



ON Semiconductor®

FOD817 Series 4-Pin Phototransistor Optocouplers

Features

- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- Current transfer ratio in selected groups:
 - FOD817: 50–600%
 - FOD817A: 80–160%
 - FOD817B: 130–260%
 - FOD817C: 200–400%
 - FOD817D: 300–600%
- C-UL, UL and VDE approved
- High input-output isolation voltage of 5000 Vrms

Applications

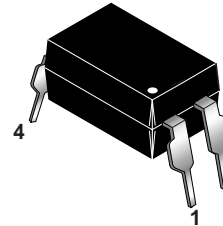
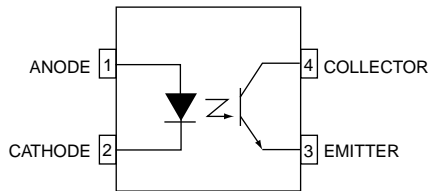
FOD817 Series

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

Description

The FOD817 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 4-pin dual in-line package.

Functional Block Diagram



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

Parameter	Symbol	Value	Units
TOTAL DEVICE			
Storage Temperature	T _{STG}	-55 to +125	°C
Operating Temperature	T _{OPR}	-55 to +110	°C
Lead Solder Temperature	T _{SOL}	260 for 10 sec	°C
Total Device Power Dissipation	P _D	200	mW
EMITTER			
Continuous Forward Current	I _F	50	mA
Reverse Voltage	V _R	6	V
LED Power Dissipation	P _D	70	mW
Derate above 25°C		0.93	mW/°C
DETECTOR			
Collector-Emitter Voltage	V _{CEO}	70	V
Emitter-Collector Voltage	V _{ECO}	6	V
Continuous Collector Current	I _C	50	mA
Detector Power Dissipation	P _D	150	mW
Derate above 25°C		2.0	mW/°C

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)**Individual Component Characteristics**

Parameter	Test Conditions	Symbol	Min	Typ*	Max	Unit
EMITTER Input Forward Voltage	($I_F = 20\text{ mA}$)	V_F	—	1.2	1.4	V
Reverse Leakage Current	($V_R = 4.0\text{ V}$)	I_R	—	—	10	μA
Terminal Capacitance	($V = 0, f = 1\text{ kHz}$)	C_t	—	30	250	pF
DETECTOR Collector-Emitter Breakdown Voltage	($I_C = 0.1\text{ mA}, I_F = 0$)	BV_{CEO}	70	—	—	V
Emitter-Collector Breakdown Voltage	($I_E = 10\text{ }\mu\text{A}, I_F = 0$)	BV_{ECO}	6	—	—	V
Collector-Emitter Dark Current	($V_{CE} = 20\text{ V}, I_F = 0$)	I_{CEO}	—	—	100	nA

*Typical values at $T_A = 25^\circ\text{C}$.**Transfer Characteristics** ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

DC Characteristic	Test Conditions	Symbol	Device	Min	Typ*	Max	Unit
Current Transfer Ratio	($I_F = 5\text{ mA}, V_{CE} = 5\text{ V}$) (note 1)	CTR	FOD817	50	—	600	%
			FOD817A	80	—	160	%
			FOD817B	130	—	260	%
			FOD817C	200	—	400	%
			FOD817D	300	—	600	%
Collector-Emitter Saturation Voltage	($I_F = 20\text{ mA}, I_C = 1\text{ mA}$)	$V_{CE(SAT)}$		—	0.1	0.2	V
AC Characteristic							
Rise Time	($I_C = 2\text{ mA}, V_{CE} = 2\text{ V}, R_L = 100\Omega$) (note 2)	t_r		—	4	18	μs
Fall Time	($I_C = 2\text{ mA}, V_{CE} = 2\text{ V}, R_L = 100\Omega$) (note 2)	t_f		—	3	18	μs

Isolation Characteristics

Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units
Input-Output Isolation Voltage (note 3)	$f = 60\text{ Hz}, t = 1\text{ min}$	V_{ISO}	5000			Vac(rms)
Isolation Resistance	($V_{I-O} = 500\text{ VDC}$)	R_{ISO}	5×10^{10}	10^{11}		Ω
Isolation Capacitance	($V_{I-O} = 0, f = 1\text{ MHz}$)	C_{ISO}		0.6	1.0	pf

*Typical values at $T_A = 25^\circ\text{C}$.**NOTES**

- Current Transfer Ratio (CTR) = $I_C/I_F \times 100\%$.
- For test circuit setup and waveforms, refer to page 4.
- For this test, Pins 1 and 2 are common, and Pins 3 and 4 are common.

Typical Electrical/Optical Characteristic Curves ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Fig. 1 Forward Current vs. Ambient Temperature

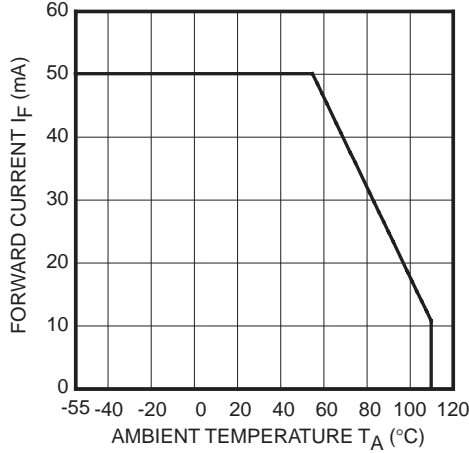


Fig. 2 Collector Power Dissipation vs. Ambient Temperature

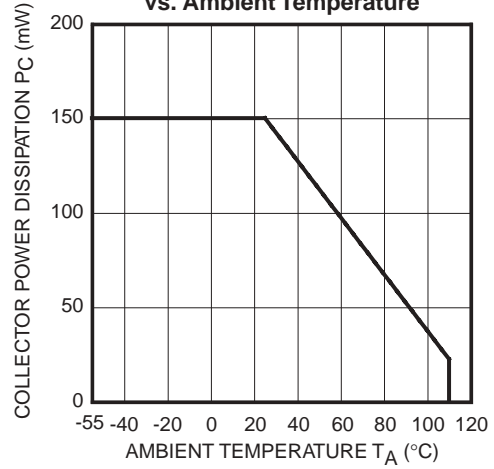


Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current

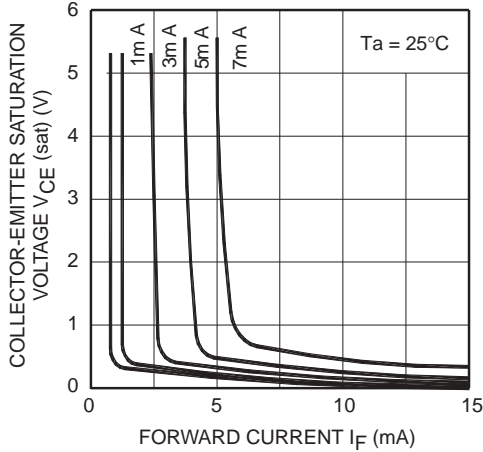


Fig. 4 Forward Current vs. Forward Voltage

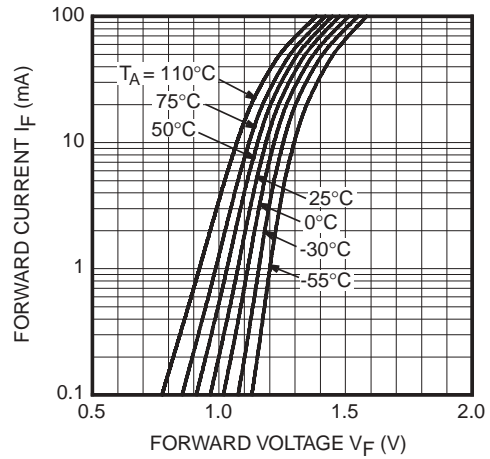


Fig. 5 Current Transfer Ratio vs. Forward Current

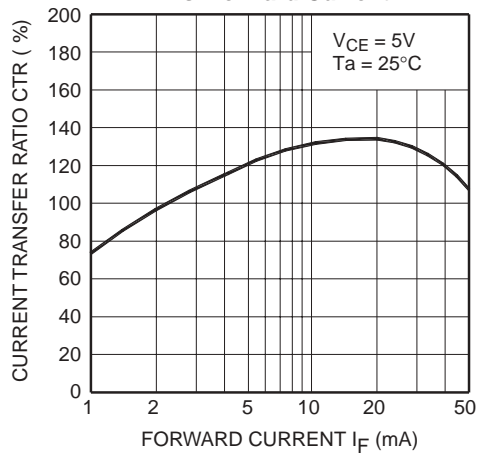
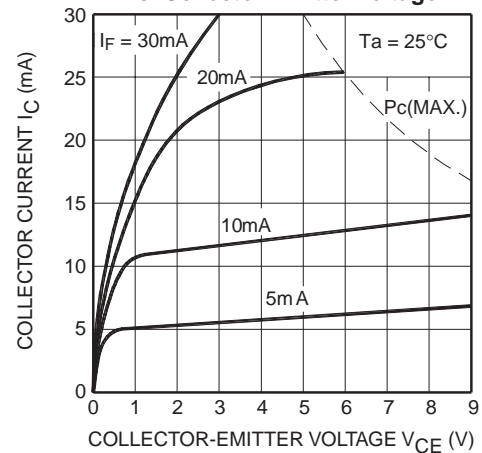


Fig. 6 Collector Current vs. Collector-Emitter Voltage



Typical Electrical/Optical Characteristic Curves ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

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

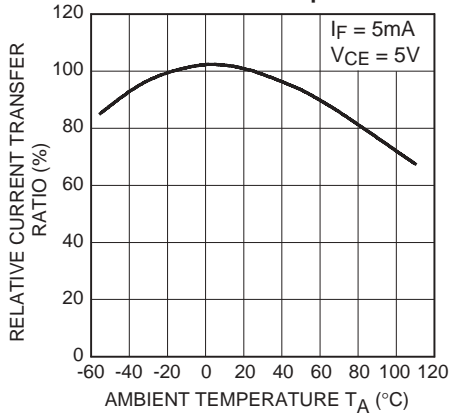


Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

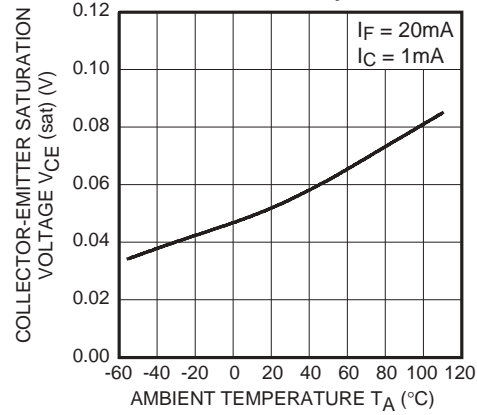


Fig. 9 Collector Dark Current vs. Ambient Temperature

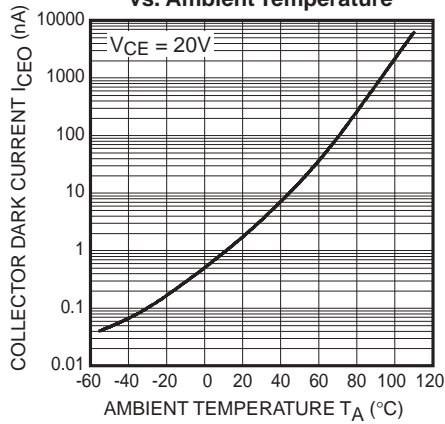


Fig. 10. Response Time vs. Load Resistance

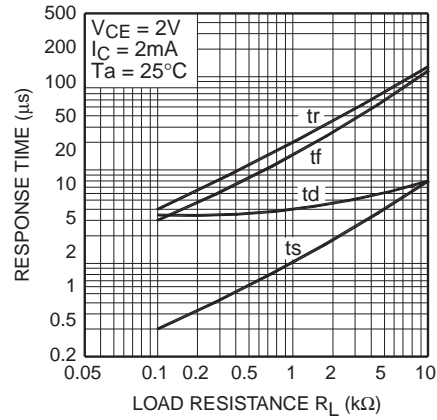
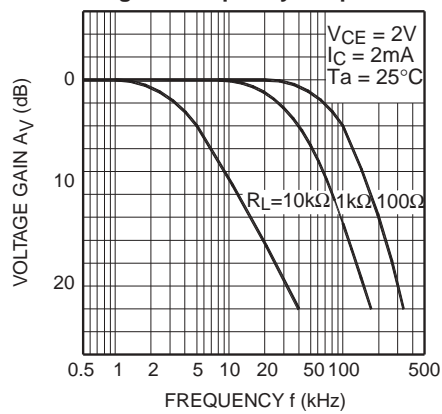
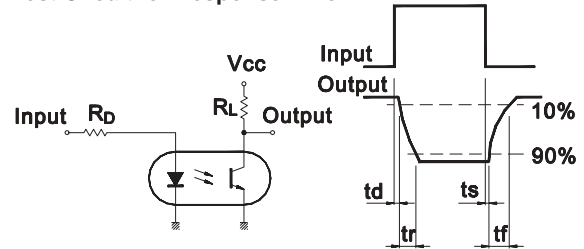


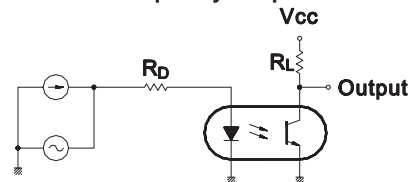
Fig. 11. Frequency Response



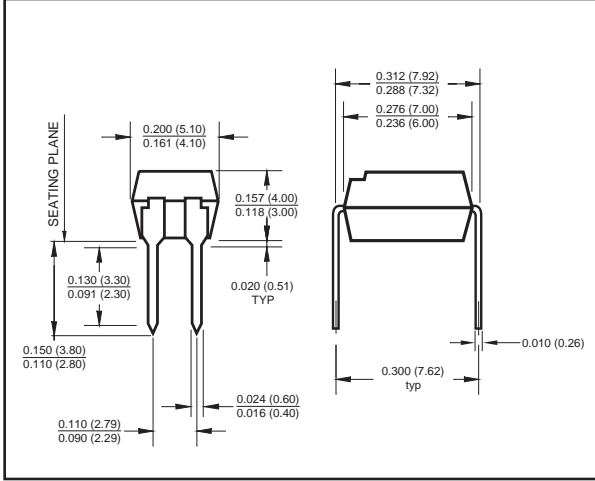
Test Circuit for Response Time



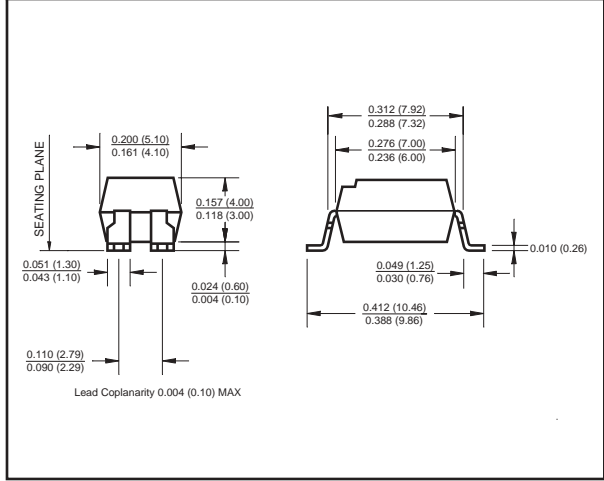
Test Circuit for Frequency Response



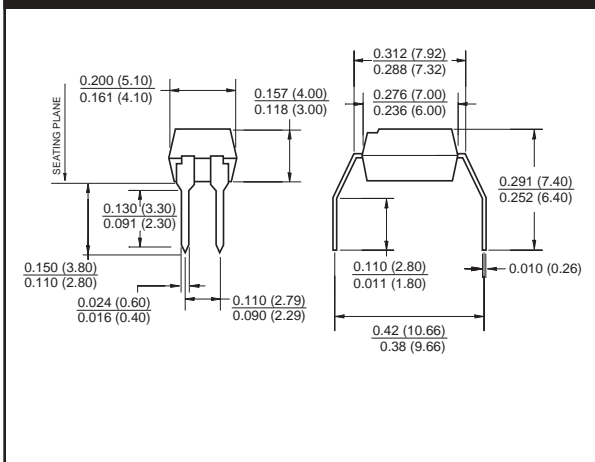
Package Dimensions (Through Hole)



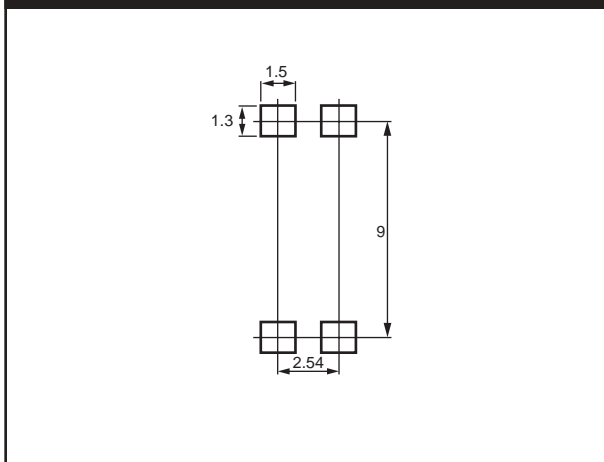
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Footprint Dimensions (Surface Mount)



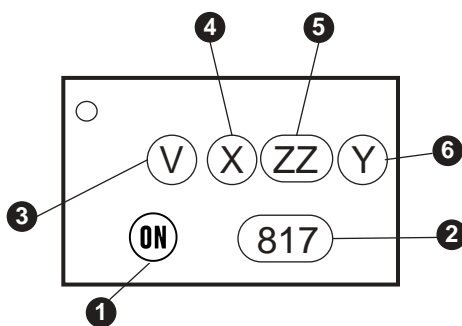
NOTE

All dimensions are in inches (millimeters)

Ordering Information

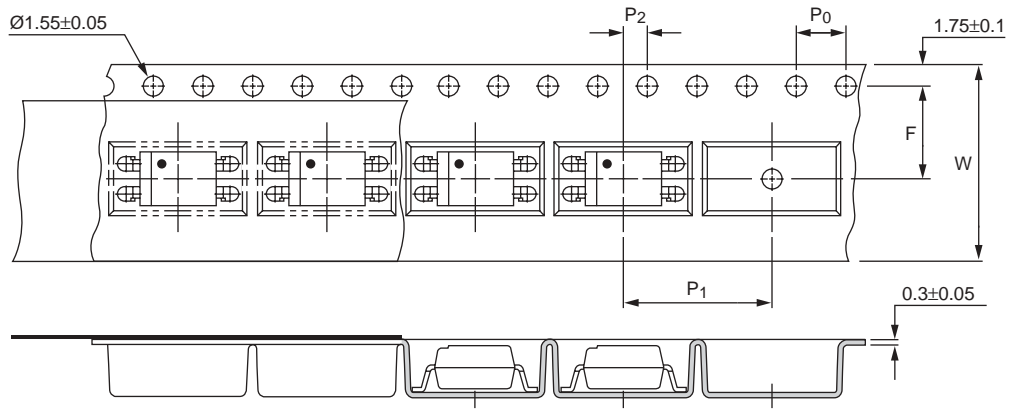
Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4" Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

Marking Information



Definitions	
1	ON Semiconductor 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

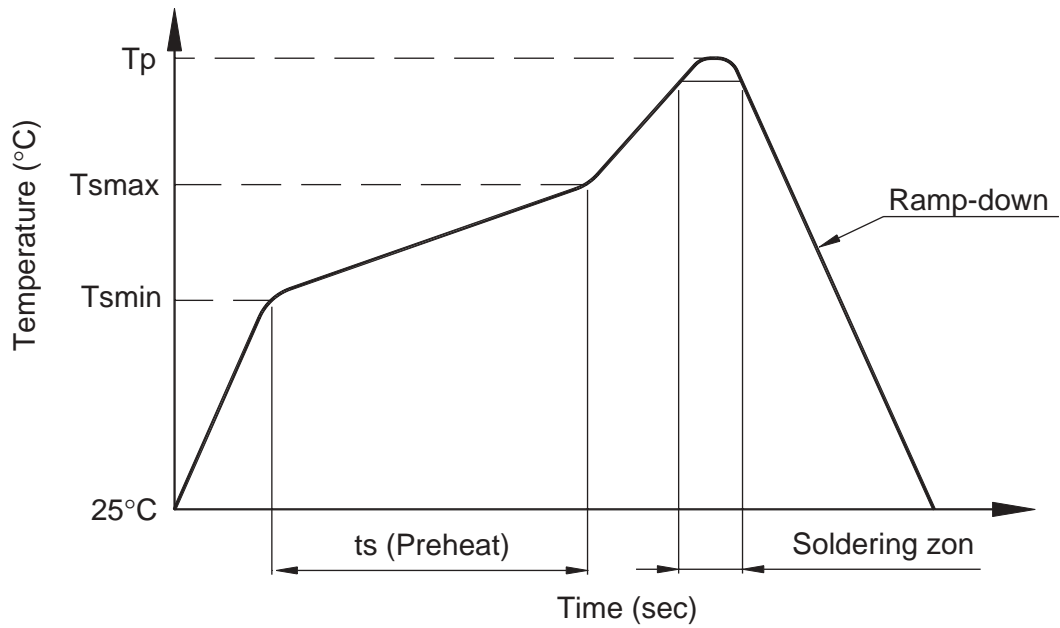


NOTE

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	7.5 ± 0.1 (.295)
	P ₂	2 ± 0.1 (.079)
Distance of compartment to compartment	P ₁	12 ± 0.1 (.472)

Lead Free recommended IR Reflow condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmmin-Tsmmax / 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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