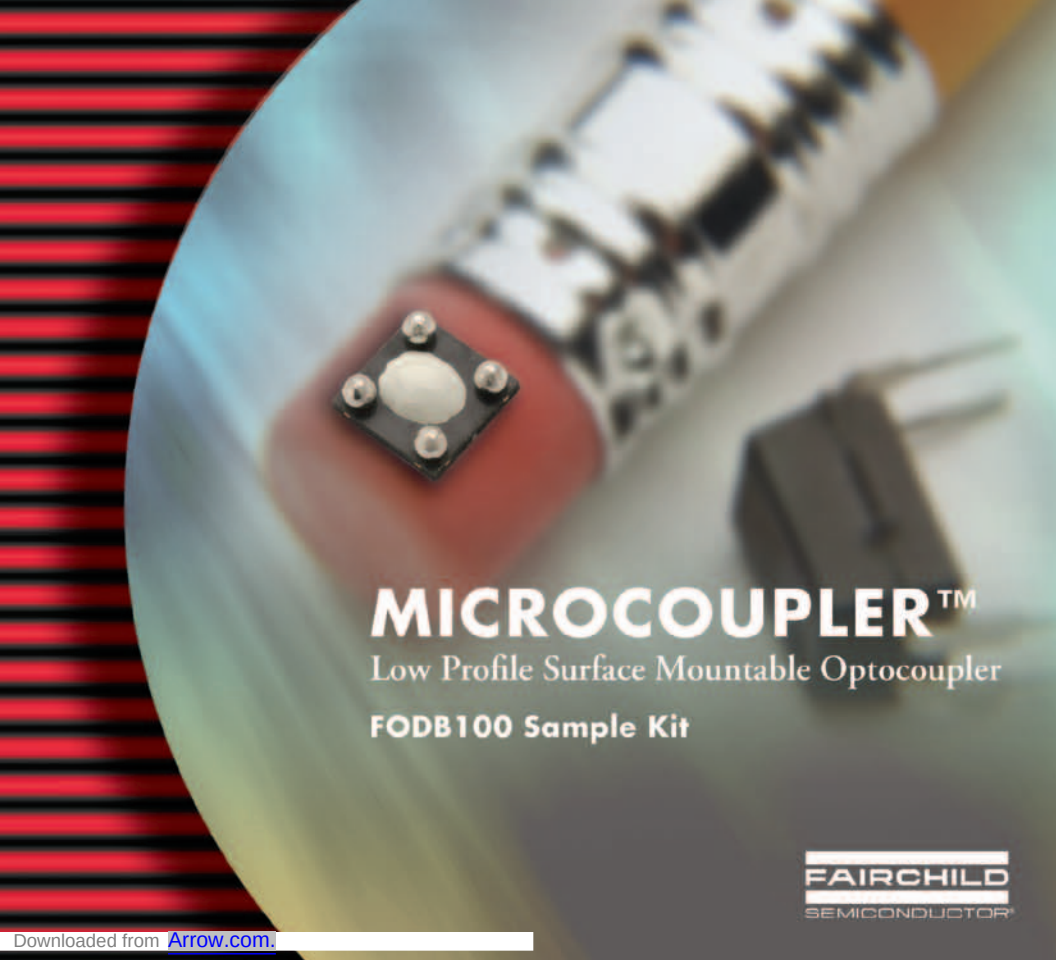


Introduction

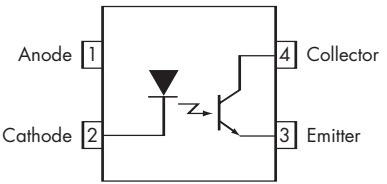
Over the last few decades, there has been an exponential growth in the semiconductor sector spawning new products and technologies. This trend has been recently stimulated by a driving force towards miniaturization, resulting in more compact applications and products being introduced into the industrial,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

FODB100

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

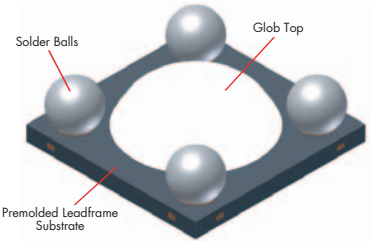
Features

- 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_{rms}
- 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.

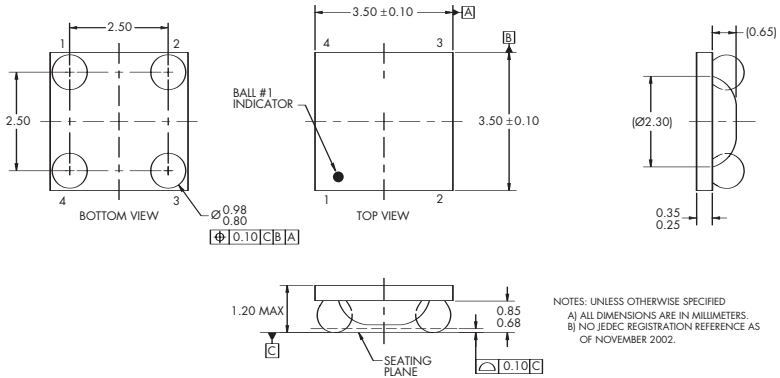
Advantages

- 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.

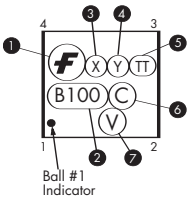
Package Information



Package Dimensions

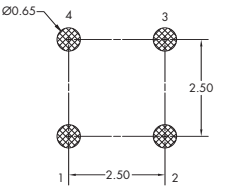


Marking Information



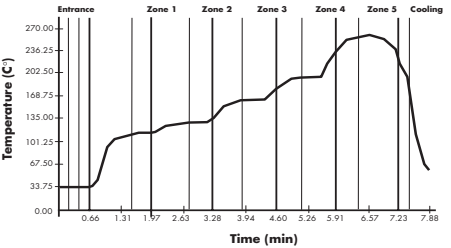
Definitions	
1	Fairchild logo
2	Device number (FODB100)
3	One digit year code e.g. "4" for 2004
4	6-week date code character
5	Die run code
6	Assembly package code
7	VDE 0884 approved (optional)

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise specified)			
Parameters	**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)		0.6	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						
Parameters	**Test Conditions**	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Emitter						
Forward Voltage	(I_F = 2mA)	V_F	1.0		1.5	V
Reverse Current	(V_R = 6V)	I_R			10	µA
Detector						
Breakdown Voltage Collector to Emitter	(I_C = 100mA, I_F = 0)	BV_{CEO}	75			V
Emitter to Collector	(I_E = 100µA, $_F$ = 0)	BV_{ECO}	7			
Collector Dark Current	(V_{CE} = 75V, I_F = 0)	I_{CEO}			100	nA
Capacitance	(V_{CE} = 0V, f = 1MHz)	C_{CE}		8		pF

Electrical Specifications

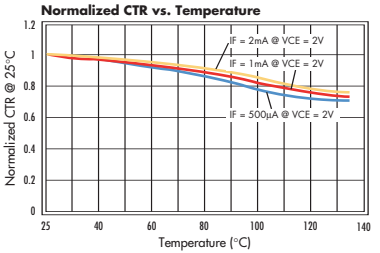
TRANSFER CHARACTERISTICS (T_A = 25°C)						
Characteristic	**Test Conditions**	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Current Transfer Ratio[1]	(I_F = 1 mA, V_{CE} = 5V)	CTR	100			%
Saturated Current Transfer Ratio (Collector to Emitter)	(I_F = 1.6mA, V_{CE} = 0.4V)	$CTR_{CE(SAT)}$	100			%
	(I_F = 1.0mA, V_{CE} = 0.4V)		*75*			
Saturation Voltage	(I_F = 3.0mA, I_C = 1.8mA) (I_F = 1.6mA, I_C = 1.6mA)	$V_{CE(SAT)}$			0.4	V
Rise Time (Non-Saturated)	(I_C = 2mA, V_{CE} = 5V) (R_L = 1K)	t_r		1		µs
Fall Time (Non-Saturated)	(I_C = 2mA, V_{CE} = 5V) (R_L = 1K)	t_f		5		µs
Propagation Delay High to Low	I_F = 1.6mA, V_{CC} = 5.0V R_L = 750	T_{PHL}		3		µs
	I_F = 1.6mA, V_{CC} = 5.0V R_L = 4.7K			12		
Propagation Delay Low to High	I_F = 1.6mA, V_{CC} = 5.0V R_L = 750	T_{PLH}		*5*		µs
	I_F = 1.6mA, V_{CC} = 5.0V R_L = 4.7K			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} = 500 VDC)	R_{ISO}	10^{12}			
Capacitance (input to output)[2]	f = 1MHz	C_{ISO}		0.3	0.5	pF

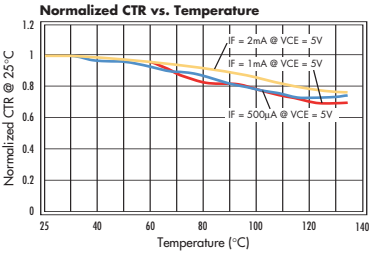
Notes:
1. CTR bin (FODB100 only)
   FODB101: 100% – 200%
   FODB102: 150% – 300%
2. Pin 1 and Pin 2 are shorted as input and Pin 3 and Pin 4 are shorted as output.

Typical Characteristic Curves

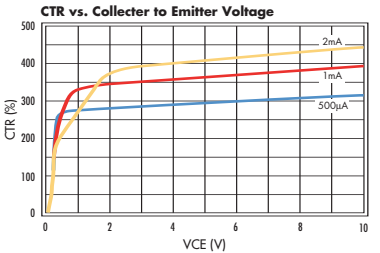
Normalized CTR at Vce = 2V



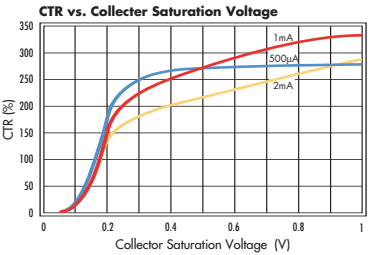
Normalized CTR at V_{ce} = 5V



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:

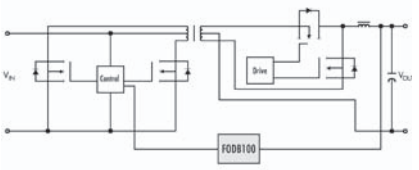
- Communications – chargers, adapters
- Consumer – appliances, set top boxes
- Industrial – power supplies, motor control

Safety Agency Approvals:

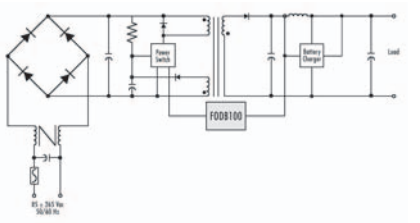
UL and VDE certifications pending

Application Schematic Diagrams:

DC to DC Converter

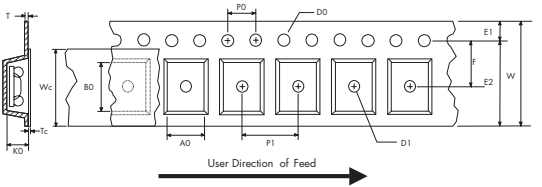


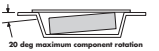
AC to DC Battery Charger



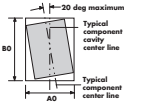
Tape and Reel Specifications

Optocoupler Embossed Carrier Tape Configuration

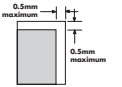




Sketch A (Side or Front Sectional View)
Component Rotation



Sketch B (Top View)
Component Rotation

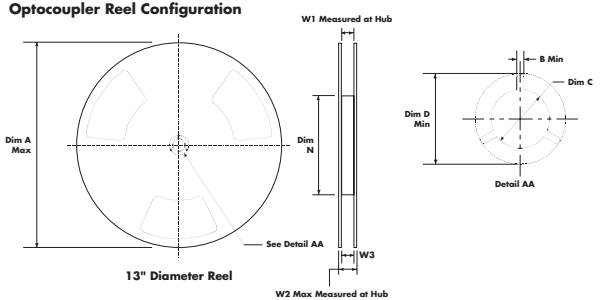


Sketch C (Top View)
Component lateral movement

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	5.50 ±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.)

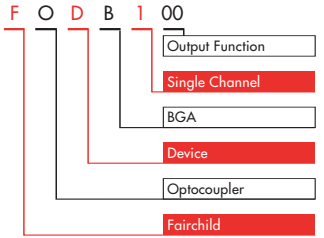
Optocoupler Reel Configuration



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	0.469 – 0.606 11.9 – 15.4

Ordering Information

FODB100



Roadmap

April 2004	June 2004	July 2004	Q4 2004
Introduce single channel, transistor output: FODB100	Introduce 5300V Viso version of FODB100 series	Introduce quad channel, transistor output: FODBQ4XX	Introduce various output functions with single and multiple channels

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