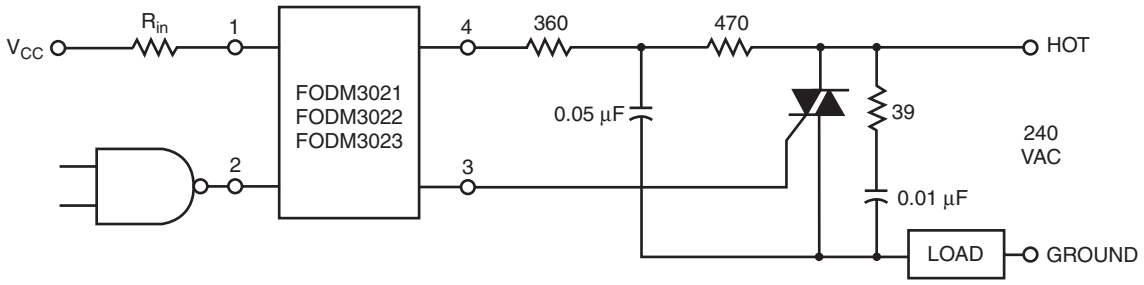


Figure 11. Inductive Load with Sensitive Gate Triac ($I_{GT} \leq 15$ mA)



In this circuit the “hot” side of the line is switched and the load connected to the cold or ground side.

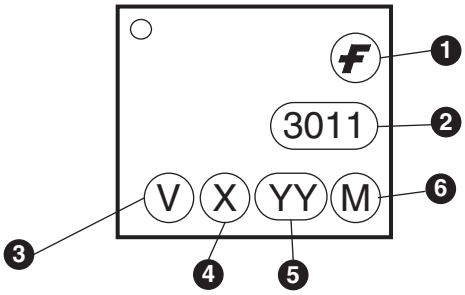
The 39 ohm resistor and 0.01 µF capacitor are for snubbing of the triac, and the 470 ohm resistor and 0.05 mF capacitor are for snubbing the coupler. These components may or may not be necessary depending upon the particular and load used.

Figure 12. Typical Application Circuit

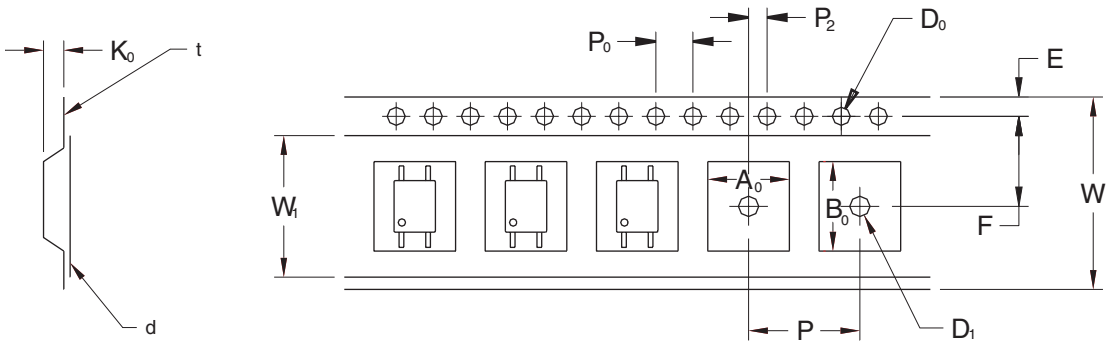
Ordering Information

Option	Description
V	VDE Approved
R1	Tape and Reel (500 units)
R2	Tape and Reel (2500 units)
R3	Tape and Reel (500 units; unit 180° rotated)
R4	Tape and Reel (2500 units; unit 180° rotated)
R1V	Tape and Reel (500 units) and VDE Approved
R2V	Tape and Reel (2500 units) and VDE Approved
R3V	Tape and Reel (500 units; unit 180° rotated) and VDE Approved
R4V	Tape and Reel (2500 units; unit 180° rotated) and VDE Approved

Marking Information

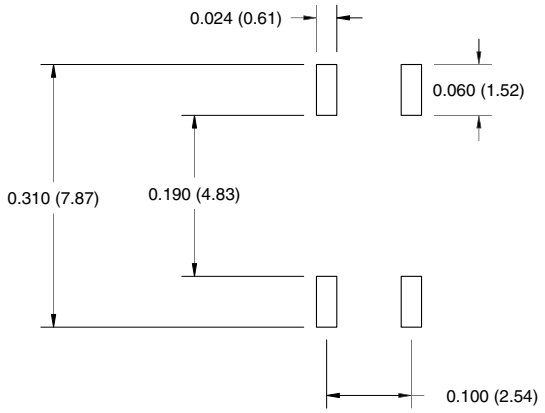


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

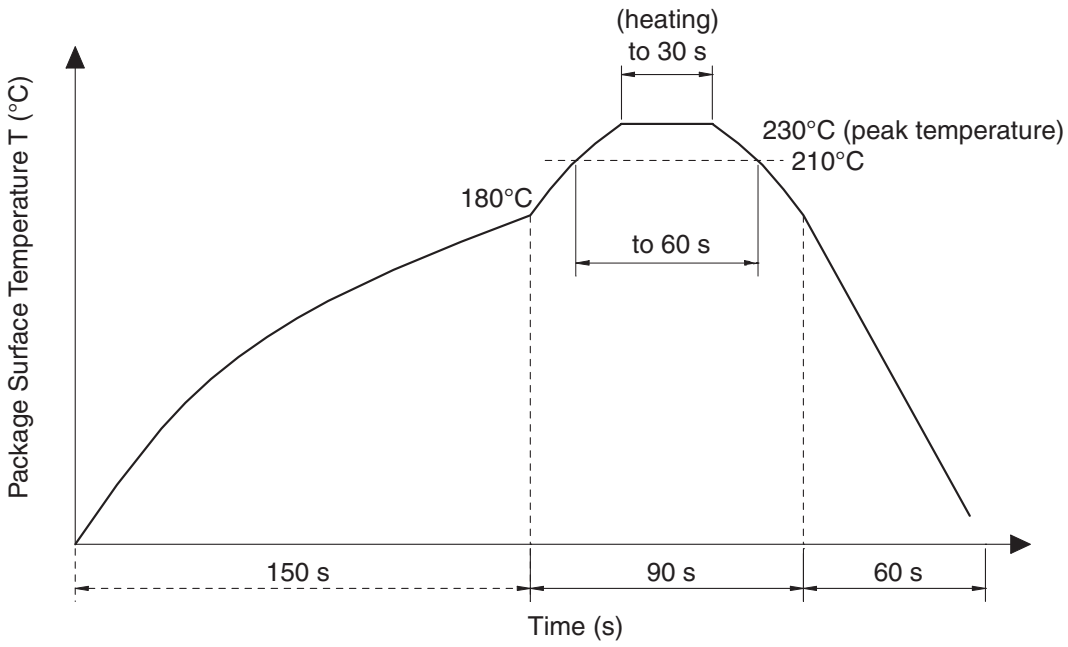


			2.54 Pitch
Description		Symbol	Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P_0	4.00±0.20
Sprocket Hole Dia.		D_0	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P_2	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A_0	4.40±0.20
		B_0	7.30±0.20
		K_0	2.30±0.20
Pocket Hole Dia.		D_1	1.55±0.20
Cover Tape Width		W_1	9.20
Cover Tape Thickness		d	0.065±0.02
Max. Component Rotation or Tilt			20° max
Devices Per Reel	R1		500
	R2		2500
Reel Diameter	R1		178 mm (7")
	R2		330 mm (13")

Footprint Drawing for PCB Layout



Recommended Infrared Reflow Soldering Profile



- Peak reflow temperature: 230°C (package surface temperature) for 30 seconds
- Time of temperature higher than 210°C: 60 seconds or less
- One time soldering reflow is recommended

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