

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

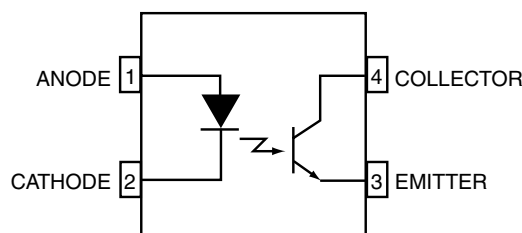
Applications

- 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

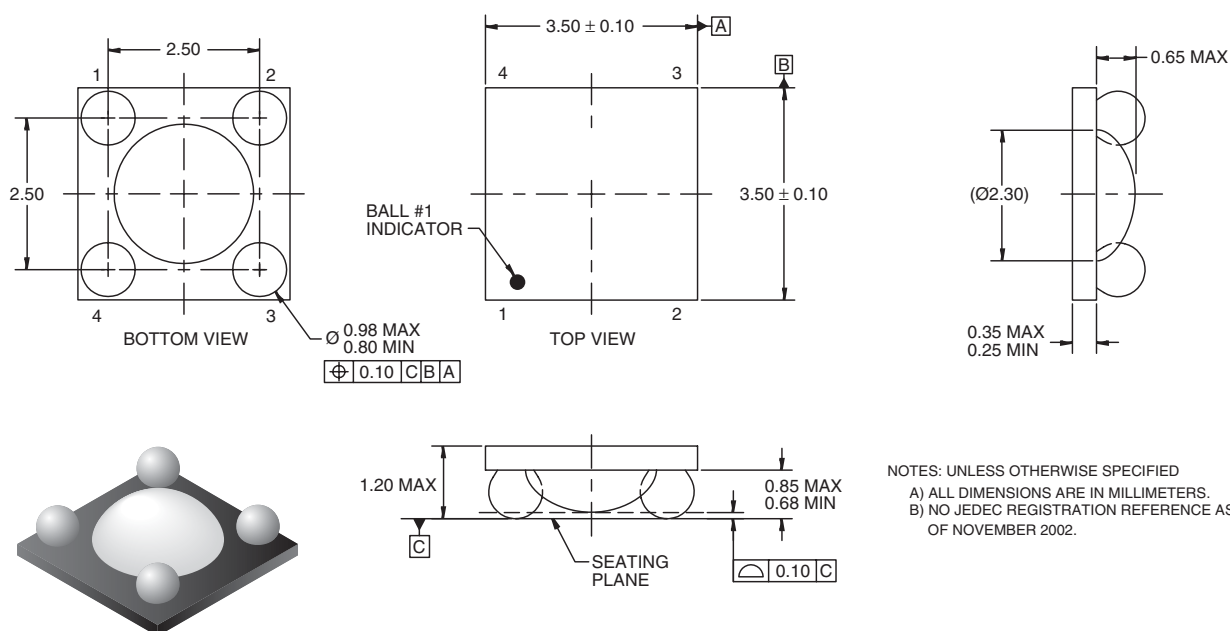
Description

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



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			
$I_F (\text{avg})$	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 (FODB100 only)
FODB101: 100% – 200%
FODB102: 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)

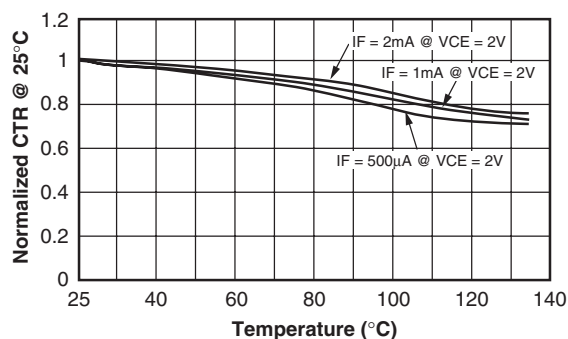


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

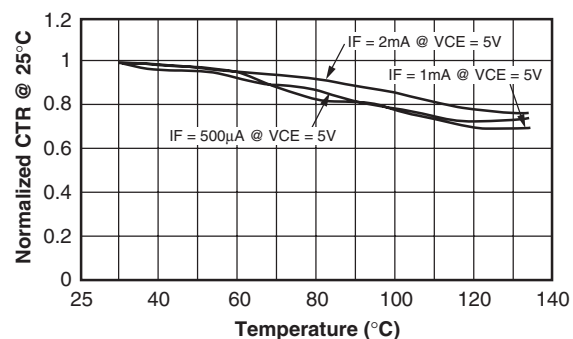


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

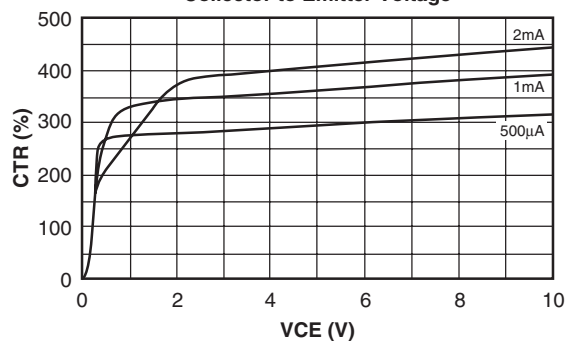


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

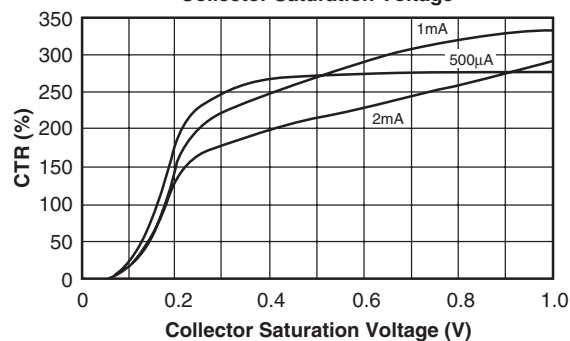
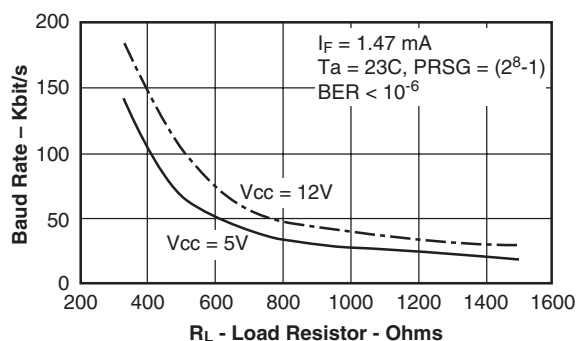
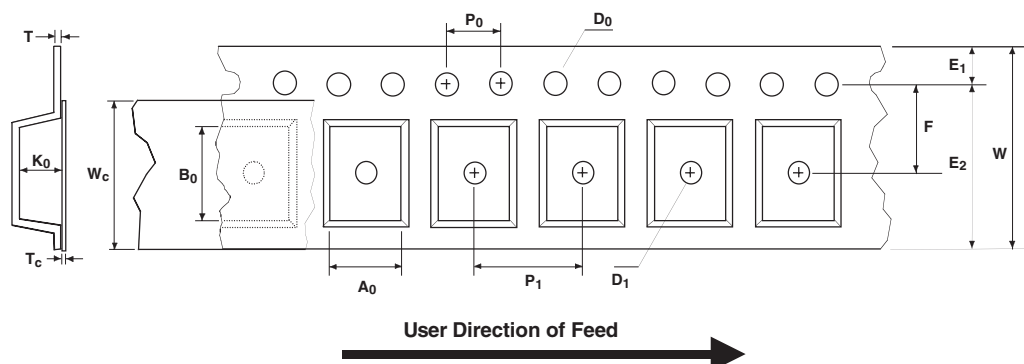


Fig. 5 Baud Rate vs. Load Resistor



Tape and Reel Specifications

Embossed Carrier Tape Configuration

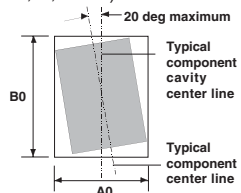


Dimensions are in millimeter														
Pkg type	A_0	B_0	W	D_0	D_1	E_1	E_2	F	P_1	P_0	K_0	T	W_c	T_c
Optocoupler (12mm)	3.80 ± 0.10	3.80 ± 0.10	12.0 $+0.3/-0.1$	1.50 $+0.25/-0.00$	1.50 $+0.25/-0.00$	1.75 ± 0.10	10.25 min	5.50 ± 0.05	8.0 ± 0.1	4.0 ± 0.1	1.40 ± 0.10	0.279 ± 0.02	9.2 ± 0.3	0.06 ± 0.02

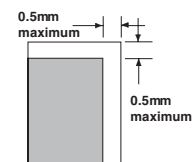
Notes: A_0 , B_0 , and K_0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

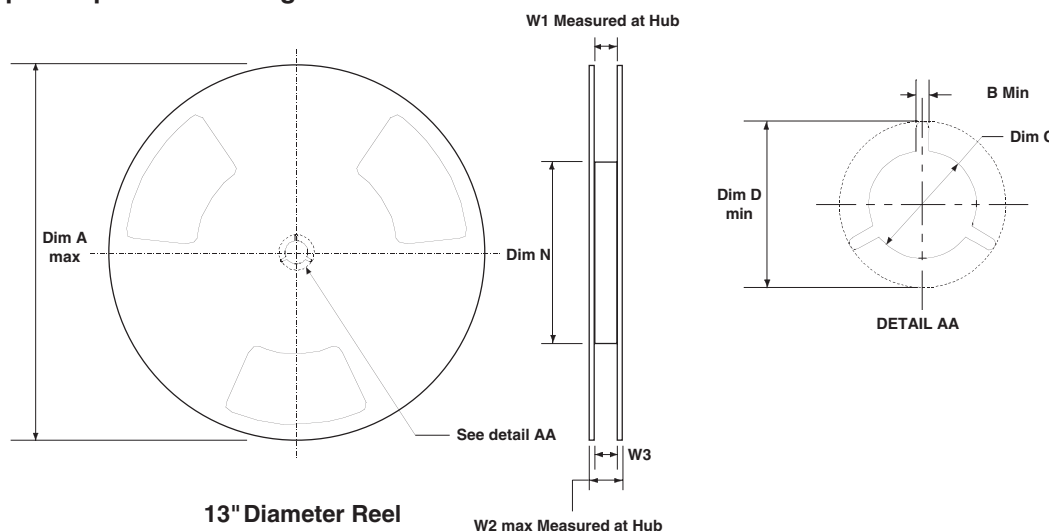


Sketch B (Top View)
Component Rotation



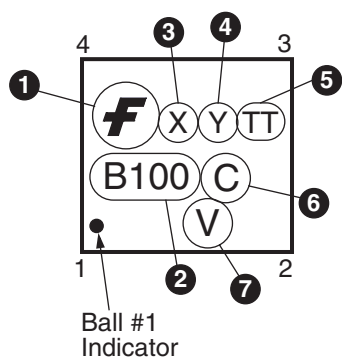
Sketch C (Top View)
Component lateral movement

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

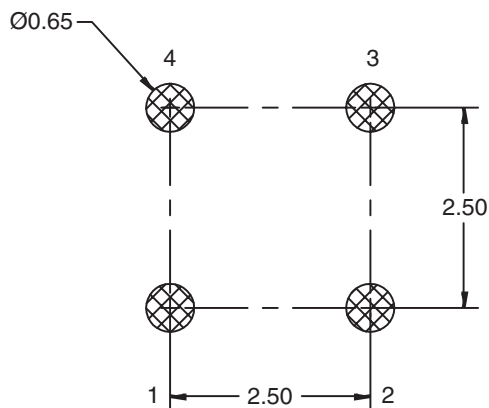


Note: The device number prefix of “FOD” will be omitted in the part number

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)

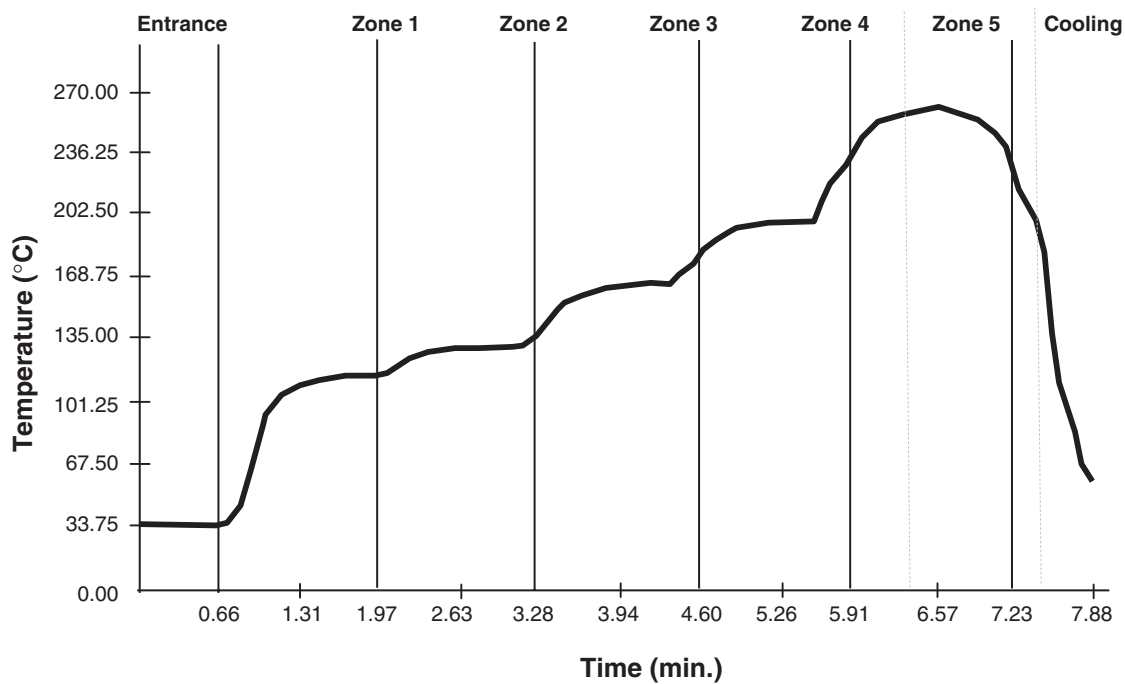
Recommended Footprint Drawing for PCB Layout



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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