

FOD814 Series, FOD617 Series, FOD817 Series 4-Pin High Operating Temperature Phototransistor Optocouplers

Features

- AC input response (FOD814 only)
- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- Current transfer ratio in selected groups:

FOD617A: 40–80%	FOD817: 50–600%
FOD617B: 63–125%	FOD817A: 80–160%
FOD617C: 100–200%	FOD817B: 130–260%
FOD617D: 160–320%	FOD817C: 200–400%
FOD814: 20–300%	FOD817D: 300–600%
FOD814A: 50–150%	
- C-UL, UL and VDE approved
- High input-output isolation voltage of 5000Vrms
- Minimum BV_{CEO} of 70V guaranteed
- Higher operating temperatures (versus H11AXXX counterparts)

Applications

FOD814 Series

- AC line monitor
- Unknown polarity DC sensor
- Telephone line interface

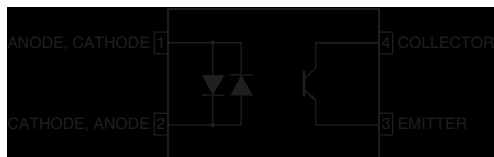
FOD617 and FOD817 Series

- 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 FOD617/817 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 4-pin dual in-line package.

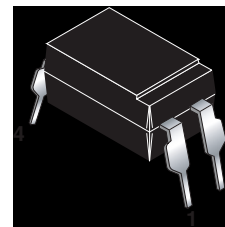
Functional Block Diagram



FOD814



FOD617/817



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Symbol	Parameter	Value		Units
		FOD814	FOD617/817	
TOTAL DEVICE				
T_{STG}	Storage Temperature	-55 to +150		$^\circ\text{C}$
T_{OPR}	Operating Temperature	-55 to +105	-55 to +110	$^\circ\text{C}$
T_{SOL}	Lead Solder Temperature	260 for 10 sec		$^\circ\text{C}$
P_{TOT}	Total Power Dissipation	200		mW
EMITTER				
I_F	Continuous Forward Current	± 50	50	mA
V_R	Reverse Voltage	-	6	
P_D	Power Dissipation	70		mW
	Derate above 100°C	1.7		$\text{mW}/^\circ\text{C}$
DETECTOR				
V_{CEO}	Collector-Emitter Voltage	70		V
V_{ECO}	Emitter-Collector Voltage	6	6 (FOD817) 7 (FOD617)	V
I_C	Continuous Collector Current	50		mA
P_C	Collector Power Dissipation	150		mW
	Derate above 90°C	2.9		$\text{mW}/^\circ\text{C}$

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

Individual Component Characteristics

Symbol	Parameter	Device	Test Conditions	Min.	Typ.*	Max.	Unit
EMITTER							
V_F	Forward Voltage	FOD814	$I_F = \pm 20\text{mA}$	–	1.2	1.4	V
		FOD617	$I_F = 60\text{mA}$	–	1.35	1.65	
		FOD817	$I_F = 20\text{mA}$	–	1.2	1.4	
I_R	Reverse Leakage Current	FOD617	$V_R = 6.0\text{V}$	–	0.001	10	μA
		FOD817	$V_R = 4.0\text{V}$	–	–	10	
C_t	Terminal Capacitance	FOD814	$V = 0, f = 1\text{kHz}$	–	50	250	pF
		FOD617	$V = 0, f = 1\text{kHz}$	–	30	250	
		FOD817	$V = 0, f = 1\text{kHz}$	–	30	250	
DETECTOR							
I_{CEO}	Collector Dark Current	FOD814	$V_{CE} = 20\text{V}, I_F = 0$	–	–	100	nA
		FOD617C/D	$V_{CE} = 10\text{V}, I_F = 0$	–	1	100	
		FOD617A/B	$V_{CE} = 10\text{V}, I_F = 0$	–	1	50	
		FOD817	$V_{CE} = 20\text{V}, I_F = 0$	–	–	100	
BV_{CEO}	Collector-Emitter Breakdown Voltage	FOD814	$I_C = 0.1\text{mA}, I_F = 0$	70	–	–	V
		FOD617	$I_C = 100\mu\text{A}, I_F = 0$	70	–	–	
		FOD817	$I_C = 0.1\text{mA}, I_F = 0$	70	–	–	
BV_{ECO}	Emitter-Collector Breakdown Voltage	FOD814	$I_E = 10\mu\text{A}, I_F = 0$	6	–	–	V
		FOD617	$I_E = 10\mu\text{A}, I_F = 0$	7	–	–	
		FOD817	$I_E = 10\mu\text{A}, I_F = 0$	6	–	–	

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

Symbol	DC Characteristic	Device	Test Conditions	Min.	Typ.*	Max.	Unit	
CTR	Current Transfer Ratio	FOD814	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}^{(1)}$	20	–	300	%	
		FOD814A		50	–	150		
		FOD617A	$I_F = 10\text{mA}, V_{CE} = 5\text{V}^{(1)}$	40	–	80		
		FOD617B		63	–	125		
		FOD617C		100	–	200		
		FOD617D		160	–	320		
		FOD617A		$I_F = 1\text{mA}, V_{CE} = 5\text{V}^{(1)}$	13	–		–
		FOD617B			22	–		–
		FOD617C	34		–	–		
		FOD617D	56		–	–		
		FOD817	$I_F = 5\text{mA}, V_{CE} = 5\text{V}^{(1)}$	50	–	600		
		FOD817A		80	–	160		
		FOD817B		130	–	260		
		FOD817C		200	–	400		
FOD817D	300	–		600				
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	FOD814	$I_F = \pm 20\text{mA}, I_C = 1\text{mA}$	–	0.1	0.2	V	
		FOD617	$I_F = 10\text{mA}, I_C = 2.5\text{mA}$	–	–	0.4		
		FOD817	$I_F = 20\text{mA}, I_C = 1\text{mA}$	–	0.1	0.2		

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

Transfer Characteristics (Continued) ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Symbol	AC Characteristic	Device	Test Conditions	Min.	Typ.*	Max.	Unit
f_C	Cut-Off Frequency	FOD814	$V_{CE} = 5\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega$, -3dB	15	80	–	kHz
t_r	Response Time (Rise)	FOD814	$V_{CE} = 2\text{V}$, $I_C = 2\text{mA}$, $R_L = 100\Omega^{(2)}$	–	4	18	μs
		FOD617					
		FOD817					
t_f	Response Time (Fall)	FOD814		–	3	18	μs
		FOD617					
		FOD817					

Isolation Characteristics

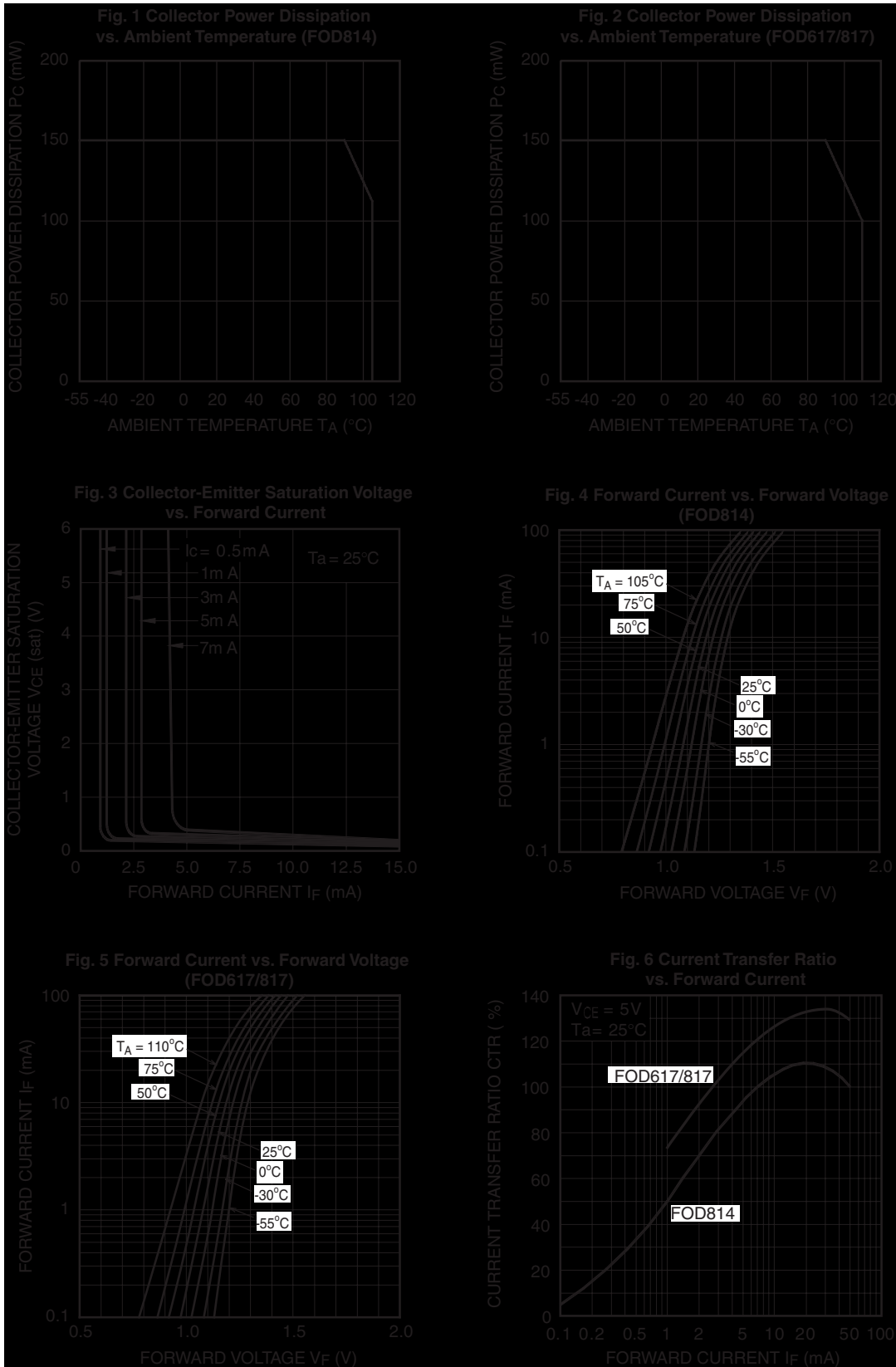
Symbol	Characteristic	Device	Test Conditions	Min.	Typ.*	Max.	Units
V_{ISO}	Input-Output Isolation Voltage ⁽³⁾	FOD814	$f = 60\text{Hz}$, $t = 1\text{ min}$, $I_{I-O} \leq 2\mu\text{A}$	5000			Vac(rms)
		FOD617					
		FOD817					
R_{ISO}	Isolation Resistance	FOD814	$V_{I-O} = 500\text{VDC}$	5×10^{10}	1×10^{11}	–	Ω
		FOD617					
		FOD817					
C_{ISO}	Isolation Capacitance	FOD814	$V_{I-O} = 0$, $f = 1\text{ MHz}$		0.6	1.0	pf
		FOD617					
		FOD817					

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

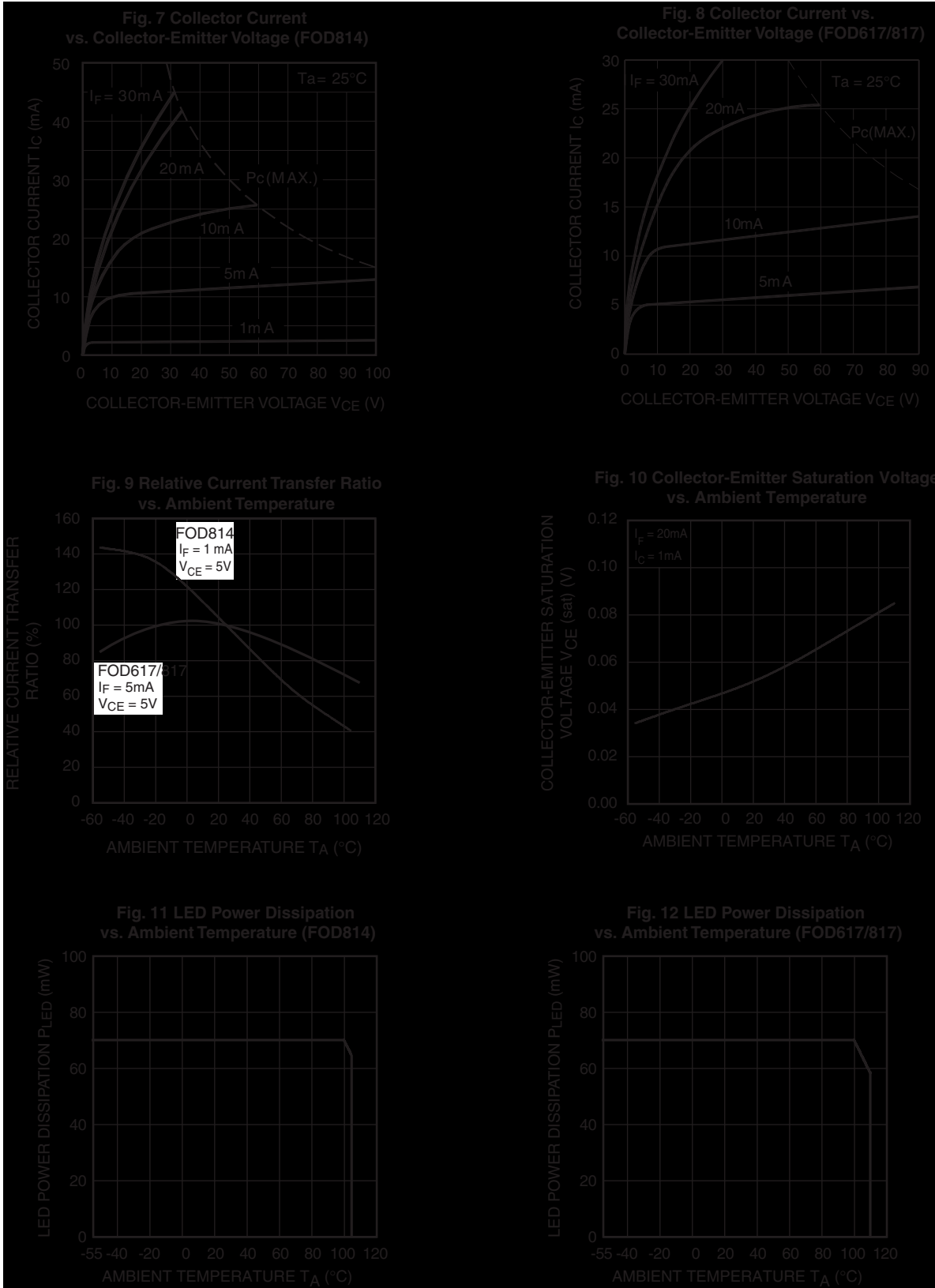
Notes:

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

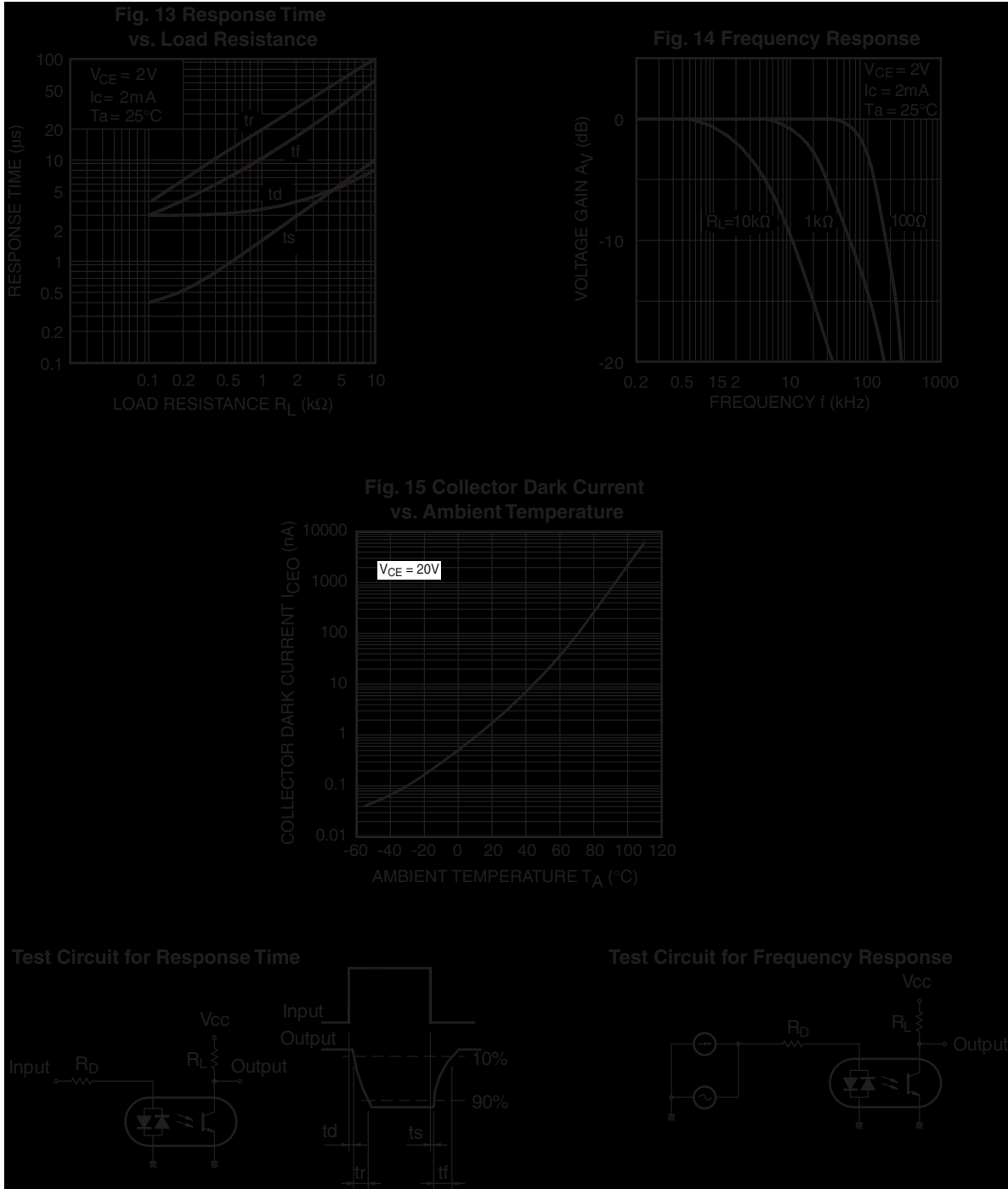
Typical Electrical/Optical Characteristics ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

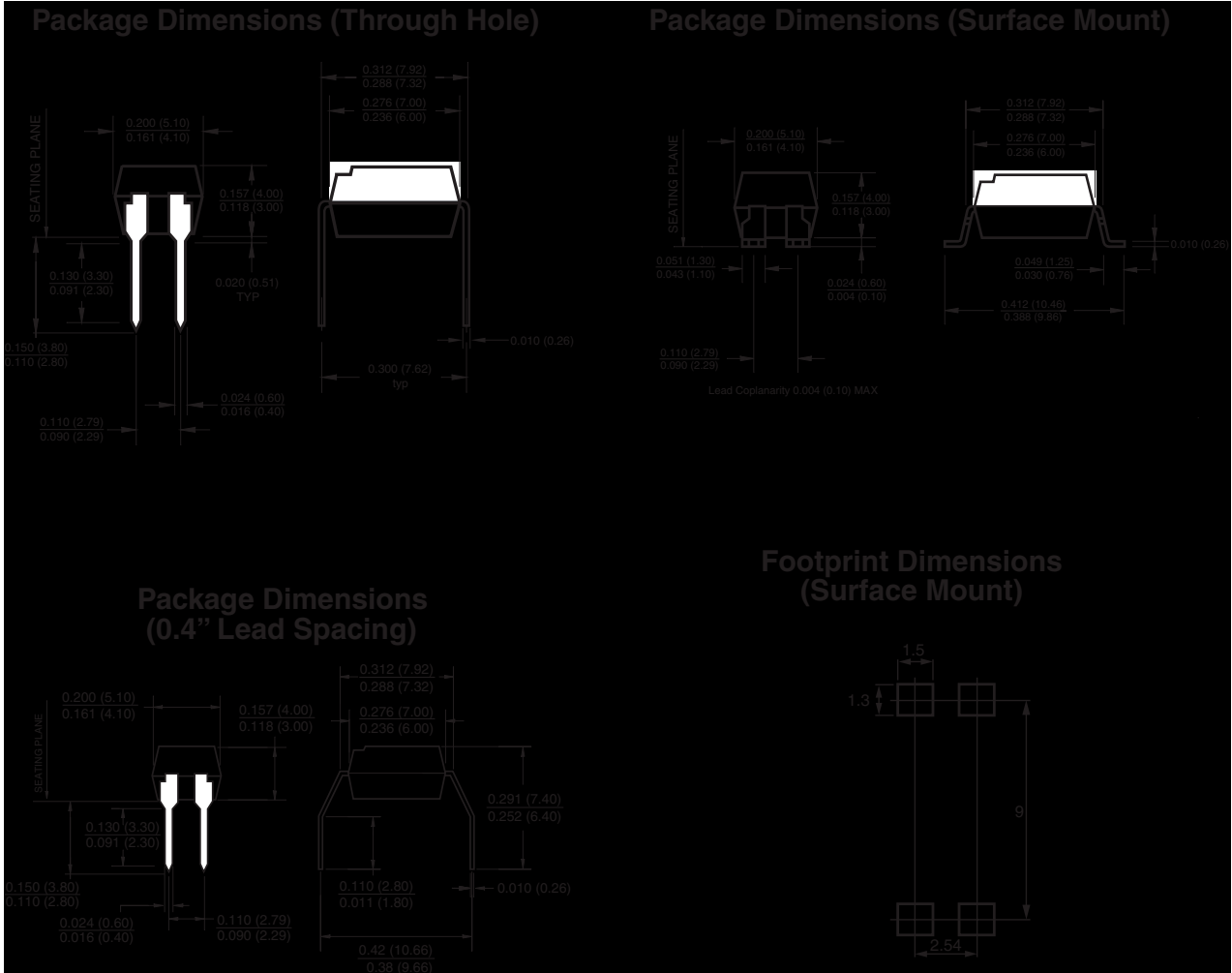


Typical Electrical/Optical Characteristics (Continued) ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)



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





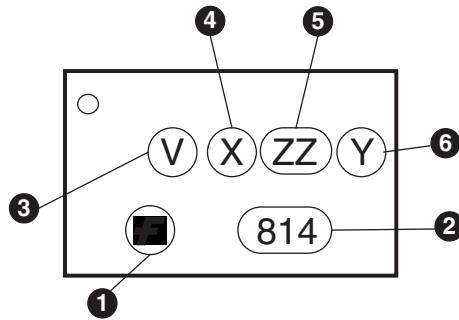
Note:

All dimensions are in inches (millimeters).

Ordering Information

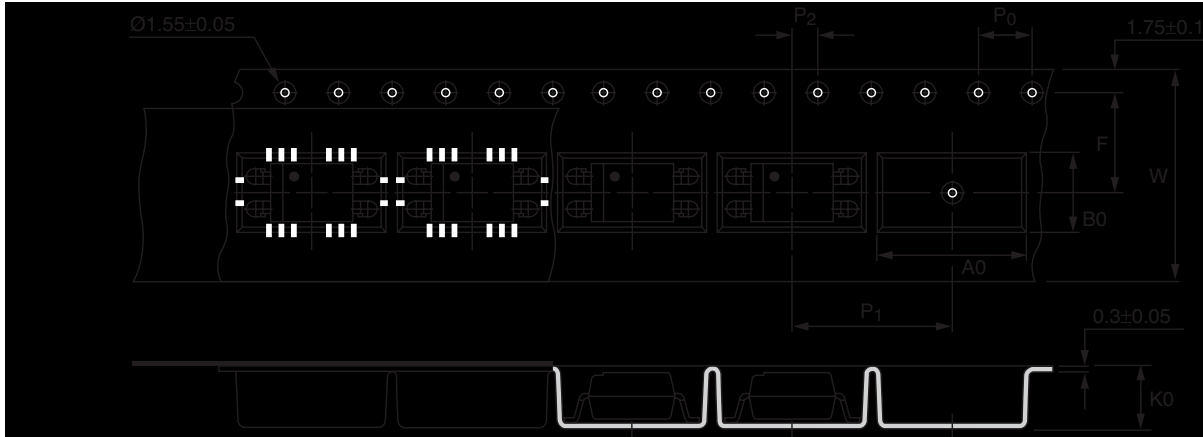
Option	Part Number Example	Description
S	FOD814S	Surface Mount Lead Bend
SD	FOD814SD	Surface Mount; Tape and reel
W	FOD814W	0.4" Lead Spacing
300	FOD814300	VDE Approved
300W	FOD814300W	VDE Approved, 0.4" Lead Spacing
3S	FOD8143S	VDE Approved, Surface Mount
3SD	FOD8143SD	VDE Approved, Surface Mount, Tape & 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

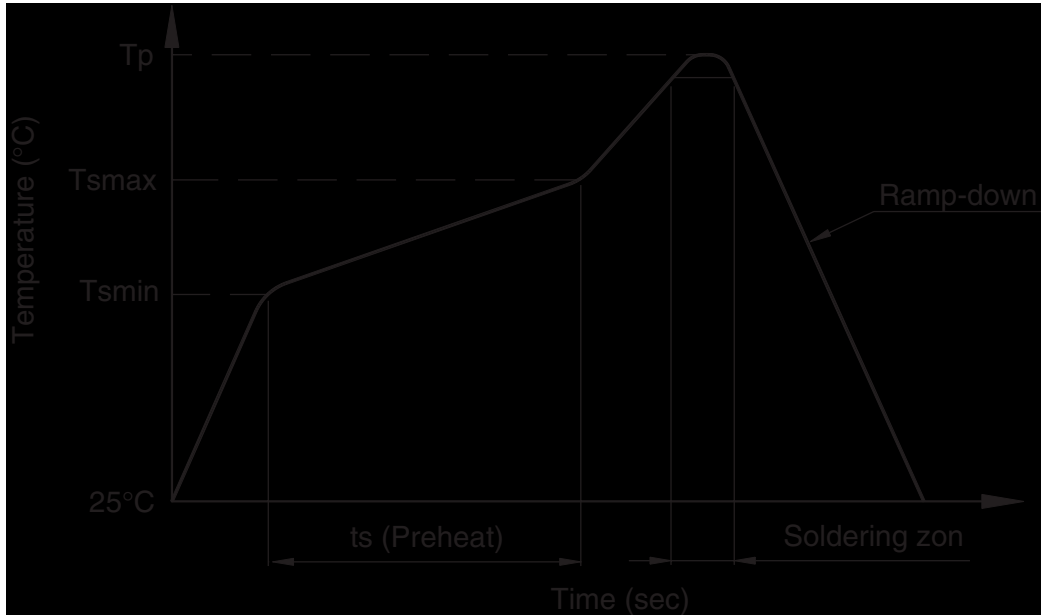


Note:

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	7.5 ± 0.1 (.295)
	P ₂	2 ± 0.1 (.079)
Distance of compartment to compartment	P ₁	12 ± 0.1 (.472)
Compartment	A ₀	10.45 ± 0.1 (.411)
	B ₀	5.30 ± 0.1 (.209)
	K ₀	4.25 ± 0.1 (.167)

Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (T _{smin} -T _{smax} / t _s)	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 (T _p)	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 (T _p)	Max 260°C for 10 sec

