

# 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

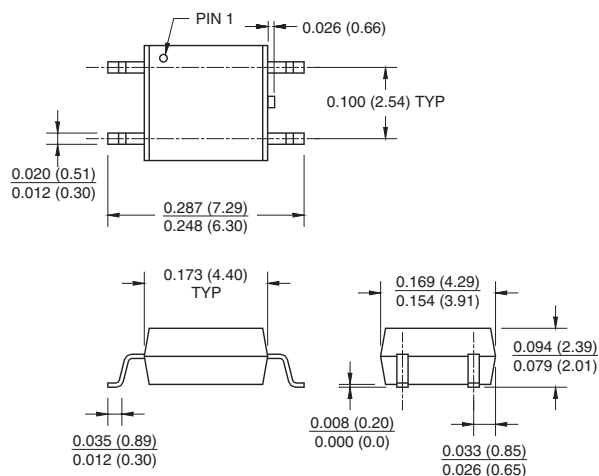
### Applications

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

### Description

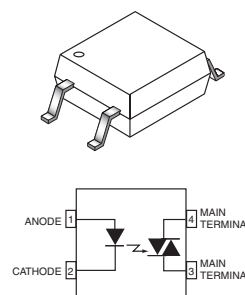
The FODM301X and FODM302X series consists of a GaAs infrared emitting diode driving a silicon bilateral switch housed in a compact 4-pin mini-flat package. The lead pitch is 2.54 mm. They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads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

### 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                                   | $V_{DRM}$    | 250         | V                |
|                                                                     |              | 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

- Test voltage must be applied within  $dv/dt$  rating.
- This is static  $dv/dt$ . See Figure 1 for test circuit. Commutating  $dv/dt$  is function of the load-driving thyristor(s) only.
- 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

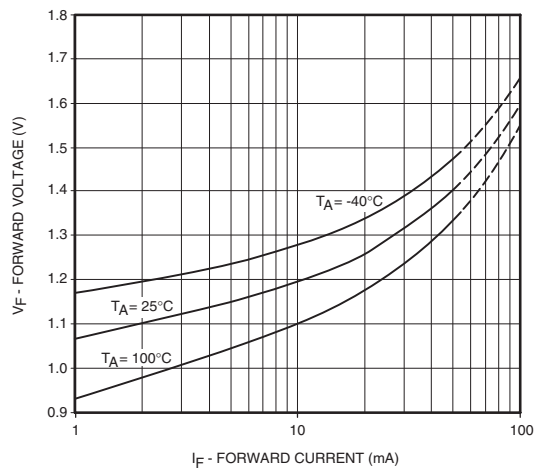


Fig. 2 Leakage Current vs. Ambient Temperature

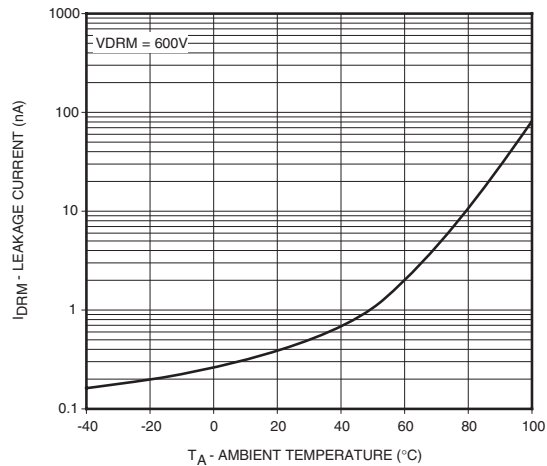


Fig. 3 Holding Current vs. Ambient Temperature

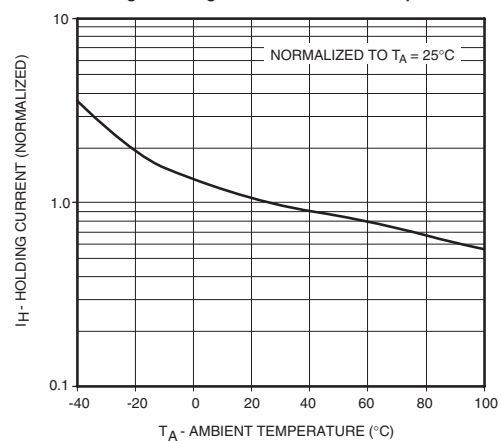
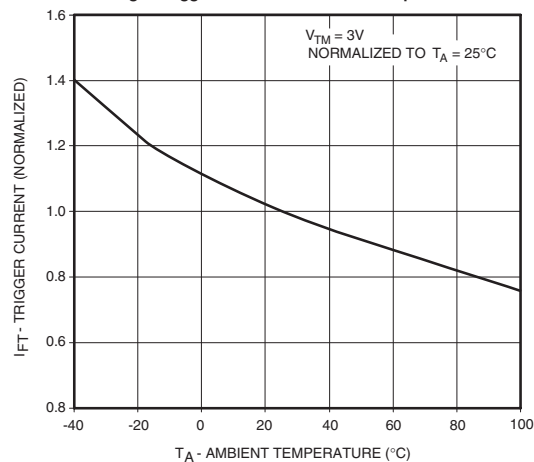


Fig. 4 Trigger Current vs. Ambient Temperature



## Typical Performance Curves

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

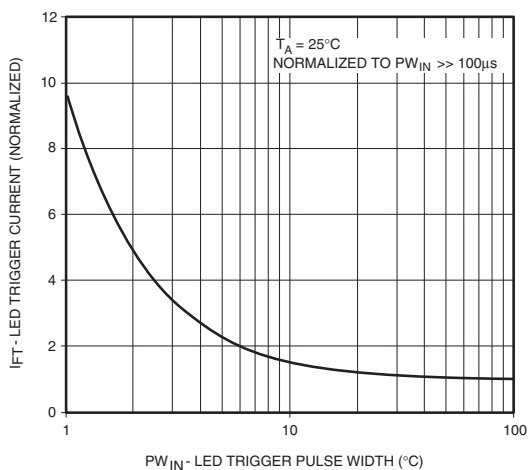


Fig. 6 Off-State Output Terminal Voltage vs. Ambient Temperature

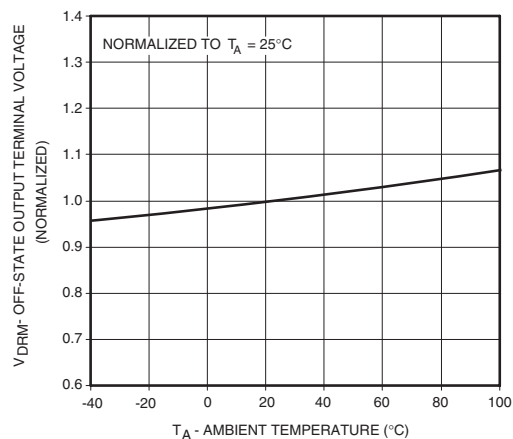
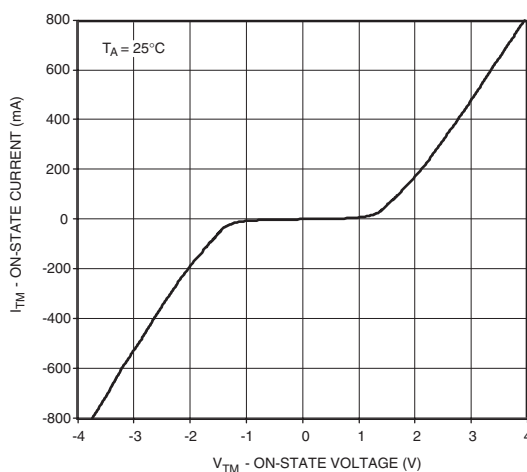


Fig. 7 On-State Characteristics



## Typical Performance Curves

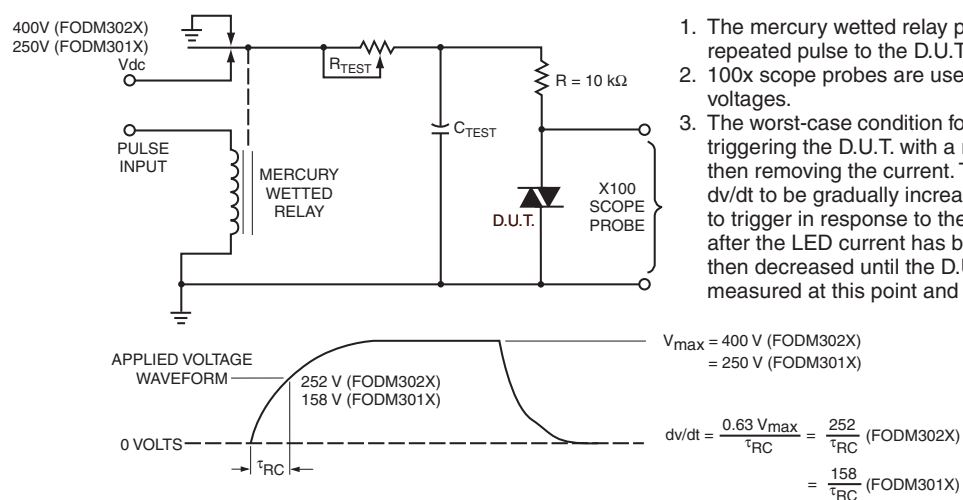


Figure 8. Static dv/dt Test Circuit

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

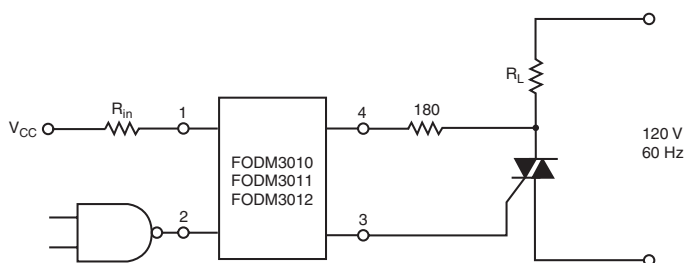


Figure 9. Resistive Load

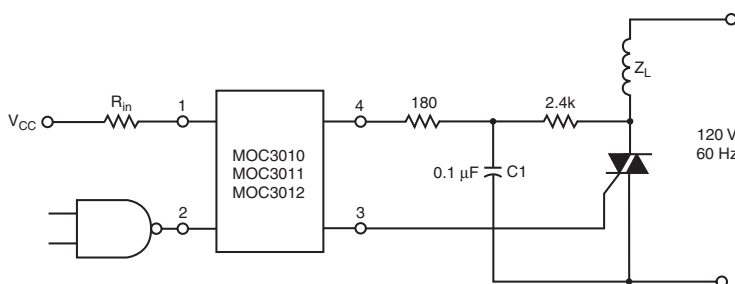
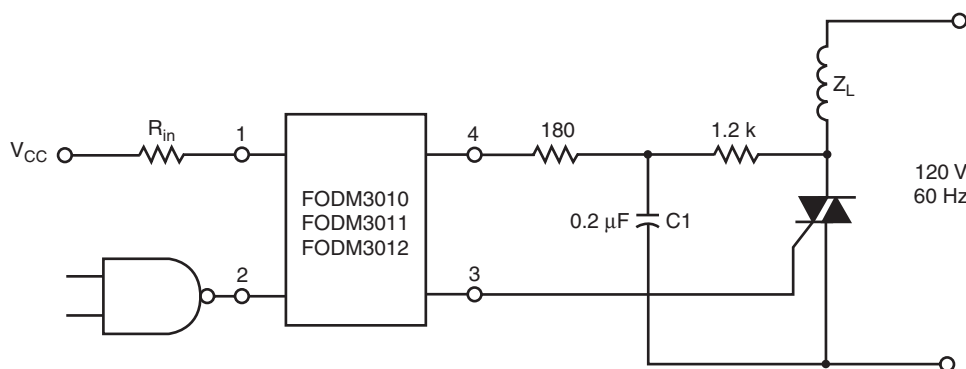
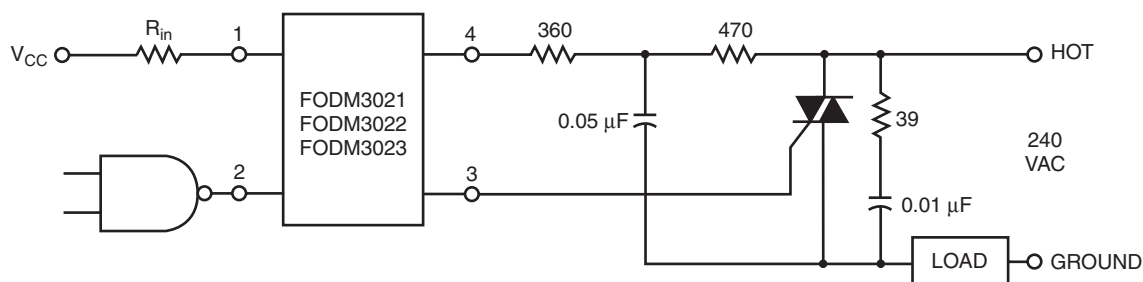


Figure 10. Inductive Load with Sensitive Gate Triac (I<sub>GT</sub> ≤ 15 mA)



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



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

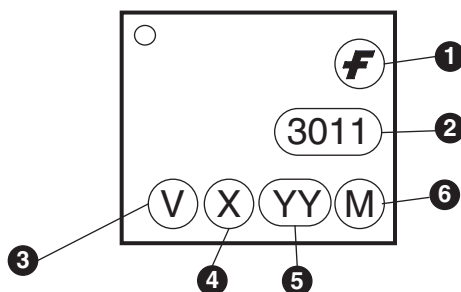
The 39 ohm resistor and 0.01  $\mu$ F capacitor are for snubbing of the triac, and the 470 ohm resistor and 0.05 mF capacitor are for snubbing the coupler. These components may or may not be necessary depending upon the particular and load used.

**Figure 12. Typical Application Circuit**

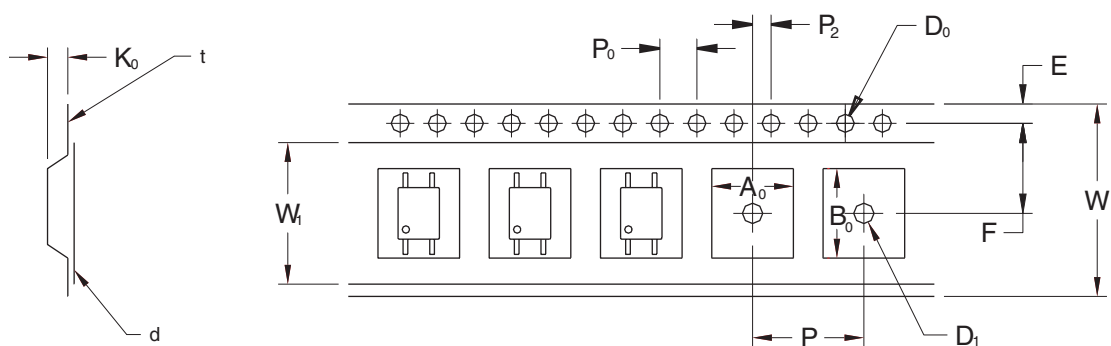
## Ordering Information

| 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

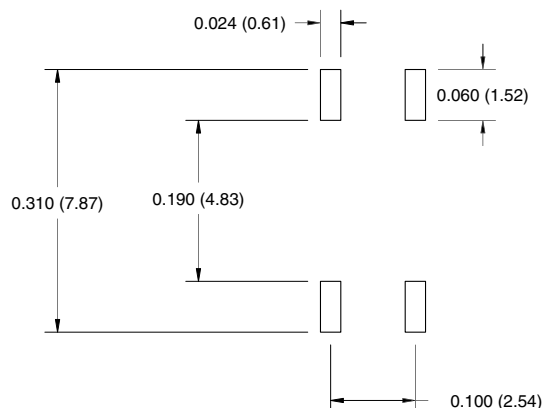


| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 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                                                                  |

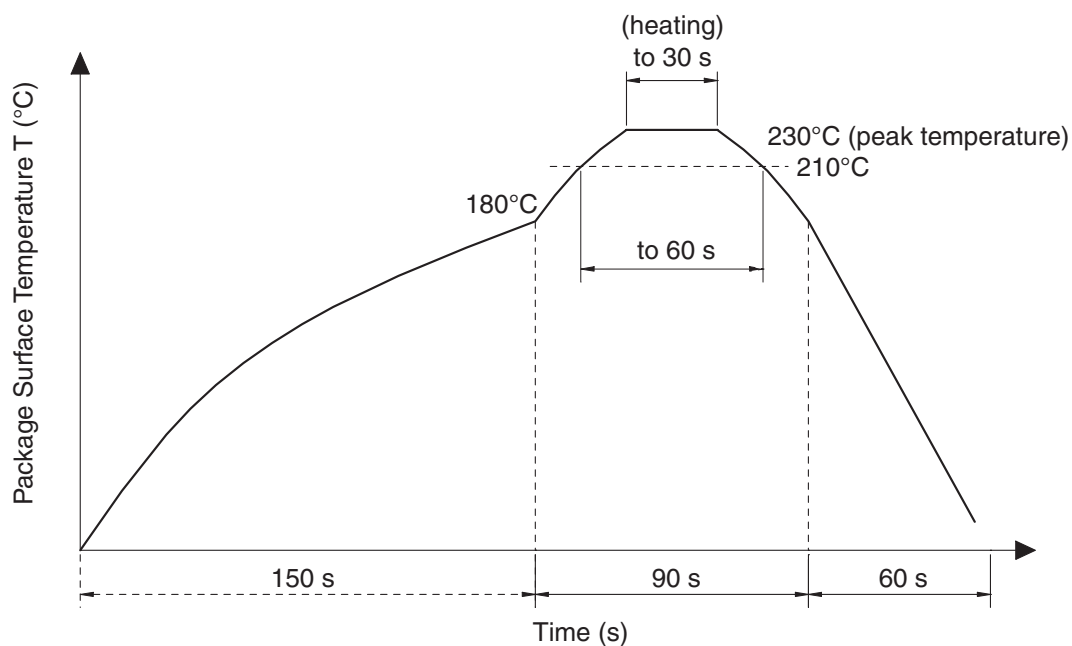


|                                 |                | 2.54 Pitch      |
|---------------------------------|----------------|-----------------|
| Description                     | Symbol         | Dimensions (mm) |
| Tape Width                      | W              | 12.00±0.4       |
| Tape Thickness                  | t              | 0.30±0.20       |
| Sprocket Hole Pitch             | P <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>t</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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