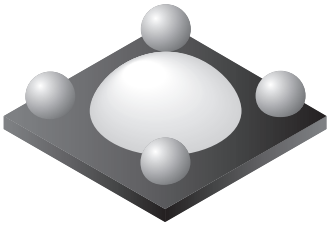
FAIRCHILD
SEMICONDUCTOR®

SINGLE CHANNEL MICROCOUPLER™

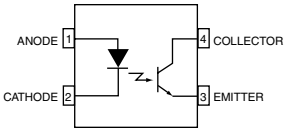
FODB100 FODB101 FODB102

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



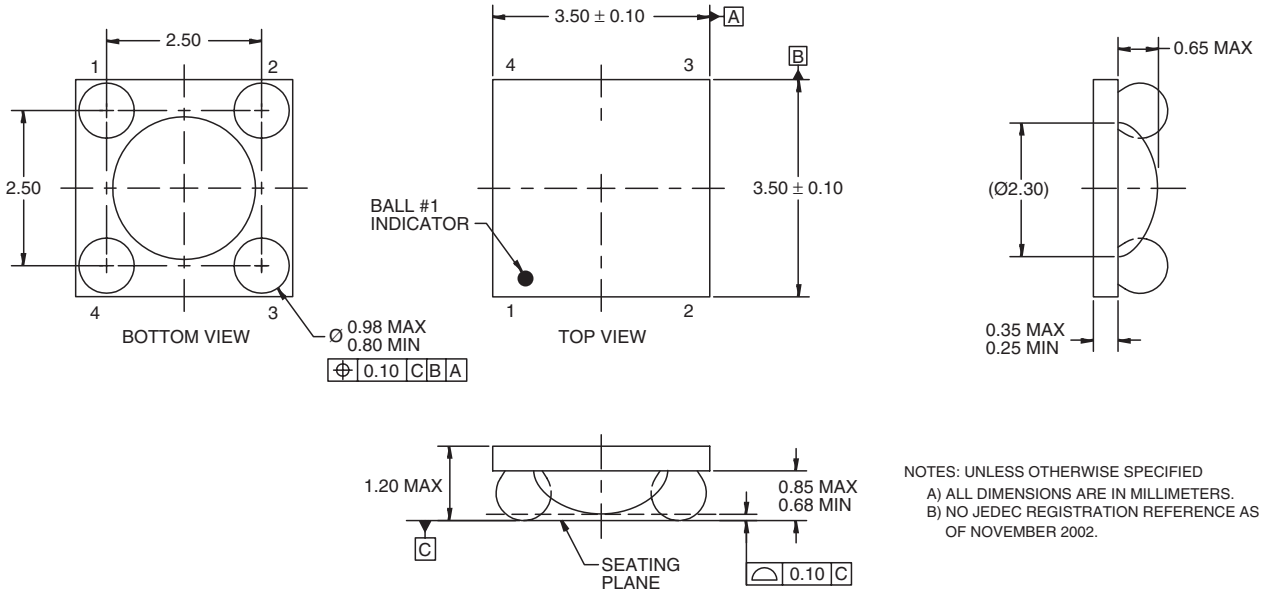
FEATURES

- 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, C-UL approved; VDE pending

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

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)

Parameter	Symbol	Value	Units
TOTAL PACKAGE			
Storage Temperature	T_{STG}	-55 to +150	°C
Operating Temperature	T_{OPR}	-40 to +125	°C
Junction Temperature	T_j	130	°C
EMITTER			
Continuous Forward Current	$I_{F\ (avg)}$	30	mA
Reverse Input Voltage	V_R	6	V
Power Dissipation	P_D	40	mW
Derate linearly (above 25°C)		0.39	mW/°C
DETECTOR			
Continuous Collector Current		50	mA
Power Dissipation	P_D	150	mW
Derate linearly (above 25°C)		1.42	mW/°C
Collector-Emitter Voltage	V_{CEO}	75	V
Emitter-Collector Voltage	V_{ECO}	7	V

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
EMITTER						
Forward Voltage	(I_F = 2 mA)	V_F	1.0		1.5	V
Reverse Current	(V_R = 6 V)	I_R			10	µA
DETECTOR						
Breakdown Voltage Collector to Emitter	(I_C = 100 µA, I_F = 0)	BV_{CEO}	75			V
Emitter to Collector	(I_E = 100 µA, I_F = 0)	BV_{ECO}	7			
Collector Dark Current	(V_{CE} = 75 V, I_F = 0)	I_{CEO}			100	nA
Capacitance	(V_{CE} = 0 V, f = 1 MHz)	C_{CE}		8		pF

TRANSFER CHARACTERISTICS (T_A = 25°C)

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Unit
Current Transfer Ratio[1]	(I_F = 1 mA, V_{CE} = 5 V)	CTR	100			%
Saturated Current Transfer Ratio (Collector to Emitter)	(I_F = 1.6 mA, V_{CE} = 0.4 V)	$CTR_{CE(SAT)}$	100			%
	(I_F = 1.0 mA, V_{CE} = 0.4 V)		75			
Saturation Voltage	(I_F = 3.0 mA, I_C = 1.8 mA) (I_F = 1.6 mA, I_C = 1.6 mA)	$V_{CE\ (SAT)}$			0.4	V
Rise Time (Non-Saturated)	(I_C = 2 mA, V_{CE} = 5 V) (R_L = 1KΩ)	t_r		1		µs
Fall Time (Non-Saturated)	(I_C = 2 mA, V_{CE} = 5 V) (R_L = 1KΩ)	t_f		5		
Propagation Delay High to Low	I_F = 1.6 mA, V_{CC} = 5.0 V R_L = 750Ω	T_{PHL}		3		µs
	I_F = 1.6 mA, V_{CC} = 5.0 V R_L = 4.7KΩ			12		
Propagation Delay Low to High	I_F = 1.6 mA, V_{CC} = 5.0 V R_L = 750Ω	T_{PLH}		5		µs
	I_F = 1.6 mA, V_{CC} = 5.0 V R_L = 4.7KΩ			19		

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Unit
Steady State Isolation Voltage[2]	(RH ≤ 50%, T_A = 25°C, t = 1 sec)	V_{ISO}	2500			V(rms)
Resistance (input to output)[2]	(V_{I-O} = 500VDC)	R_{ISO}	10^{12}			Ω
Capacitance (input to output)[2]	f = 1MHz	C_{ISO}		0.3	0.5	pF

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

TYPICAL PERFORMANCE CURVES

Fig. 1 Normalized CTR vs. Temperature (VCE = 2V)

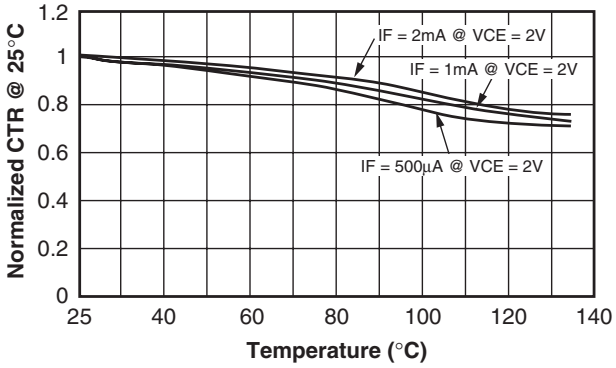


Fig. 2 Normalized CTR vs. Temperature (VCE = 5V)

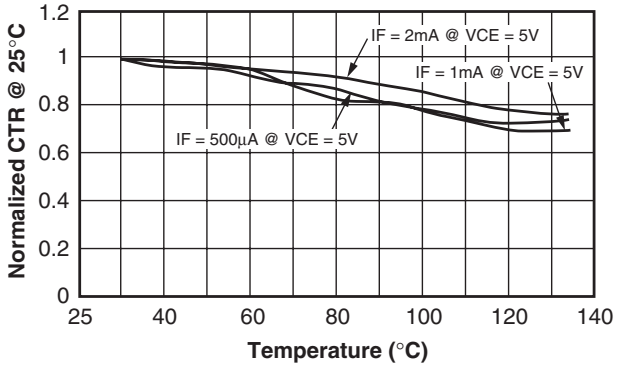


Fig. 3 Current Transfer Ratio vs. Collector to Emitter Voltage

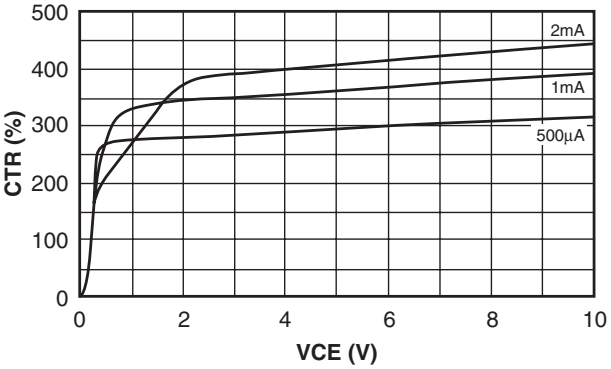


Fig. 4 Current Transfer Ratio vs. Collector Saturation Voltage

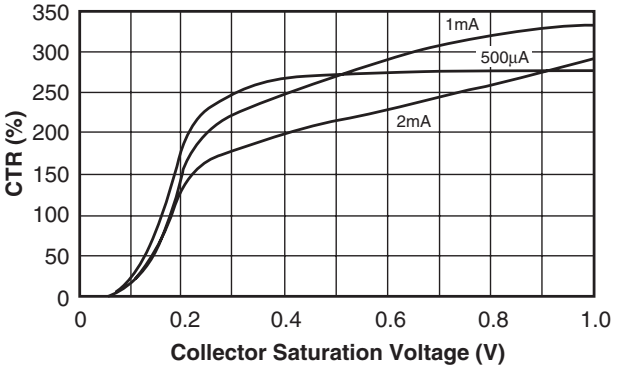
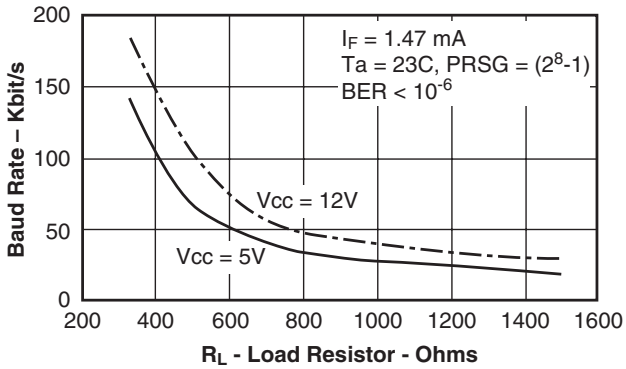
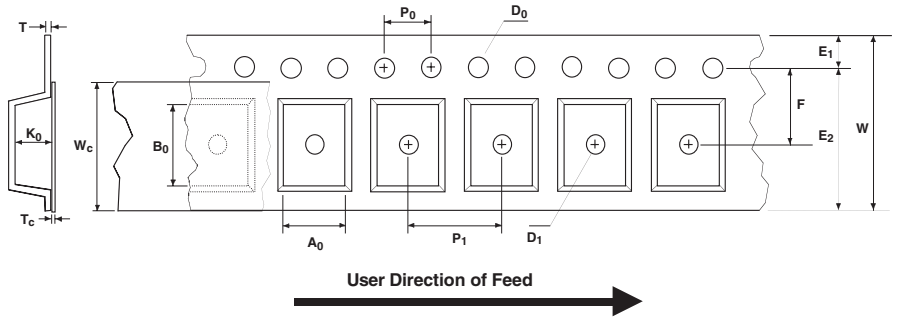


Fig. 5 Baud Rate vs. Load Resistor



TAPE AND REEL SPECIFICATIONS

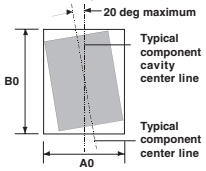
Embossed Carrier Tape Configuration



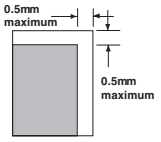
Dimensions are in millimeter														
Pkg type	A_0	B_0	W	D_0	D_1	E_1	E_2	F	P_1	P_0	K_0	T	W_c	T_c
Optocoupler (12mm)	3.80 ±0.10	3.80 ±0.10	12.0 +0.3/ −0.1	1.50 +0.25/ −0.00	1.50 +0.25/ −0.00	1.75 ±0.10	10.25 min	5.50 ±0.05	8.0 ±0.1	4.0 ±0.1	1.40 ±0.10	0.279 ±0.02	9.2 ±0.3	0.06 ±0.02

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

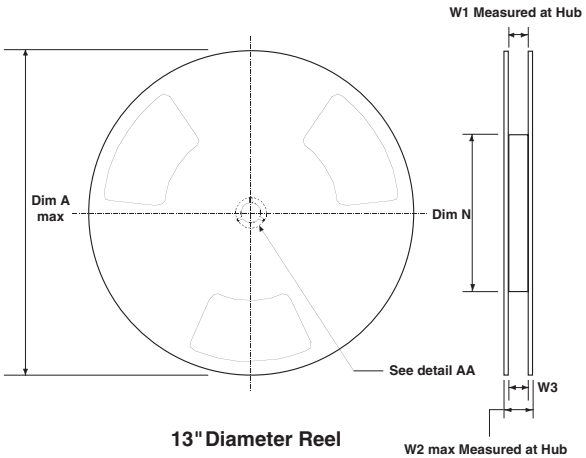


Sketch B (Top View)
Component Rotation

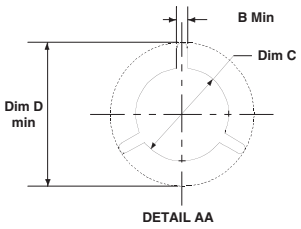


Sketch C (Top View)
Component lateral movement

Optocoupler Reel Configuration

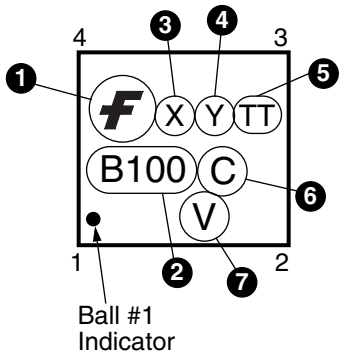


13" Diameter Reel



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

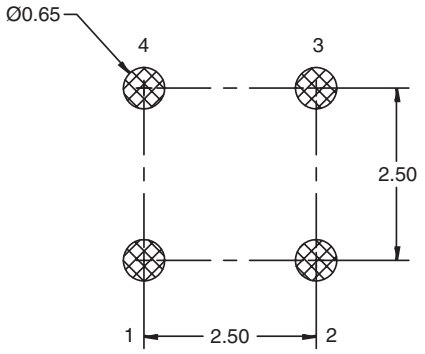
MARKING INFORMATION



Definitions	
1	Fairchild logo
2	Device number (FODB100)
3	One digit year code e.g. “4” for 2004
4	6-week date code character
5	Die Run Code
6	Assembly package code
7	VDE 0884 approved (Optional)

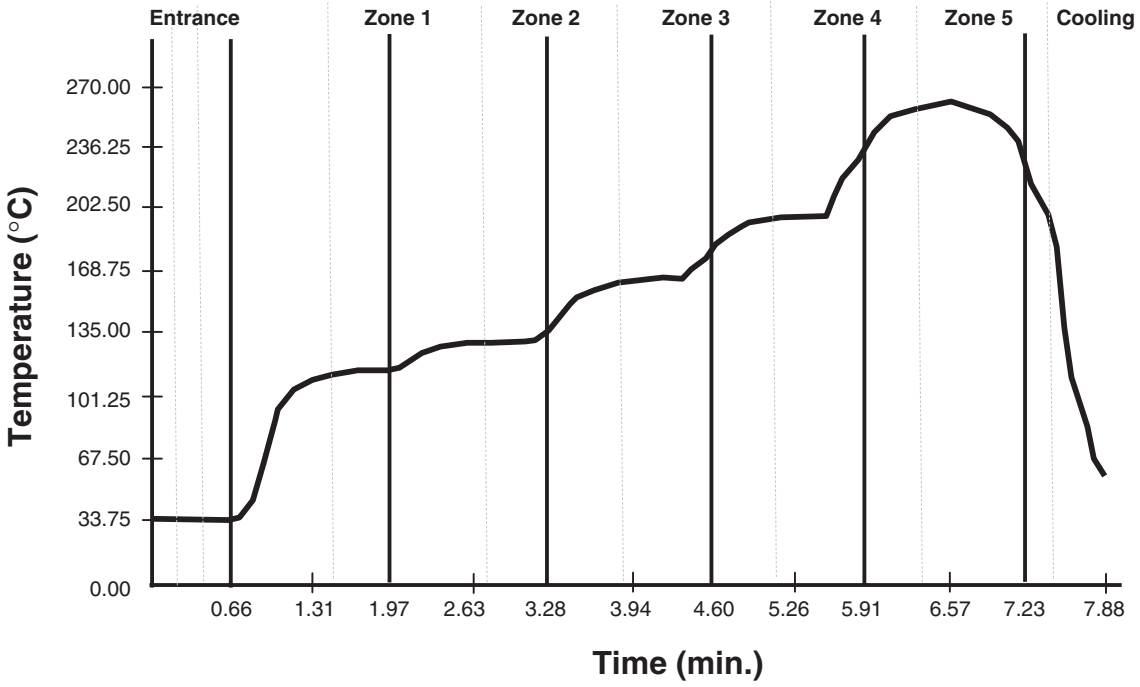
Note: The device number prefix of “FOD” will be ommitted in the part number

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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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.