

User Guide for  
FEBFAN6208\_CP433v1  
Evaluation Board

FAN6208 Secondary-Side  
Synchronous Rectifier

Featured Fairchild Product:  
FAN6208

***Direct questions or comments  
about this Evaluation Board to:  
“Worldwide Direct Support”***

**[Fairchild Semiconductor.com](http://Fairchild Semiconductor.com)**

## Table of Contents

1. Introduction.....	3
2. General Specification.....	3
3. Function Check Report.....	3
3.1. Normal Test.....	4
3.2. DC Output Turn-On Test.....	5
3.3. DC Output Turn-off Test.....	5
3.4. Dynamic Load Test.....	6
3.5. Efficiency.....	7
3.6. Short Output Test.....	7
3.7. Surge Test.....	8
3.8. ESD Test.....	8
4. Photograph.....	8
5. Schematic.....	9
6. PCB Layout.....	10
7. Bill of Materials.....	11
8. Revision History.....	12



## 1. Introduction

This user guide supports the FAN6208 Secondary-Side Synchronous Rectifier evaluation board. It should be used in conjunction with the product datasheet as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at [www.fairchildsemi.com](http://www.fairchildsemi.com).

## 2. General Specification

Specification	Min.	Max.	Units
Input			
Voltage	90	264	V <sub>AC</sub>
Frequency	47	63	Hz
<b>Output</b>			
Output Voltage 1	24		V
Output Current 1	8		A
Output Cable (18AWG)			m
<b>Total Output Power</b>			
Full-load Output Power	192		W
Peak Output Power			W

## 3. Function Check Report

<b>Test Model</b>	FEBFAN6208_CP433v1-001
<b>Test Date</b>	2010-10-01
<b>Test Temperature</b>	Ambient
<b>Test Equipment</b>	AC source: 6220 AC POWER SOURCE Electronic Load: Chroma 63030 Power Meter: WT210 Oscilloscope: LeCroy LT434 Test Power : FAN6982 + FAN7621 + FSBH0270 24V/8A test board
<b>Test Items</b>	<ol style="list-style-type: none"> <li>1. Normal test</li> <li>2. DC output turn-on test</li> <li>3. DC output turn-off test</li> <li>4. Dynamic load test</li> <li>5. Efficiency</li> <li>6. Short output test</li> <li>7. Surge test</li> <li>8. ESD test</li> </ol>

### 3.1. Normal Test

#### 3.1.1. Test Condition

Set output at different loading. Measure the GATE and DET.

#### 3.1.2. Measured Waveforms

Ch1: GATE1; Ch2: DET1; Ch3: GATE2; Ch4: DET2



Figure 1. At 25% Loading

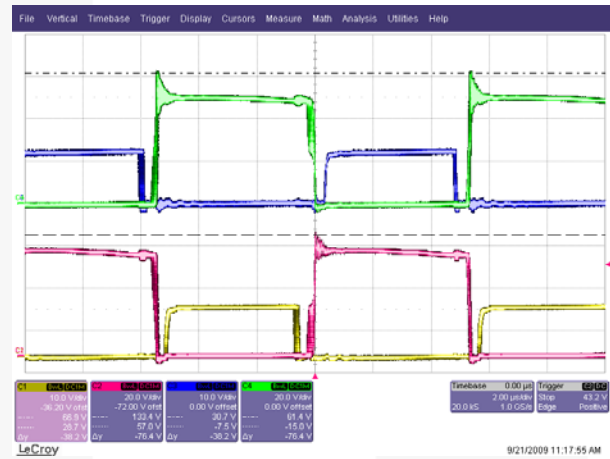


Figure 2. At 50% Loading



Figure 3. At 75% Loading



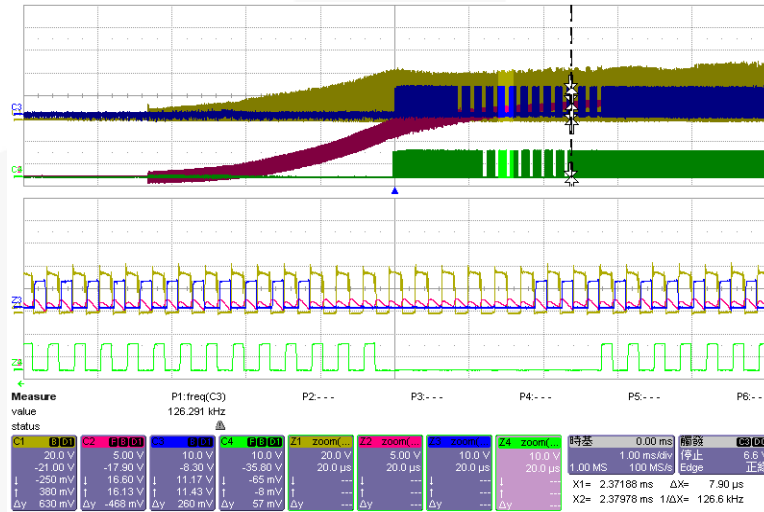
Figure 4. At 100% Loading

### 3.2. DC Output Turn-On Test

#### 3.2.1. Test Condition

Set output at maximum loading. Measure the GATE and verify DET has no overlap and no voltage spike appears.

#### 3.2.2. Measured Waveform



Ch1: DET  
Ch2: XN  
Ch3: GATE1  
Ch4: GATE2

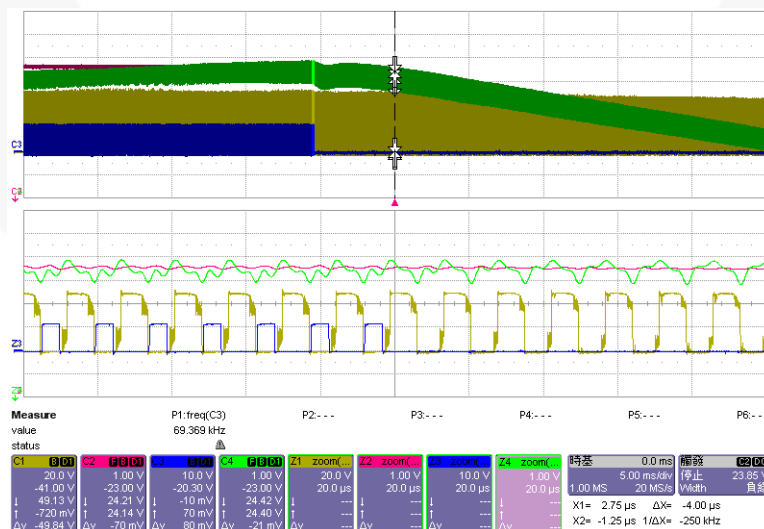
Figure 5. At Maximum Load

### 3.3. DC Output Turn-Off Test

#### 3.3.1. Test Condition

Set output at maximum loading. Measure the GATE and verify DET has no overlap and no voltage spike appears.

#### 3.3.2. Measured Waveform



Ch1: DET  
Ch2: VO  
Ch3: GATE1  
Ch4: XN

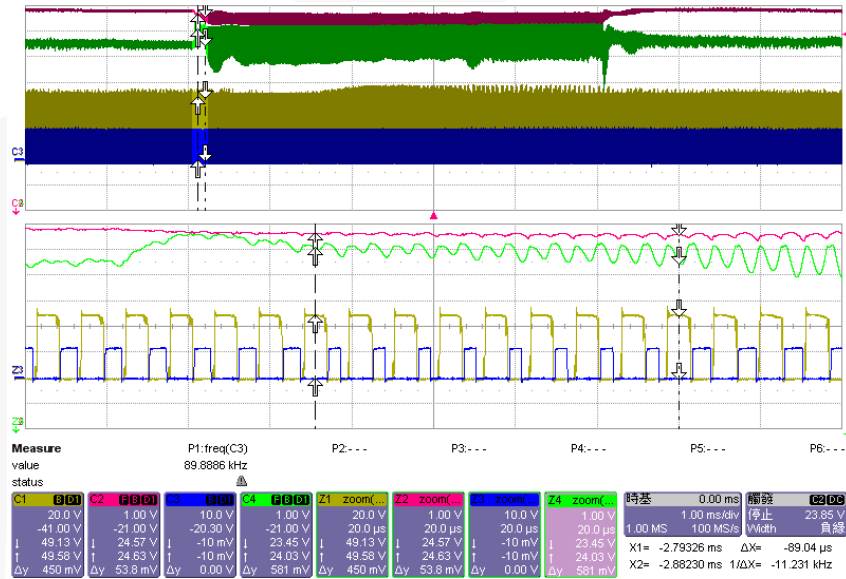
Figure 6. At Maximum Load

### 3.4. Dynamic Load Test

#### 3.4.1. Test Condition

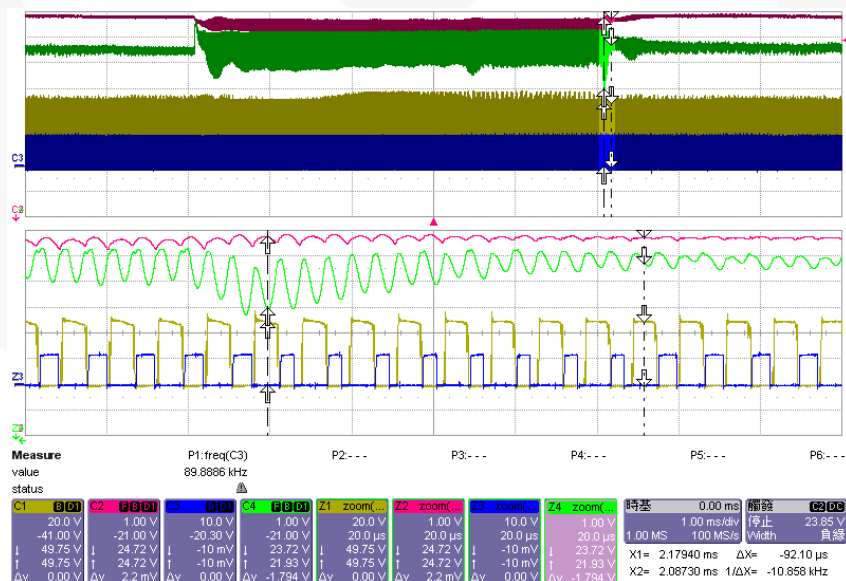
Set output loading 10% to 90%. Measure the GATE and verify DET has no overlap and no voltage spike appears.

#### 3.4.2. Measured Waveforms



Ch1: DET  
Ch2: VO  
Ch3: GATE1  
Ch4: XN

Figure 7. Light Load to Heavy Load



Ch1: DET  
Ch2: VO  
Ch3: GATE1  
Ch4: XN

Figure 8. Heavy Load to Light Load

### 3.5. Efficiency

#### 3.5.1. Test Condition

Output at 25%, 50%, 75%, and 100% load.

#### 3.5.2. Test Result

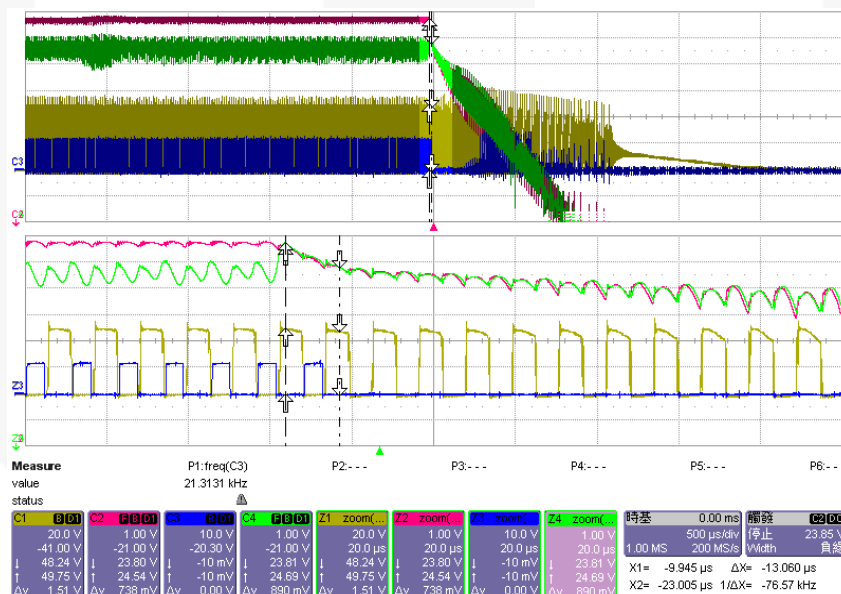
Output Wattage	25%	50%	75%	100%	Specification
I <sub>O</sub>	2A	4A	6A	8A	
P <sub>IN</sub>	57.43W	110.4W	164.42W	220.6W	
P <sub>OUT</sub>	48.73W	97.52W	145.91W	194.55W	
EFF	85.76%	88.8%	89.06%	88.43%	

### 3.6. Short Output Test

#### 3.6.1. Test Condition

Set output short circuit. Measure the GATE and verify DET has no overlap and no voltage spike appears.

#### 3.6.2. Measured Waveform



Ch1: DET  
Ch2: VO  
Ch3: GATE1  
Ch4: XN

Figure 9. At Maximum Load

### 3.7. Surge Test

Mode	Polarity	Phase	Voltage	Condition
L-PE	+/-	0°	3KV	PASS
	+/-	90°		PASS
	+/-	180°		PASS
	+/-	270°		PASS
N-PE	+/-	0°	3KV	PASS
	+/-	90°		PASS
	+/-	180°		PASS
	+/-	270°		PASS

### 3.8. ESD Test

Air Discharge (16.5KV)		Contact Discharge (8.8KV)	
PASS	PASS	PASS	PASS

## 4. Photograph

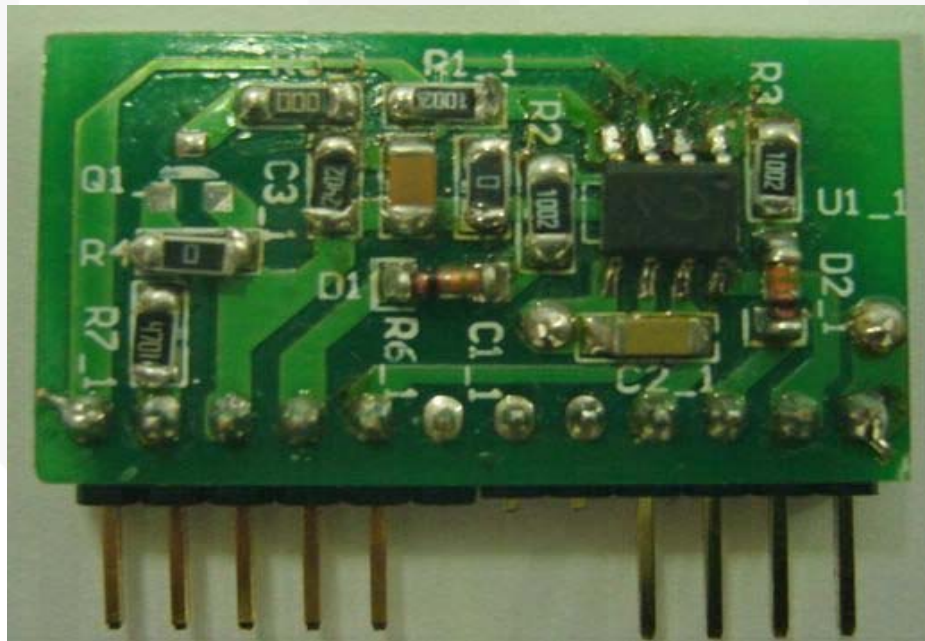


Figure 10. Top View



## 5. Schematic

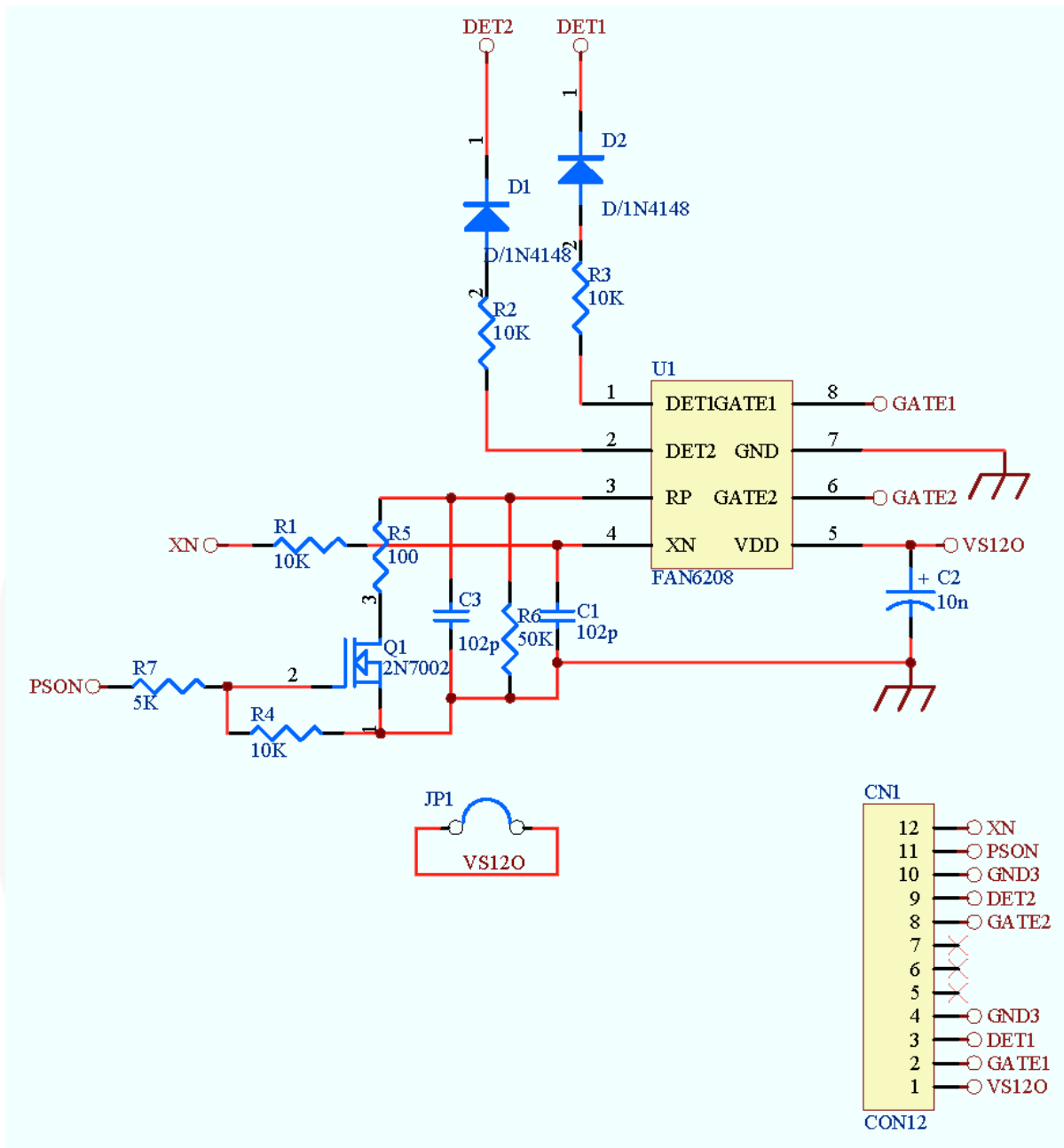


Figure 11. Circuit Schematic

## 6. PCB Layout

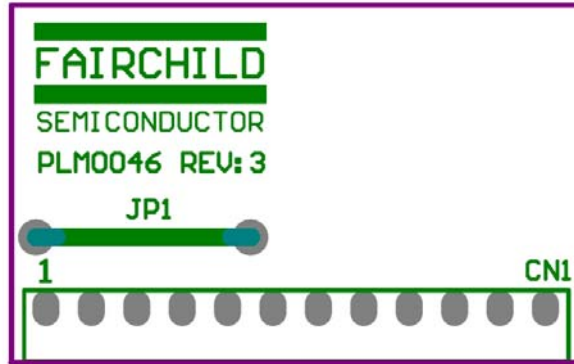


Figure 12. PCB Layout

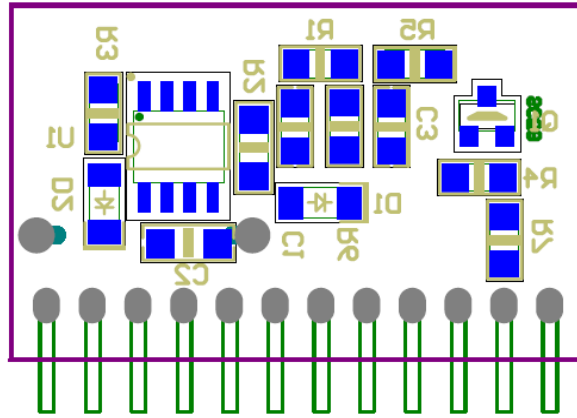


Figure 13. Top Layer

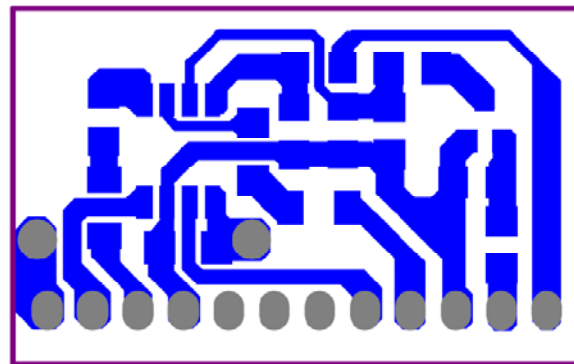


Figure 14. Bottom Layer

## 7. Bill of Materials

Component	Qty	Part No.	Manufacturer	Reference
JUMPER WIRE 0.6*52mm	1			JP1
SMD Resistor 1206 0Ω±5%	1			R5
SMD Resistor 1206 4.7kΩ±5%	1			R7
SMD Resistor 1206 10kΩ±5%	4			R1,R2,R3,R4
SMD Resistor 1206 20kΩ±1%	1			R6
SMD MLCC 1206 104P 100V ±10%	2			C2,C3
SMD Diode 1A/100V SOD80	2	FDLL4148	Fairchild	D1,D2
SMD MOS 2N7002	1		Fairchild	Q1
PIN HDR 1*12P 2.54mm 90°	2			CN1
SR Controller for LLC Topology	1	FAN6208MY	Fairchild	U1
PCB PLM0046 REV3	1			

## 8. Revision History

Rev.	Date	Description
1.0.0	November, 2011	Initial release

---

### WARNING AND DISCLAIMER

Replace components on the Evaluation Board only with those parts shown on the parts list (or Bill of Materials) in the Users' Guide. Contact an authorized Fairchild representative with any questions.

This board is intended to be used by certified professionals, in a lab environment, following proper safety procedures. Use at your own risk. The Evaluation board (or kit) is for demonstration purposes only and neither the Board nor this User's Guide constitute a sales contract or create any kind of warranty, whether express or implied, as to the applications or products involved. Fairchild warrants that its products meet Fairchild's published specifications, but does not guarantee that its products work in any specific application. Fairchild reserves the right to make changes without notice to any products described herein to improve reliability, function, or design. Either the applicable sales contract signed by Fairchild and Buyer or, if no contract exists, Fairchild's standard Terms and Conditions on the back of Fairchild invoices, govern the terms of sale of the products described herein.

#### DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

#### LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

---

### ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

---

### EXPORT COMPLIANCE STATEMENT

These commodities, technology, or software were exported from the United States in accordance with the Export Administration Regulations for the ultimate destination listed on the commercial invoice. Diversion contrary to U.S. law is prohibited.

U.S. origin products and products made with U.S. origin technology are subject to U.S. Re-export laws. In the event of re-export, the user will be responsible to ensure the appropriate U.S. export regulations are followed.