

# 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

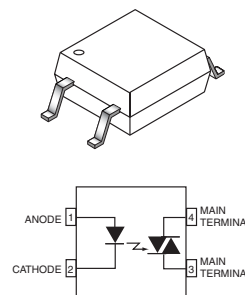
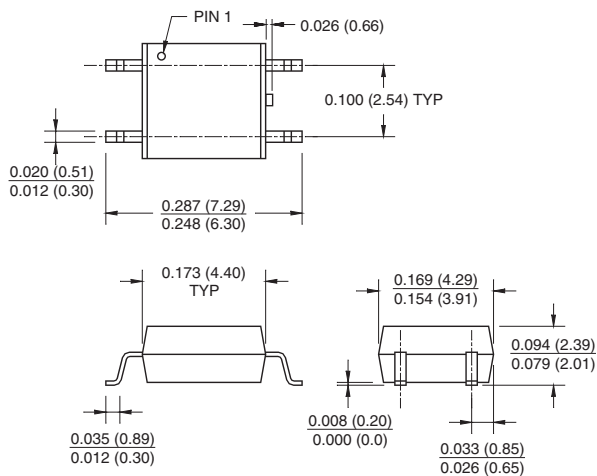
### Description

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 ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Units	
<b>TOTAL PACKAGE</b>				
Storage Temperature	$T_{STG}$	-40 to +125	$^\circ\text{C}$	
Junction Temperature	$T_J$	125	$^\circ\text{C}$	
Operating Temperature	$T_{OPR}$	-40 to +100	$^\circ\text{C}$	
<b>EMITTER</b>				
Continuous Forward Current	$I_F$ (avg)	60	mA	
Peak Forward Current (1 $\mu\text{s}$ 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	
<b>DETECTOR</b>				
On-State RMS Current	$I_{T(RMS)}$	70	mA (RMS)	
Off-State Output Terminal Voltage	$V_{DRM}$	FODM3010/1/2	250	V
		FODM3021/2/3	400	
Power Dissipation (No derating required over operating temp. range)	$P_D$	300	mW	

### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ ) Individual Component Characteristics

Parameter	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
<b>EMITTER</b>							
Input Forward Voltage	$I_F = 10\text{ mA}$	$V_F$	All		1.20	1.5	V
Reverse Leakage Current	$V_R = 3\text{ V}, T_A = 25^\circ\text{C}$	$I_R$	All		0.01	100	$\mu\text{A}$
<b>DETECTOR</b>							
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	$I_{TM} = 100\text{mA}$ 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/ $\mu\text{s}$

### Transfer Characteristics ( $T_A = 25^\circ\text{C}$ )

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		$\mu\text{A}$

### 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  $T_A = 25^\circ\text{C}$

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

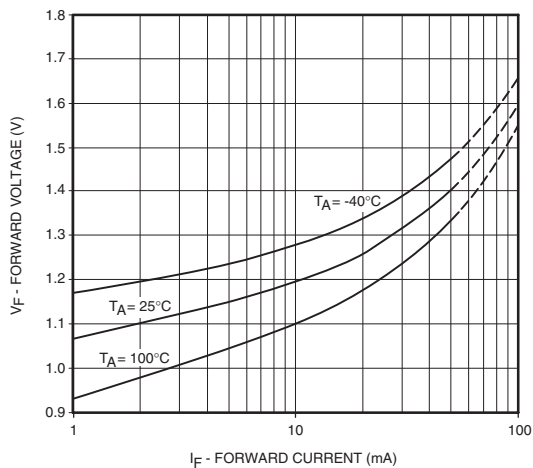


Fig. 2 Leakage Current vs. Ambient Temperature

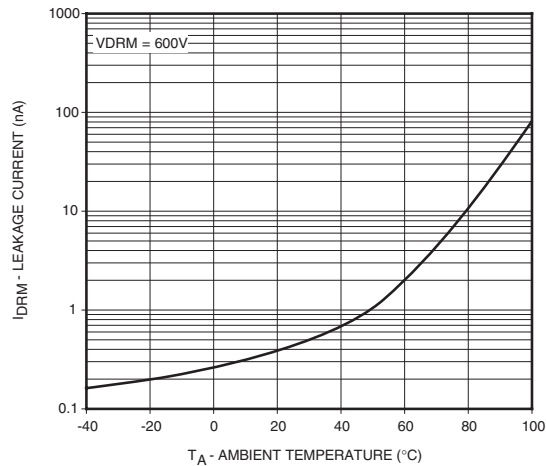


Fig. 3 Holding Current vs. Ambient Temperature

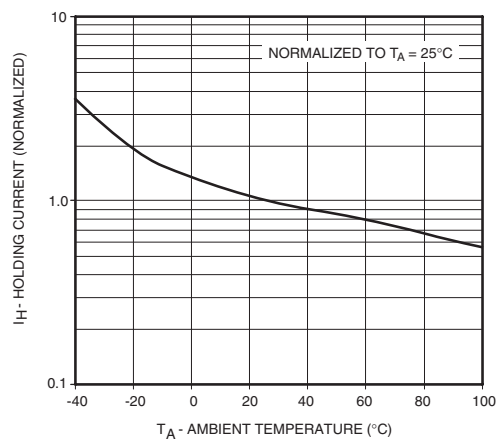
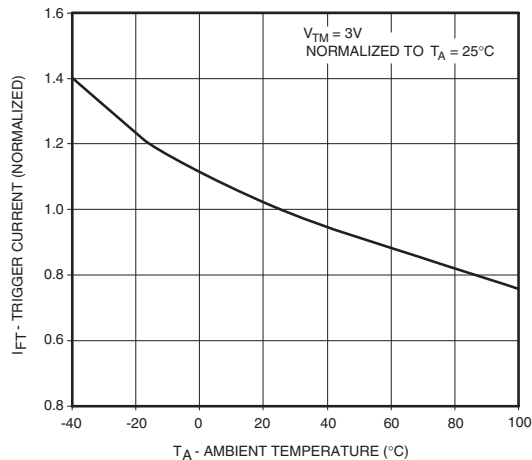
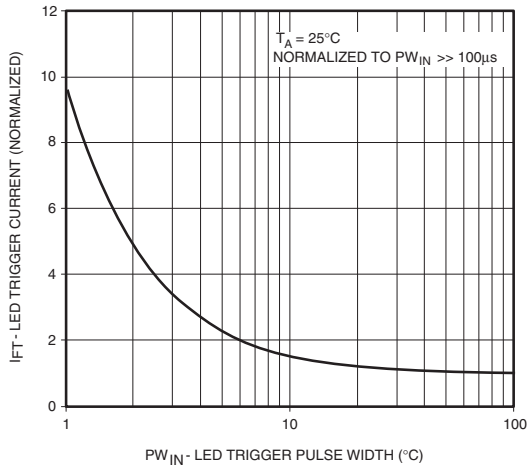


Fig. 4 Trigger Current vs. Ambient Temperature

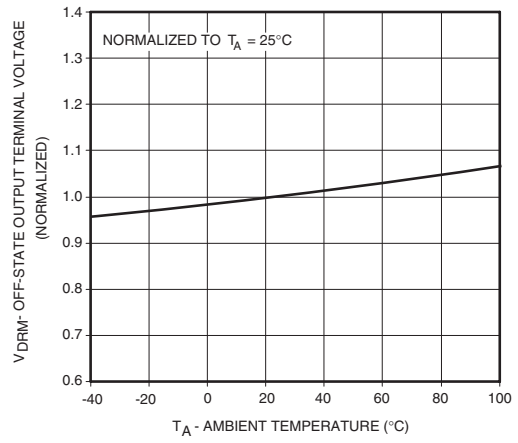


## Typical Performance Curves

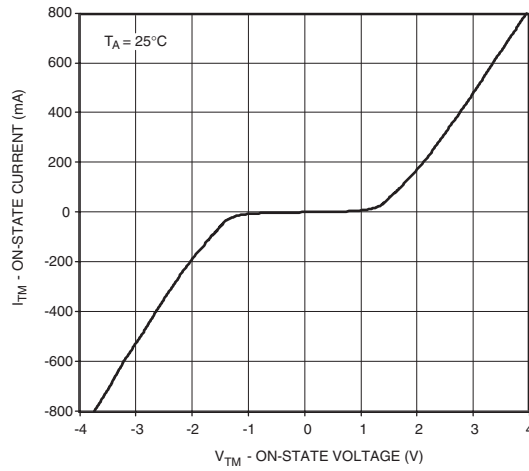
**Fig. 5 LED Current Required to Trigger vs. LED Pulse Width**



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



**Fig. 7 On-State Characteristics**



## Typical Performance Curves

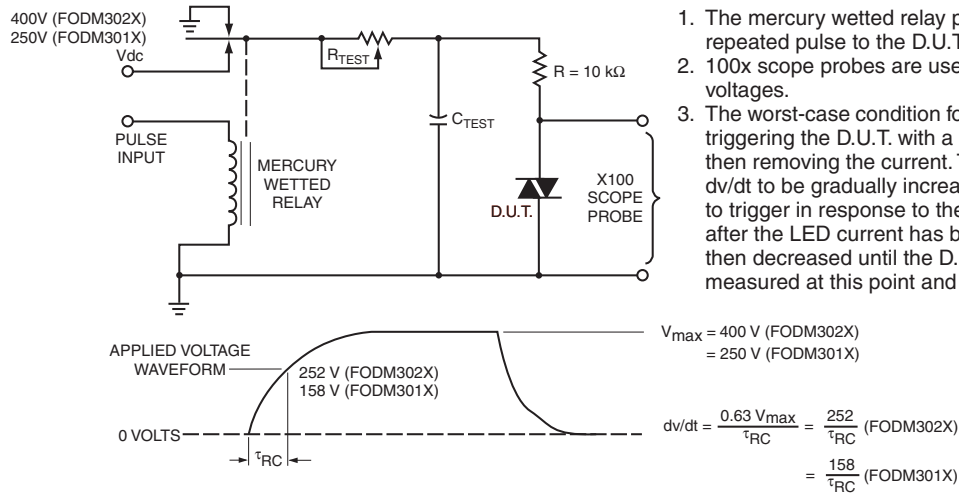


Figure 8. Static dv/dt Test Circuit

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

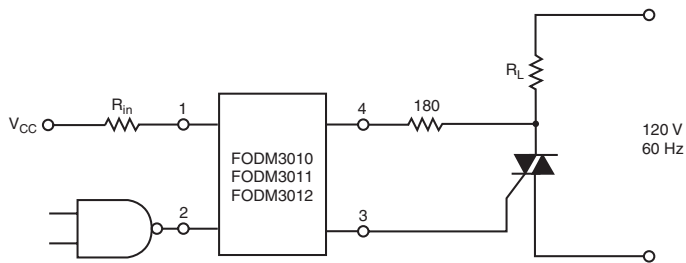


Figure 9. Resistive Load

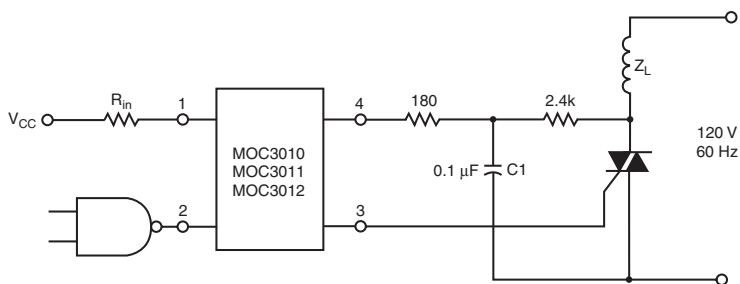
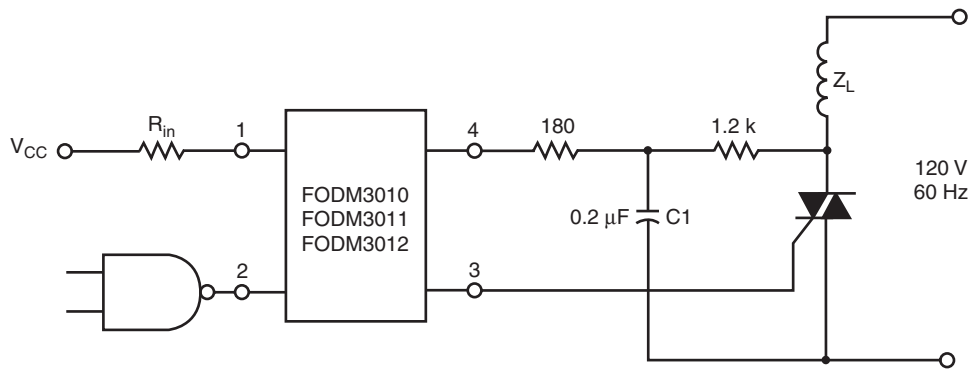
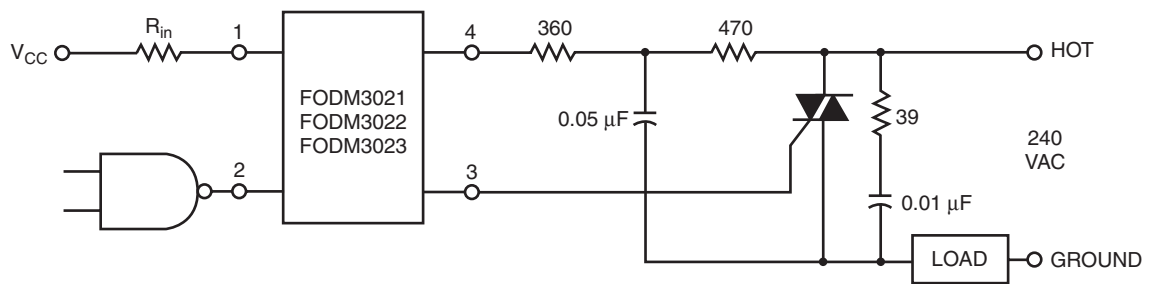


Figure 10. Inductive Load with Sensitive Gate Triac (I<sub>GT</sub> ≤ 15 mA)



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



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

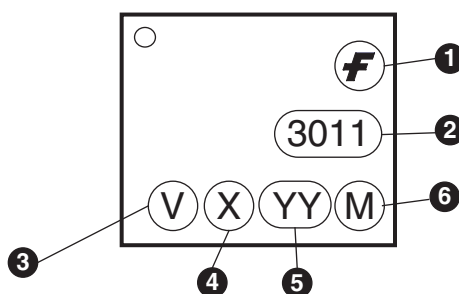
The 39 ohm resistor and 0.01  $\mu\text{F}$  capacitor are for snubbing of the triac, and the 470 ohm resistor and 0.05  $\mu\text{F}$  capacitor are for snubbing the coupler. These components may or may not be necessary depending upon the particular and load used.

**Figure 12. Typical Application Circuit**

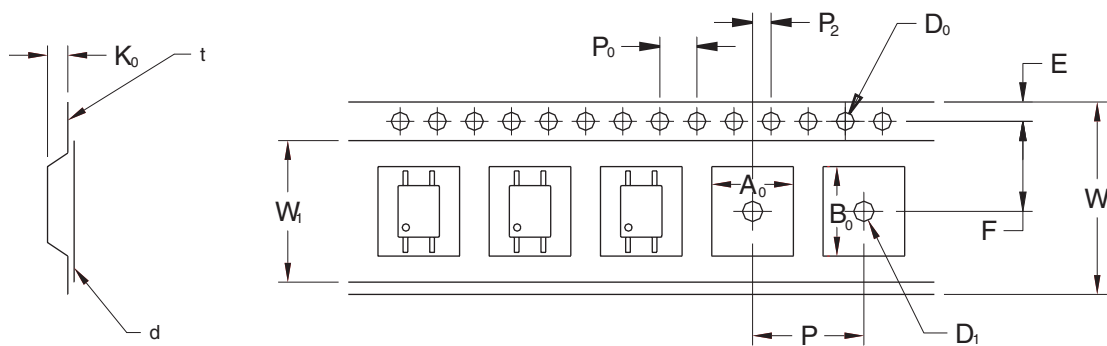
## Ordering Information

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



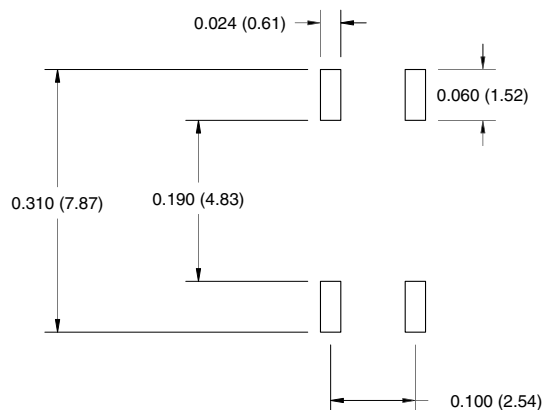
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code



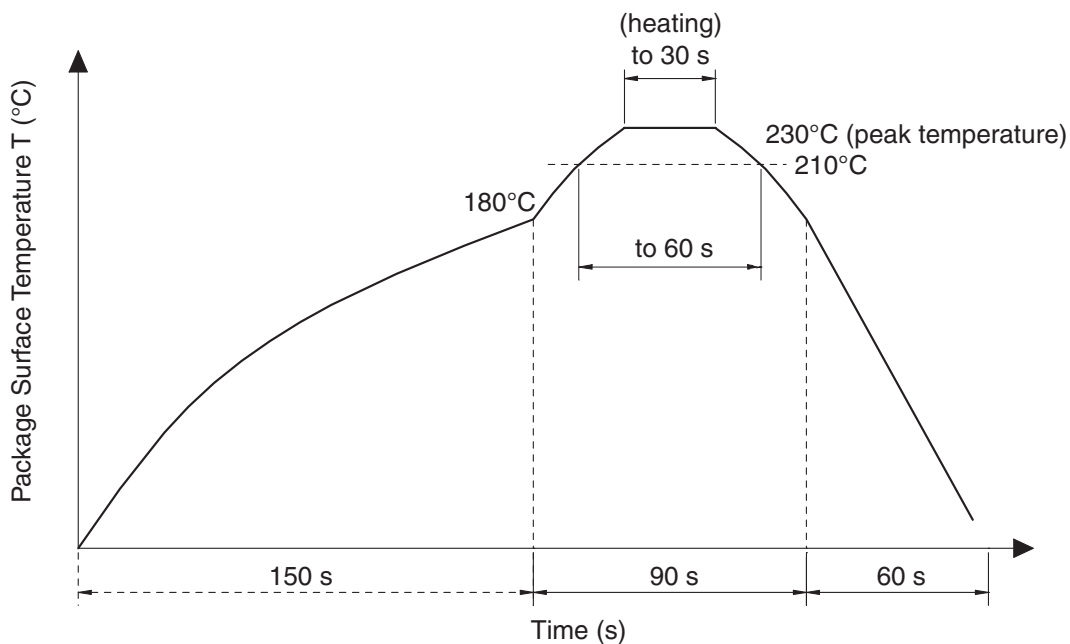
Description		Symbol	2.54 Pitch Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P <sub>0</sub>	4.00±0.20
Sprocket Hole Dia.		D <sub>0</sub>	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P <sub>2</sub>	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A <sub>0</sub>	4.40±0.20
		B <sub>0</sub>	7.30±0.20
		K <sub>0</sub>	2.30±0.20
Pocket Hole Dia.		D <sub>1</sub>	1.55±0.20
Cover Tape Width		W <sub>f</sub>	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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