

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

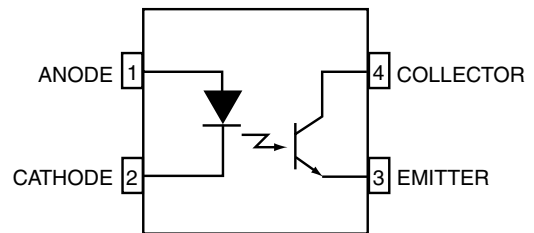
Applications

- 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

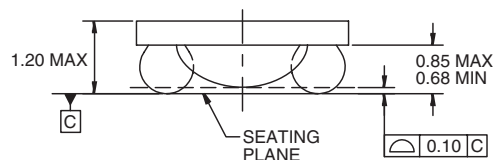
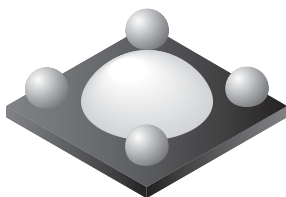
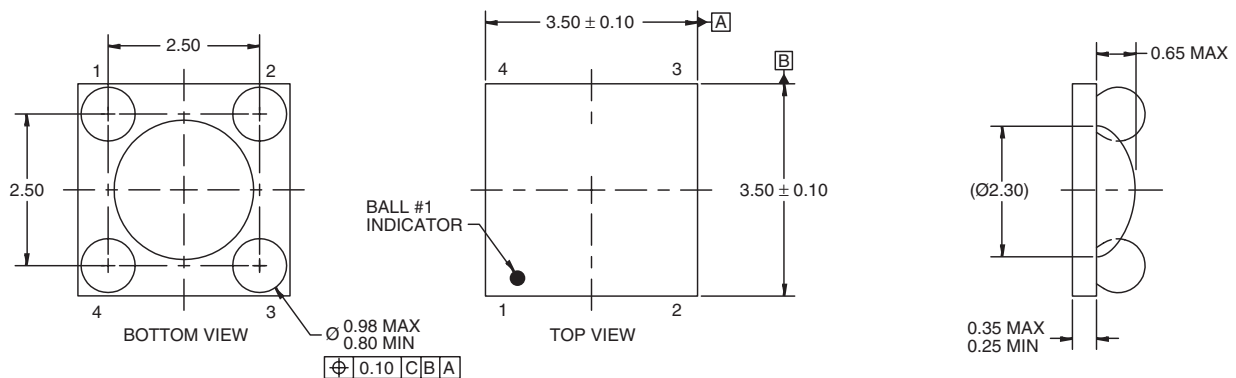
Description

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°C Unless otherwise specified)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
EMITTER						
V _F	Forward Voltage	I _F = 2mA	1.0		1.5	V
I _R	Reverse Current	V _R = 6V			10	μA
DETECTOR						
BV _{CEO}	Breakdown Voltage Collector to Emitter	I _C = 100μA, I _F = 0	75			V
BV _{ECO}	Emitter to Collector	I _E = 100μA, I _F = 0	7			V
I _{CEO}	Collector Dark Current ⁽¹⁾	V _{CE} = 75V, I _F = 0			100	nA
C _{CE}	Capacitance	V _{CE} = 0V, f = 1MHz		8		pF

Transfer Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
CTR	Current Transfer Ratio ⁽²⁾	I _F = 1mA, V _{CE} = 5V	100			%
CTR _{CE(SAT)}	Saturated Current Transfer Ratio (Collector to Emitter)	I _F = 1.6mA, V _{CE} = 0.4V	100			%
		I _F = 1.0mA, V _{CE} = 0.4V	75			
V _{CE(SAT)}	Saturation Voltage	I _F = 3.0mA, I _C = 1.8mA			0.4	V
		I _F = 1.6mA, I _C = 1.6mA				
t _r	Rise Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5 V, R _L = 1kΩ		1		μs
t _f	Fall Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5 V, R _L = 1kΩ		5		
T _{PHL}	Propagation Delay High to Low	I _F = 1.6mA, V _{CC} = 5.0 V, R _L = 750Ω		3		μs
		I _F = 1.6mA, V _{CC} = 5.0 V, R _L = 4.7kΩ		12		
T _{PLH}	Propagation Delay Low to High	I _F = 1.6mA, V _{CC} = 5.0 V, R _L = 750Ω		5		μs
		I _F = 1.6mA, V _{CC} = 5.0 V, R _L = 4.7kΩ		19		

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
V _{ISO}	Steady State Isolation Voltage ⁽³⁾	RH ≤ 50%, T _A = 25°C, t = 1 sec	2500			V(rms)
R _{ISO}	Resistance (input to output) ⁽³⁾	V _{I-O} = 500VDC	10 ¹²			Ω
C _{ISO}	Capacitance (input to output) ⁽³⁾	f = 1MHz		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 (FODDB100 only)
FODDB101: 100% – 200%
FODDB102: 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)

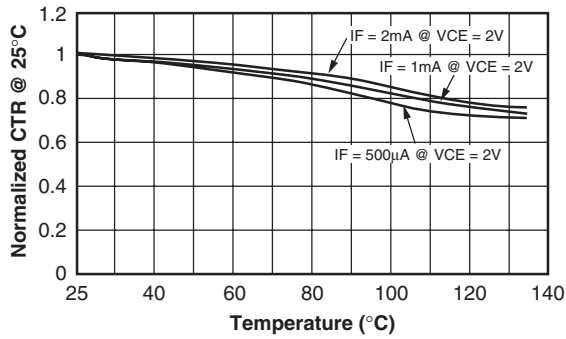


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

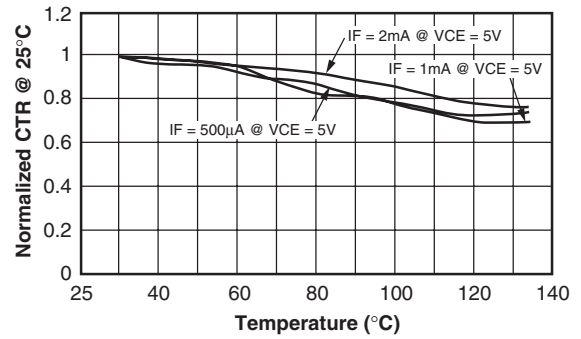


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

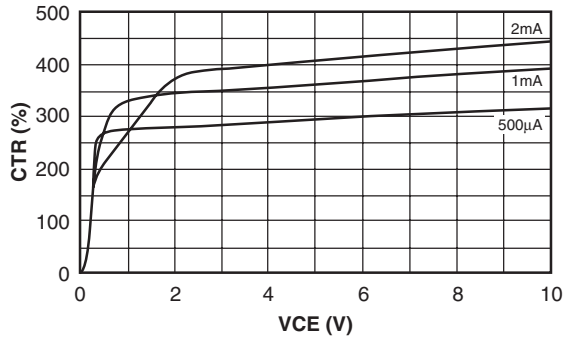


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

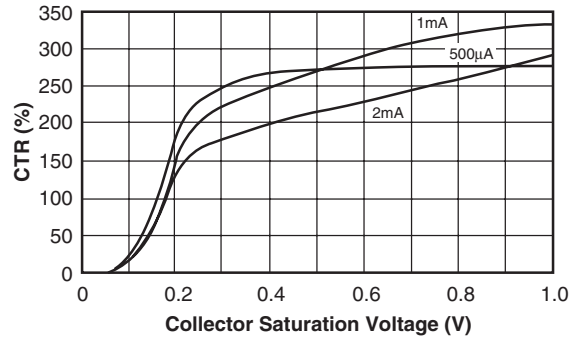
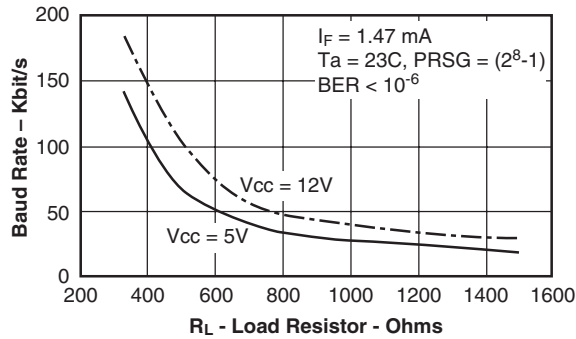
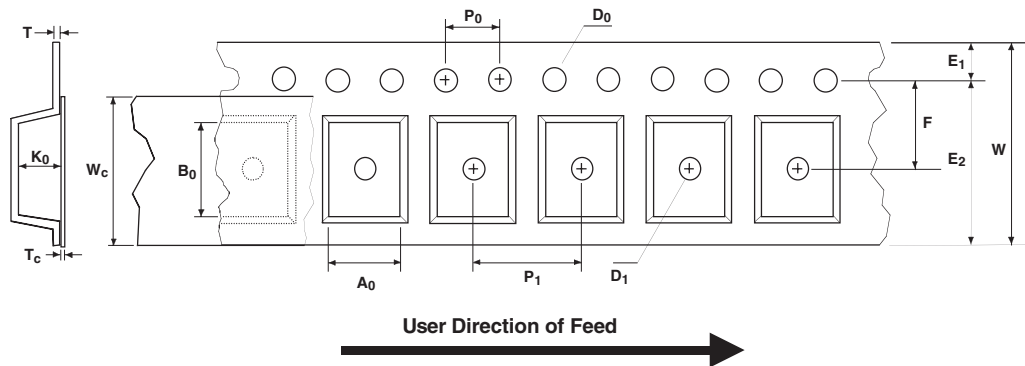


Fig. 5 Baud Rate vs. Load Resistor



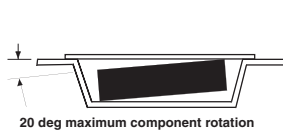
Tape and Reel Specifications

Embossed Carrier Tape Configuration

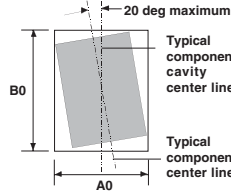


Dimensions are in millimeter														
Pkg type	A_0	B_0	W	D_0	D_1	E_1	E_2	F	P_1	P_0	K_0	T	W_c	T_c
Optocoupler (12mm)	3.80 ±0.10	3.80 ±0.10	12.0 +0.3/-0.1	1.50 +0.25/-0.00	1.50 +0.25/-0.00	1.75 ±0.10	10.25 min	5.50 ±0.05	8.0 ±0.1	4.0 ±0.1	1.40 ±0.10	0.279 ±0.02	9.2 ±0.3	0.06 ±0.02

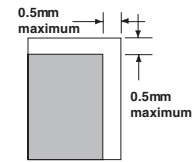
Notes: A_0 , B_0 , and K_0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

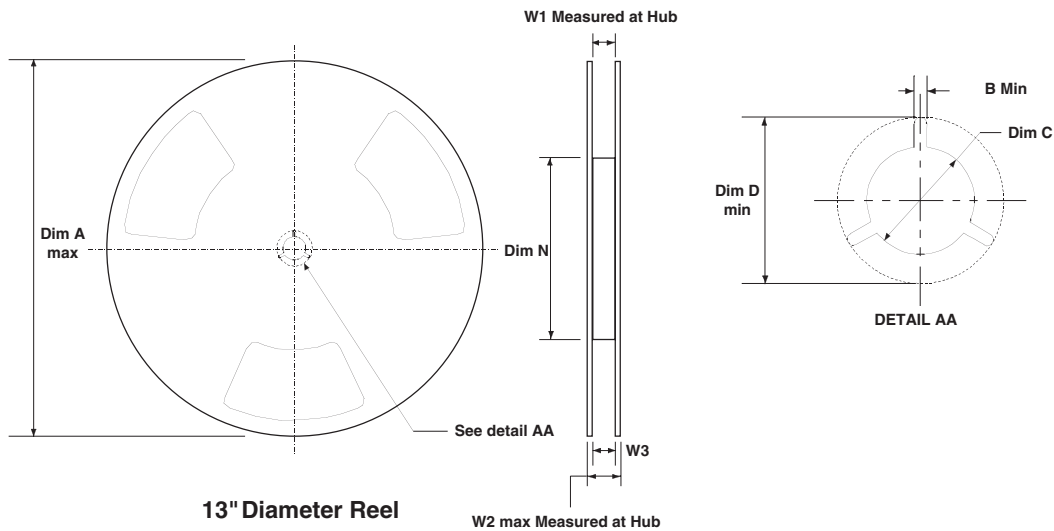


Sketch B (Top View)
Component Rotation



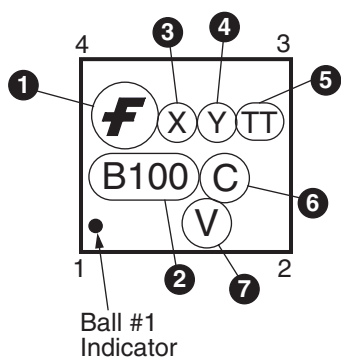
Sketch C (Top View)
Component lateral movement

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

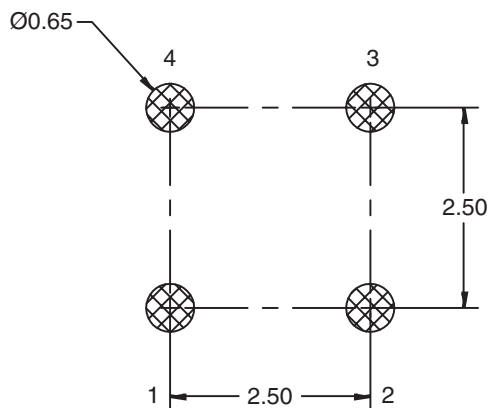
Marking Information



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)

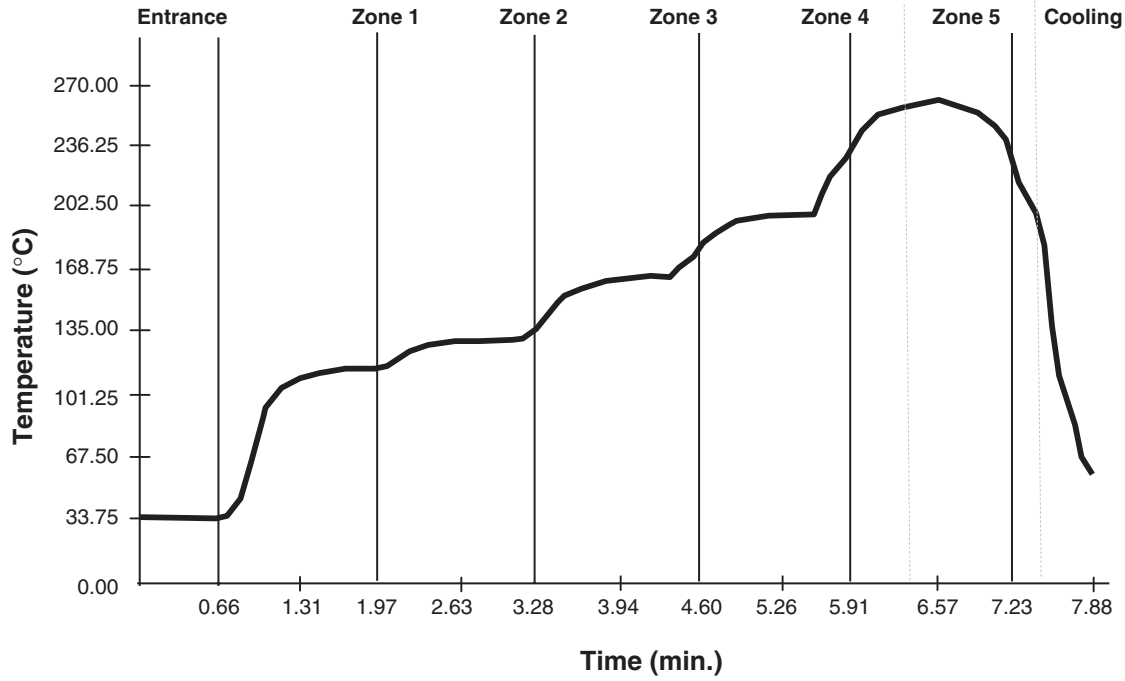
Note: The device number prefix of "FOD" will be omitted in the part number

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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Datasheet Identification	Product Status	Definition
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