

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

| Symbol               | Parameter                                  | Value                     | Units |   |
|----------------------|--------------------------------------------|---------------------------|-------|---|
| TOTAL PACKAGE        |                                            |                           |       |   |
| T <sub>STG</sub>     | Storage Temperature                        | -40 to +125               | °C    |   |
| T <sub>OPR</sub>     | Operating Temperature                      | -40 to +110               | °C    |   |
| EMITTER              |                                            |                           |       |   |
| I <sub>F</sub> (avg) | Continuous Forward Current                 | 50                        | mA    |   |
| I <sub>F</sub> (pk)  | Peak Forward Current (1μs pulse, 300 pps.) | 1                         | A     |   |
| V <sub>R</sub>       | Reverse Input Voltage                      | 6                         | V     |   |
| P <sub>D</sub>       | Power Dissipation                          | 70                        | mW    |   |
|                      | Derate linearly (above 25°C)               | 0.65                      | mW/°C |   |
| DETECTOR             |                                            |                           |       |   |
|                      | Continuous Collector Current               | 80                        | mA    |   |
| P <sub>D</sub>       | Power Dissipation                          | 150                       | mW    |   |
|                      | Derate linearly (above 25°C)               | 2.0                       | mW/°C |   |
| V <sub>CEO</sub>     | Collector-Emitter Voltage                  | FODM2701 Series, FODM2705 | 40    | V |
|                      |                                            | FODM121 Series, FODM124   | 80    |   |
| V <sub>ECO</sub>     | 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 <sub>F</sub>    | Forward Voltage                           | I <sub>F</sub> = 10mA                      | FODM121 Series<br>FODM124   | 1.0  |       | 1.3  | V    |
|                   |                                           | I <sub>F</sub> = 5mA                       | FODM2701 Series             |      |       | 1.4  |      |
|                   |                                           | I <sub>F</sub> = ±5mA                      | FODM2705                    |      |       |      |      |
| I <sub>R</sub>    | Reverse Current                           | V <sub>R</sub> = 5V                        | FODM2701 Series             |      |       | 5    | µA   |
|                   |                                           |                                            | FODM121 Series              |      |       |      |      |
|                   |                                           |                                            | FODM124                     |      |       |      |      |
| DETECTOR          |                                           |                                            |                             |      |       |      |      |
| BV <sub>CEO</sub> | Breakdown Voltage<br>Collector to Emitter | I <sub>C</sub> = 1mA, I <sub>F</sub> = 0   | FODM121 Series<br>FODM124   | 80   |       |      | V    |
|                   |                                           |                                            | FODM2701 Series<br>FODM2705 | 40   |       |      |      |
| BV <sub>ECO</sub> | Emitter to Collector                      | I <sub>E</sub> = 100µA, I <sub>F</sub> = 0 | All                         | 7    |       | —    | V    |
| I <sub>CEO</sub>  | Collector Dark<br>Current                 | V <sub>CE</sub> = 40V, I <sub>F</sub> = 0  | All                         |      |       | 100  | nA   |
| C <sub>CE</sub>   | Capacitance                               | V <sub>CE</sub> = 0V, f = 1MHz             | 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  | %             |
|               |                           | $I_F = 5\text{mA}$ , $V_{CE} = 5\text{V}$                        | 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             |
|               |                           | $I_F = 10\text{mA}$ , $I_C = 2\text{mA}$                         | 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) | $I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$ ,<br>$R_L = 100\Omega$ | All       |      | 3      |      | $\mu\text{s}$ |
| $t_f$         | Fall Time (Non-Saturated) | $I_C = 2\text{mA}$ , $V_{CE} = 5\text{V}$ ,<br>$R_L = 100\Omega$ | All       |      | 3      |      | $\mu\text{s}$ |

**Isolation Characteristics**

| Characteristic                                | Test Conditions | Symbol    | Device | Min. | Typ.* | Max. | Unit |
|-----------------------------------------------|-----------------|-----------|--------|------|-------|------|------|
| Steady State Isolation Voltage <sup>(1)</sup> | 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

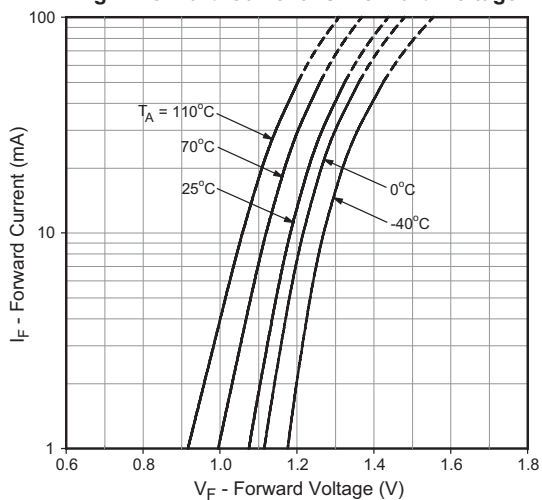


Fig. 2 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM121/2701/2705)

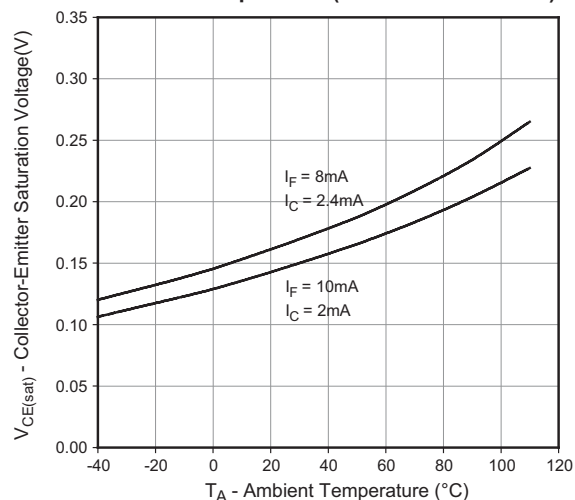


Fig. 3 Current Transfer Ratio vs. Forward Current (FODM121/2701/2705)

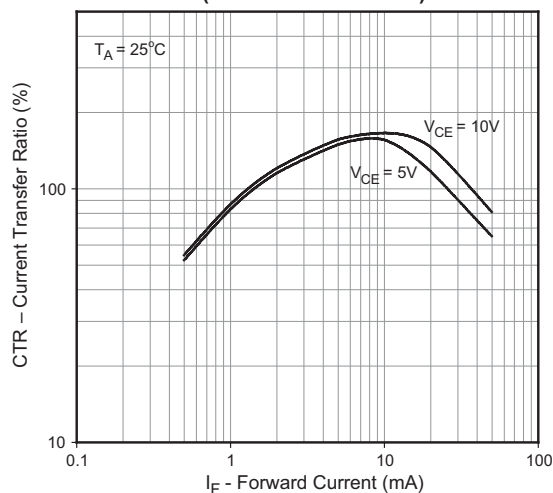


Fig. 4 Collector Current vs. Forward Current (FODM121/2701/2705)

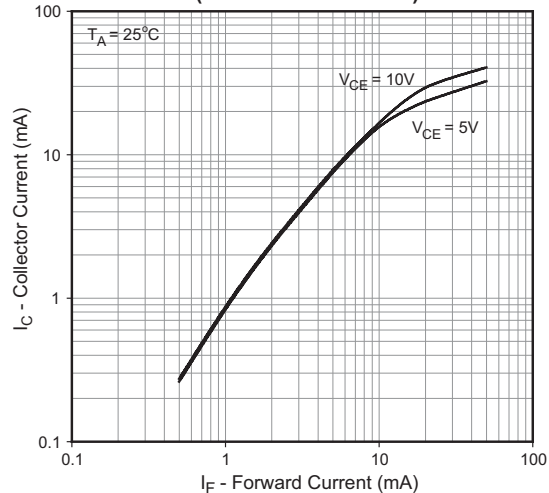


Fig. 5 Collector Current vs. Ambient Temperature (FODM121/2701/2705)

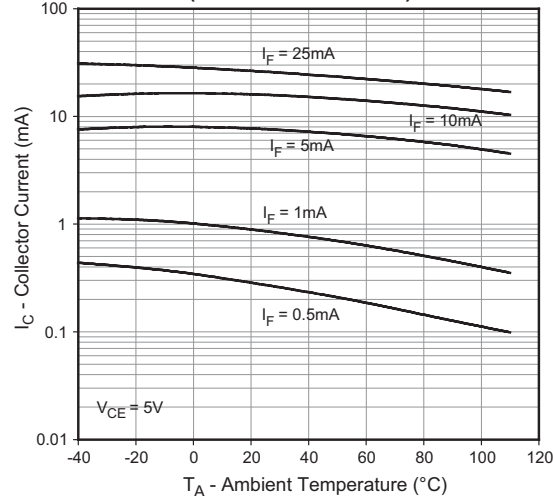
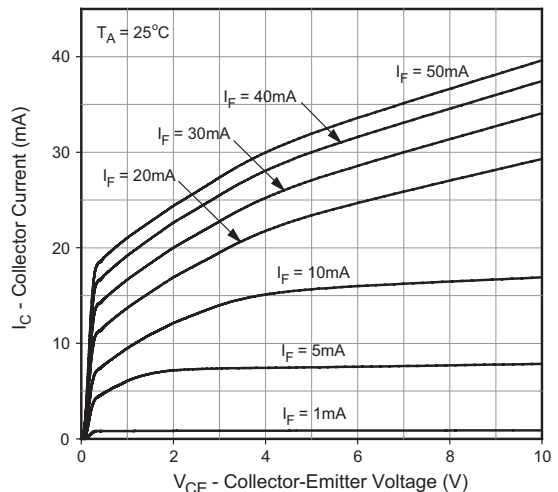
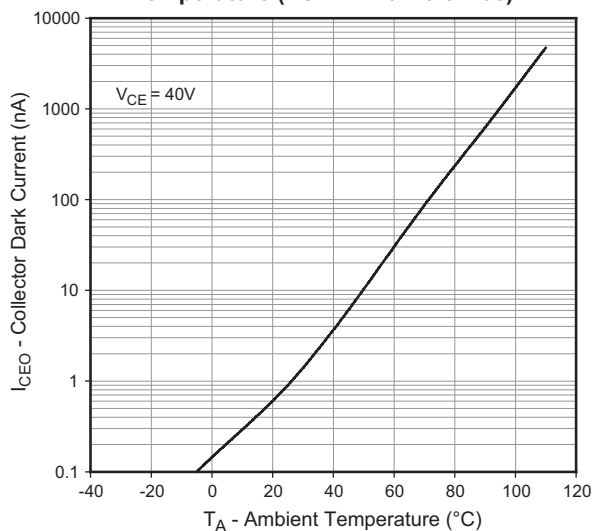
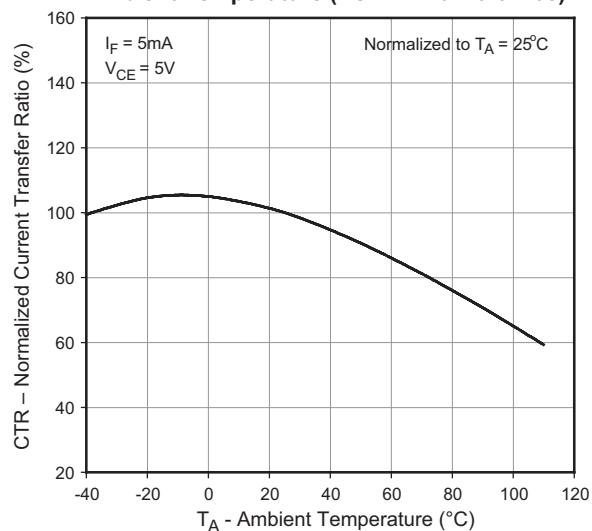
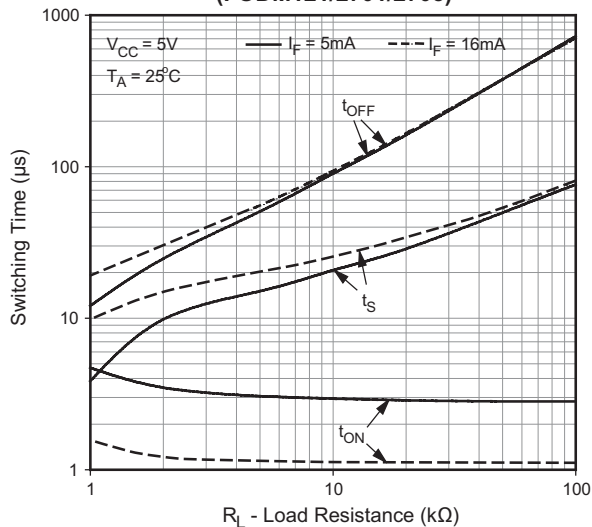
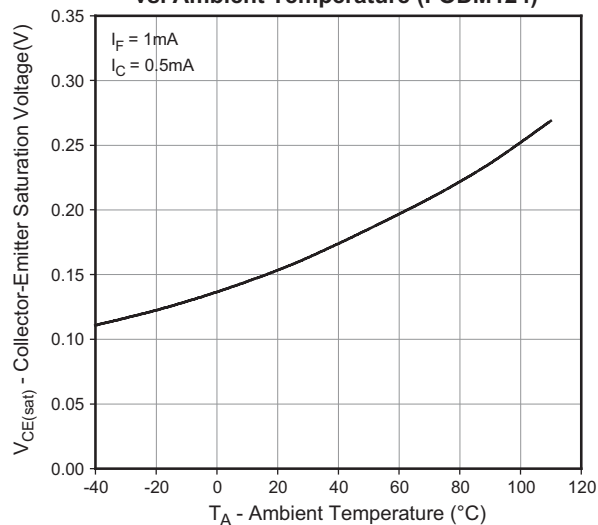
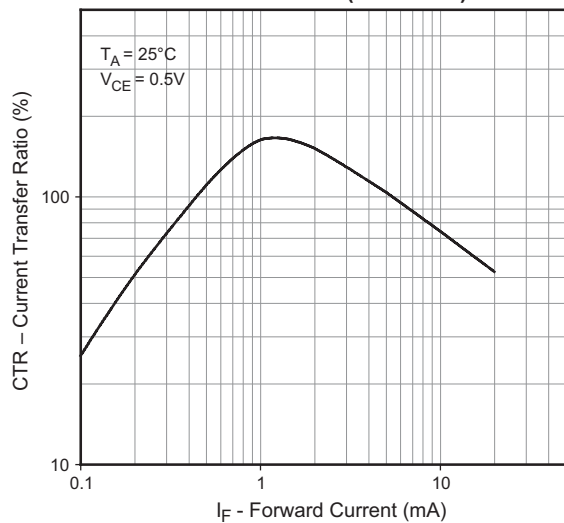
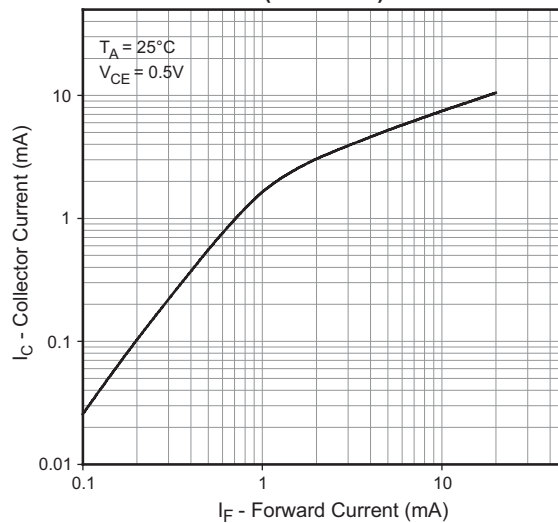
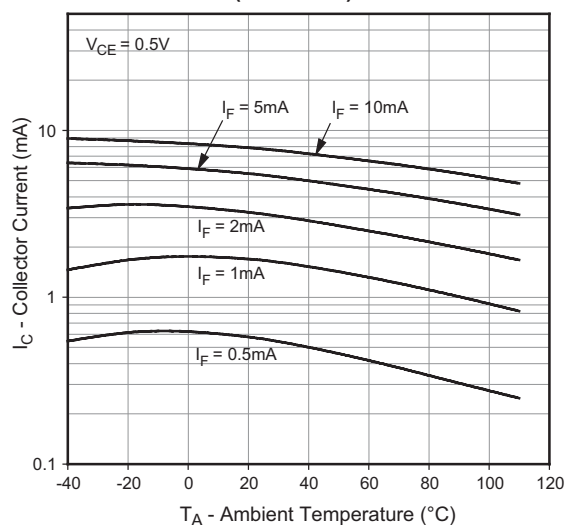


Fig. 6 Collector Current vs. Collector-Emitter Voltage (FODM121/2701/2705)

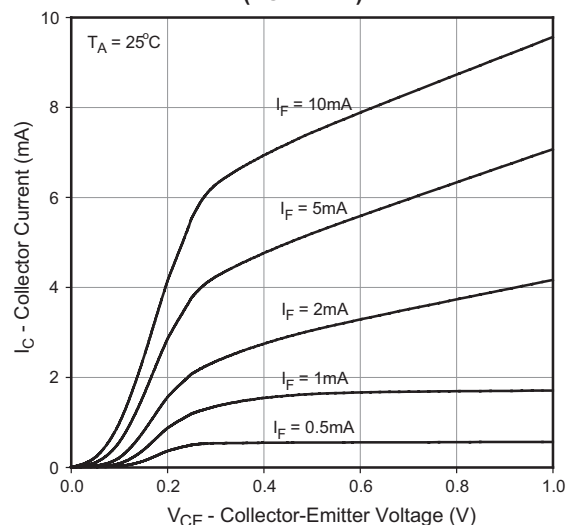


**Fig 7. Collector Dark Current vs. Ambient Temperature (FODM121/2701/2705)****Fig. 8 Normalized Current Transfer Ratio vs. Ambient Temperature (FODM121/2701/2705)****Fig. 9 Switching Time vs. Load Resistance (FODM121/2701/2705)****Fig. 10 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM124)****Fig. 11 Current Transfer Ratio vs. Forward Current (FODM124)****Fig 12. Collector Current vs. Forward Current (FODM124)**

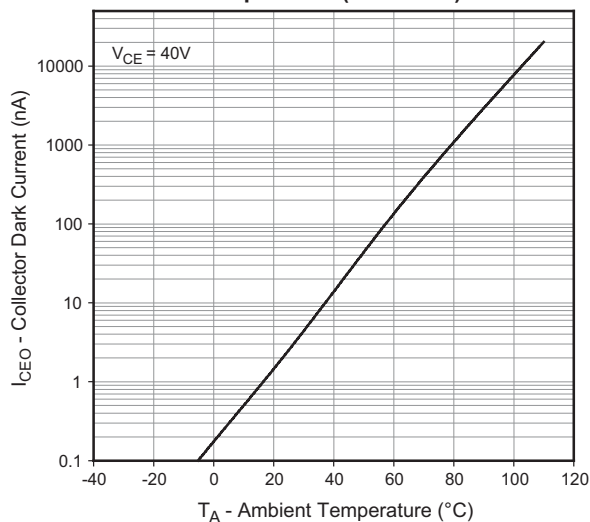
**Fig 13. Collector Current vs. Ambient Temperature (FODM124)**



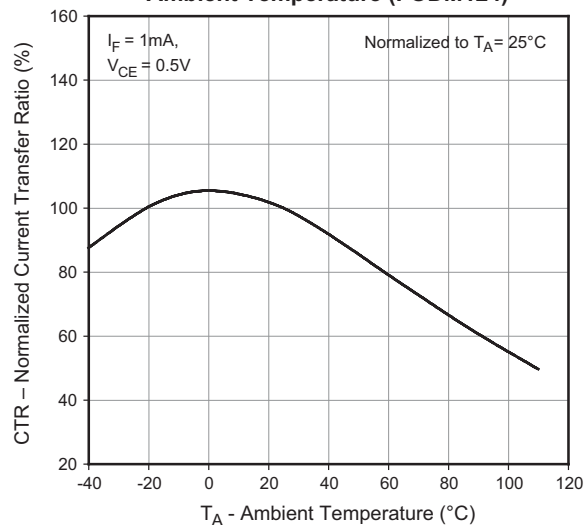
**Fig 14 Collector Current vs. Collector-Emitter Voltage (FODM124)**



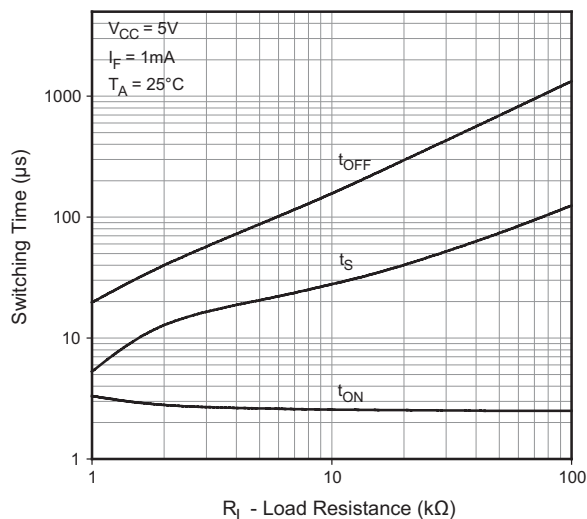
**Fig. 15 Collector Dark Current vs. Ambient Temperature (FODM124)**



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



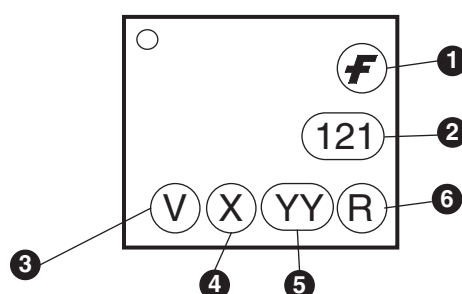
**Fig. 17 Switching Time vs. Load Resistance (FODM124)**



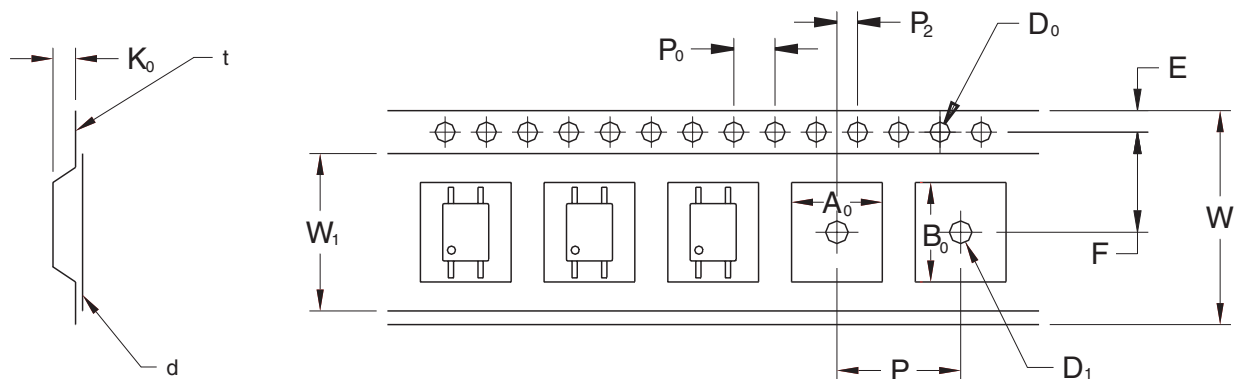
## Ordering Information

| 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

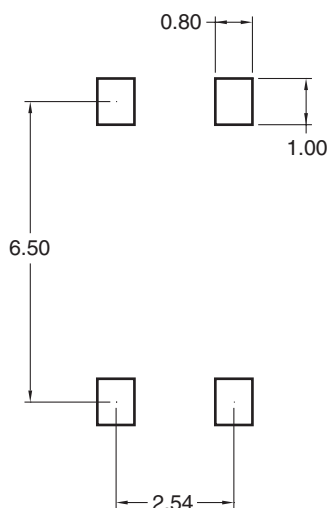


| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                            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



|                                 |                | 2.54 Pitch      |
|---------------------------------|----------------|-----------------|
| Description                     | Symbol         | Dimensions (mm) |
| Tape Width                      | W              | 12.00±0.4       |
| Tape Thickness                  | t              | 0.35±0.02       |
| 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> | 4.75±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>1</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")    |

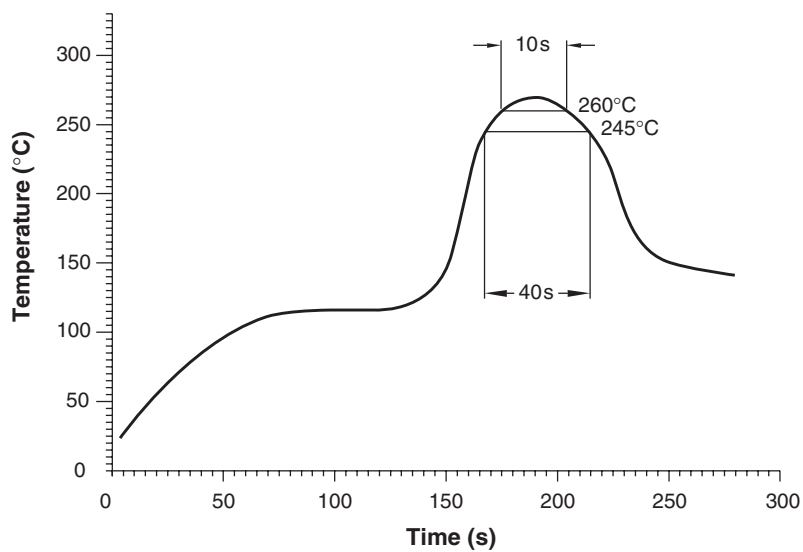
## Footprint Drawing for PCB Layout



**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



## FAIRCHILD SEMICONDUCTOR TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

|                                      |                     |                     |                  |         |
|--------------------------------------|---------------------|---------------------|------------------|---------|
| ACEx™                                | FACT Quiet Series™  | OCX™                | SILENT SWITCHER® | UniFET™ |
| ActiveArray™                         | GlobalOptoisolator™ | OCXPro™             | SMART START™     | VCX™    |
| Bottomless™                          | GTO™                | OPTOLOGIC®          | SPM™             | Wire™   |
| Build it Now™                        | HiSeC™              | OPTOPLANAR™         | Stealth™         |         |
| CoolFET™                             | I <sup>2</sup> C™   | PACMAN™             | SuperFET™        |         |
| CROSSVOLT™                           | i-Lo™               | POP™                | SuperSOT™-3      |         |
| DOME™                                | ImpliedDisconnect™  | Power247™           | SuperSOT™-6      |         |
| EcoSPARK™                            | IntelliMAX™         | PowerEdge™          | SuperSOT™-8      |         |
| E <sup>2</sup> CMOS™                 | ISOPPLANAR™         | PowerSaver™         | SyncFET™         |         |
| EnSigna™                             | LittleFET™          | PowerTrench®        | TCM™             |         |
| FACT®                                | MICROCOUPLER™       | QFET®               | TinyBoost™       |         |
| FAST®                                | MicroFET™           | QS™                 | TinyBuck™        |         |
| FASTr™                               | MicroPak™           | QT Optoelectronics™ | TinyPWM™         |         |
| FPST™                                | MICROWIRE™          | Quiet Series™       | TinyPower™       |         |
| FRFET™                               | MSX™                | RapidConfigure™     | TinyLogic®       |         |
|                                      | MSXPro™             | RapidConnect™       | TINYOPTO™        |         |
| Across the board. Around the world.™ |                     | SerDes™             | TruTranslation™  |         |
| The Power Franchise®                 |                     | ScalarPump™         | UHC®             |         |
| Programmable Active Droop™           |                     |                     |                  |         |

### DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

### LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

### 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.                                                                           |
| Preliminary              | First Production       | This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| No Identification Needed | Full Production        | This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.                                                       |
| Obsolete                 | Not In Production      | This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.                                          |

Rev. I22