



**THE DATASHEET OF  
FOD8153S**



# FOD815 Series 4-Pin High Operating Temperature Photodarlington Optocoupler

## Features

- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- High current transfer ratio: 600% minimum
- C-UL, UL, and VDE approved
- High input-output isolation voltage of 5000Vrms
- Higher operating temperature (versus H11B815)

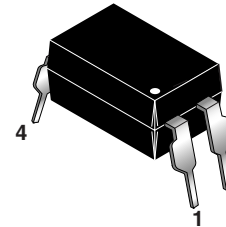
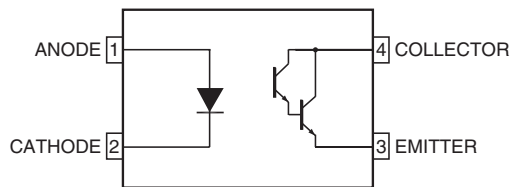
## Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

## Description

The FOD815 consists of a gallium arsenide infrared emitting diode, driving a silicon photodarlington output in a 4-pin dual in-line package.

## Functional Block Diagram



## Absolute Maximum Ratings (T<sub>A</sub> = 25°C Unless otherwise specified.)

Symbol	Parameter	Value	Units
<b>TOTAL DEVICE</b>			
T <sub>STG</sub>	Storage Temperature	-55 to +125	°C
T <sub>OPR</sub>	Operating Temperature	-30 to +105	°C
T <sub>SOL</sub>	Lead Solder Temperature	260 for 10 sec	°C
P <sub>TOT</sub>	Total Power Dissipation	200	mW
<b>INPUT</b>			
I <sub>F</sub>	Forward Current	50	mA
P	Power Dissipation	70	mW
<b>OUTPUT</b>			
V <sub>CEO</sub>	Collector-Emitter Voltage	35	V
V <sub>ECO</sub>	Emitter-Collector Voltage	6	V
I <sub>C</sub>	Collector Current	80	mA
P <sub>C</sub>	Collector Power Dissipation	150	mW

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>INPUT</b>						
$V_F$	Forward Voltage	$I_F = 20\text{mA}$	–	1.2	1.4	V
$C_t$	Terminal Capacitance	$V = 0, f = 1\text{kHz}$	–	50	250	pF
<b>OUTPUT</b>						
$I_{CEO}$	Collector Dark Current	$V_{CE} = 10\text{V}, I_F = 0$	–	–	1	$\mu\text{A}$
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 0.1\text{mA}, I_F = 0$	35	–	–	V
$BV_{ECO}$	Emitter-Collector Breakdown Voltage	$I_E = 10\mu\text{A}, I_F = 0$	6	–	–	V

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

Symbol	DC Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$I_C$	Collector Current	$I_F = 1\text{mA}, V_{CE} = 2\text{V}$	6	–	75	mA
CTR	Current Transfer Ratio <sup>(1)</sup>		600	–	7,500	%
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_F = 20\text{mA}, I_C = 5\text{mA}$	–	0.8	1	V
$f_C$	Cut-Off Frequency	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$	1	6	–	KHz
$t_r$	Response Time (Rise)	$V_{CE} = 2\text{V}, I_C = 10\text{mA}, R_L = 100\Omega$	–	60	300	$\mu\text{s}$
$t_f$	Response Time (Fall)		–	53	250	$\mu\text{s}$

**Isolation Characteristics**

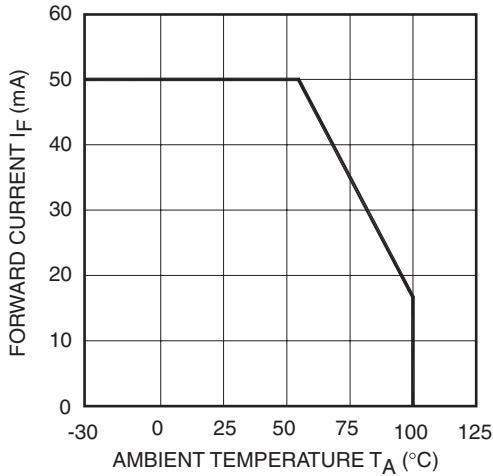
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
$V_{ISO}$	Input-Output Isolation Voltage	$f = 60\text{Hz}, t = 1\text{min}, I_{I-O} \leq 2\mu\text{A}$	5000	–	–	Vac(rms)
$R_{ISO}$	Isolation Resistance	DC500V 40~60% R.H.	$5 \times 10^{10}$	$1 \times 10^{11}$	–	$\Omega$
$C_f$	Floating Capacitance	$V = 0, f = 1\text{MHz}$	–	0.6	1	pF

**Note:**

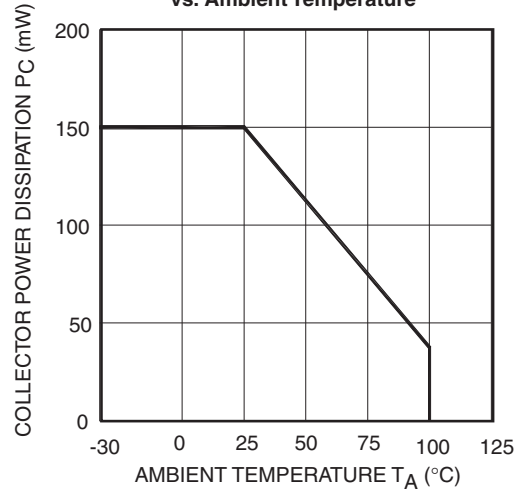
- Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

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

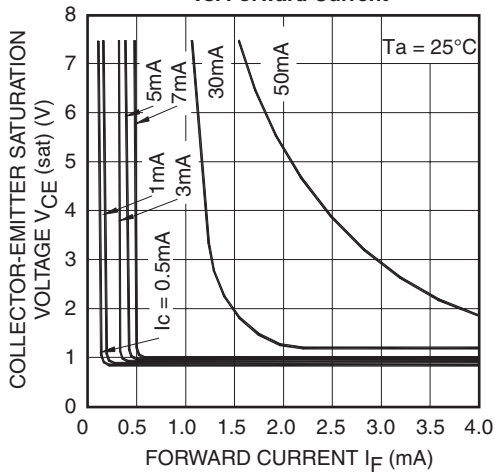
**Fig. 1 Forward Current vs. Ambient Temperature**



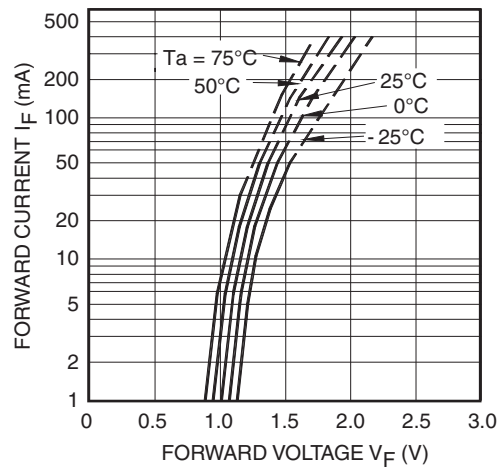
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



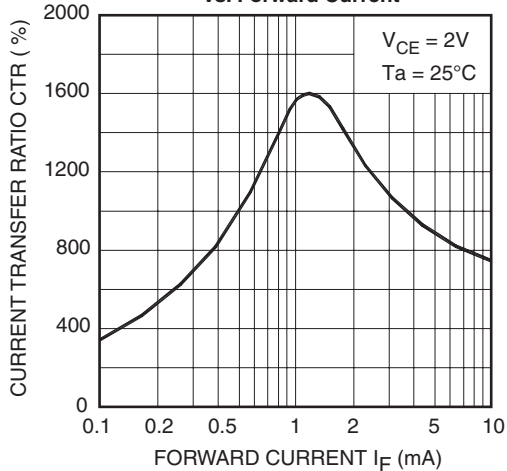
**Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current**



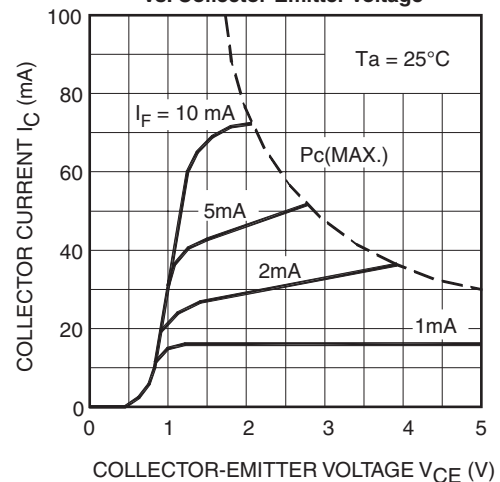
**Fig. 4 Forward Current vs. Forward Voltage**



**Fig. 5 Current Transfer Ratio vs. Forward Current**

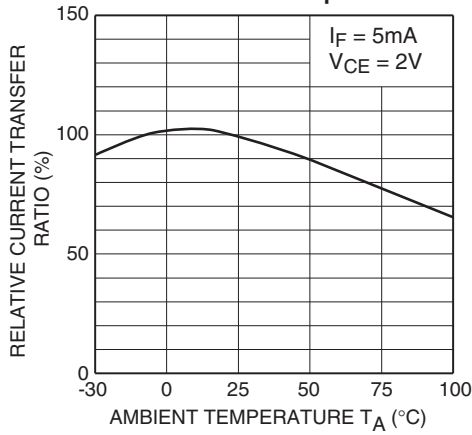


**Fig. 6 Collector Current vs. Collector-Emitter Voltage**

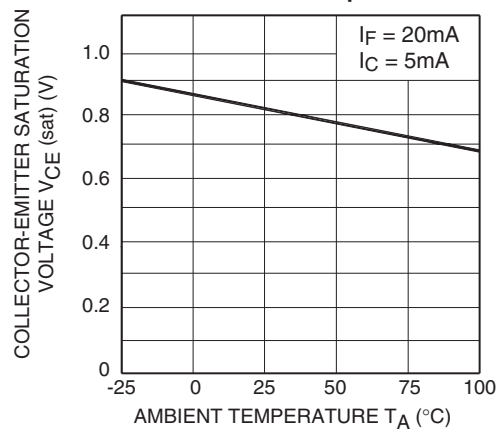


**Typical Electrical/Optical Characteristic Curves** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

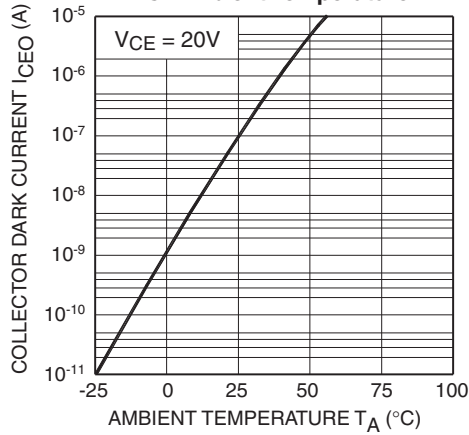
**Fig. 7. Relative Current Transfer Ratio vs. Ambient Temperature**



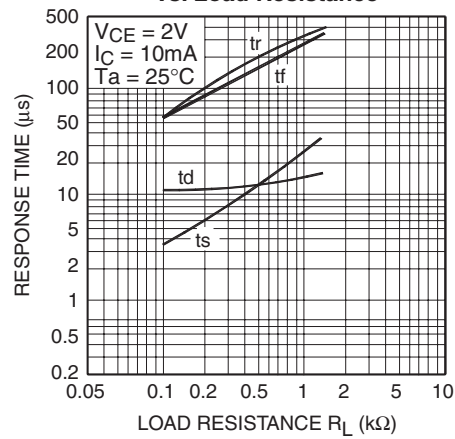
**Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



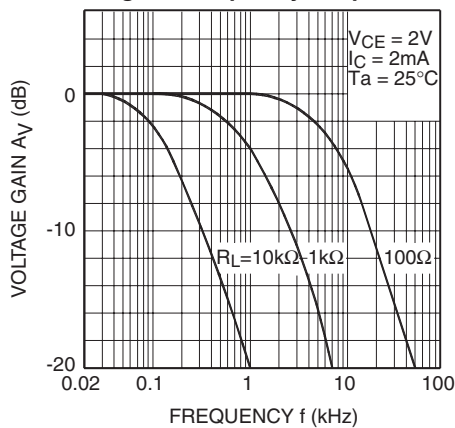
**Fig. 9 Collector Dark Current vs. Ambient Temperature**



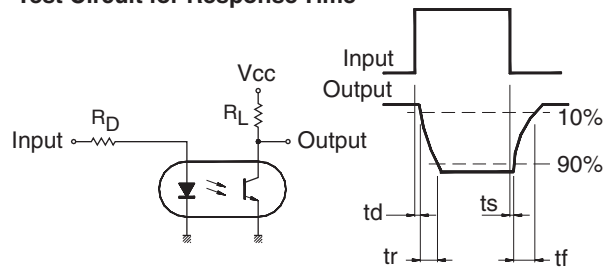
**Fig. 10. Response Time vs. Load Resistance**



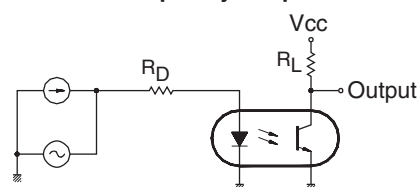
**Fig. 11. Frequency Response**



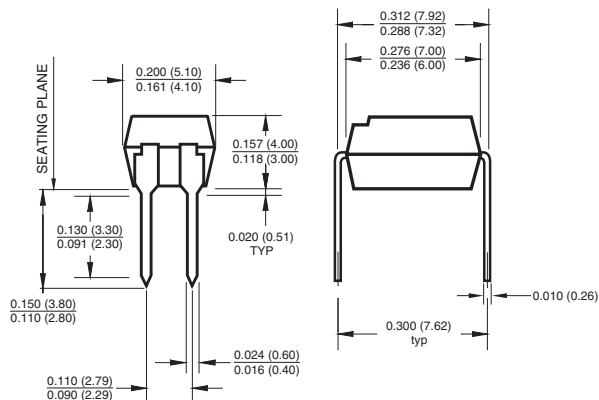
**Test Circuit for Response Time**



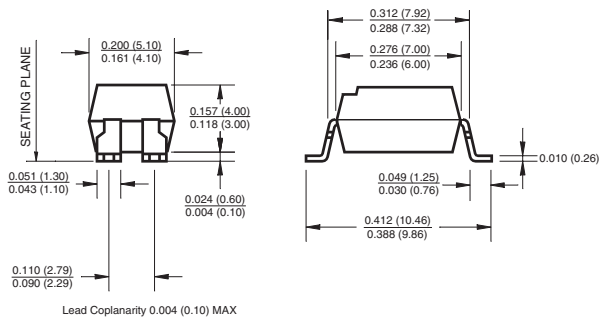
**Test Circuit for Frequency Response**



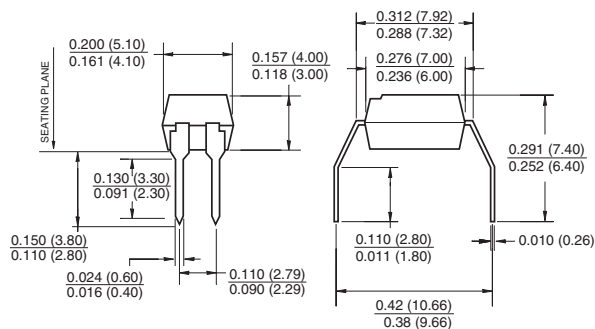
### Package Dimensions (Through Hole)



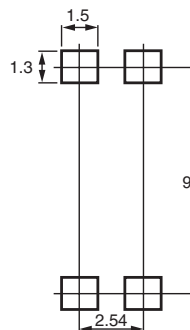
### Package Dimensions (Surface Mount)



### Package Dimensions (0.4" Lead Spacing)



### Footprint Dimensions (Surface Mount)



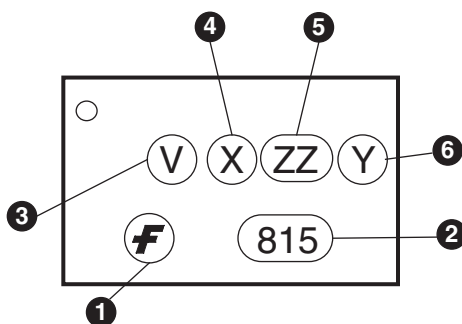
**Note:**

All dimensions are in inches (millimeters)

### Ordering Information

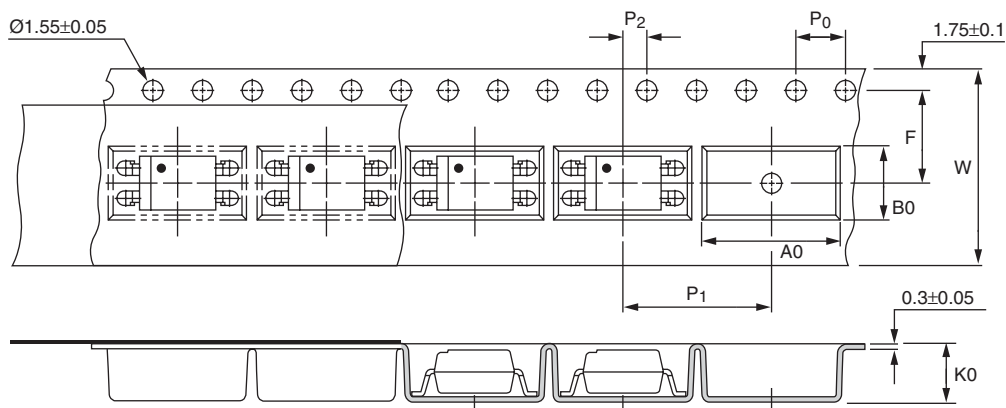
Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE Approved
300W	.300W	VDE Approved, 0.4" Lead Spacing
3S	.3S	VDE Approved, Surface Mount
3SD	.3SD	VDE Approved, Surface Mount, Tape & Reel

### 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

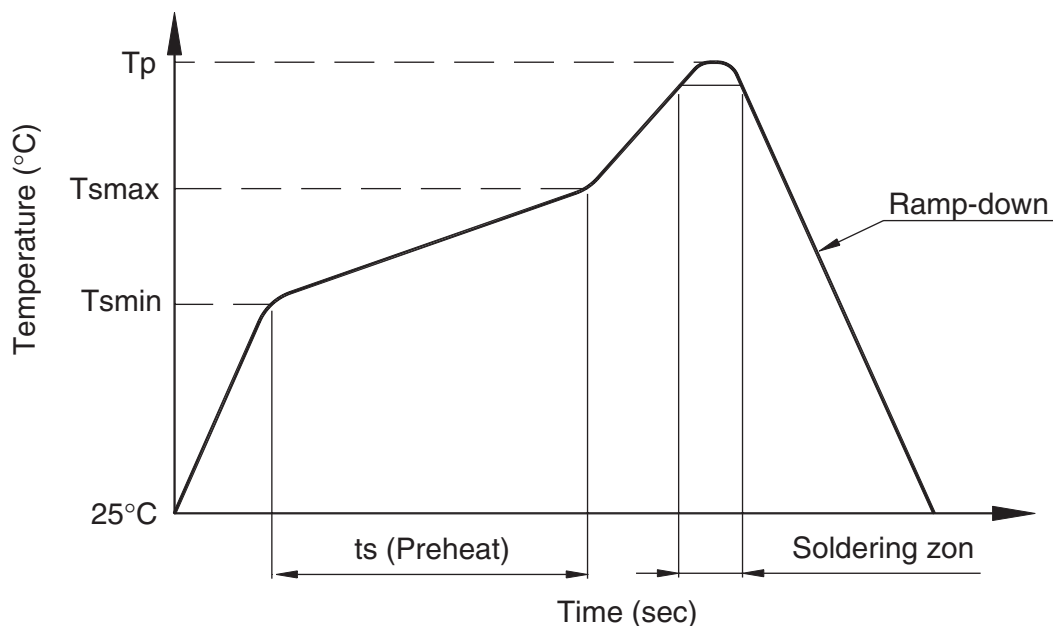


**Note:**

All dimensions are in millimeters.

Description	Symbol	Dimensions in mm (inches)
Tape wide	W	$16 \pm 0.3$ (.63)
Pitch of sprocket holes	$P_0$	$4 \pm 0.1$ (.15)
Distance of compartment	F	$7.5 \pm 0.1$ (.295)
	$P_2$	$2 \pm 0.1$ (.079)
Distance of compartment to compartment	$P_1$	$12 \pm 0.1$ (.472)
Compartment	$A_0$	$10.45 \pm 0.1$ (.411)
	$B_0$	$5.30 \pm 0.1$ (.209)
	$K_0$	$4.25 \pm 0.1$ (.167)

### Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (Tsmín-Tsmáx / 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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FACT Quiet Series™		OPTOPLANAR™	SILENT SWITCHER®	UltraFET®
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### Definition of Terms

Datasheet Identification	Product Status	Definition
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