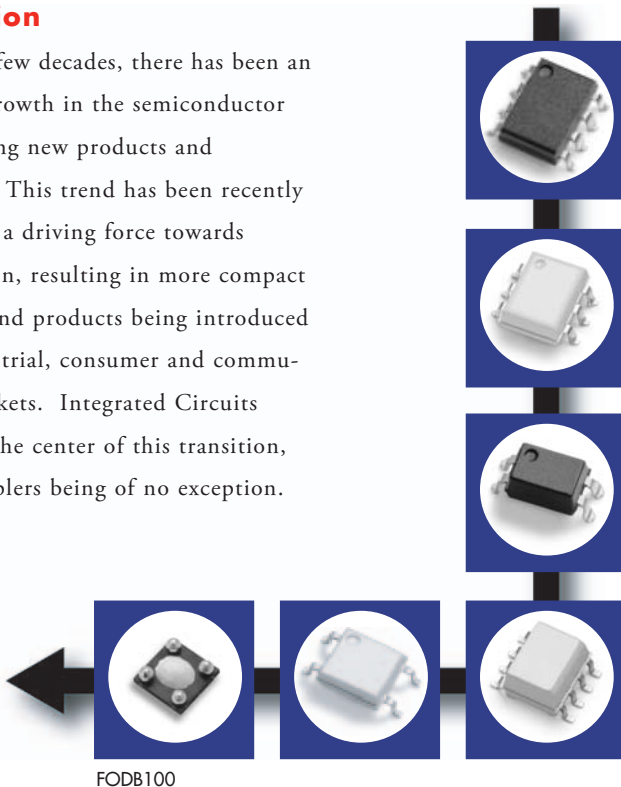


## Introduction

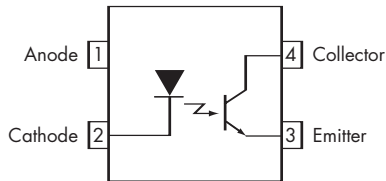
Over the last few decades, there has been an exponential growth in the semiconductor sector spawning new products and technologies. This trend has been recently stimulated by a driving force towards miniaturization, resulting in more compact applications and products being introduced into the industrial, consumer and communications markets. Integrated Circuits have been at the center of this transition, with optocouplers being of no exception.



# MICROCOUPLER™ Package

## Description

The FODB100 single channel MICRO-COUPLER is an all Pb-free, low profile miniature surface mount optocoupler in a Ball Grid Array (BGA) package. It consists of an aluminum gallium arsenide infrared emitting diode driving a silicon phototransistor.



FODB100 Schematic

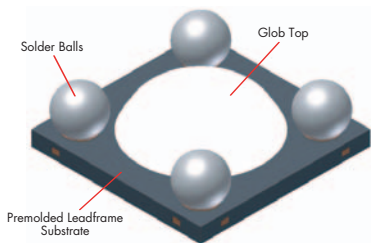
## Features

- 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<sub>rms</sub>
- Data rates up to 120Kbits/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, VDE certifications pending.

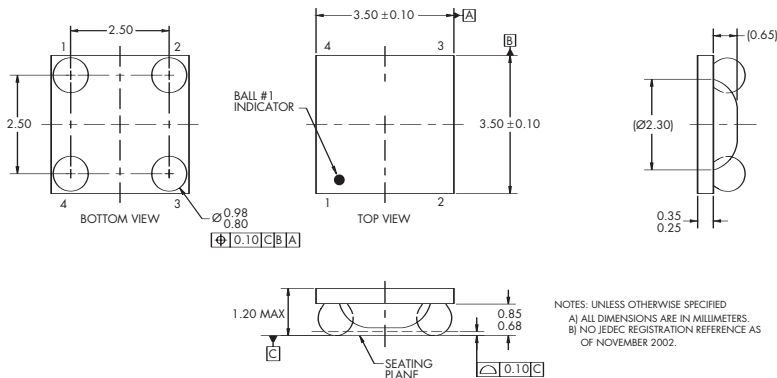
## Advantages

- Improved CTR performance over temperature
- Wide operating temperature range as compared to conventional optocouplers
- Owing to its low profile, small volume and footprint, this package can further save on board real estate giving hardware designers more flexibility and allowing for overall systems cost savings
- High IR reflow soldering capability in lead free environments.

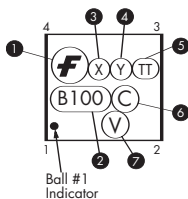
# Package Information



## Package Dimensions



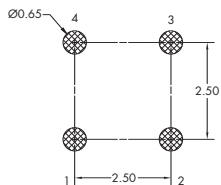
## Marking Information



### Definitions

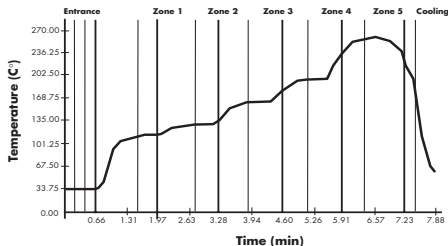
1	Fairchild logo
2	Device number (FODB100)
3	One digit year code e.g. "4" for 2004
4	6-week date code character
5	Die run code
6	Assembly package code
7	VDE 0884 approved (optional)

## Recommended Land Pattern



Notes:  
 1. All dimensions in 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	8 min max

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

## Electrical Specifications

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise specified)			
Parameters	Symbol	Value	Units
<b>Total Package</b>			
Storage Temperature	$T_{\text{STG}}$	-55 to +150	$^\circ\text{C}$
Operating Temperature	$T_{\text{OPR}}$	-40 to +125	$^\circ\text{C}$
Junction Temperature	$T_J$	130	$^\circ\text{C}$
<b>Emitter</b>			
Continuous Forward Current	$I_F (\text{avg})$	30	mA
Reverse Input Voltage	$V_R$	6	V
Power Dissipation Derate linearly (above $25^\circ\text{C}$ )	$P_D$	40	mW
		0.6	mW/ $^\circ\text{C}$
<b>Detector</b>			
Continuous Collector Current		50	mA
Power Dissipation Derate linearly (above $25^\circ\text{C}$ )	$P_D$	150	mW
		1.42	mW/ $^\circ\text{C}$
Collector-Emitter Voltage	$V_{\text{CEO}}$	75	V
Emitter-Collector Voltage	$V_{\text{ECO}}$	7	V

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ )						
<b>INDIVIDUAL COMPONENT CHARACTERISTICS</b>						
Parameters	Test Conditions	Symbol	Min	Typ	Max	Unit
<b>Emitter</b>						
Forward Voltage	( $I_F = 2\text{mA}$ )	$V_F$	1.0		1.5	V
Reverse Current	( $V_R = 6\text{V}$ )	$I_R$			10	$\mu\text{A}$
<b>Detector</b>						
Breakdown Voltage Collector to Emitter	( $I_C = 100\text{mA}$ , $I_F = 0$ )	$BV_{\text{CEO}}$	75			V
Emitter to Collector	( $I_E = 100\mu\text{A}$ , $I_F = 0$ )	$BV_{\text{ECO}}$	7			
Collector Dark Current	( $V_{\text{CE}} = 75\text{V}$ , $I_F = 0$ )	$I_{\text{CEO}}$			100	nA
Capacitance	( $V_{\text{CE}} = 0\text{V}$ , $f = 1\text{MHz}$ )	$C_{\text{CE}}$		8		pF

# Electrical Specifications

TRANSFER CHARACTERISTICS (T <sub>A</sub> = 25°C)						
Characteristic	Test Conditions	Symbol	Min	Typ	Max	Unit
Current Transfer Ratio <sup>1</sup>	(I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5V)	CTR	100			%
Saturated Current Transfer Ratio (Collector to Emitter)	(I <sub>F</sub> = 1.6mA, V <sub>CE</sub> = 0.4V)	CTR <sub>CE(SAT)</sub>	100			%
	(I <sub>F</sub> = 1.0mA, V <sub>CE</sub> = 0.4V)		75			
Saturation Voltage	(I <sub>F</sub> = 3.0mA, I <sub>C</sub> = 1.8mA) (I <sub>F</sub> = 1.6mA, I <sub>C</sub> = 1.6mA)	V <sub>CE(SAT)</sub>			0.4	V
Rise Time (Non-Saturated)	(I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V) (R <sub>L</sub> = 1K )	t <sub>r</sub>		1		μs
Fall Time (Non-Saturated)	(I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V) (R <sub>L</sub> = 1K)	t <sub>f</sub>		5		
Propagation Delay High to Low	I <sub>F</sub> = 1.6mA, V <sub>CC</sub> = 5.0V R <sub>L</sub> = 750	T <sub>PHL</sub>		3		μs
	I <sub>F</sub> = 1.6mA, V <sub>CC</sub> = 5.0V R <sub>L</sub> = 4.7K			12		
Propagation Delay Low to High	I <sub>F</sub> = 1.6mA, V <sub>CC</sub> = 5.0V R <sub>L</sub> = 750	T <sub>PLH</sub>		5		μs
	I <sub>F</sub> = 1.6mA, V <sub>CC</sub> = 5.0V R <sub>L</sub> = 4.7K			19		

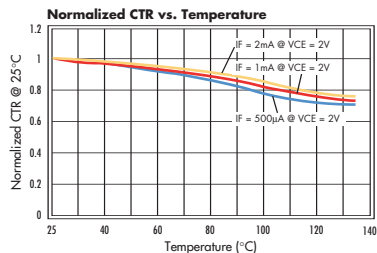
ISOLATION CHARACTERISTICS						
Characteristic	Test Conditions	Symbol	Min	Typ	Max	Unit
Steady State Isolation Voltage <sup>2</sup>	(RH ≤ 50%, T <sub>A</sub> = 25°C, t = 1 sec)	V <sub>ISO</sub>	2500			V(rms)
Resistance (input to output) <sup>2</sup>	(V <sub>I/O</sub> = 500 VDC)	R <sub>ISO</sub>	10 <sup>12</sup>			
Capacitance (input to output) <sup>2</sup>	f = 1MHz	C <sub>ISO</sub>		0.3	0.5	pF

## Notes:

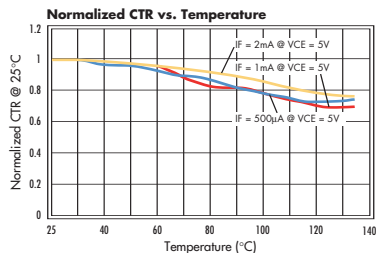
- CTR bin (FODB100 only)  
FODB101: 100% – 200%  
FODB102: 150% – 300%
- Pin 1 and Pin 2 are shorted as input and Pin 3 and Pin 4 are shorted as output.

# Typical Characteristic Curves

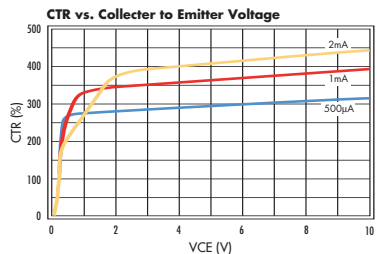
Normalized CTR at  $V_{ce} = 2V$



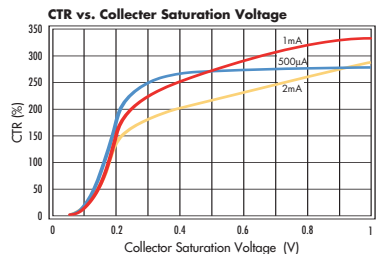
Normalized CTR at  $V_{ce} = 5V$



CTR vs.  $V_{ce}$



CTR vs.  $V_{ce(SAT)}$



# Applications, Markets, Safety Approvals

## Primary Application:

Feedback loop switch mode power supply

## Secondary Application:

Ground loop isolation and signal to noise isolation

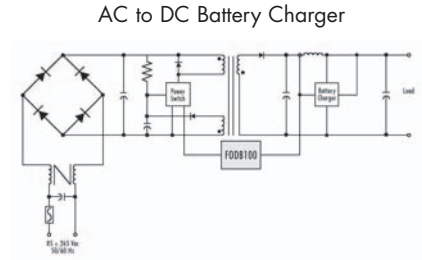
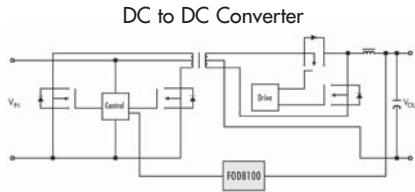
## Target Markets:

- Communications – chargers, adapters
- Consumer – appliances, set top boxes
- Industrial – power supplies, motor control

## Safety Agency Approvals:

UL and VDE certifications pending

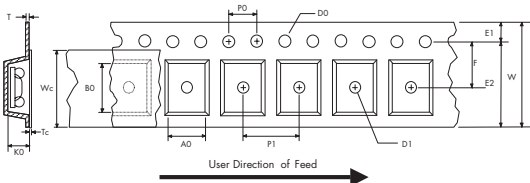
## Application Schematic Diagrams:



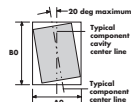


# Tape and Reel Specifications

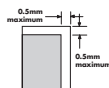
## Optocoupler Embossed Carrier Tape Configuration



Sketch A (Side or Front Sectional View)  
Component Rotation



Sketch B (Top View)  
Component Rotation

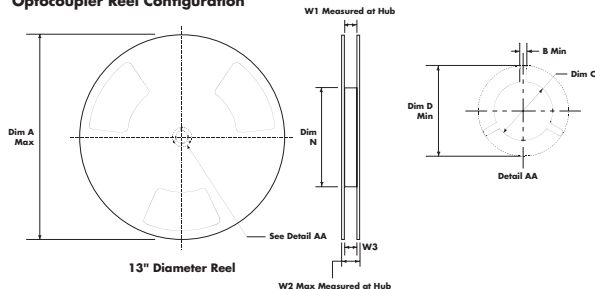


Sketch C (Top View)  
Component lateral movement

Dimensions are in millimeters														
Pkg Type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
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	5.30 ±0.05	8.0 ±0.1	4.0 ±0.1	1.40 ±0.10	0.279 ±0.02	0.2 ±0.3	0.06 ±0.02

**Note:** 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.)

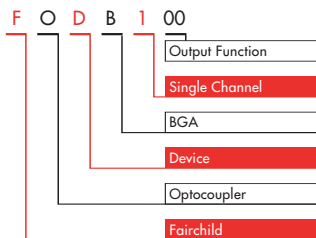
## Optocoupler Reel Configuration



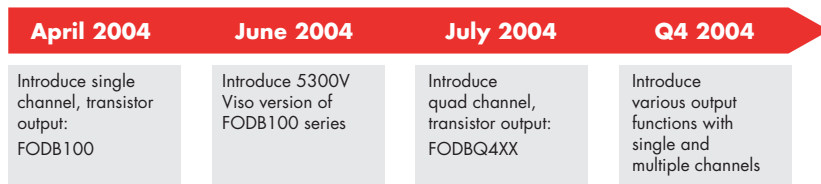
Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 ±0.5/0.2	0.795 20.2	7.00 178	0.488 ±0.078/0.000 12.4 ±2/0	0.724 18.4	0.489 - 0.606 11.9 - 15.4

# Ordering Information

FODB100



## Roadmap



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**[www.fairchildsemi.com/microcoupler](http://www.fairchildsemi.com/microcoupler)**  
.....

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