

# 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

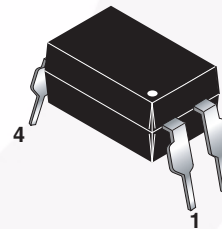
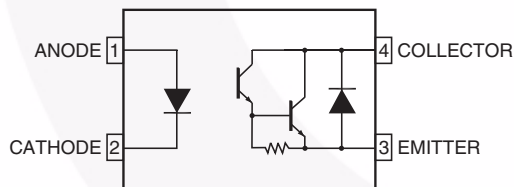
### Applications

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

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.

Symbol	Parameter	Value	Units
<b>TOTAL DEVICE</b>			
$T_{STG}$	Storage Temperature	-55 to +125	$^\circ\text{C}$
$T_{OPR}$	Operating Temperature	-30 to +100	$^\circ\text{C}$
$T_{SOL}$	Lead Solder Temperature	260 for 10 sec	$^\circ\text{C}$
$P_{TOT}$	Total Device Power Dissipation	200	mW
<b>INPUT</b>			
$I_F$	Continuous Forward Current	50	mA
$V_R$	Reverse Voltage	6	V
$P_D$	LED Power Dissipation	70	mW
<b>OUTPUT</b>			
$V_{CEO}$	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** ( $T_A = 25^\circ\text{C}$  unless otherwise specified.)**Individual Component Characteristics**

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

**Transfer Characteristics**

Symbol	DC Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$I_C$	Collector Current	$I_F = 1\text{mA}, V_{CE} = 2\text{V}$	10	40	1 f0	mA
CTR	Current Transfer Ratio <sup>(1)</sup>		1,000	4,000	15,000	%
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_F = 20\text{mA}, I_C = 100\text{mA}$			1.2	V
$R_{iso}$	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
$f_C$	Cut-Off Frequency	$V_{CE} = 2\text{V}, I_C = 20\text{mA}, R_L = 100\Omega, -3\text{dB}$	1	7		kHz
$t_r$	Response Time (Rise)	$V_{CE} = 2\text{V}, I_C = 20\text{mA}, R_L = 100\Omega$		100	300	$\mu\text{s}$
$t_f$	Response Time (Fall)			20	100	$\mu\text{s}$

**Isolation Characteristics**

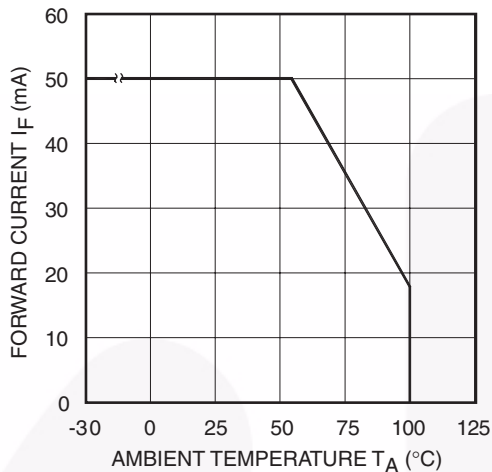
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Units
$V_{ISO}$	Input-Output Isolation Voltage	$f = 60\text{Hz}, t = 1 \text{ min}, I_{I-O} \leq 2\mu\text{A}$	5000			Vac(rms)
$R_{ISO}$	Isolation Resistance	$V_{I-O} = 500 \text{ VDC}$	$5 \times 10^{10}$	$10^{11}$	–	$\Omega$
$C_{ISO}$	Isolation Capacitance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

**Note:**

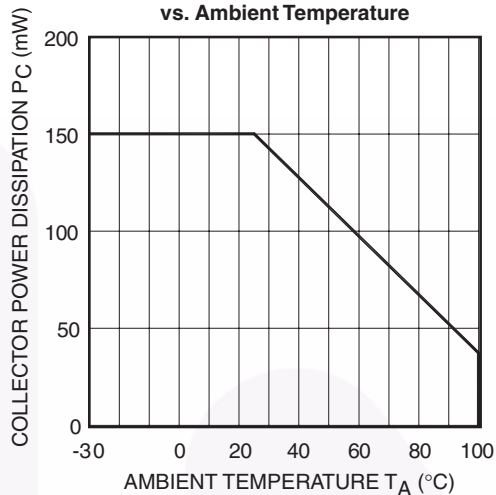
1. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

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

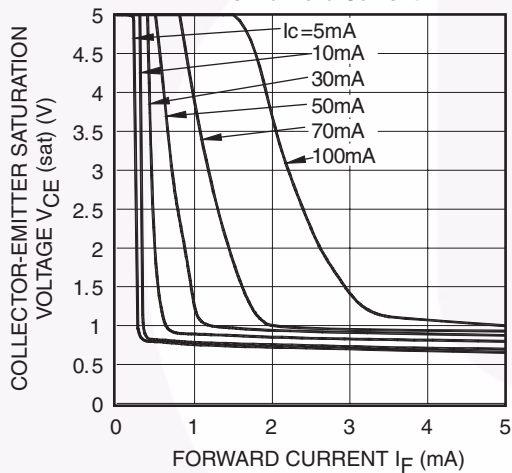
**Fig. 1 Forward Current vs. Ambient Temperature**



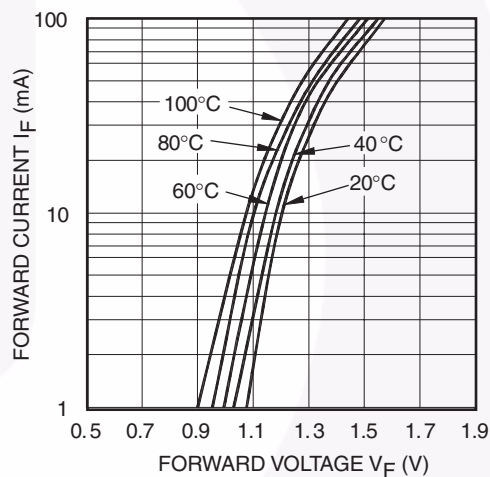
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



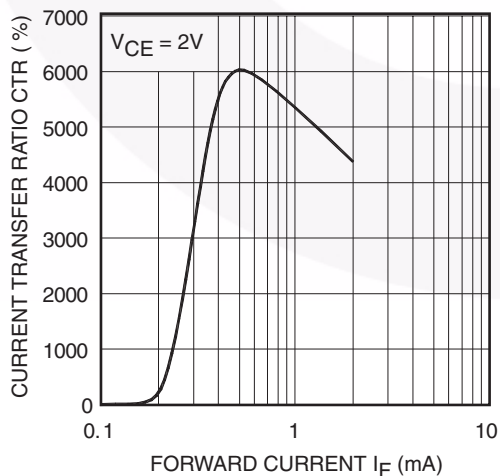
**Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current**



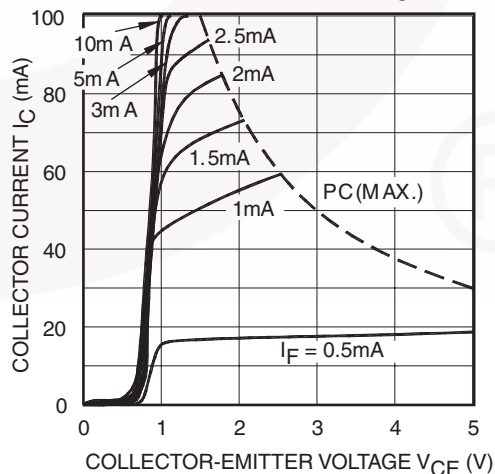
**Fig. 4 Forward Current vs. Forward Voltage**



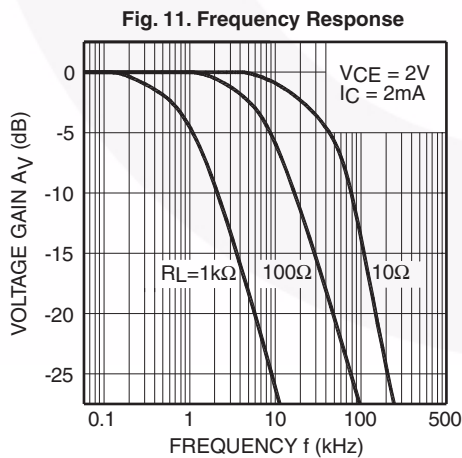
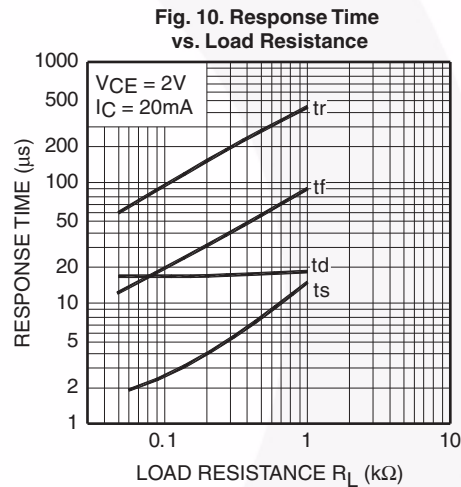
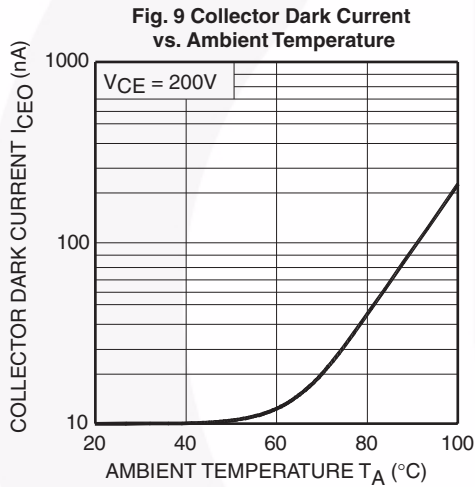
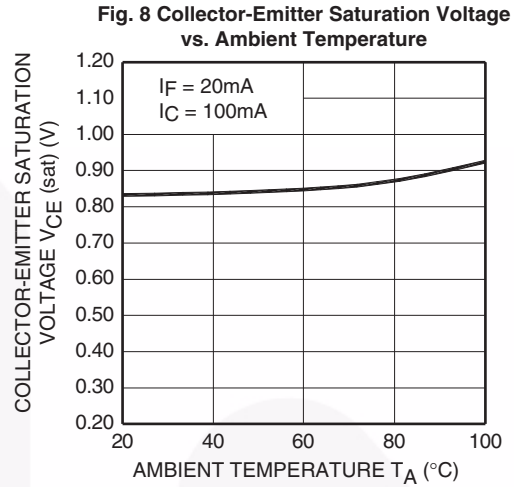
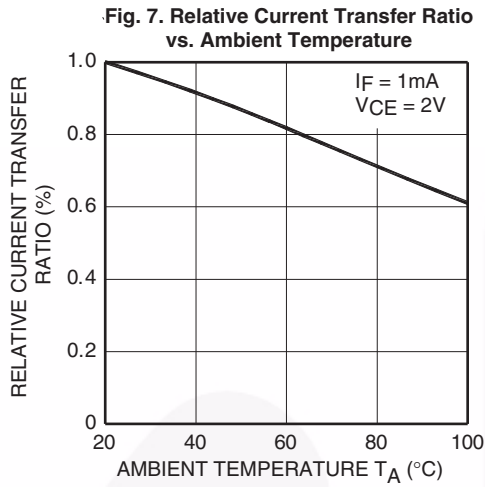
**Fig. 5 Current Transfer Ratio vs. Forward Current**



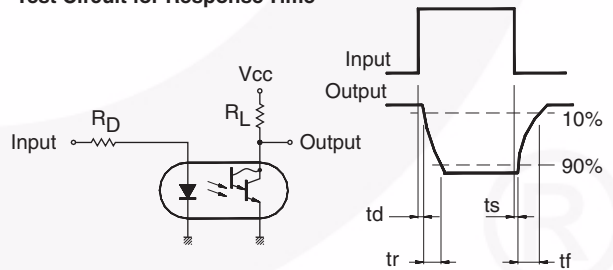
**Fig. 6 Collector Current vs. Collector-Emitter Voltage**



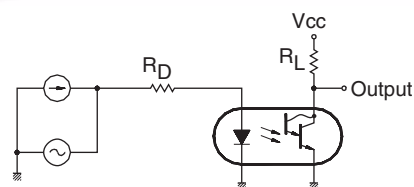
**Typical Electrical/Optical Characteristic Curves** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)



**Test Circuit for Response Time**

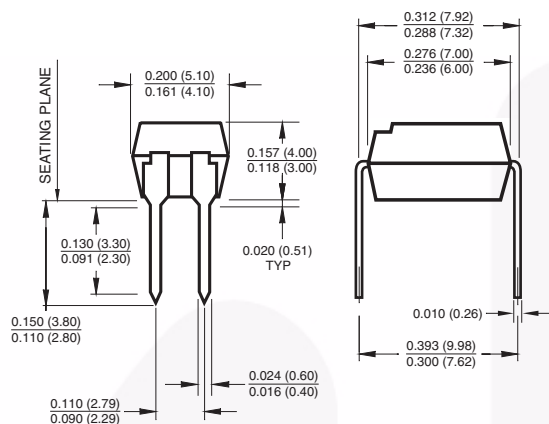


**Test Circuit for Frequency Response**

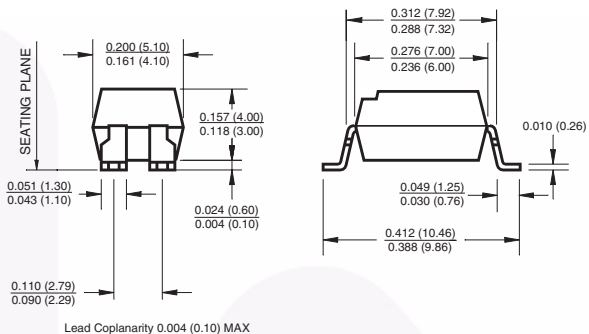


## Package Dimensions

### Through Hole

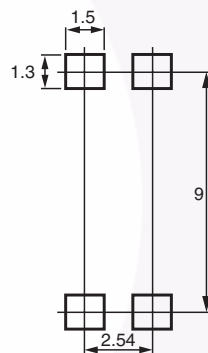
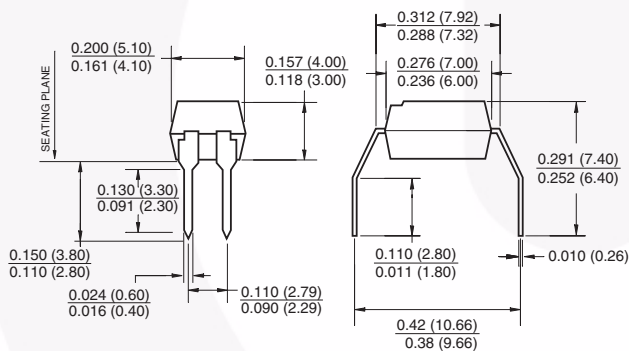


### Surface Mount



### Surface Mount (Footprint Dimensions)

### 0.4" Lead Spacing



### Note:

All dimensions are in inches (millimeters)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

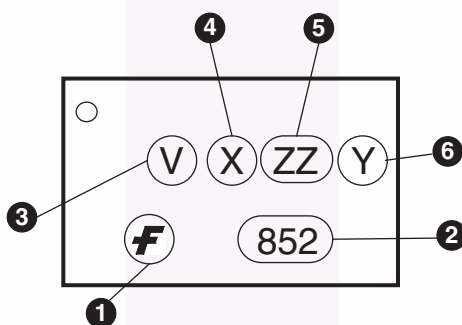
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

<http://www.fairchildsemi.com/packaging/>

### 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

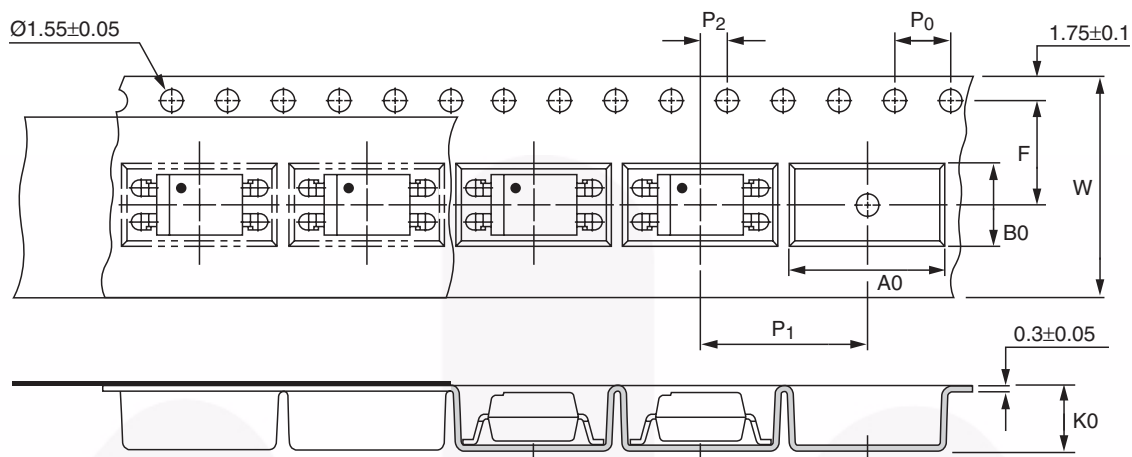
### Marking Information



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

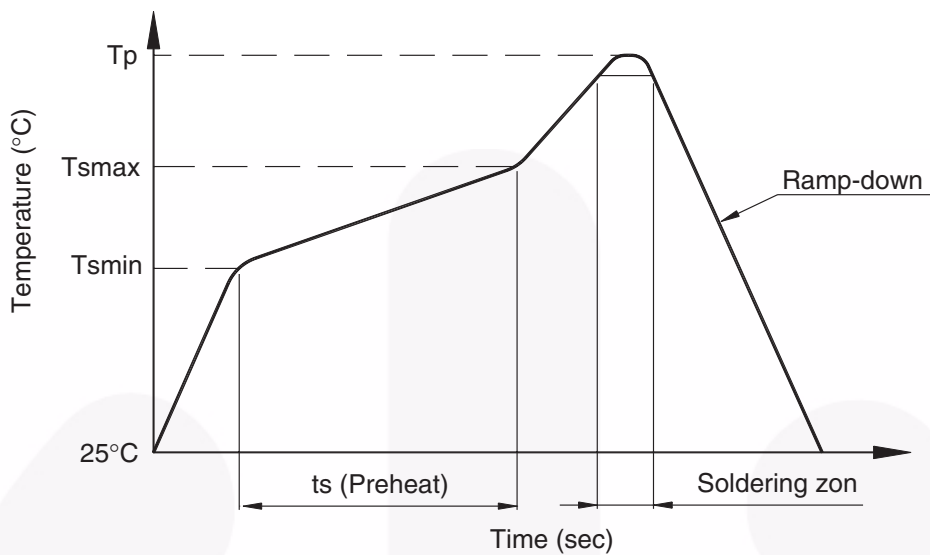


**Note:**  
All dimensions are in millimeters.

Symbol	Description	Dimensions in mm (inches)
W	Tape wide	16 ± 0.3 (.63)
P <sub>0</sub>	Pitch of sprocket holes	4 ± 0.1 (.15)
F	Distance of compartment	7.5 ± 0.1 (.295)
P <sub>2</sub>		2 ± 0.1 (.079)
P <sub>1</sub>	Distance of compartment to compartment	12 ± 0.1 (.472)
A <sub>0</sub>	Compartment	10.45 ± 0.1 (.411)
B <sub>0</sub>		5.30 ± 0.1 (.209)
K <sub>0</sub>		4.25 ± 0.1 (.167)



### Lead Free Recommended IR Reflow Condition



Profile Feature	Pb-Sn solder assembly	Lead Free assembly
Preheat condition (T <sub>smín</sub> -T <sub>smáx</sub> / t <sub>s</sub> )	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 <sub>p</sub> )	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 <sub>p</sub> )	Max 260°C for 10 sec



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| CorePOWER™                                                                          | Green FPS™                                                                          | QS™                                                                                 | TinyBuck™                                                                             |
| CROSSVOLT™                                                                          | Green FPS™ e-Series™                                                                | Quiet Series™                                                                       | TinyLogic®                                                                            |
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**Definition of Terms**

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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