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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

May 2017

FOD814 Series, FOD817 Series
4-Pin DIP Phototransistor Optocouplers

Features

- AC Input Response (FOD814)
- Current Transfer Ratio in Selected Groups:

FOD814: 20–300%	FOD817: 50–600%
FOD814A: 50–150%	FOD817A: 80–160%
	FOD817B: 130–260%
	FOD817C: 200–400%
	FOD817D: 300–600%

- Minimum BV_{CEO} of 70 V Guaranteed
- Safety and Regulatory Approvals
  - UL1577, 5,000 VAC_{RMS} for 1 Minute
  - DIN EN/IEC60747-5-5

Applications

FOD814 Series
- AC Line Monitor
- Unknown Polarity DC Sensor
- Telephone Line Interface

FOD817 Series
- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs

Description

The FOD814 consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a silicon phototransistor output in a 4-pin dual in-line package. 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

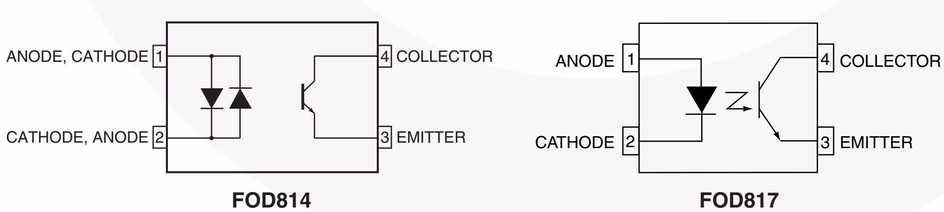


Figure 1. Schematic

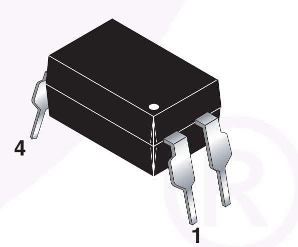


Figure 2. Package Outlines

Safety and Insulation Ratings

As per DIN EN/IEC 60747-5-5, this optocoupler is suitable for "safe electrical insulation" only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	< 150 V_{RMS}	I–IV
	< 300 V_{RMS}	I–III
Climatic Classification		30/110/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V_{PR}	Input-to-Output Test Voltage, Method A, V_{IORM} x 1.6 = V_{PR}, Type and Sample Test with t_m = 10 s, Partial Discharge < 5 pC	1360	V_{peak}
	Input-to-Output Test Voltage, Method B, V_{IORM} x 1.875 = V_{PR}, 100% Production Test with t_m = 1 s, Partial Discharge < 5 pC	1560	V_{peak}
V_{IORM}	Maximum Working Insulation Voltage	850	V_{peak}
V_{IOTM}	Highest Allowable Over-Voltage	8000	V_{peak}
	External Creepage	≥ 7	mm
	External Clearance	≥ 7	mm
	External Clearance (for Option W, 0.4" Lead Spacing)	≥ 10	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.4	mm
T_S	Case Temperature(1)	175	°C
$I_{S,INPUT}$	Input Current(1)	400	mA
$P_{S,OUTPUT}$	Output Power(1)	700	mW
R_{IO}	Insulation Resistance at T_S, V_{IO} = 500 V(1)	> 10^{11}	Ω

Note:

1. Safety limit values – maximum values allowed in the event of a failure.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. T_A = 25°C Unless otherwise specified.

Symbol	Parameter	Value		Unit
		FOD814	FOD817	
Total Device				
T_{STG}	Storage Temperature	-55 to +150		°C
T_{OPR}	Operating Temperature	-55 to +105	-55 to +110	°C
T_J	Junction Temperature	-55 to +125		°C
T_{SOL}	Lead Solder Temperature	260 for 10 seconds		°C
θ_{JC}	Junction-to-Case Thermal Resistance	210		°C/W
P_{TOT}	Total Device Power Dissipation	200		mW
EMITTER				
I_F	Continuous Forward Current	±50	50	mA
V_R	Reverse Voltage		6	V
P_D	Power Dissipation	70		mW
	Derate Above 100°C	1.7		mW/°C
DETECTOR				
V_{CEO}	Collector-Emitter Voltage	70		V
V_{ECO}	Emitter-Collector Voltage	6		V
I_C	Continuous Collector Current	50		mA
P_C	Collector Power Dissipation	150		mW
	Derate Above 90°C	2.9		mW/°C

Electrical Characteristics

T_A = 25°C unless otherwise specified.

Individual Component Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
EMITTER							
V_F	Forward Voltage	FOD814	I_F = ±20 mA		1.2	1.4	V
		FOD817	I_F = 20 mA		1.2	1.4	
I_R	Reverse Current	FOD817	V_R = 4.0 V			10	µA
C_t	Terminal Capacitance	FOD814	V = 0, f = 1 kHz		50	250	pF
		FOD817	V = 0, f = 1 kHz		30	250	
DETECTOR							
I_{CEO}	Collector Dark Current	FOD814	V_{CE} = 20 V, I_F = 0			100	nA
		FOD817	V_{CE} = 20 V, I_F = 0			100	
BV_{CEO}	Collector-Emitter Breakdown Voltage	FOD814	I_C = 0.1 mA, I_F = 0	70			V
		FOD817	I_C = 0.1 mA, I_F = 0	70			
BV_{ECO}	Emitter-Collector Breakdown Voltage	FOD814	I_E = 10 µA, I_F = 0	6			V
		FOD817	I_E = 10 µA, I_F = 0	6			

DC Transfer Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
CTR	Current Transfer Ratio[2]	FOD814	I_F = ±1 mA, V_{CE} = 5 V	20		300	%
		FOD814A		50		150	
		FOD817	I_F = 5 mA, V_{CE} = 5 V	50		600	
		FOD817A		80		160	
		FOD817B		130		260	
		FOD817C		200		400	
		FOD817D		300		600	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	FOD814	I_F = ±20 mA, I_C = 1 mA		0.1	0.2	V
		FOD817	I_F = 20 mA, I_C = 1 mA		0.1	0.2	

AC Transfer Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
f_C	Cut-Off Frequency	FOD814	V_{CE} = 5 V, I_C = 2 mA, R_L = 100 Ω, -3 dB	15	80		kHz
t_r	Response Time (Rise)	FOD814, FOD817	V_{CE} = 2 V, I_C = 2 mA, R_L = 100 Ω[3]		4	18	µs
t_f	Response Time (Fall)	FOD814, FOD817			3	18	µs

Notes:

2. Current Transfer Ratio (CTR) = I_C / I_F x 100%.
3. For test circuit setup and waveforms, refer to page 7.

Electrical Characteristics (Continued)

T_A = 25°C unless otherwise specified.

Isolation Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.	Max.	Unit
V_{ISO}	Input-Output Isolation Voltage(4)	FOD814, FOD817	f = 60 Hz, t = 1 minute, $I_{I-O} \leq 2$ µA	5000			VAC_{RMS}
R_{ISO}	Isolation Resistance	FOD814, FOD817	V_{I-O} = 500 V_{DC}	5×10^{10}	1×10^{11}		Ω
C_{ISO}	Isolation Capacitance	FOD814, FOD817	V_{I-O} = 0, f = 1 MHz		0.6	1.0	pf

Note:

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°C unless otherwise specified.

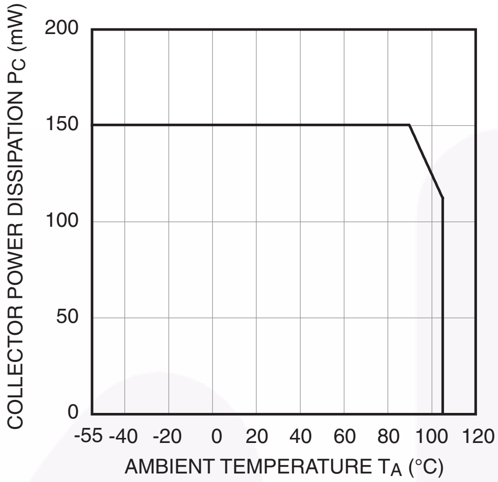


Fig. 3 Collector Power Dissipation vs. Ambient Temperature (FOD814)

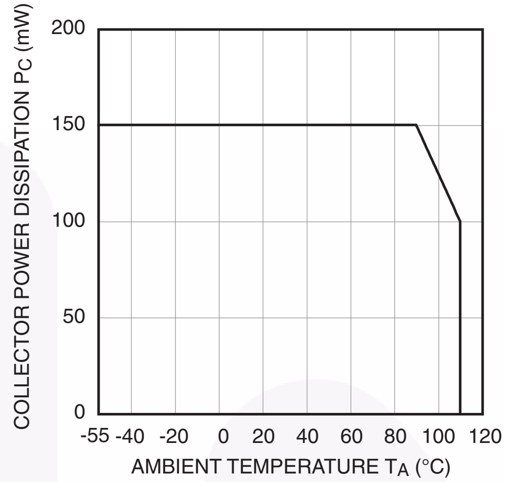


Fig. 4 Collector Power Dissipation vs. Ambient Temperature (FOD817)

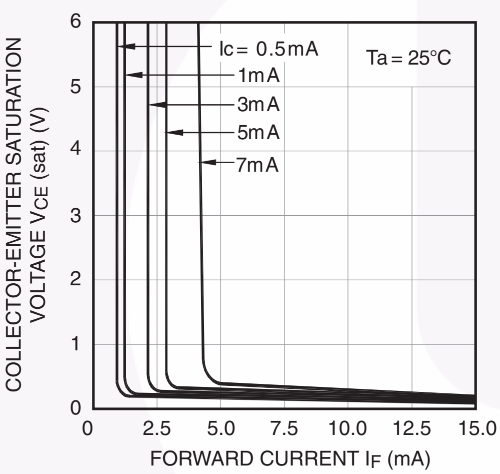


Fig. 5 Collector-Emitter Saturation Voltage vs. Forward Current

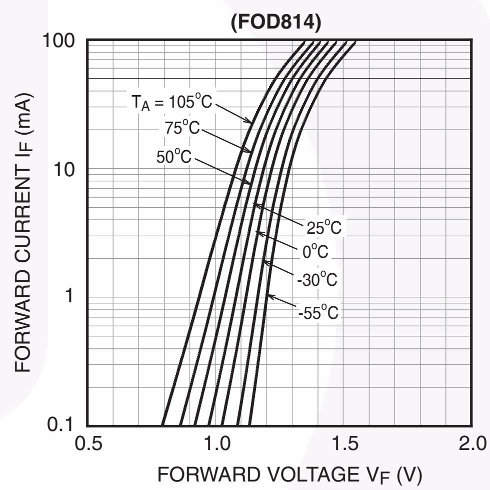


Fig. 6 Forward Current vs. Forward Voltage

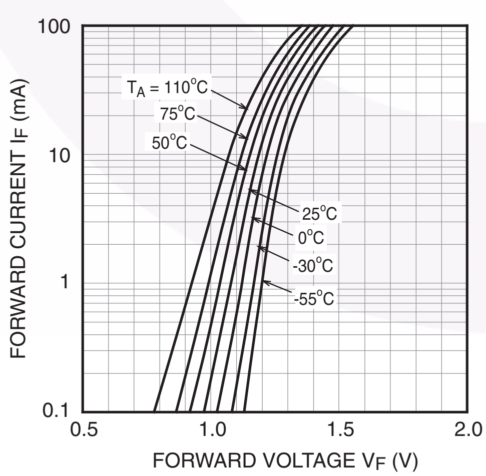


Fig. 7 Forward Current vs. Forward Voltage (FOD817)

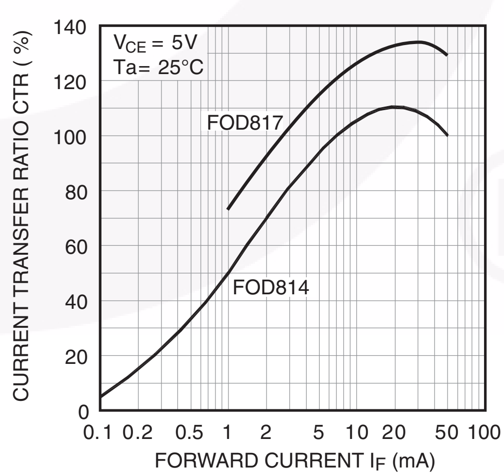


Fig. 8 Current Transfer Ratio vs. Forward Current

Typical Electrical/Optical Characteristic Curves (Continued)

T_A = 25°C unless otherwise specified.

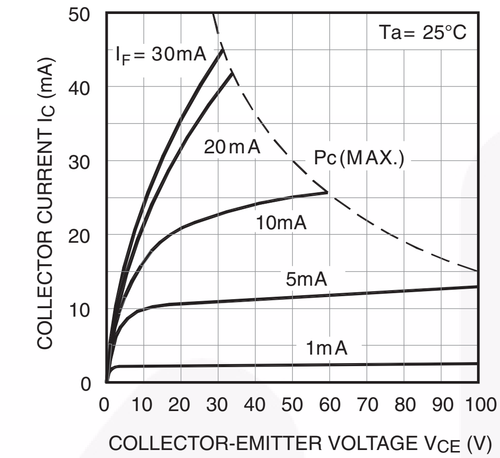


Fig. 9 Collector Current vs. Collector-Emitter Voltage (FOD814)

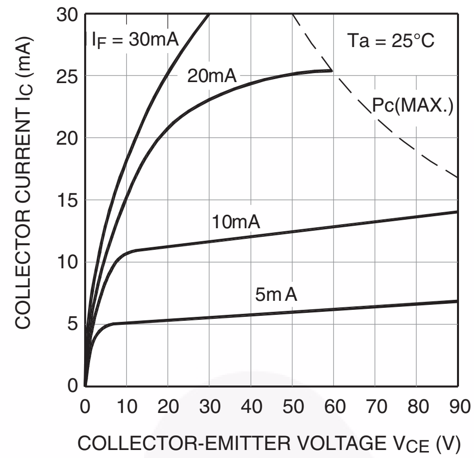


Fig. 10 Collector Current vs. Collector-Emitter Voltage (FOD817)

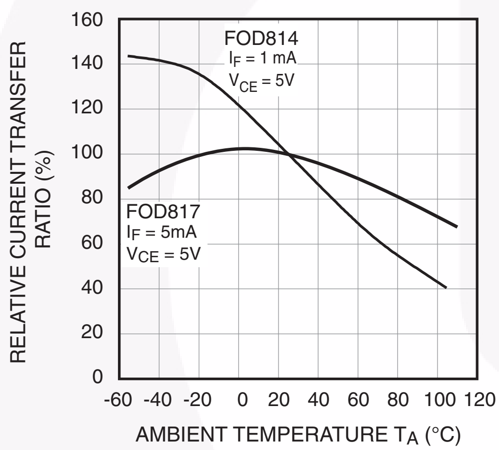


Fig. 11 Relative Current Transfer Ratio vs. Ambient Temperature

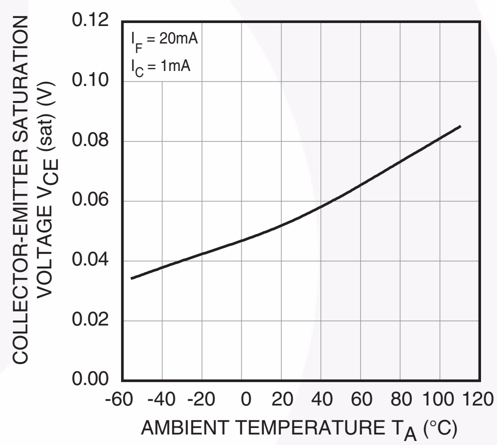


Fig. 12 Collector-Emitter Saturation Voltage vs. Ambient Temperature

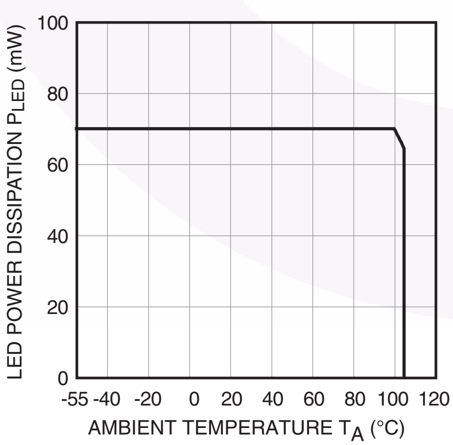


Fig. 13 LED Power Dissipation vs. Ambient Temperature (FOD814)

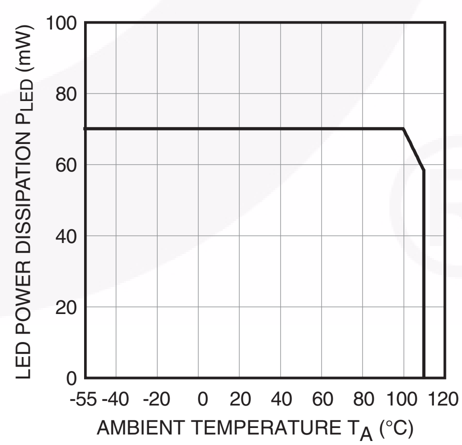


Fig. 14 LED Power Dissipation vs. Ambient Temperature (FOD817)

Typical Electrical/Optical Characteristic Curves (Continued)

T_A = 25°C unless otherwise specified.

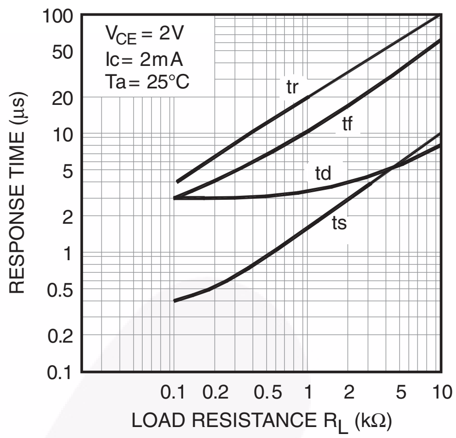


Fig. 15 Response Time vs. Load Resistance

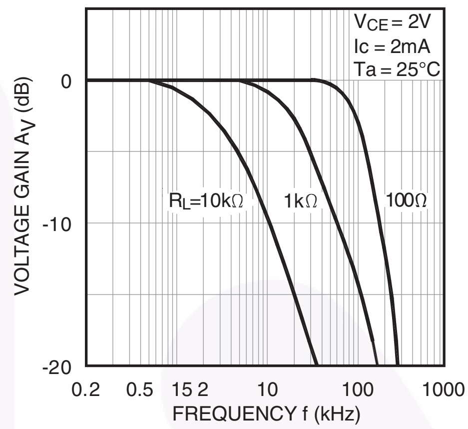


Fig. 16 Frequency Response

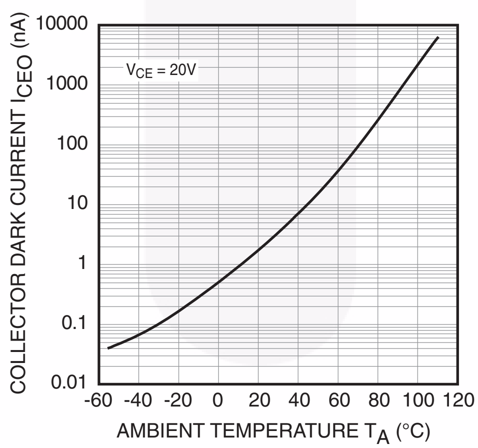
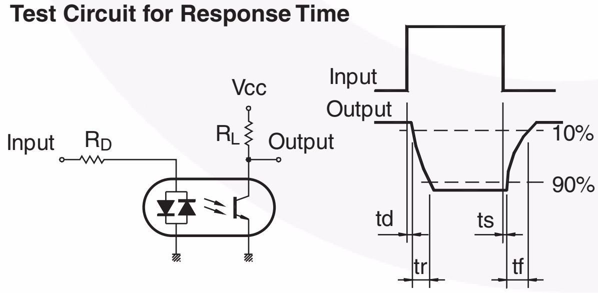
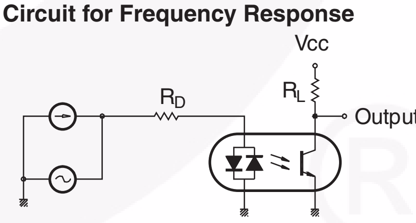


Fig. 17 Collector Dark Current vs. Ambient Temperature

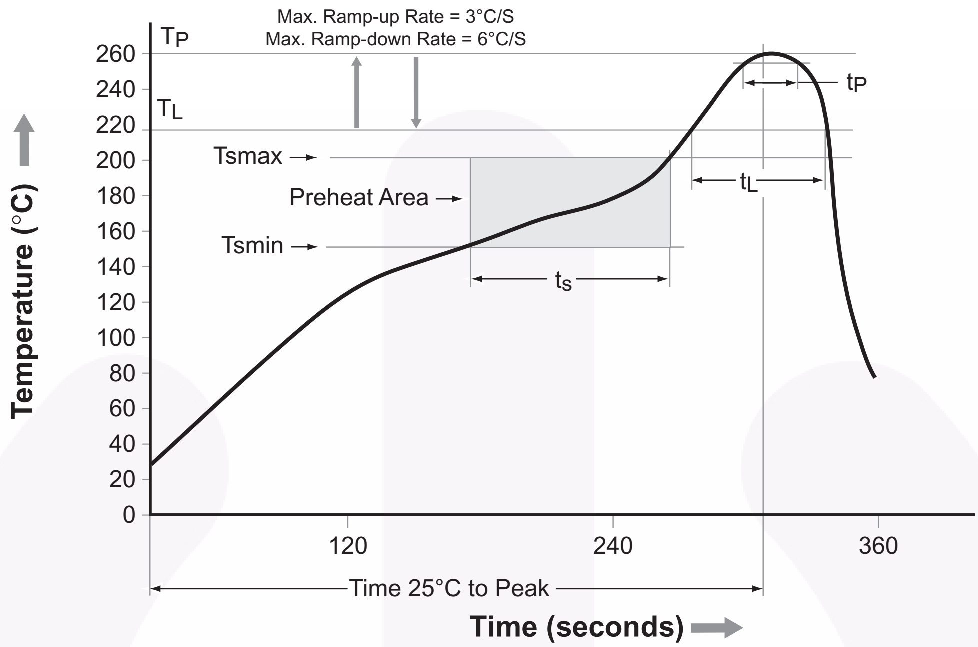
Test Circuit for Response Time



Test Circuit for Frequency Response



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (t_S) from (Tsmin to Tsmax)	60–120 seconds
Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / –5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

Figure 20. Reflow Profile

Ordering Information

Part Number	Package	Packing Method
FOD817X	DIP 4-Pin	Tube (100 units per tube)
FOD817XS	SMT 4-Pin (Lead Bend)	Tube (100 units per tube)
FOD817XSD	SMT 4-Pin (Lead Bend)	Tape and Reel (1,000 units per reel)
FOD817X300	DIP 4-Pin, DIN EN/IEC60747-5-5 option	Tube (100 units per tube)
FOD817X3S	SMT 4-Pin (Lead Bend), DIN EN/IEC60747-5-5 option	Tube (100 units per tube)
FOD817X3SD	SMT 4-Pin (Lead Bend), DIN EN/IEC60747-5-5 option	Tape and Reel (1,000 units per reel)
FOD817X300W	DIP 4-Pin, 0.4" Lead Spacing, DIN EN/IEC60747-5-5 option	Tube (100 units per tube)

Note:
The product orderable part number system listed in this table also applies to the FOD814 products.
"X" denotes the Current Transfer Ratio (CTR) options

Marking Information

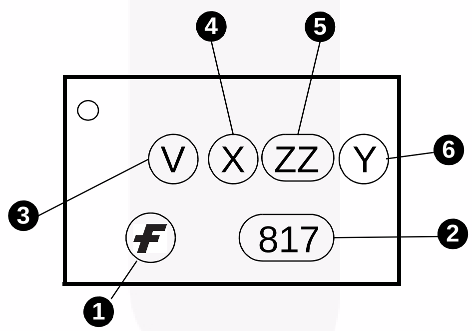


Figure 21. Top Mark

Definitions	
1	Fairchild Logo
2	Device Number
3	DIN EN/IEC60747-5-5 Option (only appears on parts ordered with this option)
4	One-Digit Year Code, e.g., '5'
5	Two-Digit Work Week, Ranging from '01' to '53'
6	Assembly Package Code Y = Manufactured in Thailand YA = Manufactured in China

Carrier Tape Specifications

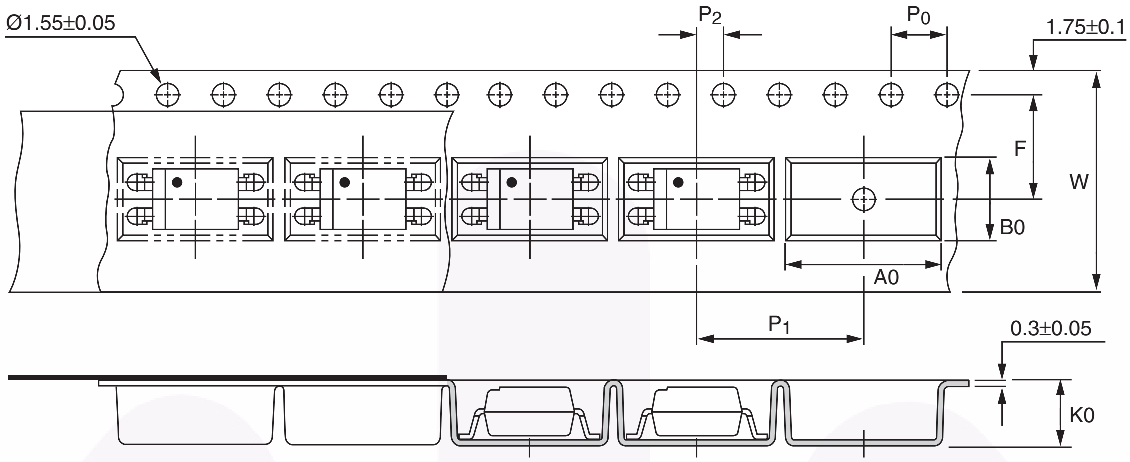
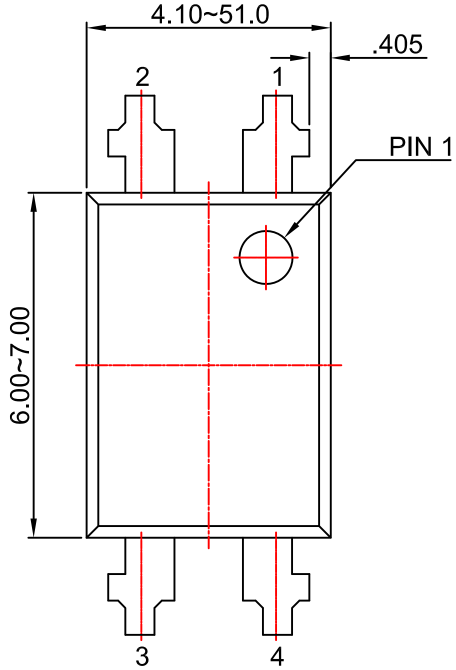


Figure 22. Carrier Tape Specification

Symbol	Description	Dimensions in mm (inches)
W	Tape wide	16 ± 0.3 (0.63)
P_0	Pitch of sprocket holes	4 ± 0.1 (0.15)
F P_2	Distance of compartment	7.5 ± 0.1 (0.295) 2 ± 0.1 (0.079)
P_1	Distance of compartment to compartment	12 ± 0.1 (0.472)
A0	Compartment	10.45 ± 0.1 (0.411)
B0		5.30 ± 0.1 (0.209)
K0		4.25 ± 0.1 (0.167)



NOTES:

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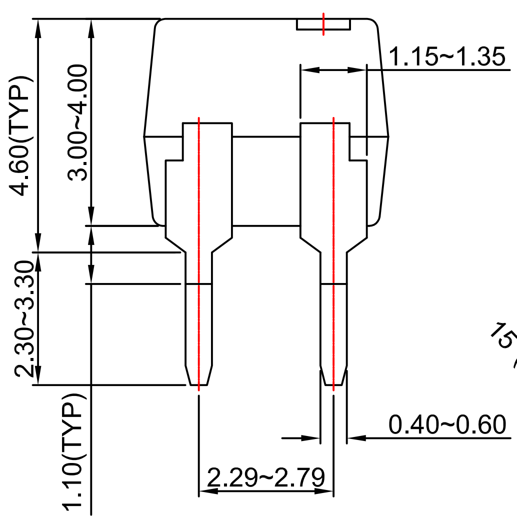

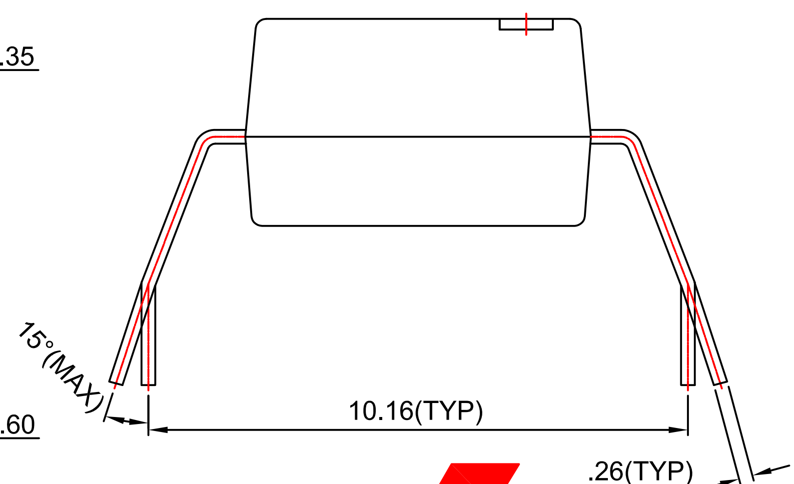

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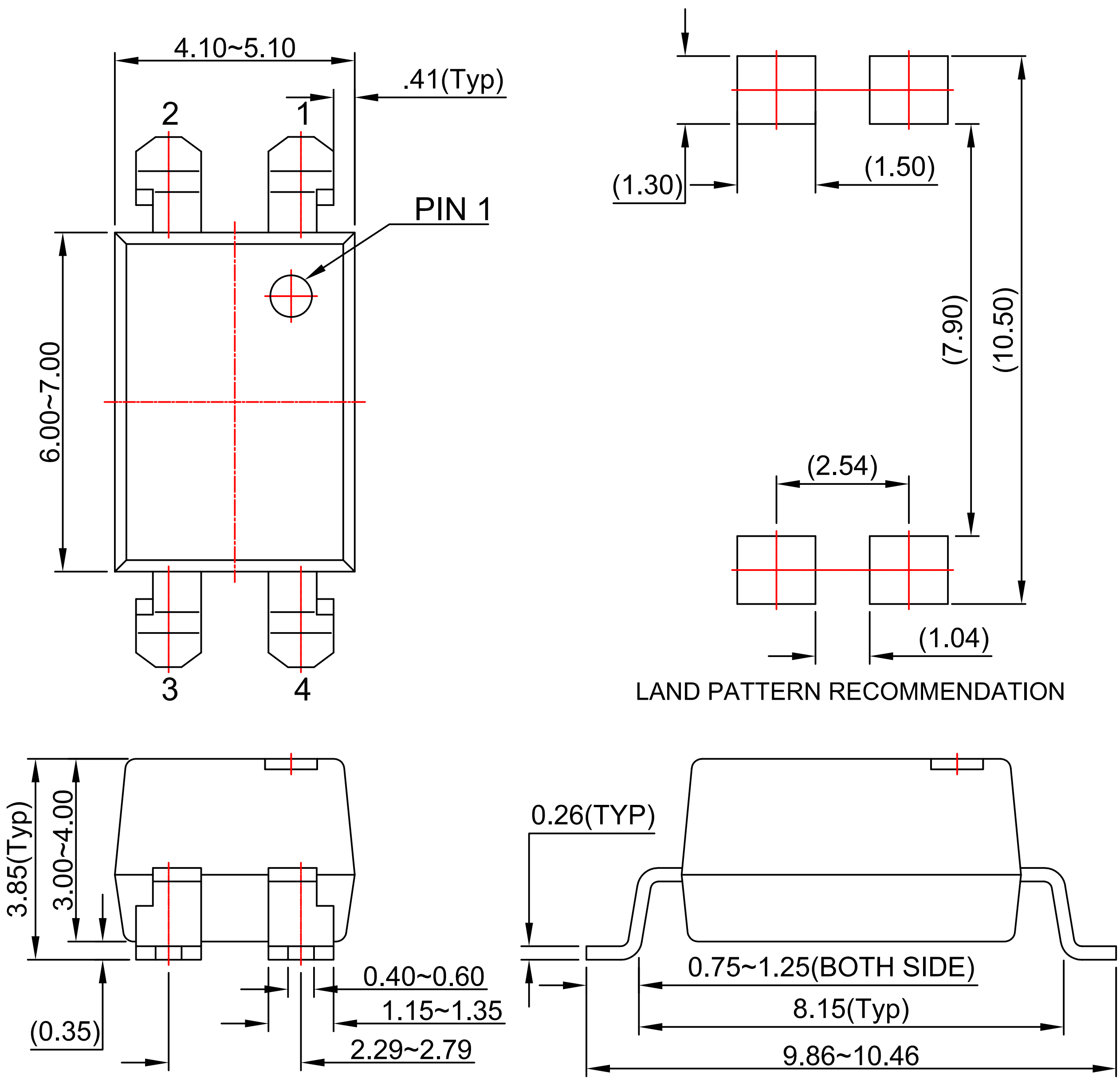

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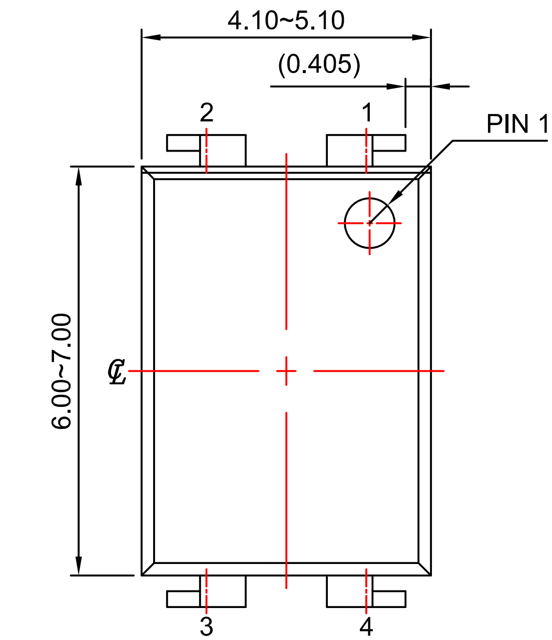

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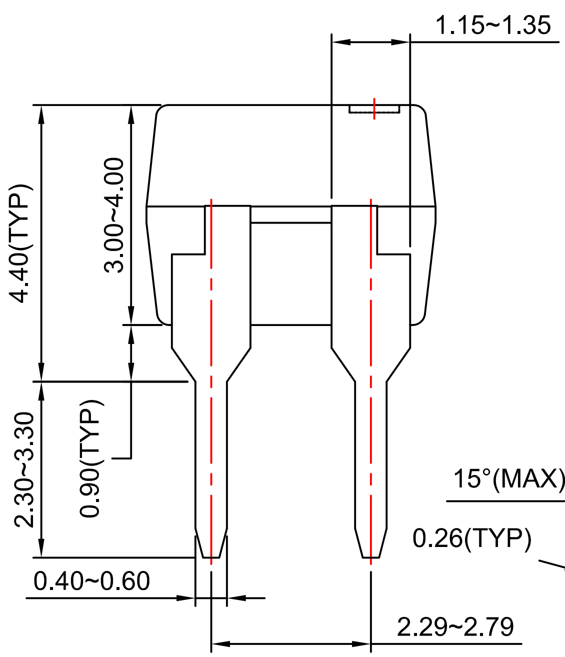

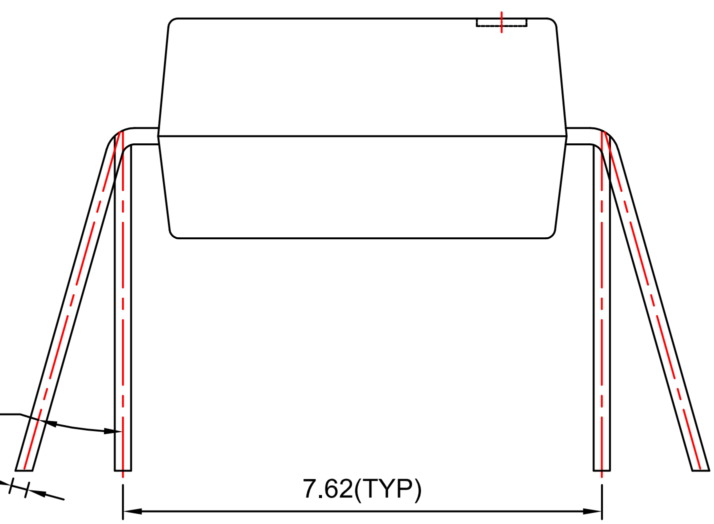

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ON Semiconductor Website: **www.onsemi.com**

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- *Работу по проектам и поставку образцов.*
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- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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