FAIRCHILD SEMICONDUCTOR®

May 2006

FOD852
4-Pin High Operating Temperature Photodarlington Optocoupler

Features

- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- High current transfer ratio: 1000% minimum
- C-UL, UL, and VDE approved
- High input-output isolation voltage of 5000Vrms
- High operating temperature of 100°C

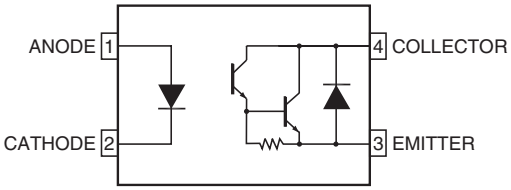
Applications

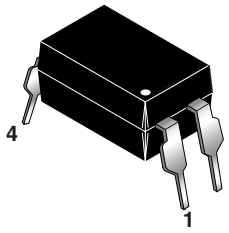
- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

Description

The FOD852 consists of gallium arsenide infrared emitting diode driving a silicon photodarlington output (with integral base-emitter resistor) in a 4-pin dual in-line package.

Functional Block Diagram





Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified.)

Symbol	Parameter	Value	Units
TOTAL DEVICE			
T_{STG}	Storage Temperature	-55 to +125	°C
T_{OPR}	Operating Temperature	-30 to +100	°C
T_{SOL}	Lead Solder Temperature	260 for 10 sec	°C
P_{TOT}	Total Device Power Dissipation	200	mW
INPUT			
I_F	Continuous Forward Current	50	mA
V_R	Reverse Voltage	6	V
P_D	LED Power Dissipation	70	mW
OUTPUT			
V_{CEO}	Collector-Emitter Voltage	300	V
V_{ECO}	Emitter-Collector Voltage	0.1	V
I_C	Continuous Collector Current	150	mA
P_C	Collector Power Dissipation	150	mW

Electrical Characteristics (T_A = 25°C Unless otherwise specified.)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
INPUT						
V_F	Forward Voltage	I_F = 10mA	–	1.2	1.4	V
I_R	Reverse Current	V_R = 4V	–	–	10	μA
C_t	Terminal Capacitance	V = 0, f = 1kHz	–	30	250	pF
OUTPUT						
I_{CEO}	Collector Dark Current	V_{CE} = 200V, I_F = 0	–	–	200	nA
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 0.1mA, I_F = 0	300	–	–	V
BV_{ECO}	Emitter-Collector Breakdown Voltage	I_E = 10μA, I_F = 0	0.1	–	–	V

Transfer Characteristics (T_A = 25°C Unless otherwise specified.)

Symbol	DC Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
I_C	Collector Current	I_F = 1mA, V_{CE} = 2V	10	40	150	mA
CTR	Current Transfer Ratio[1]		1,000	4,000	15,000	%
$V_{CE\ (sat)}$	Collector-Emitter Saturation Voltage	I_F = 20mA, I_C = 100mA	–	–	1.2	V
R_{iso}	Isolation Resistance	DC500V 40~60% R.H.	$5x10^{10}$	$1x10^{11}$	–	Ω
C_f	Floating Capacitance	V = 0, f = 1MHz	–	0.6	1	pF
f_C	Cut-Off Frequency	V_{CE} = 2V, I_C = 20mA, R_L = 100Ω, -3dB	1	7	–	kHz
t_r	Response Time (Rise)	V_{CE} = 2V, I_C = 20mA, R_L = 100Ω	–	100	300	μs
t_f	Response Time (Fall)		–	20	100	μs

Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
V_{ISO}	Input-Output Isolation Voltage	f = 60Hz, t = 1 min, $I_{I-O} \le 2\mu A$	5000	–	–	Vac(rms)
R_{ISO}	Isolation Resistance	V_{I-O} = 500 VDC	5×10^{10}	10^{11}	–	Ω
C_{ISO}	Isolation Capacitance	V_{I-O} = 0, f = 1MHz	–	0.6	1.0	pf

Note:

1. Current Transfer Ratio (CTR) = I_C/I_F x 100%.

Typical Electrical/Optical Characteristic Curves (T_A = 25°C Unless otherwise specified.)

Fig. 1 Forward Current vs. Ambient Temperature

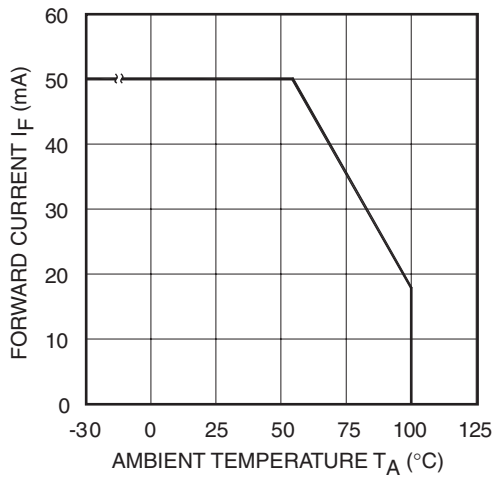


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

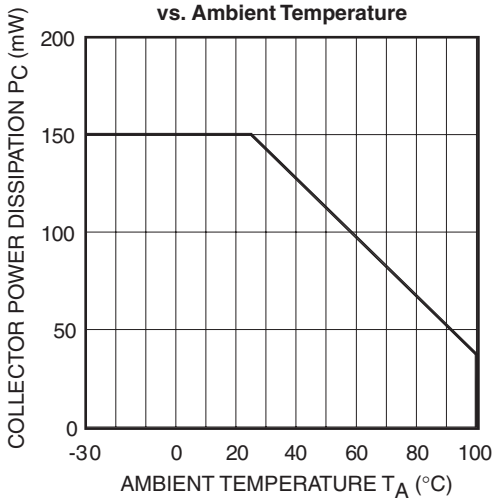


Fig. 3 Collector-Emitted Saturation Voltage vs. Forward Current

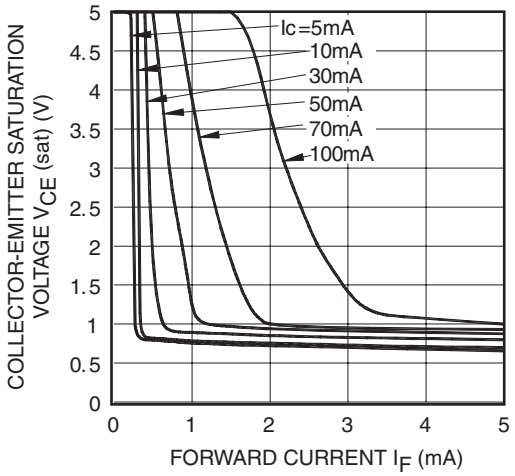


Fig. 4 Forward Current vs. Forward Voltage

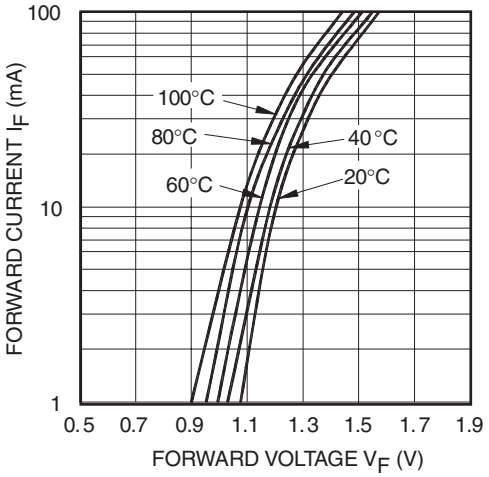


Fig. 5 Current Transfer Ratio vs. Forward Current

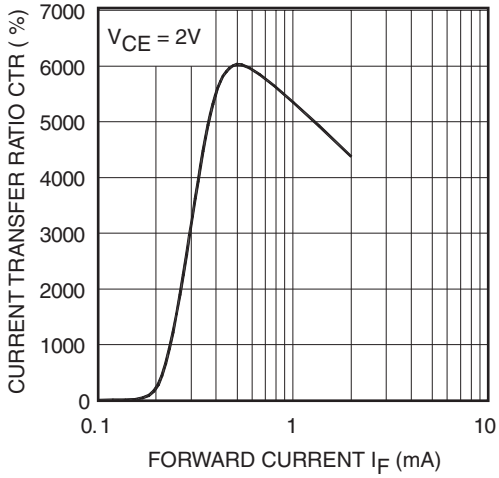
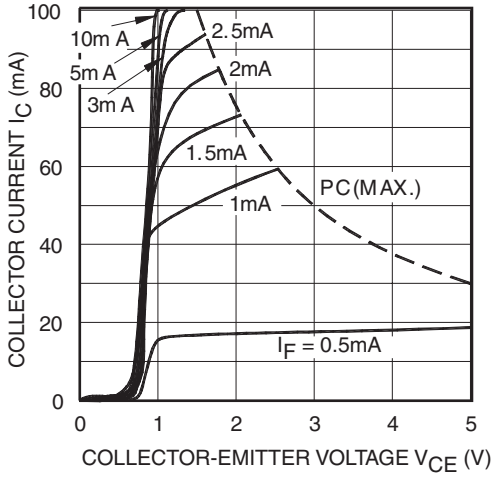


Fig. 6 Collector Current vs. Collector-Emitter Voltage



Typical Electrical/Optical Characteristic Curves (T_A = 25°C Unless otherwise specified.)

Fig. 7. Relative Current Transfer Ratio vs. Ambient Temperature

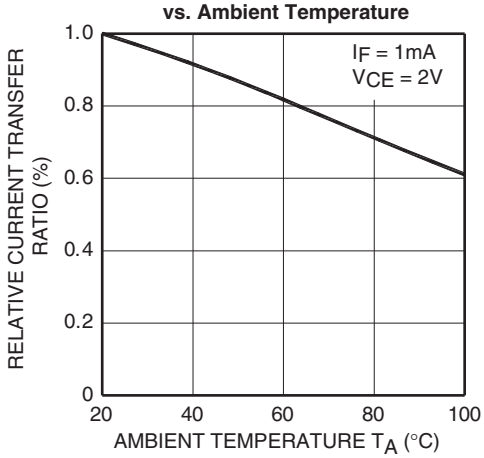


Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

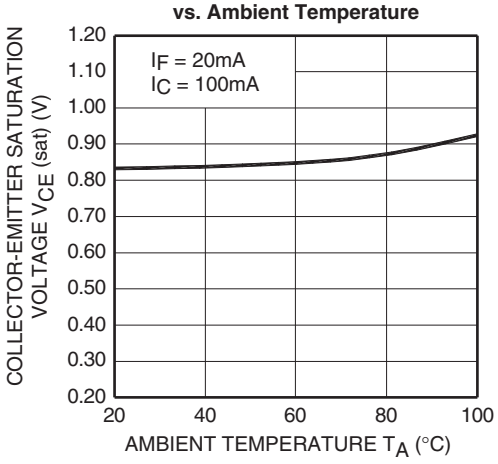


Fig. 9 Collector Dark Current vs. Ambient Temperature

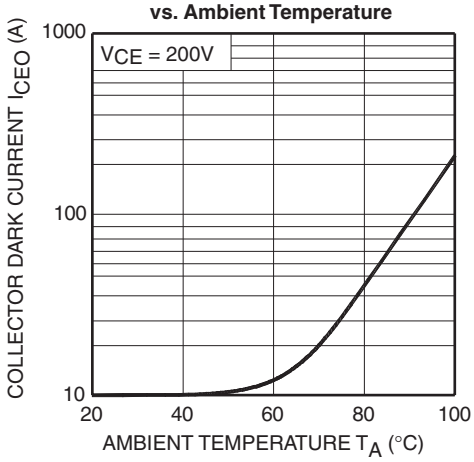


Fig. 10. Response Time vs. Load Resistance

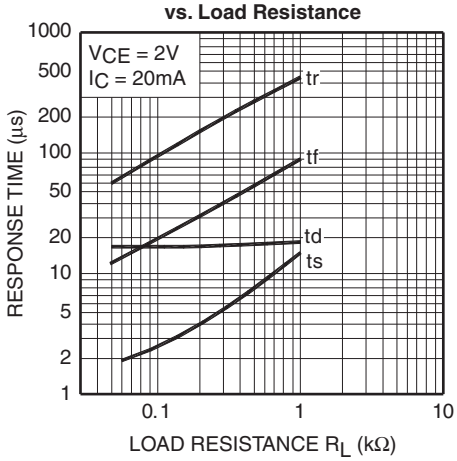
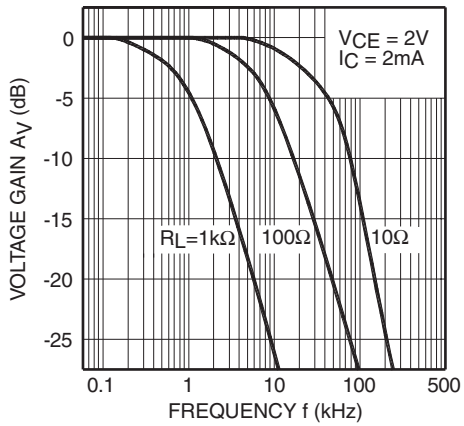
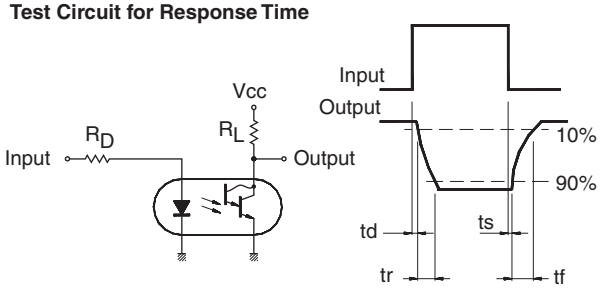


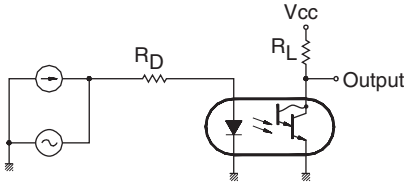
Fig. 11. Frequency Response



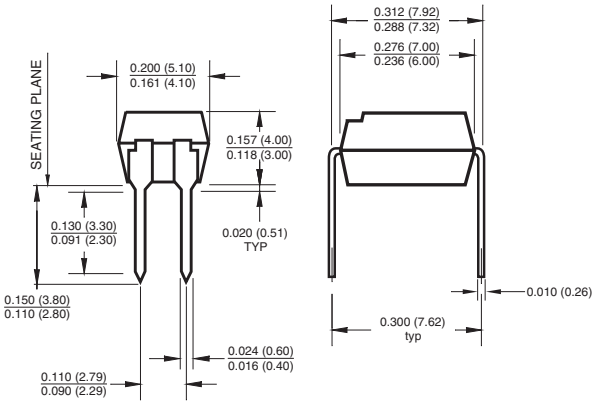
Test Circuit for Response Time



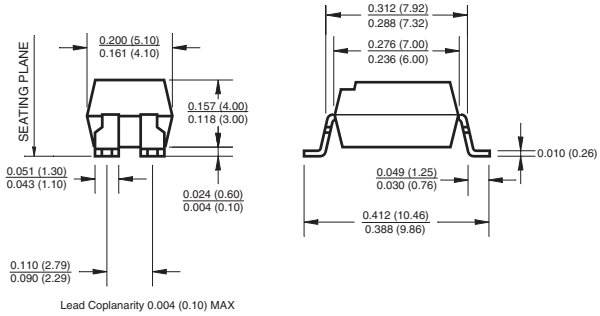
Test Circuit for Frequency Response



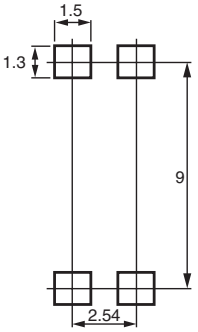
Package Dimensions (Through Hole)



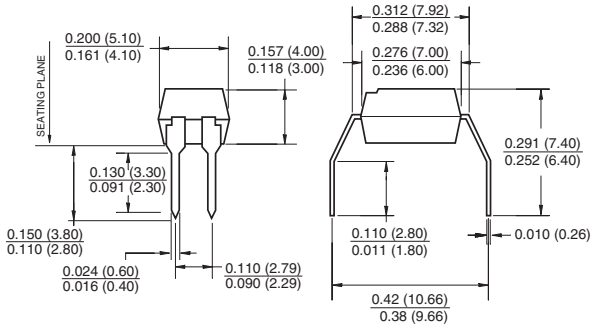
Package Dimensions (Surface Mount)



Footprint Dimensions (Surface Mount))



Package Dimensions (0.4" Lead Spacing)

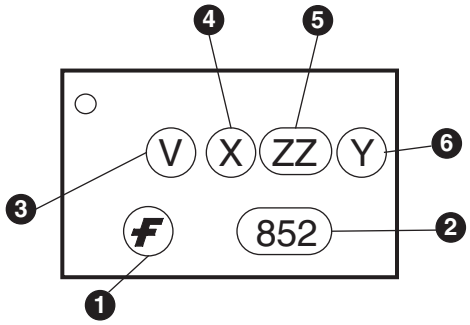


Note:
All dimensions are in inches (millimeters)

Ordering Information

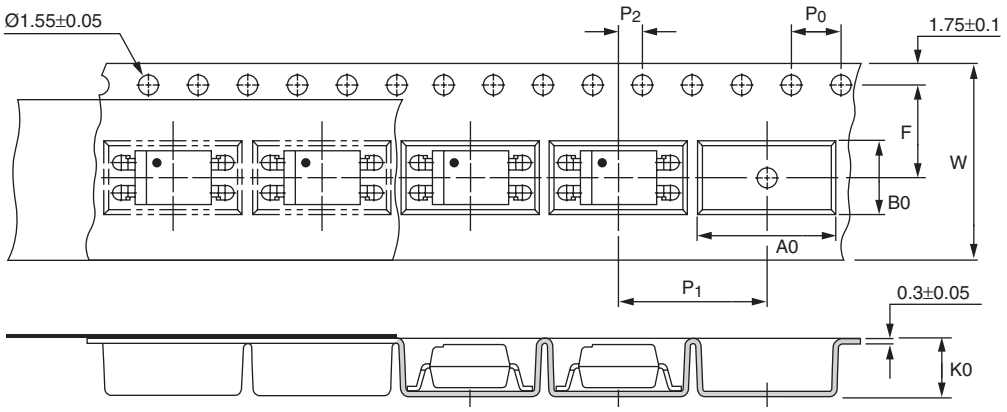
Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE Approved
300W	.300W	VDE Approved, 0.4" Lead Spacing
3S	.3S	VDE Approved, Surface Mount
3SD	.3SD	VDE Approved, Surface Mount, Tape & Reel

Marking Information



Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

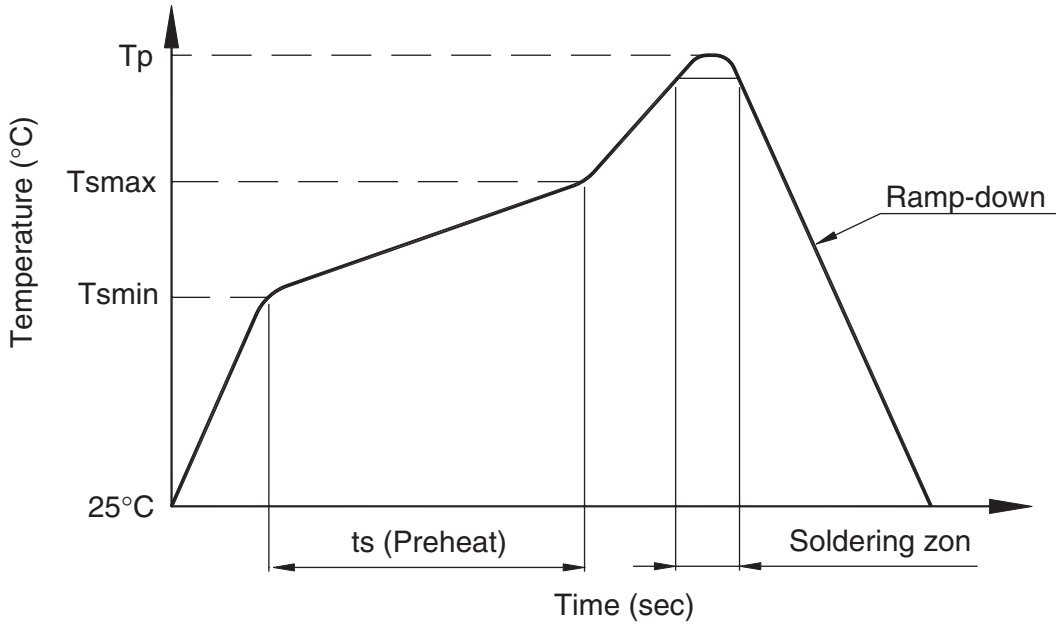
Carrier Tape Specifications



Note:
All dimensions are in millimeters.

Description	Symbol	Dimensions in mm (inches)
Tape wide	W	16 ± 0.3 (.63)
Pitch of sprocket holes	P_0	4 ± 0.1 (.15)
Distance of compartment	F P_2	7.5 ± 0.1 (.295) 2 ± 0.1 (.079)
Distance of compartment to compartment	P_1	12 ± 0.1 (.472)
Compartment	A0	10.45 ± 0.1 (.411)
	B0	5.30 ± 0.1 (.209)
	K0	4.25 ± 0.1 (.167)

Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmin-Tsmax / ts)	100°C ~ 150°C 60 ~ 120 sec	150°C ~ 200°C 60 ~120 sec
Melt soldering zone	183°C 60 ~ 120 sec	217°C 30 ~ 90 sec
Peak temperature (Tp)	240 +0/-5°C	260 +0/-5°C
Ramp-down rate	6°C/sec max.	6°C/sec max.

Recommended Wave Soldering condition

Profile Feature	For all solder assembly
Peak temperature (Tp)	Max 260°C for 10 sec

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Build it Now™	FRFET™	MicroFET™	QFET®	SuperSOT™-8
CoolFET™	GlobalOptoisolator™	MicroPak™	QS™	SyncFET™
CROSSVOLT™	GTO™	MICROWIRE™	QT Optoelectronics™	TCM™
DOME™	HiSeC™	MSX™	Quiet Series™	TinyLogic®
EcoSPARK™	I^2C™	MSXPro™	RapidConfigure™	TINYOPTO™
E^2CMOS™	*i-Lo*™	OCX™	RapidConnect™	TruTranslation™
EnSigna™	ImpliedDisconnect™	OCXPro™	µSerDes™	UHC™
FACT™	IntelliMAX™	OPTOLOGIC®	ScalarPump™	UniFET™
FACT Quiet Series™		OPTOPLANAR™	SILENT SWITCHER®	UltraFET®
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The Power Franchise®		POP™	SPM™	Wire™
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2. A critical component is 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.

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.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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Rev. I19