FAIRCHILD SEMICONDUCTOR®

July 2006

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

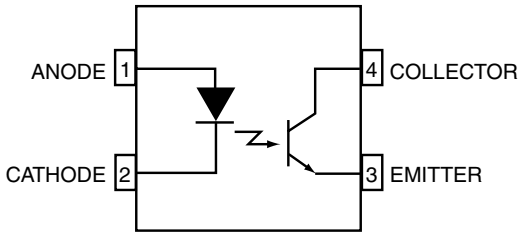
Applications

- 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

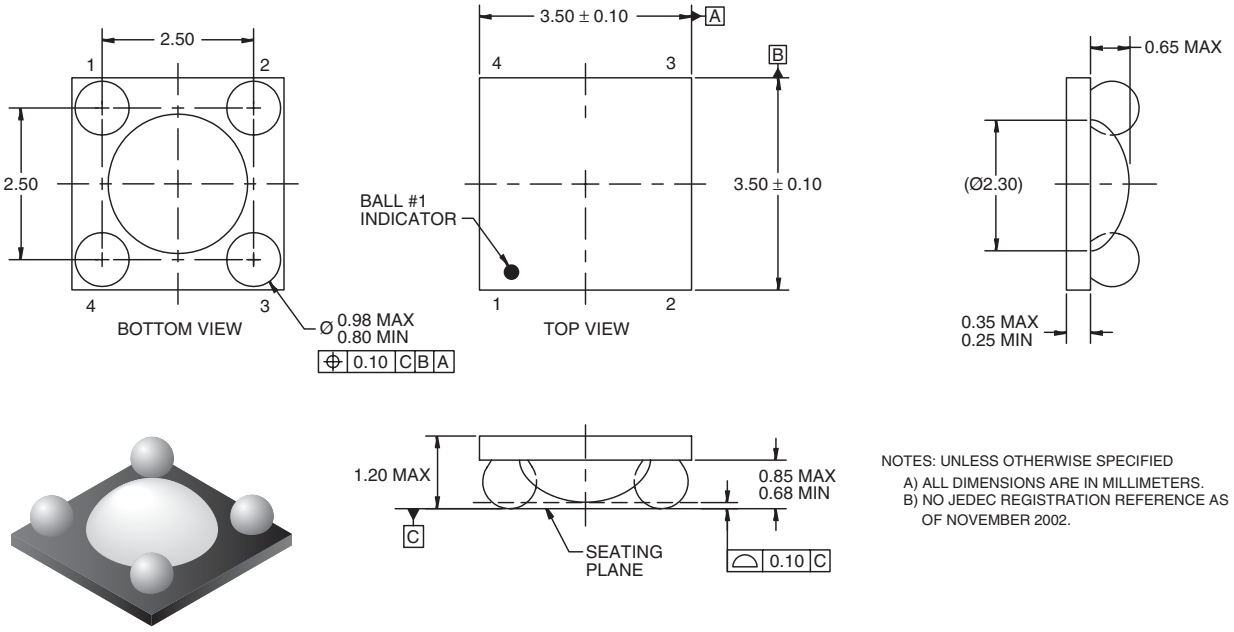
Description

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°C Unless otherwise specified)

Symbol	Parameter	Value	Units
TOTAL PACKAGE			
T_{STG}	Storage Temperature	-55 to +150	°C
T_{OPR}	Operating Temperature	-40 to +125	°C
T_j	Junction Temperature	130	°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/°C
DETECTOR			
	Continuous Collector Current	50	mA
P_D	Power Dissipation	150	mW
	Derate linearly (above 25°C)	1.42	mW/°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:

1. 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.
2. CTR bin (FODB100 only)
   FODB101: 100% – 200%
   FODB102: 150% – 300%
3. 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)

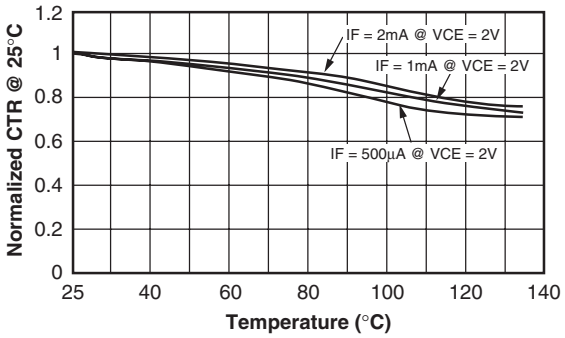


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

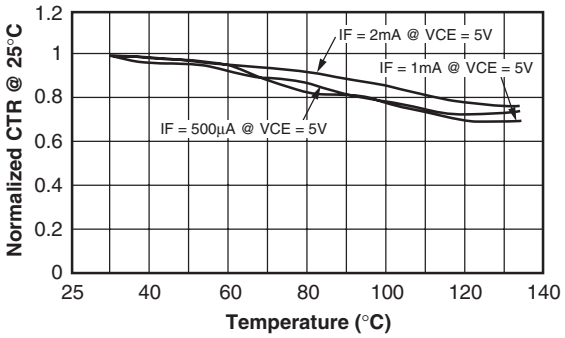


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

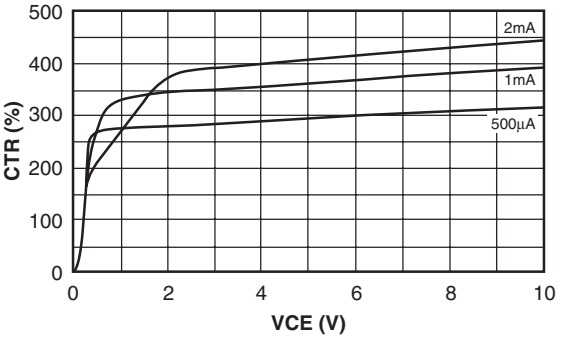


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

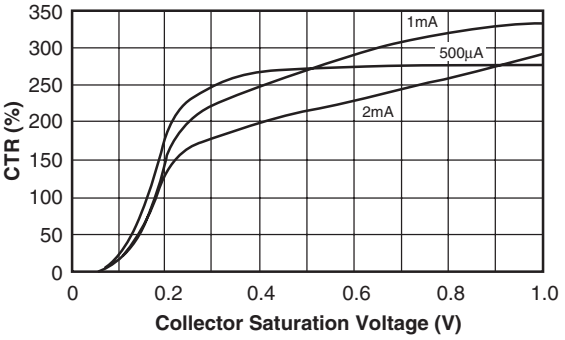
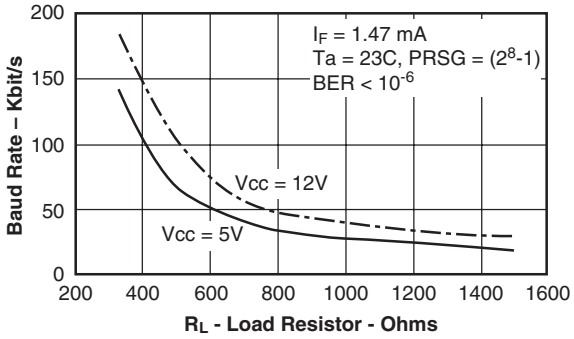
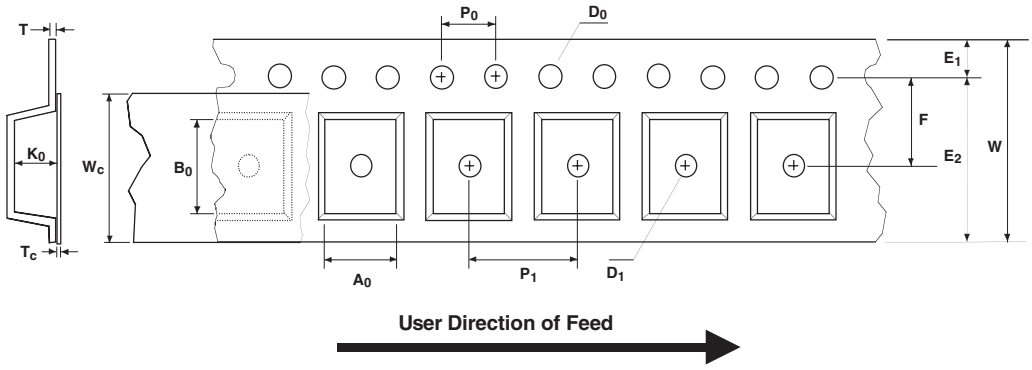


Fig. 5 Baud Rate vs. Load Resistor



Tape and Reel Specifications

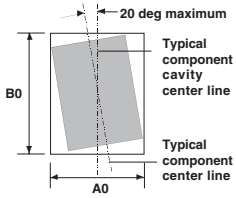
Embossed Carrier Tape Configuration



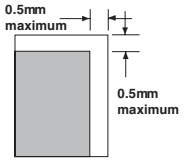
Dimensions are in millimeter														
Pkg type	A_0	B_0	W	D_0	D_1	E_1	E_2	F	P_1	P_0	K_0	T	W_c	T_c
Optocoupler (12mm)	3.80 ±0.10	3.80 ±0.10	12.0 +0.3/ –0.1	1.50 +0.25/ –0.00	1.50 +0.25/ –0.00	1.75 ±0.10	10.25 min	5.50 ±0.05	8.0 ±0.1	4.0 ±0.1	1.40 ±0.10	0.279 ±0.02	9.2 ±0.3	0.06 ±0.02

Notes: A0, B0, and K0 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

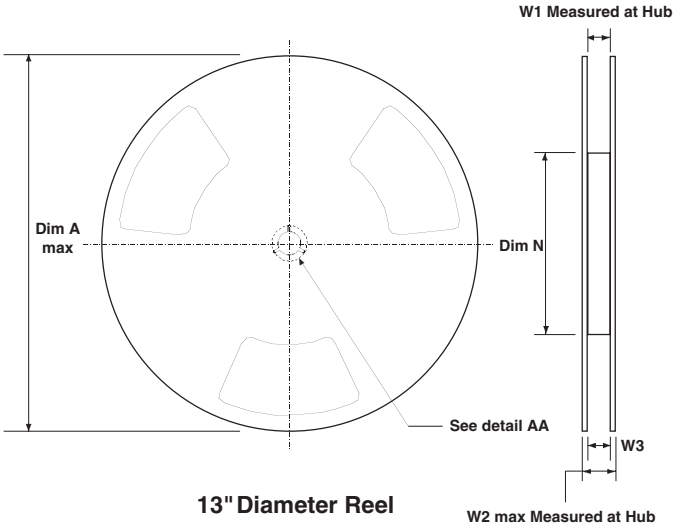


Sketch B (Top View)
Component Rotation

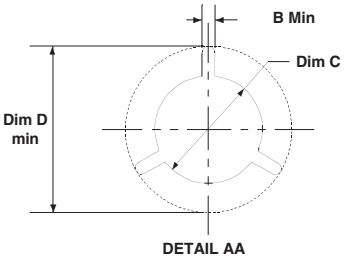


Sketch C (Top View)
Component lateral movement

Optocoupler Reel Configuration

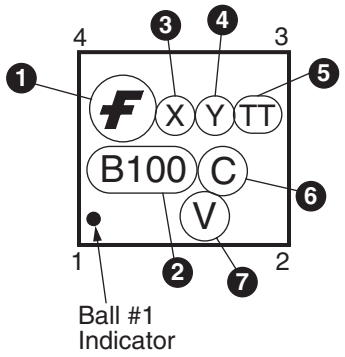


13" Diameter Reel



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

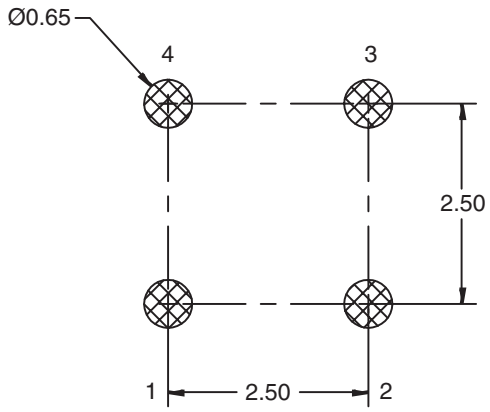
Marking Information



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)

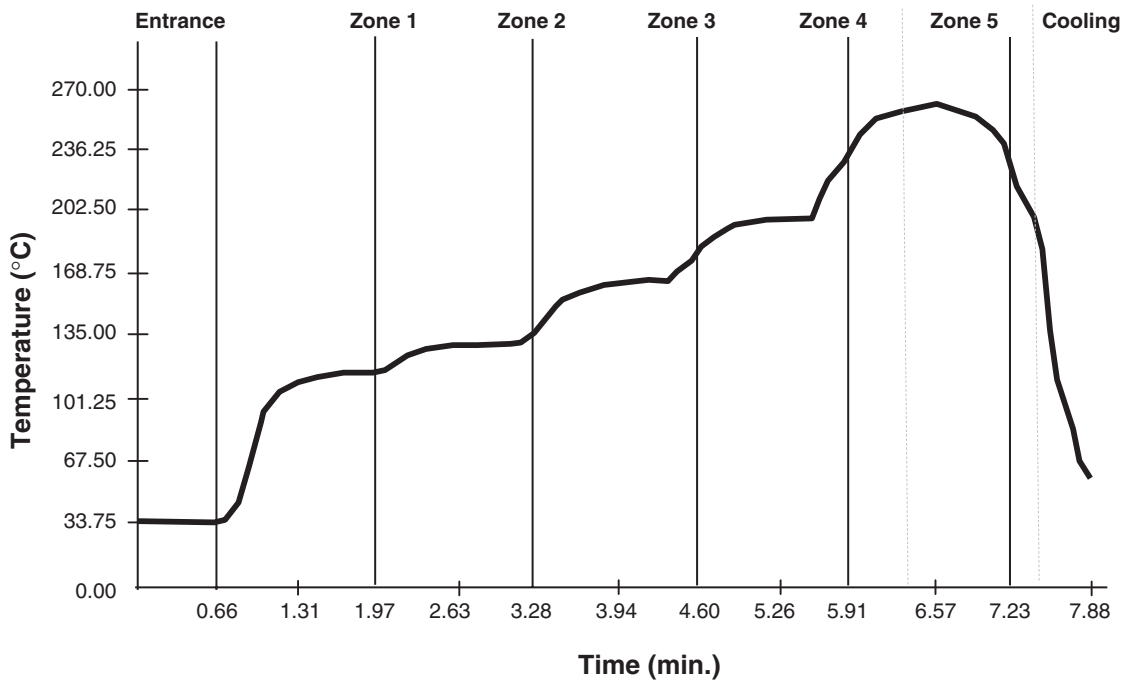
Note: The device number prefix of “FOD” will be ommitted in the part number

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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CoolFET™	I^2C™	PACMAN™	SuperFET™	
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E^2CMOS™	ISOPLANAR™	PowerSaver™	SyncFET™	
EnSigna™	LittleFET™	PowerTrench®	TCM™	
FACT™	MICROCOUPLER™	QFET®	TinyBoost™	
FAST®	MicroFET™	QS™	TinyBuck™	
FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
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Across the board. Around the world.™		μSerDes™	TruTranslation™	
The Power Franchise®		ScalarPump™	UHC™	
Programmable Active Droop™				

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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.
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