



THE DATASHEET OF FODB101V



FODB100, FODB101, FODB102 Single Channel Microcoupler™

Features

- Low profile package (1.20mm maximum mounted height)
- Land pattern allows for optimum board space savings
- High Current Transfer Ratio (CTR) at low IF
- Minimum isolation distance of 0.45mm
- High steady state isolation voltage of 2500V_{rms}
- Data rates up to 120Kbit/s (NRZ)
- Minimum creepage distance of 2mm
- Wide operating temperature range of -40°C to +125°C
- Available in tape and reel quantities of 3000 units
- Applicable to Pb-free Infrared Ray reflow (260°C max)
- UL and VDE approved

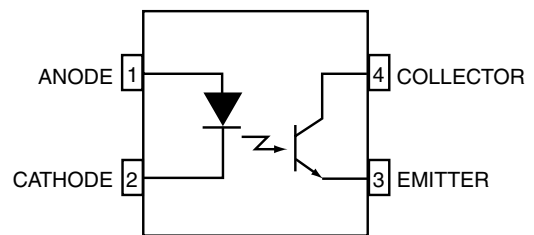
Applications

- Primarily suited for DC-DC converters
- For ground loop isolation, signal to noise isolation
 - Communications – chargers, adapters
 - Consumer – appliances, set top boxes
 - Industrial – power supplies, motor control

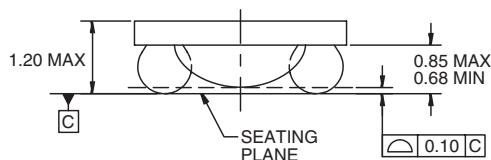
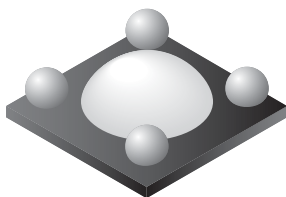
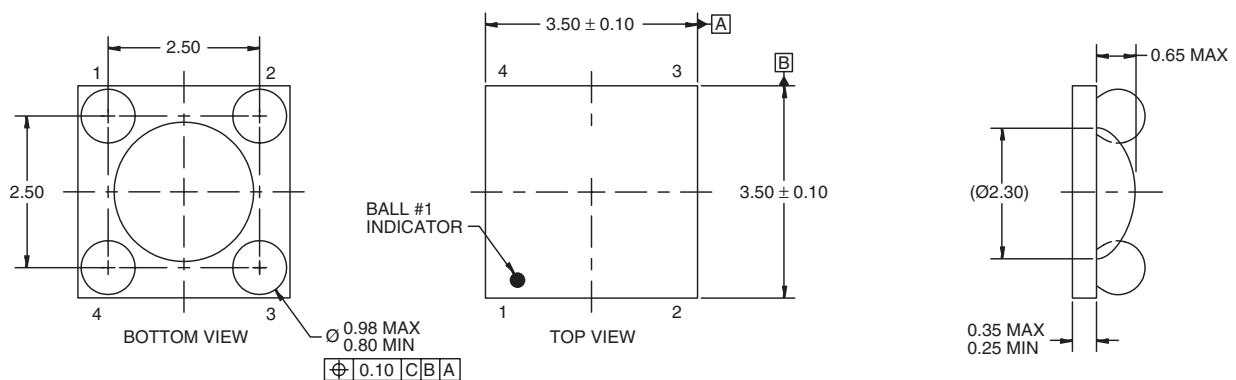
Description

The FODB100, FODB101 and FODB102 single channel MICROCOUPLERS™ are all Pb-free, low profile miniature surface mount optocouplers in a Ball Grid Array (BGA) package. Each consists of an aluminum gallium arsenide (AlGaAs) infrared emitting diode driving a silicon phototransistor.

Schematic



Package Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED
A) ALL DIMENSIONS ARE IN MILLIMETERS.
B) NO JEDEC REGISTRATION REFERENCE AS OF NOVEMBER 2002.

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

| Symbol | Parameter | Value | Units |
|----------------------|---|-------------|----------------------|
| TOTAL PACKAGE | | | |
| T_{STG} | Storage Temperature | -55 to +150 | $^\circ\text{C}$ |
| T_{OPR} | Operating Temperature | -40 to +125 | $^\circ\text{C}$ |
| T_j | Junction Temperature | 130 | $^\circ\text{C}$ |
| EMITTER | | | |
| I_F (avg) | Continuous Forward Current | 30 | mA |
| V_R | Reverse Input Voltage | 6 | V |
| P_D | Power Dissipation | 40 | mW |
| | Derate linearly (above 25°C) | 0.39 | mW/ $^\circ\text{C}$ |
| DETECTOR | | | |
| | Continuous Collector Current | 50 | mA |
| P_D | Power Dissipation | 150 | mW |
| | Derate linearly (above 25°C) | 1.42 | mW/ $^\circ\text{C}$ |
| V_{CEO} | Collector-Emitter Voltage | 75 | V |
| V_{ECO} | Emitter-Collector Voltage | 7 | V |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---------------------------------------|------|------|------|---------------|
| EMITTER | | | | | | |
| V_F | Forward Voltage | $I_F = 2\text{mA}$ | 1.0 | | 1.5 | V |
| I_R | Reverse Current | $V_R = 6\text{V}$ | | | 10 | μA |
| DETECTOR | | | | | | |
| BV_{CEO} | Breakdown Voltage Collector to Emitter | $I_C = 100\mu\text{A}, I_F = 0$ | 75 | | | V |
| BV_{ECO} | Emitter to Collector | $I_E = 100\mu\text{A}, I_F = 0$ | 7 | | | V |
| I_{CEO} | Collector Dark Current ⁽¹⁾ | $V_{CE} = 75\text{V}, I_F = 0$ | | | 100 | nA |
| C_{CE} | Capacitance | $V_{CE} = 0\text{V}, f = 1\text{MHz}$ | | 8 | | pF |

Transfer Characteristics

| Symbol | Characteristic | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---|---|------|------|------|---------------|
| CTR | Current Transfer Ratio ⁽²⁾ | $I_F = 1\text{mA}, V_{CE} = 5\text{V}$ | 100 | | | % |
| $CTR_{CE(SAT)}$ | Saturated Current Transfer Ratio (Collector to Emitter) | $I_F = 1.6\text{mA}, V_{CE} = 0.4\text{V}$ | 100 | | | % |
| | | $I_F = 1.0\text{mA}, V_{CE} = 0.4\text{V}$ | 75 | | | |
| $V_{CE(SAT)}$ | Saturation Voltage | $I_F = 3.0\text{mA}, I_C = 1.8\text{mA}$ | | | 0.4 | V |
| | | $I_F = 1.6\text{mA}, I_C = 1.6\text{mA}$ | | | | |
| t_r | Rise Time (Non-Saturated) | $I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 1\text{k}\Omega$ | | 1 | | μs |
| t_f | Fall Time (Non-Saturated) | $I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 1\text{k}\Omega$ | | 5 | | |
| T_{PHL} | Propagation Delay High to Low | $I_F = 1.6\text{mA}, V_{CC} = 5.0\text{V}, R_L = 750\Omega$ | | 3 | | μs |
| | | $I_F = 1.6\text{mA}, V_{CC} = 5.0\text{V}, R_L = 4.7\text{k}\Omega$ | | 12 | | |
| T_{PLH} | Propagation Delay Low to High | $I_F = 1.6\text{mA}, V_{CC} = 5.0\text{V}, R_L = 750\Omega$ | | 5 | | μs |
| | | $I_F = 1.6\text{mA}, V_{CC} = 5.0\text{V}, R_L = 4.7\text{k}\Omega$ | | 19 | | |

Isolation Characteristics

| Symbol | Characteristic | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------|---|--|-----------|------|------|----------|
| V_{ISO} | Steady State Isolation Voltage ⁽³⁾ | $RH \leq 50\%, T_A = 25^\circ\text{C}, t = 1\text{ sec}$ | 2500 | | | V(rms) |
| R_{ISO} | Resistance (input to output) ⁽³⁾ | $V_{I-O} = 500\text{VDC}$ | 10^{12} | | | Ω |
| C_{ISO} | Capacitance (input to output) ⁽³⁾ | $f = 1\text{MHz}$ | | 0.3 | 0.5 | pF |

Notes:

- The white dome area is sensitive to high intensity ambient light or any light source in the 500nm to 1200nm wavelength range. If such a light source is present, the part should be covered or protected. If the white dome is exposed to such a light source, the output leakage parameter of the phototransistor will increase.
- CTR bin (F0DB100 only)
F0DB101: 100% – 200%
F0DB102: 150% – 300%
- Pin 1 and Pin 2 are shorted as input and Pin 3 and Pin 4 are shorted as output.

Typical Performance Characteristics

Fig. 1 Normalized CTR vs. Temperature (VCE = 2V)

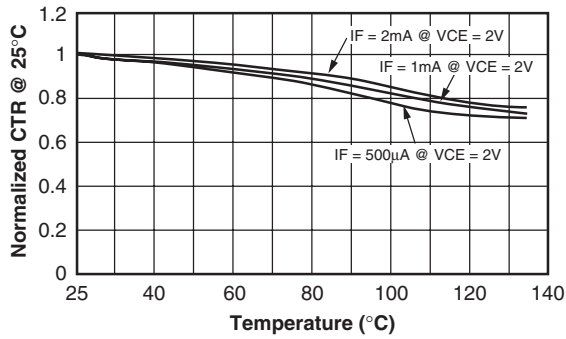


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

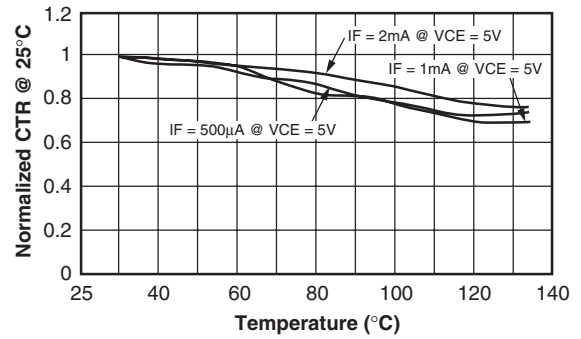


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

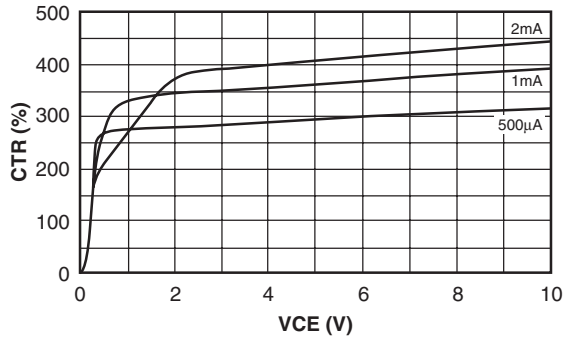


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

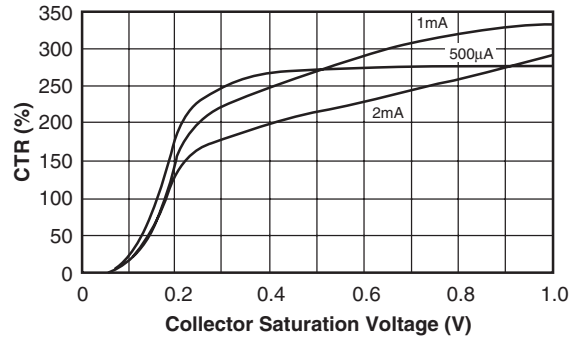
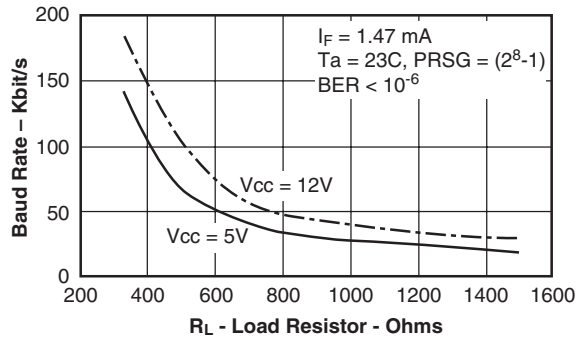
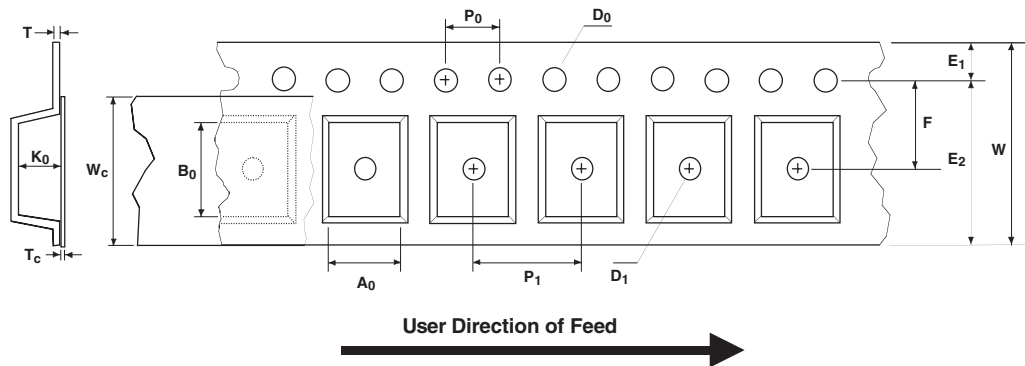


Fig. 5 Baud Rate vs. Load Resistor



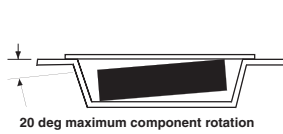
Tape and Reel Specifications

Embossed Carrier Tape Configuration

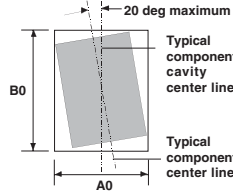


| Dimensions are in millimeter | | | | | | | | | | | | | | |
|------------------------------|------------|------------|----------------|------------------|------------------|------------|-----------|------------|----------|----------|------------|-------------|----------|------------|
| Pkg type | A_0 | B_0 | W | D_0 | D_1 | E_1 | E_2 | F | P_1 | P_0 | K_0 | T | W_c | T_c |
| Optocoupler (12mm) | 3.80 ±0.10 | 3.80 ±0.10 | 12.0 +0.3/-0.1 | 1.50 +0.25/-0.00 | 1.50 +0.25/-0.00 | 1.75 ±0.10 | 10.25 min | 5.50 ±0.05 | 8.0 ±0.1 | 4.0 ±0.1 | 1.40 ±0.10 | 0.279 ±0.02 | 9.2 ±0.3 | 0.06 ±0.02 |

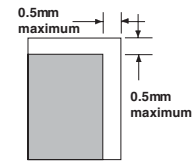
Notes: A_0 , B_0 , and K_0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

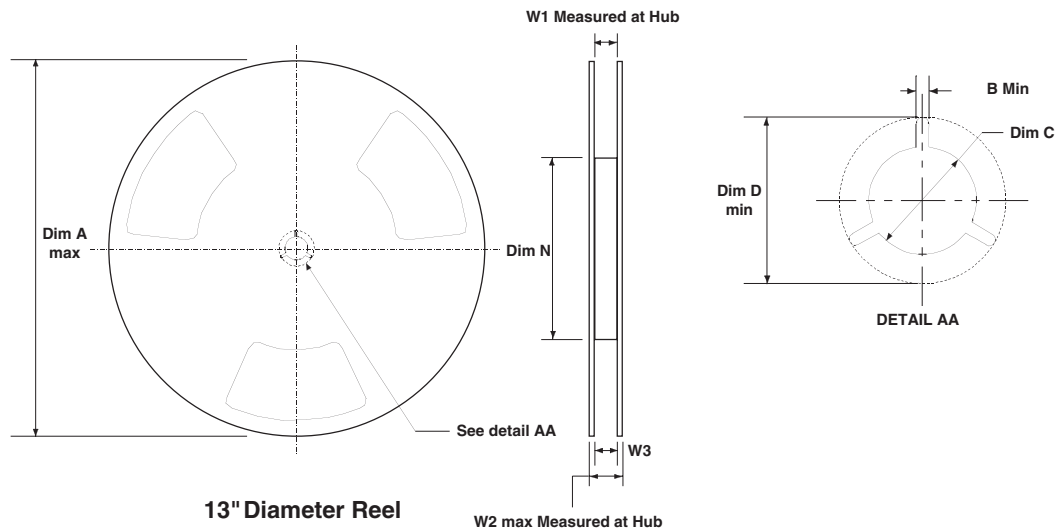


Sketch B (Top View)
Component Rotation



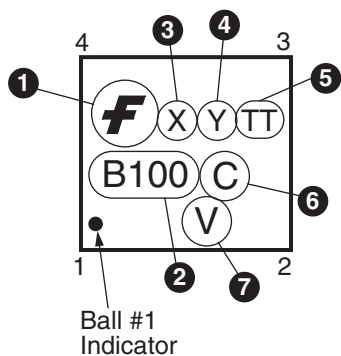
Sketch C (Top View)
Component lateral movement

Optocoupler Reel Configuration



| Dimension are in inches and millimeters | | | | | | | | | |
|---|-------------|--------------|--------------|-----------------------------------|---------------|-------------|-----------------------------------|---------------|------------------------------|
| Tape Size | Reel Option | Dim A | Dim B | Dim C | Dim D | Dim N | Dim W1 | Dim W2 | Dim W3 (LSL-USL) |
| 12mm | 13" Dia | 13.00 330 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 7.00 178 | 0.488 +0.078/-0.000 12.4 +2/-0 | 0.724 18.4 | 0.469 - 0.606 11.9 - 15.4 |

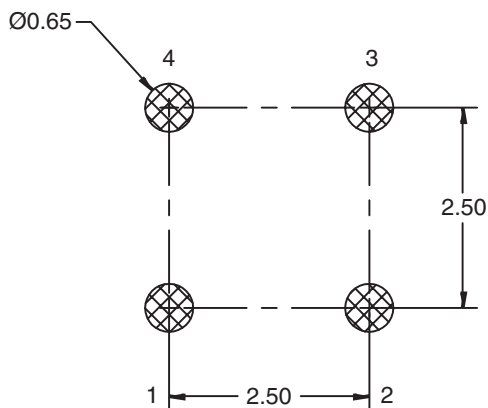
Marking Information



| Definitions | |
|-------------|---------------------------------------|
| 1 | Fairchild logo |
| 2 | Device number (FODB100) |
| 3 | One digit year code e.g. "E" for 2004 |
| 4 | 6-week date code character |
| 5 | Die Run Code |
| 6 | Assembly package code |
| 7 | VDE 0884 approved (Optional) |

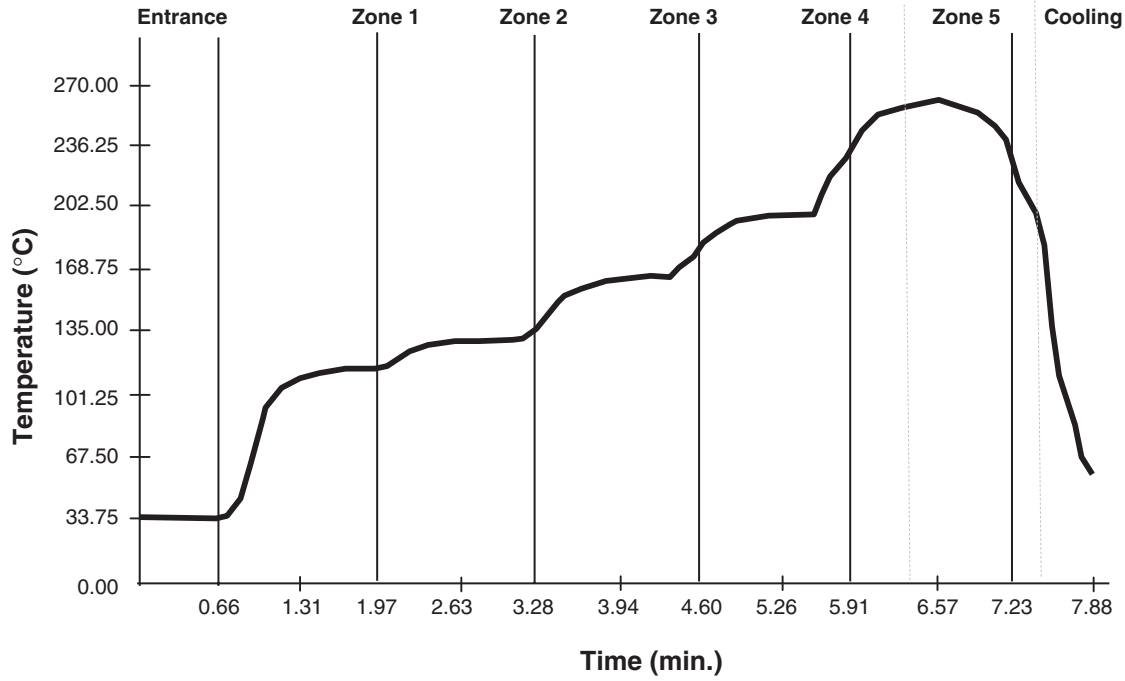
Note: The device number prefix of "FOD" will be omitted in the part number

Recommended Footprint Drawing for PCB Layout



- Note:**
1. All dimensions in millimeters (mm)
 2. It is recommended to use 6 mils of stencil thickness on PCB

Recommended Infrared Reflow Soldering Profile



Reflow Profile for Pb Free

| | Convection Reflow |
|--|-------------------|
| Average ramp-up rate (183°C to peak) | 3°C/sec max |
| Preheat Temperature 125(±25)°C to 200°C | 60-180°C |
| Temperature maintained above 220°C | 60-150 sec |
| Time within 5°C of actual peak temperature | 20-40 sec |
| Peak temperature range | 260 ±5°C |
| Ramp down rate | 6°C/sec max |
| Time 25°C to peak temperature | 8min max |

Note: Surface Mount Adhesives (SMA) isn't recommended to be used on the dome area (white dome).

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| The Power Franchise® | | ScalarPump™ | UHC™ | |
| Programmable Active Droop™ | | | | |

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