

FODM3051, FODM3052, FODM3053

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 – 600V
- Guaranteed static dv/dt of 1000 V/μs
- 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

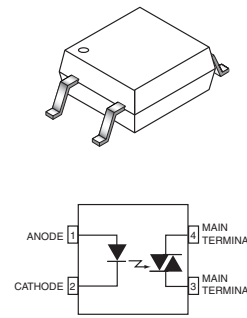
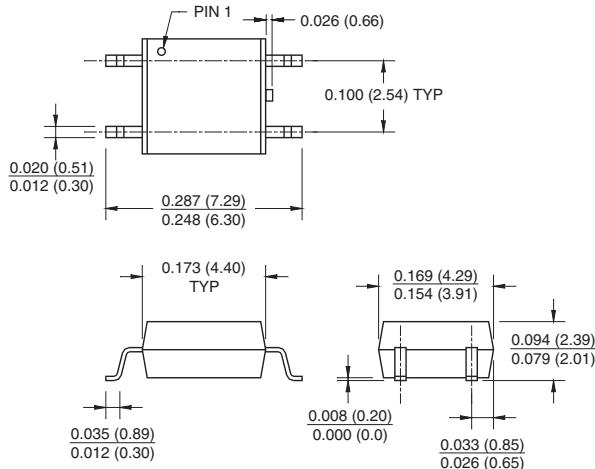
Applications

- Solenoid/valve controls
- Interfacing microprocessors to 115 and 240 Vac peripherals
- Temperature controls
- Solid state relays
- Lamp ballast
- Static AC power switch
- Motor control
- Incandescent lamp dimmers

Description

The FODM305X series consists of a gallium arsenide diode driving a silicon bilateral switch housed in a compact 4-pin mini-flat package. The lead pitch is 2.54 mm. The FODM305X series isolates low voltage logic from 115 and 240 Vac lines to provide random phase control of high current triacs or thyristors. It also features greatly enhanced static dv/dt capability to ensure stable switching performance of inductive loads.

Package Dimensions



NOTE

All dimensions are in inches (millimeters)

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

| Parameter | Symbol | Value | Units |
|--|--------------|-------------|------------------|
| TOTAL PACKAGE | | | |
| 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 | $^\circ\text{C}$ |
| 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 | V_{DRM} | 600 | V |
| Power Dissipation (No derating required over operating temp. range) | P_D | 250 | mW |

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise specified)

Individual Component Characteristics

| Parameter | Test Conditions | Symbol | Device | Min | Typ* | Max | Unit |
|--|--|-----------|--------|------|------|-----|------------------|
| EMITTER | | | | | | | |
| Input Forward Voltage | $I_F = 10\text{ mA}$ | V_F | All | | 1.20 | 1.5 | V |
| Reverse Leakage Current | $V_R = 3\text{ V}$ | I_R | All | | 0.01 | 100 | μA |
| DETECTOR | | | | | | | |
| Peak Blocking Current Either Direction | $V_{DRM} = 600\text{V}$, $I_F = 0$ (note 1) | I_{DRM} | All | | 3 | 100 | nA |
| Peak On-State Voltage Either Direction | $I_{TM} = 100\text{mA}$ peak | V_{TM} | All | | 2.0 | 2.5 | V |
| Critical Rate of Rise of Off-State Voltage | $I_F = 0$ (Figure 8, note 2) | dV/dt | All | 1000 | | | V/ μs |

Transfer Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise specified)

| DC Characteristics | Test Conditions | Symbol | Device | Min | Typ* | Max | Unit |
|-----------------------------------|-------------------------------------|----------|----------|-----|------|-----|---------------|
| LED Trigger Current | Main Terminal Voltage = 3V (note 3) | I_{FT} | FODM3051 | | | 15 | mA |
| | | | FODM3052 | | | 10 | |
| | | | FODM3053 | | | 5 | |
| Holding Current, Either Direction | | I_H | All | | 300 | | μA |

Isolation Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise specified)

| Characteristic | Test Conditions | Symbol | Device | Min | Typ* | Max | Unit |
|--------------------------------|-----------------|-----------|--------|------|------|-----|--------|
| Steady State Isolation Voltage | t = 1 Minute | V_{ISO} | All | 3750 | | | V(RMS) |

* 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 FODM3051, 10 mA for FODM3052, 5 mA for FODM3053) and absolute max I_F (60 mA).

Typical Performance Curves

Fig. 1 LED Forward Voltage vs. Forward Current

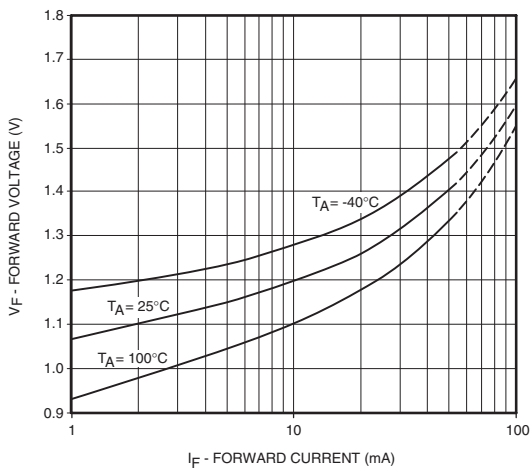


Fig. 2 Leakage Current vs. Ambient Temperature

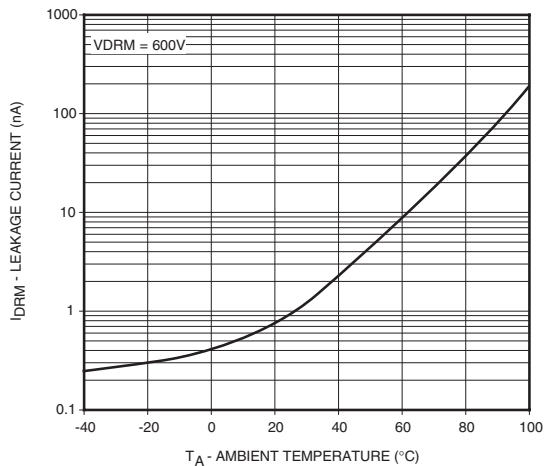


Fig. 3 Holding Current vs. Ambient Temperature

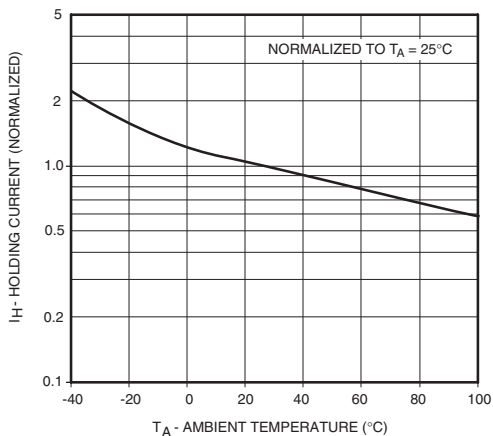


Fig. 4 Trigger Current vs. Ambient Temperature

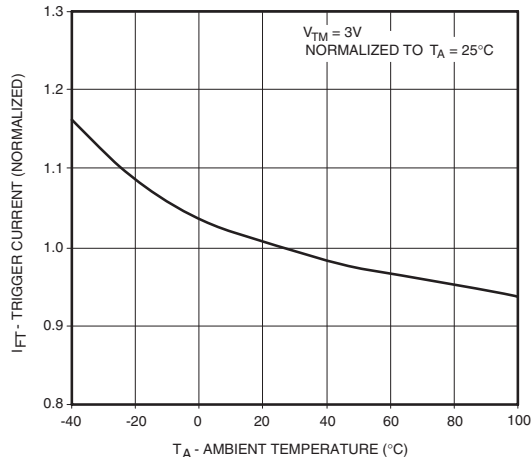


Fig. 5 LED Current Required to Trigger vs. LED Pulse Width

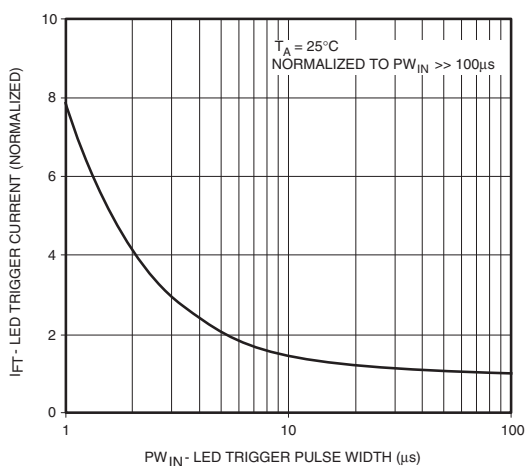


Fig. 6 Off-state Output Terminal Voltage vs. Ambient Temperature

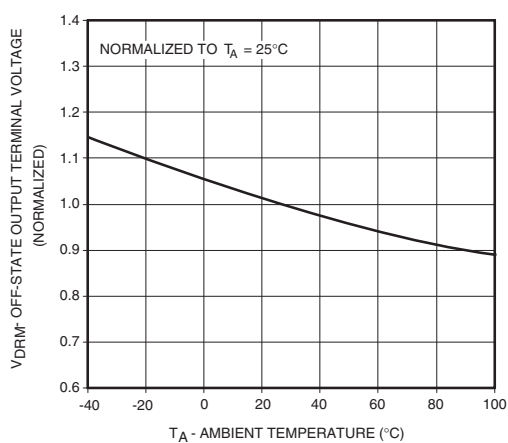
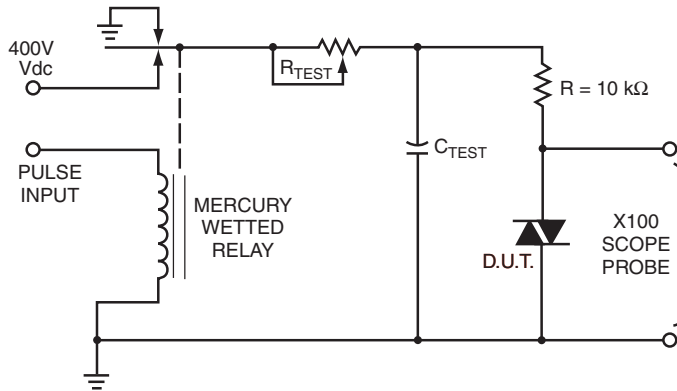
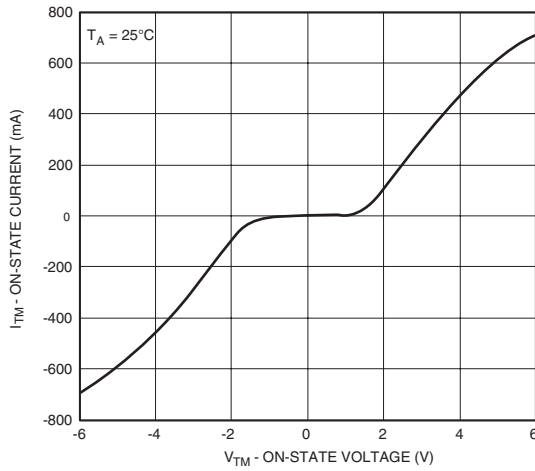


Fig. 7 On-State Characteristics



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.

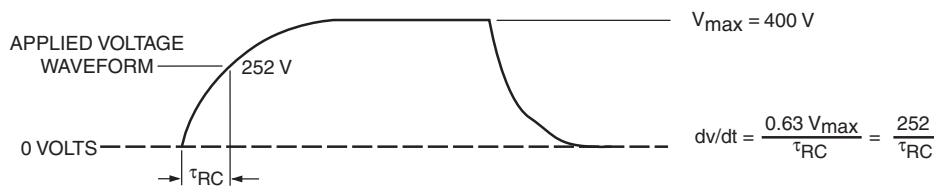
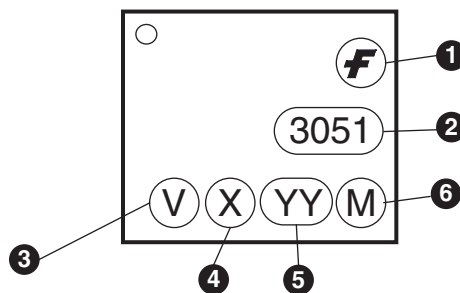


Figure 8. Static dv/dt Test Circuit

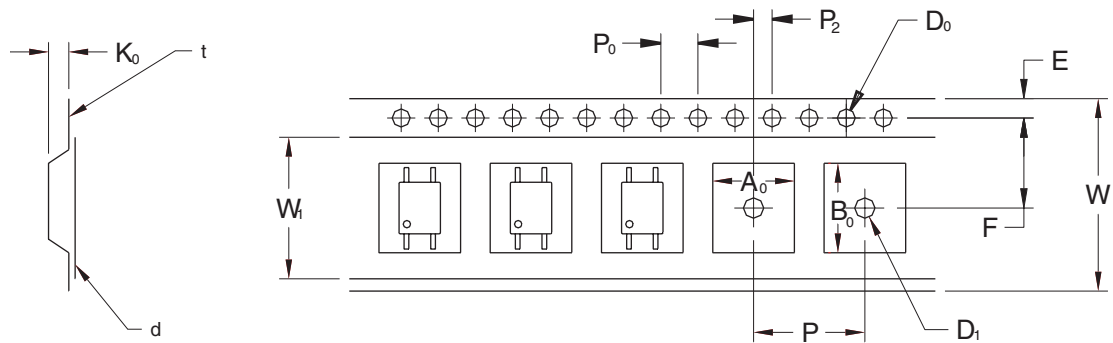
Ordering Information

| 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

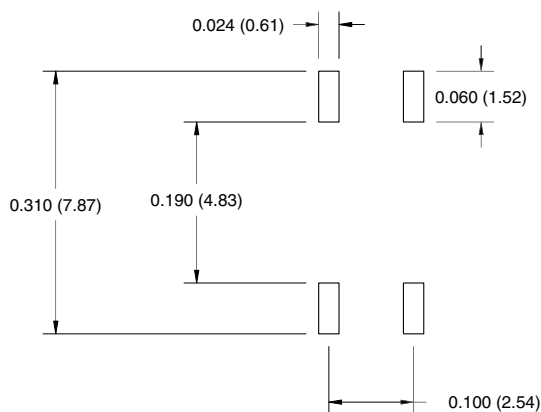


| Definitions | |
|-------------|--|
| 1 | Fairchild logo |
| 2 | Device number |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | One digit year code |
| 5 | Two digit work week ranging from '01' to '53' |
| 6 | Assembly package code |

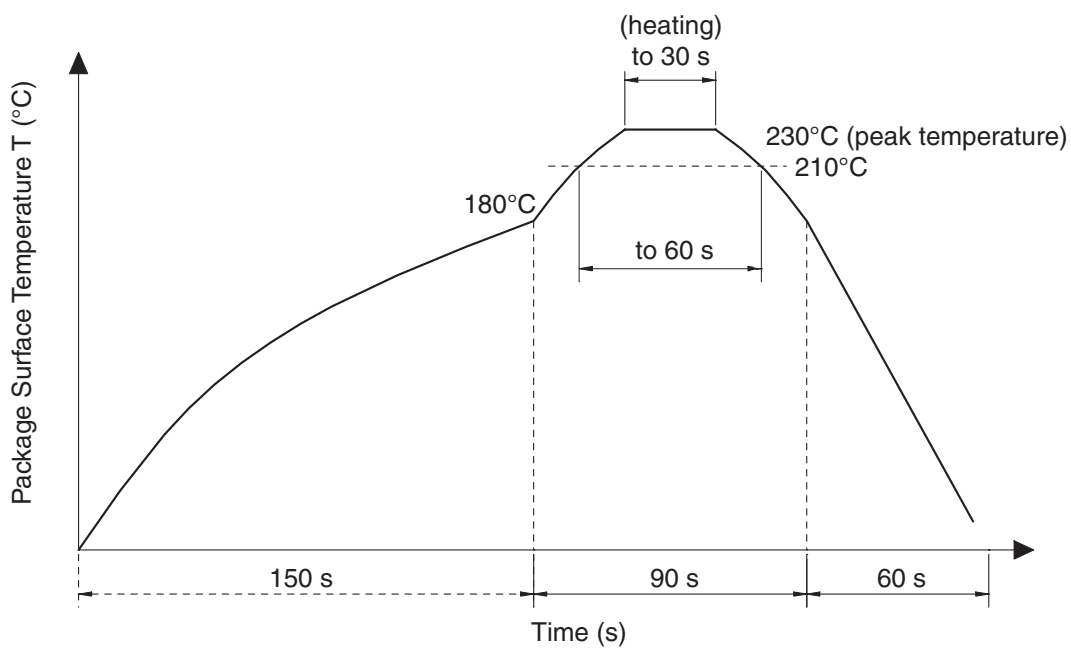


| Description | | Symbol | 2.54 Pitch Dimensions (mm) |
|---------------------------------|--|----------------|-------------------------------|
| Tape Width | | W | 12.00±0.4 |
| Tape Thickness | | t | 0.30±0.20 |
| Sprocket Hole Pitch | | P ₀ | 4.00±0.20 |
| Sprocket Hole Dia. | | D ₀ | 1.55±0.20 |
| 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 |
| | | A ₀ | 4.40±0.20 |
| | | B ₀ | 7.30±0.20 |
| Pocket Hole Dia. | | D ₁ | 1.55±0.20 |
| Cover Tape Width | | W _f | 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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PRODUCT STATUS DEFINITIONS

Definition of Terms

| Datasheet Identification | Product Status | Definition |
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