

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

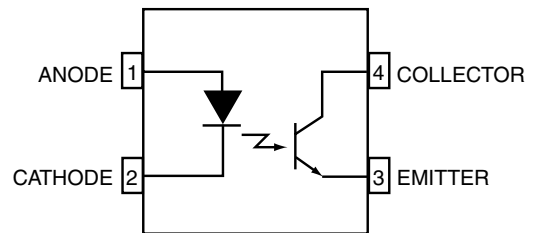
Applications

- 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

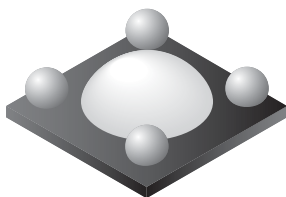
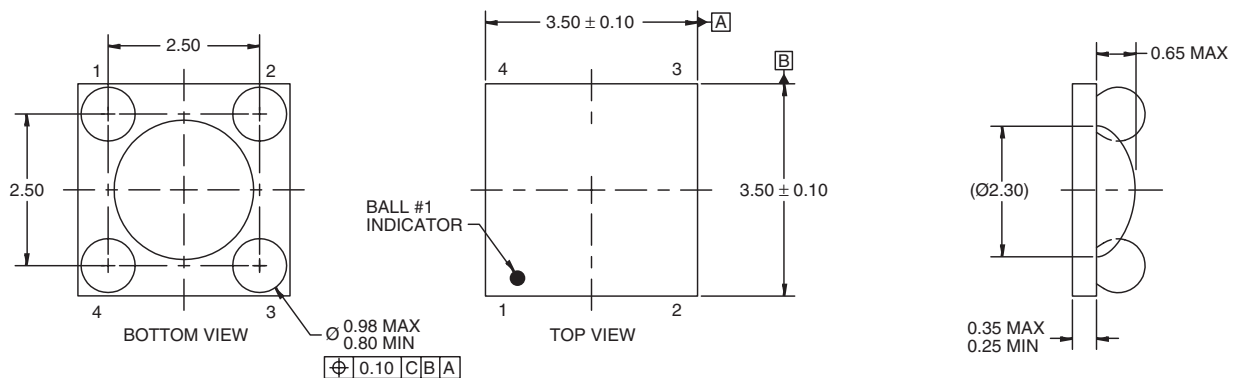
Description

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 (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)

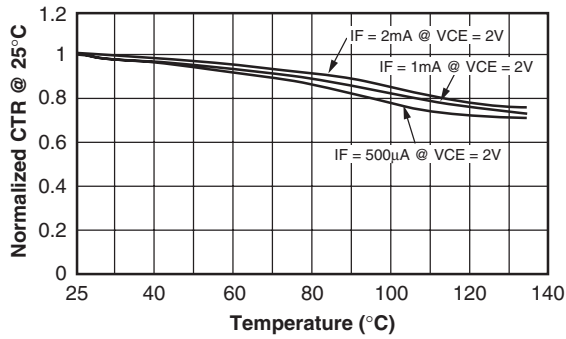


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

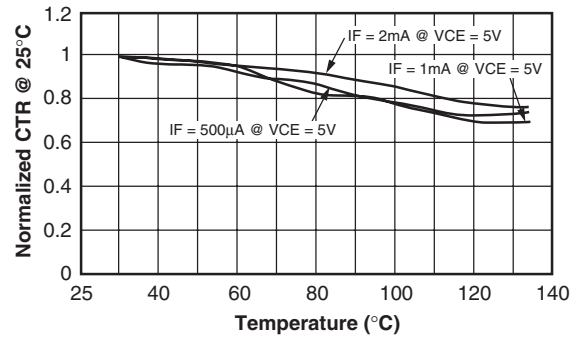


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

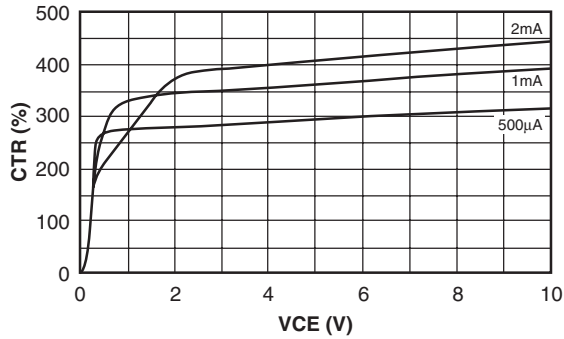


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

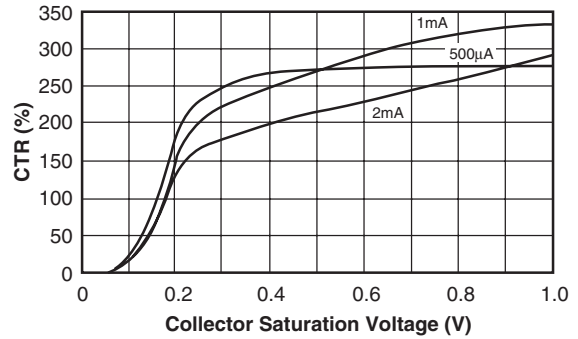
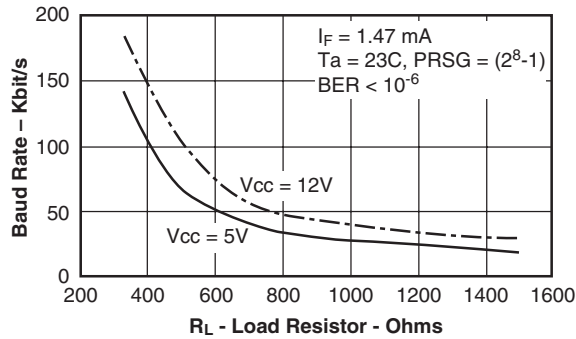
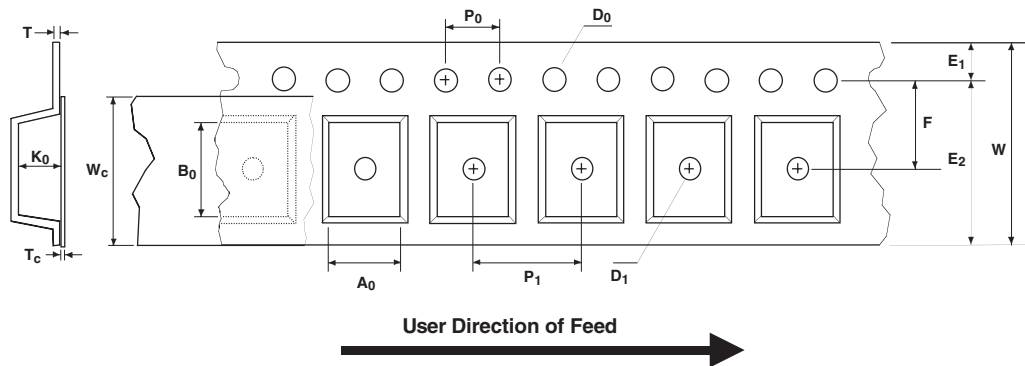


Fig. 5 Baud Rate vs. Load Resistor



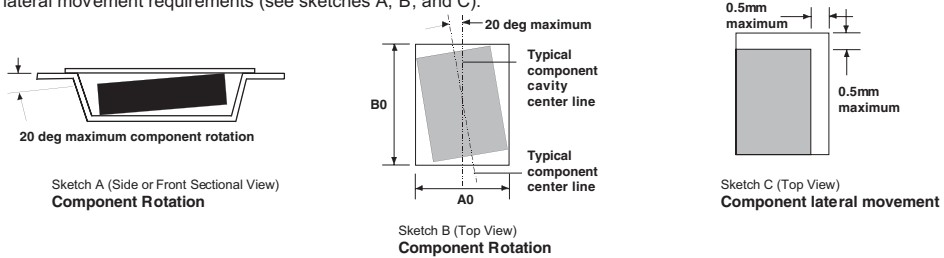
Tape and Reel Specifications

Embossed Carrier Tape Configuration

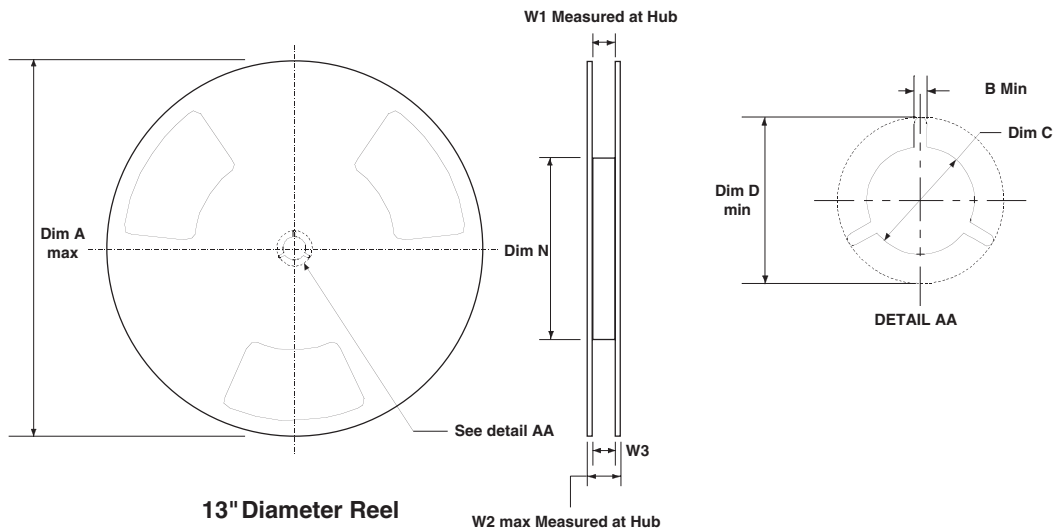


Dimensions are in millimeter														
Pkg type	A_0	B_0	W	D_0	D_1	E_1	E_2	F	P_1	P_0	K_0	T	W_c	T_c
Optocoupler (12mm)	3.80 ±0.10	3.80 ±0.10	12.0 +0.3/-0.1	1.50 +0.25/-0.00	1.50 +0.25/-0.00	1.75 ±0.10	10.25 min	5.50 ±0.05	8.0 ±0.1	4.0 ±0.1	1.40 ±0.10	0.279 ±0.02	9.2 ±0.3	0.06 ±0.02

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).

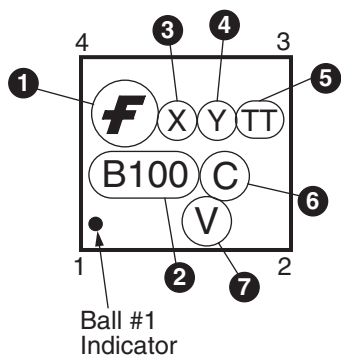


Optocoupler Reel Configuration



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

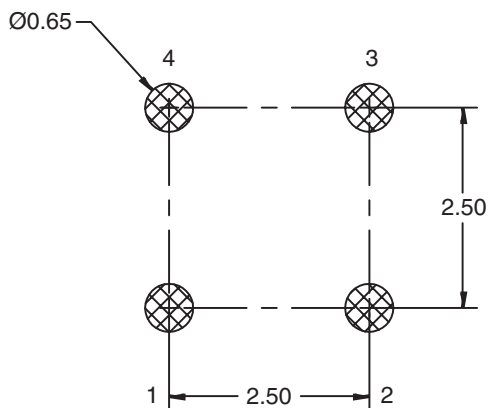
Marking Information



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)

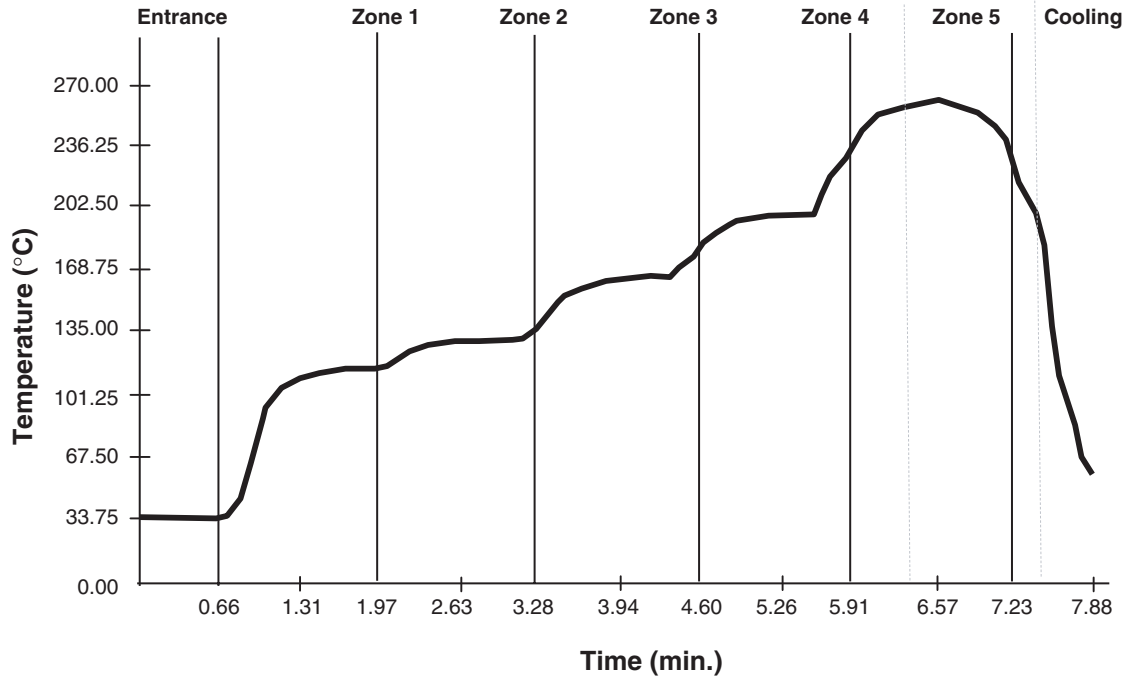
Note: The device number prefix of "FOD" will be omitted in the part number

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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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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