

FODM121 Series, FODM124, FODM2701 Series, FODM2705 4-Pin Full Pitch Mini-Flat Package Transistor Output Optocouplers

Features

- >5mm creepage/clearance
- Compact 4-pin surface mount package (2.4mm maximum standoff height)
- Current Transfer Ratio in selected groups
DC Input:

| | |
|--------------------|---------------------|
| FODM121: 50–600% | FODM2701: 50–300% |
| FODM121A: 100–300% | FODM2701A: 150–300% |
| FODM121B: 50–150% | FODM2701B: 80–160% |
| FODM121C: 100–200% | FODM124: 100% MIN |
| FODM121D: 50–100% | |
| FODM121E: 150–300% | |
| FODM121F: 100–600% | |
| FODM121G: 200–400% | |
- AC Input:
FODM2705: 50–300%
- Available in tape and reel quantities of 500 and 2500
- Applicable to Infrared Ray reflow (260°C max, 10 seconds)
- C-UL, UL and VDE* certifications

*option 'V' required

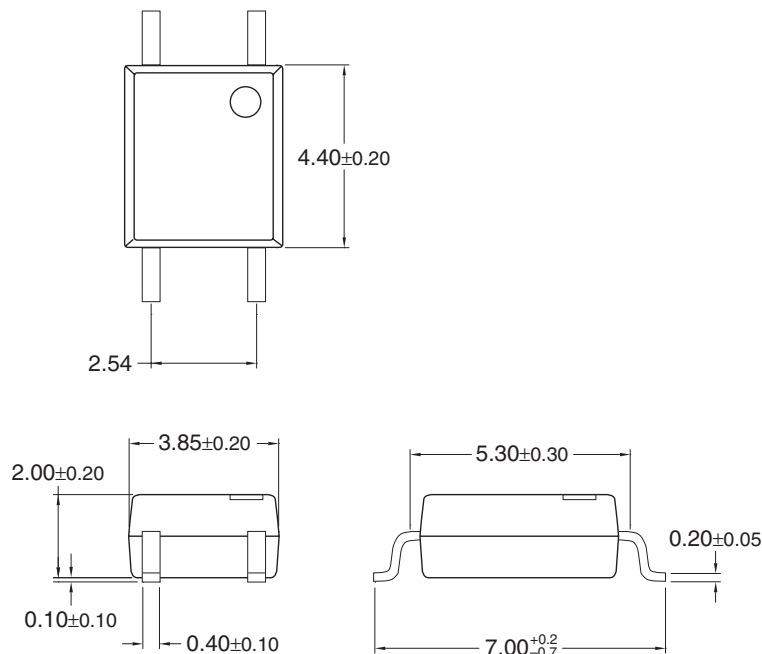
Applications

- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

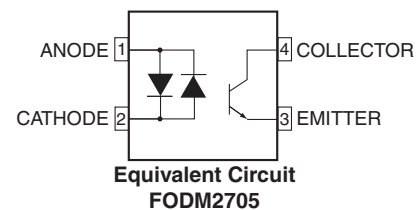
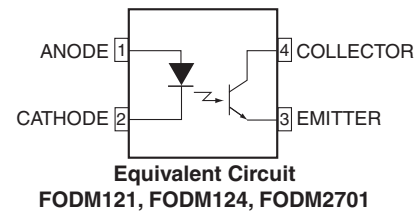
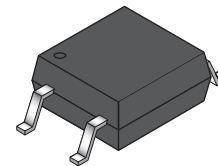
Description

The FODM124, FODM121, and FODM2701 series consists of a gallium arsenide infrared emitting diode driving a phototransistor in a compact 4-pin mini-flat package. The lead pitch is 2.54 mm. The FODM2705 series consists of two gallium arsenide infrared emitting diodes connected in inverse parallel for AC operation.

Package Dimensions



Note:
All dimensions are in millimeters.



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

| Symbol | Parameter | Value | Units | |
|----------------------|------------------------------------------------------------------|---------------------------|----------------------|---|
| TOTAL PACKAGE | | | | |
| T_{STG} | Storage Temperature | -40 to +125 | $^\circ\text{C}$ | |
| T_{OPR} | Operating Temperature | -40 to +110 | $^\circ\text{C}$ | |
| EMITTER | | | | |
| I_F (avg) | Continuous Forward Current | 50 | mA | |
| I_F (pk) | Peak Forward Current (1 μs pulse, 300 pps.) | 1 | A | |
| V_R | Reverse Input Voltage | 6 | V | |
| P_D | Power Dissipation Derate linearly (above 25°C) | 70 | mW | |
| | | 0.65 | mW/ $^\circ\text{C}$ | |
| DETECTOR | | | | |
| | Continuous Collector Current | 80 | mA | |
| P_D | Power Dissipation Derate linearly (above 25°C) | 150 | mW | |
| | | 2.0 | mW/ $^\circ\text{C}$ | |
| V_{CEO} | Collector-Emitter Voltage | FODM2701 Series, FODM2705 | 40 | V |
| | | FODM121 Series, FODM124 | 80 | |
| V_{ECO} | Emitter-Collector Voltage | 7 | V | |

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

Individual Component Characteristics

| Symbol | Parameter | Test Conditions | Device | Min. | Typ.* | Max. | Unit |
|-----------------|-------------------------------------------|---------------------------------------|-----------------------------|------|-------|------|---------------|
| EMITTER | | | | | | | |
| V_F | Forward Voltage | $I_F = 10\text{mA}$ | FODM121 Series FODM124 | 1.0 | | 1.3 | V |
| | | $I_F = 5\text{mA}$ | FODM2701 Series | | | 1.4 | |
| | | $I_F = \pm 5\text{mA}$ | FODM2705 | | | | |
| I_R | Reverse Current | $V_R = 5\text{V}$ | FODM2701 Series | | | 5 | μA |
| | | | FODM121 Series | | | | |
| | | | FODM124 | | | | |
| DETECTOR | | | | | | | |
| BV_{CEO} | Breakdown Voltage Collector to Emitter | $I_C = 1\text{mA}, I_F = 0$ | FODM121 Series FODM124 | 80 | | | V |
| | | | FODM2701 Series FODM2705 | 40 | | | |
| BV_{ECO} | Emitter to Collector | $I_E = 100\mu\text{A}, I_F = 0$ | All | 7 | | - | V |
| I_{CEO} | Collector Dark Current | $V_{CE} = 40\text{V}, I_F = 0$ | All | | | 100 | nA |
| C_{CE} | Capacitance | $V_{CE} = 0\text{V}, f = 1\text{MHz}$ | All | | 10 | | pF |

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

| Symbol | Characteristic | Test Conditions | Device | Min. | Typ.** | Max. | Unit |
|--------------------------------------------|---------------------------|---------------------------------------------------------|-----------|------|--------|------|---------------|
| CTR | DC Current Transfer Ratio | $I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ | FODM2705 | 50 | | 300 | % |
| | | | FODM2701 | 50 | | 300 | |
| | | | FODM2701A | 150 | | 300 | |
| | | | FODM2701B | 80 | | 160 | |
| | | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | FODM121 | 50 | | 600 | |
| | | | FODM121A | 100 | | 300 | |
| | | | FODM121B | 50 | | 150 | |
| | | | FODM121C | 100 | | 200 | |
| | | | FODM121D | 50 | | 100 | |
| | | | FODM121E | 150 | | 300 | |
| | | | FODM121F | 100 | | 600 | |
| | | | FODM121G | 200 | | 400 | |
| | | $I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ | FODM121F | 30 | | | |
| $I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$ | FODM124 | 100 | | 1200 | | | |
| $I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ | FODM124 | 50 | | | | | |
| | CTR Symmetry | $I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ | FODM2705 | 0.3 | | 3.0 | |
| $V_{CE(SAT)}$ | Saturation Voltage | $I_F = \pm 10\text{mA}, I_C = 2\text{mA}$ | FODM2705 | | | 0.3 | V |
| | | | FODM2701 | | | 0.3 | |
| | | | FODM2701A | | | 0.3 | |
| | | | FODM2701B | | | 0.3 | |
| | | $I_F = 8\text{mA}, I_C = 2.4\text{mA}$ | FODM121 | | | 0.4 | |
| | | | FODM121A | | | 0.4 | |
| | | | FODM121B | | | 0.4 | |
| | | | FODM121C | | | 0.4 | |
| | | | FODM121D | | | 0.4 | |
| | | | FODM121E | | | 0.4 | |
| | | | FODM121F | | | 0.4 | |
| | | | FODM121G | | | 0.4 | |
| | | $I_F = 1\text{mA}, I_C = 0.2\text{mA}$ | FODM121F | | | 0.4 | |
| $I_F = 1\text{mA}, I_C = 0.5\text{mA}$ | FODM124 | | | 0.4 | | | |
| t_r | Rise Time (Non-Saturated) | $I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 100\Omega$ | All | | 3 | | μs |
| t_f | Fall Time (Non-Saturated) | $I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 100\Omega$ | All | | 3 | | μs |

Isolation Characteristics

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

*All typicals at $T_A = 25^\circ\text{C}$

Note:

1. Steady state isolation voltage, V_{ISO} , is an internal device dielectric breakdown rating. For this test, pins 1 and 2 are common, and pins 3 and 4 are common.

Typical Performance Curves

Fig. 1 Forward Current vs. Forward Voltage

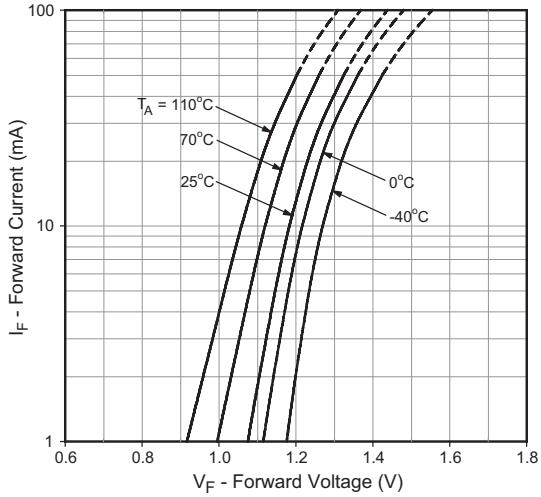


Fig. 2 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM121/2701/2705)

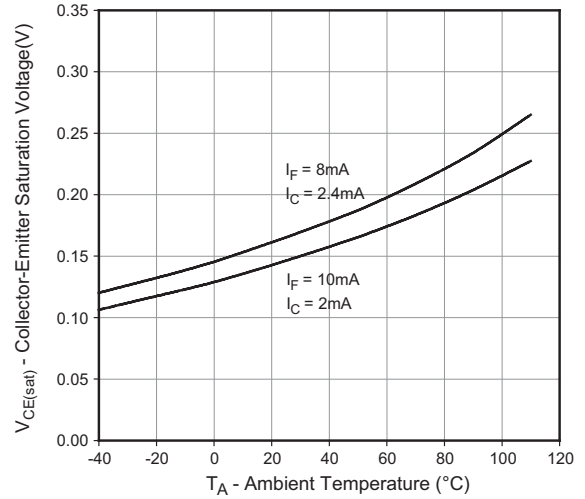


Fig. 3 Current Transfer Ratio vs. Forward Current (FODM121/2701/2705)

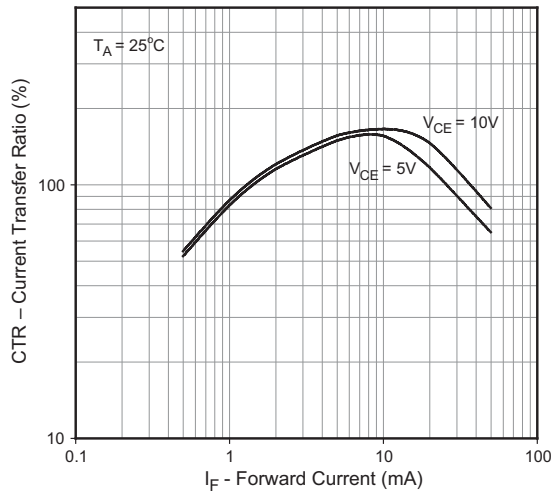


Fig. 4 Collector Current vs. Forward Current (FODM121/2701/2705)

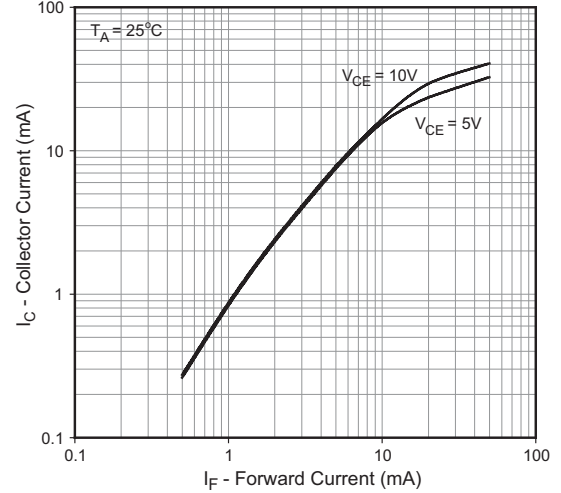


Fig. 5 Collector Current vs. Ambient Temperature (FODM121/2701/2705)

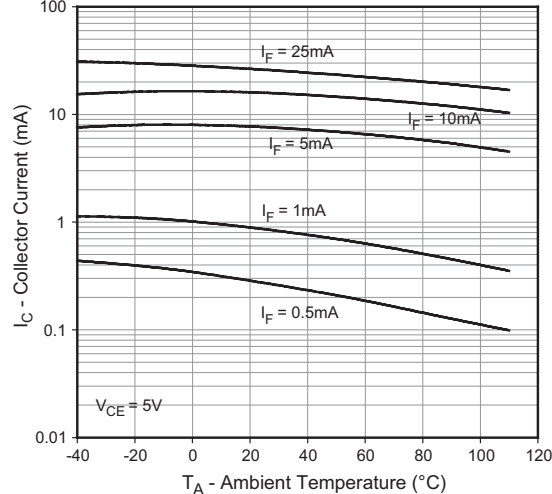


Fig. 6 Collector Current vs. Collector-Emitter Voltage (FODM121/2701/2705)

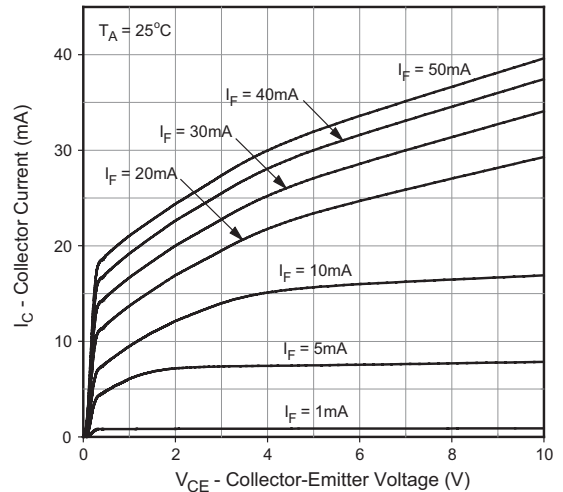


Fig 7. Collector Dark Current vs. Ambient Temperature (FODM121/2701/2705)

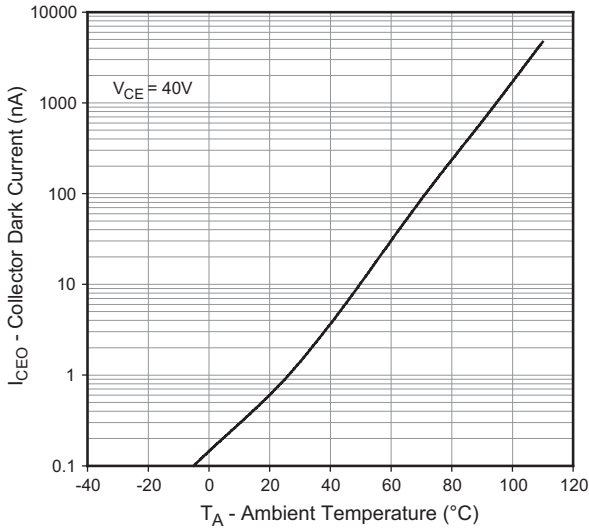


Fig 8 Normalized Current Transfer Ratio vs. Ambient Temperature (FODM121/2701/2705)

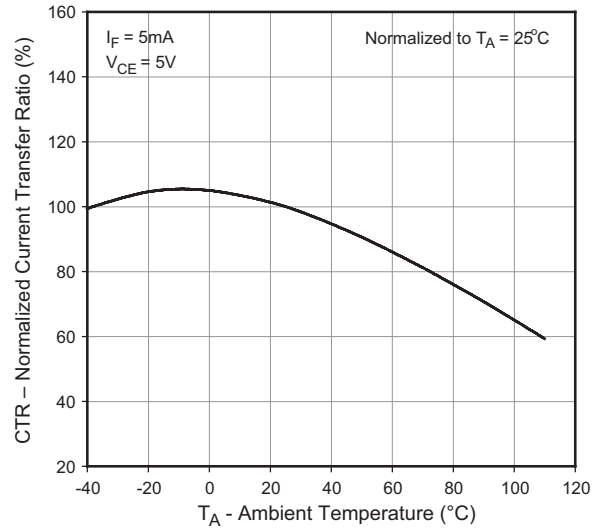


Fig 9 Switching Time vs. Load Resistance (FODM121/2701/2705)

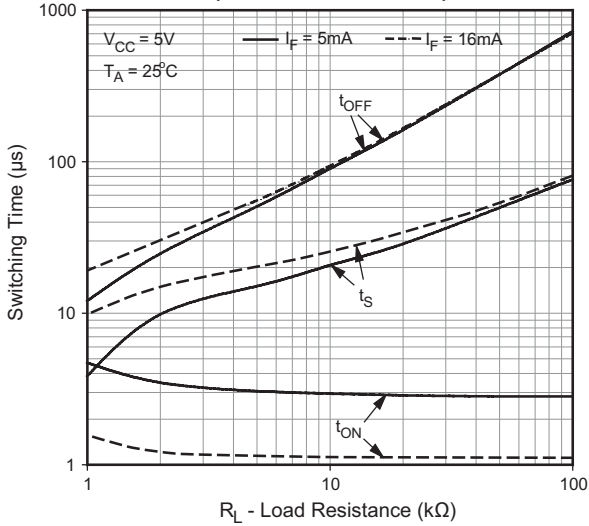


Fig 10 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM124)

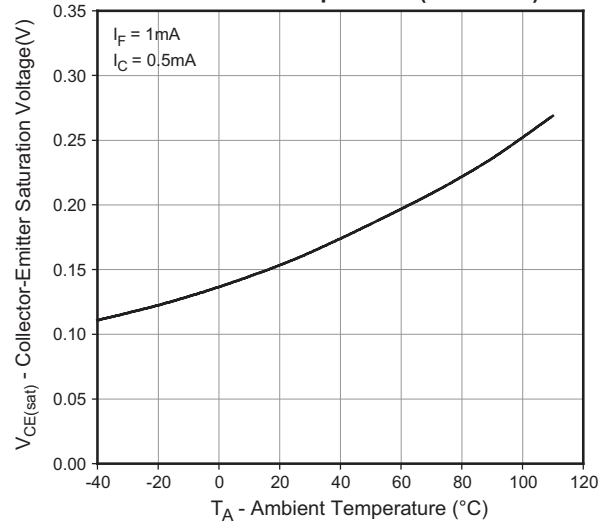


Fig 11 Current Transfer Ratio vs. Forward Current (FODM124)

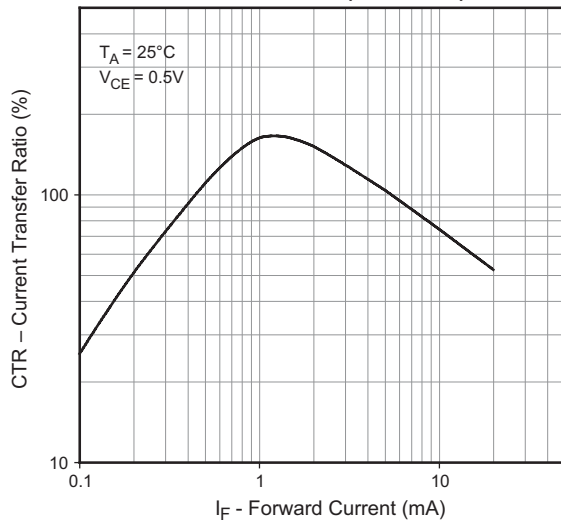


Fig 12. Collector Current vs. Forward Current (FODM124)

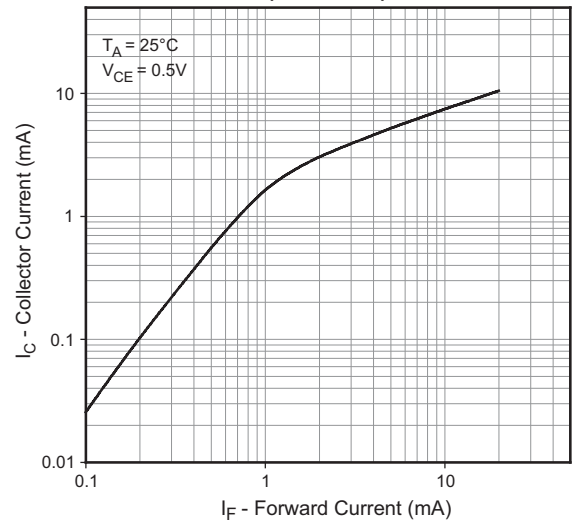


Fig 13. Collector Current vs. Ambient Temperature (FODM124)

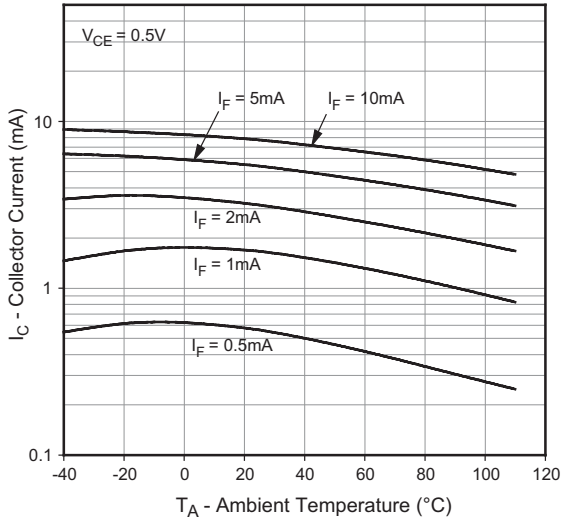


Fig 14 Collector Current vs. Collector-Emitter Voltage (FODM124)

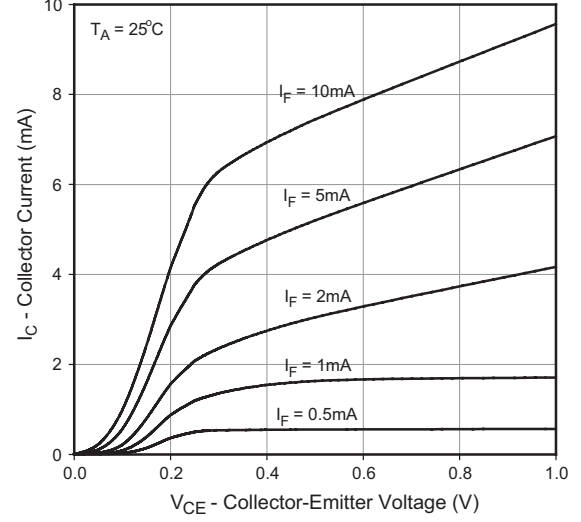


Fig 15 Collector Dark Current vs. Ambient Temperature (FODM124)

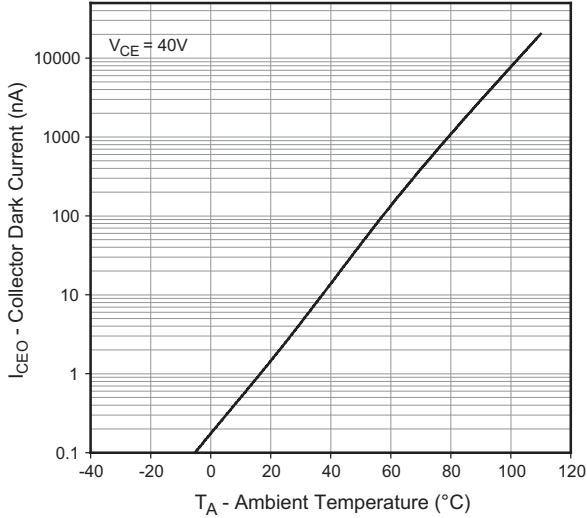


Fig 16 Normalized Current Transfer Ratio vs. Ambient Temperature (FODM124)

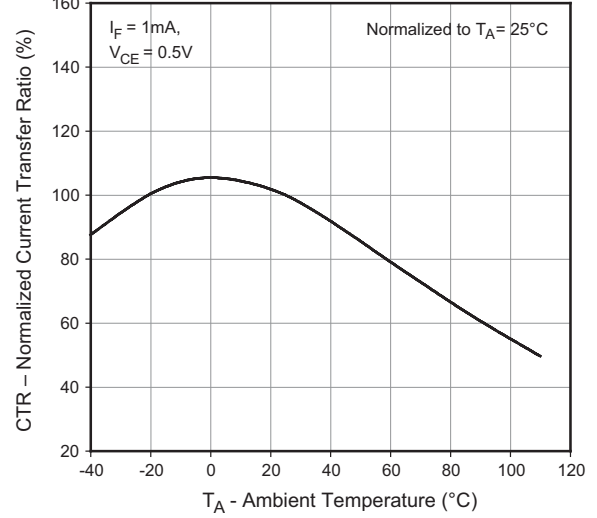
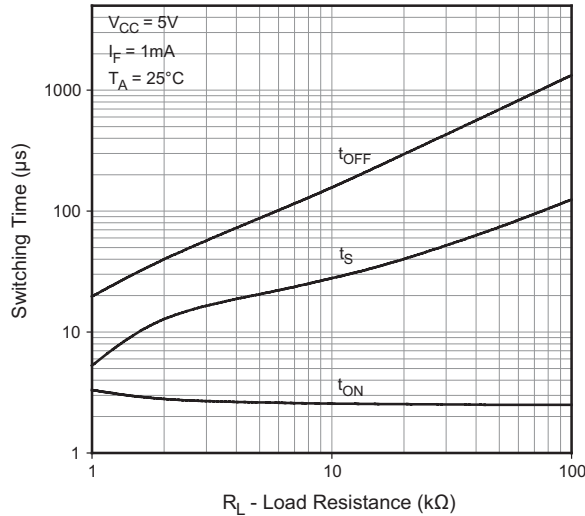


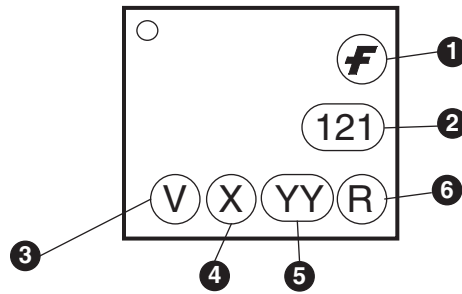
Fig 17 Switching Time vs. Load Resistance (FODM124)



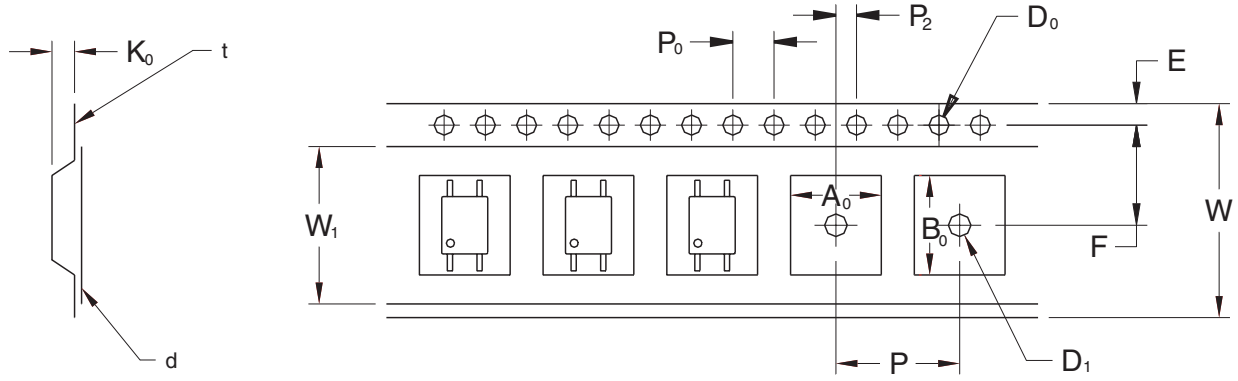
Ordering Information

| Option | Description |
|--------|---------------------------------------------|
| V | VDE Approved |
| R1 | Tape and Reel (500 units) |
| R2 | Tape and Reel (2500 units) |
| R1V | Tape and Reel (500 units) and VDE Approved |
| R2V | Tape and Reel (2500 units) and VDE Approved |

Marking Information

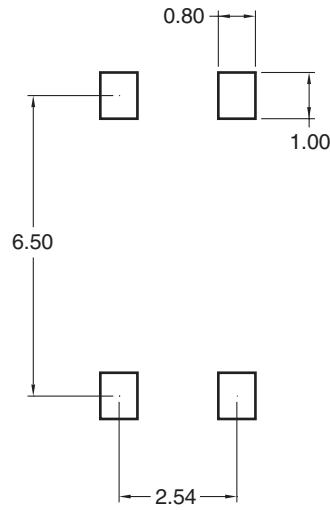


| Definitions | |
|-------------|----------------------------------------------------------------------------------------|
| 1 | Fairchild logo |
| 2 | Device number |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | One digit year code |
| 5 | Two 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 | 0.35±0.02 |
| 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 | 4.75±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") |

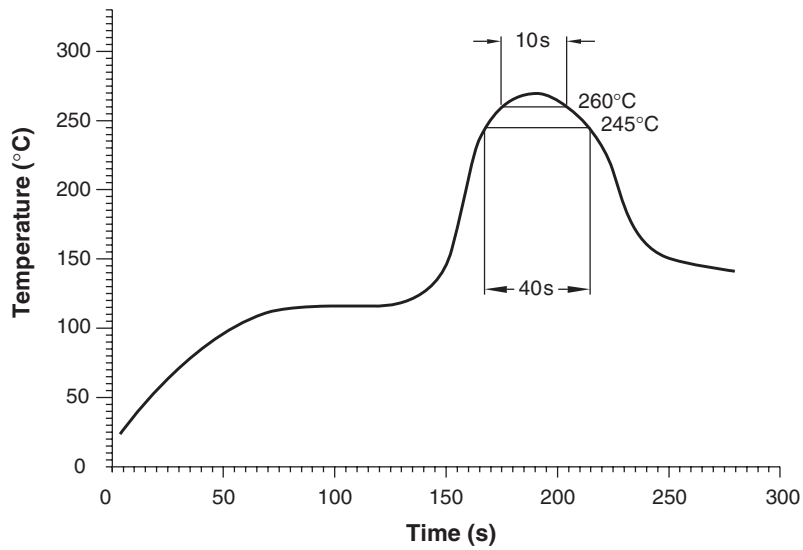
Footprint Drawing for PCB Layout



Note:
All dimensions are in mm.

Recommended Infrared Reflow Soldering Profile

- Peak reflow temperature: 260°C (package surface temperature)
- Time of temperature higher than 245°C: 40 seconds or less
- Number of reflows: 3



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| | MSXPro™ | RapidConnect™ | TINYOPTO™ | |
| Across the board. Around the world.™ | | SerDes™ | TruTranslation™ | |
| The Power Franchise® | | ScalarPump™ | UHC® | |
| Programmable Active Droop™ | | | | |

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PRODUCT STATUS DEFINITIONS

Definition of Terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advance Information | Formative or In Design | This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. |
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