

LM317L

3-Terminal 0.1A Positive Adjustable Regulator

Features

- Output Current in Excess of 100 mA
- Output Adjustable Between 1.2 V and 37 V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe Area Compensation
- Floating Operation for High-Voltage Applications

Description

The LM317L is a 3-terminal, adjustable, positive-voltage regulator capable of supplying in excess of 100 mA over an output voltage range of 1.2 V to 37 V. This voltage regulator requires only two external resistors to set the output voltage.

TO-92



1

1. Adj 2. Output 3. Input

8-SOIC



1

1. Input 2.3.6.7. Output
4. Adj 5.8. NC

Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
LM317LM	0°C to +125°C	LM317LM	8-SOIC	Rail
LM317LMX	0°C to +125°C	LM317LM	8-SOIC	Tape and Reel
LM317LZ	0°C to +125°C	LM317LZ	TO-92	Bulk
LM317LZX	0°C to +125°C	LM317LZ	TO-92	Tape and Reel

Block Diagram

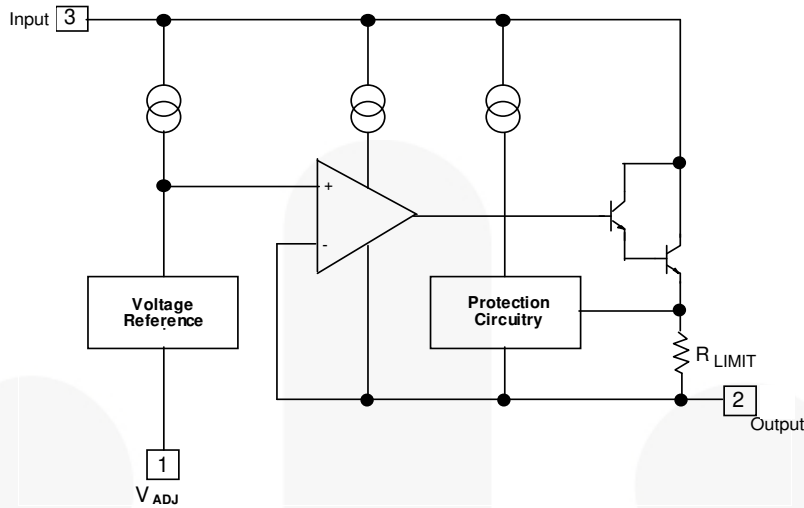


Figure 1. Block Diagram

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. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_I - V_O$	Input-Output Voltage Differential	40	V
P_D	Power Dissipation	Internally limited	W
T_J	Operating Junction Temperature Range	0 ~ +125	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-65 ~ +125	$^\circ\text{C}$

Electrical Characteristics

$V_I - V_O = 5\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $P_{D\text{MAX}} = 625\text{ mW}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R_{LINE}	Line Regulation ⁽¹⁾	$T_A = +25^\circ\text{C}$, $3\text{ V} \leq V_I - V_O \leq 40\text{ V}$		0.01	0.04	% / V
		$3\text{ V} \leq V_I - V_O \leq 40\text{ V}$		0.02	0.07	% / V
R_{LOAD}	Load Regulation ⁽¹⁾	$T_A = +25^\circ\text{C}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \leq 5\text{ V}$		5	25	mV
		$T_A = +25^\circ\text{C}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \geq 5\text{ V}$		0.1	0.5	% / V_O
		$10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \leq 5\text{ V}$		20	70	mV
		$10\text{ mA} \leq I_O \leq 100\text{ mA}$, $V_O \geq 5\text{ V}$		0.3	1.5	% / V_O
I_{ADJ}	Adjustment Pin Current			50	100	μA
ΔI_{ADJ}	Adjustment Pin Current Change	$3\text{ V} \leq V_I - V_O \leq 40\text{ V}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $P_D < P_{D\text{MAX}}$		0.2	5	μA
V_{REF}	Reference Voltage	$3\text{ V} < V_I - V_O < 40\text{ V}$, $10\text{ mA} \leq I_O \leq 100\text{ mA}$, $P_D \leq P_{D\text{MAX}}$	1.20	1.25	1.30	V
ST_T	Temperature Stability			0.7		%
$I_{\text{L(MIN)}}$	Minimum Load Current to Maintain Regulation	$V_I - V_O = 40\text{ V}$		3.5	10	mA
$I_{\text{O(MAX)}}$	Maximum Output Current	$V_I - V_O \leq 15\text{ V}$, $P_D < P_{D\text{MAX}}$	100	200		mA
		$T_A = +25^\circ\text{C}$, $V_I - V_O \leq 40\text{ V}$, $P_D < P_{D\text{MAX}}$	25	50		mA
e_N	RMS Noise, % of V_{OUT}	$T_A = +25^\circ\text{C}$, $10\text{ Hz} < f < 10\text{ kHz}$		0.003		% / V_O
RR	Ripple Rejection	$V_O = 10\text{ V}$, $f = 120\text{ Hz}$, without C_{ADJ}		65		dB
		$V_O = 10\text{ V}$, $f = 120\text{ Hz}$, $C_{\text{ADJ}} = 10\text{ }\mu\text{F}$	66	80		dB
ST	Long-Term Stability	$T_J = +125^\circ\text{C}$, 1000 Hours		0.3		%

Notes:

1. Load and Line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Typical Application

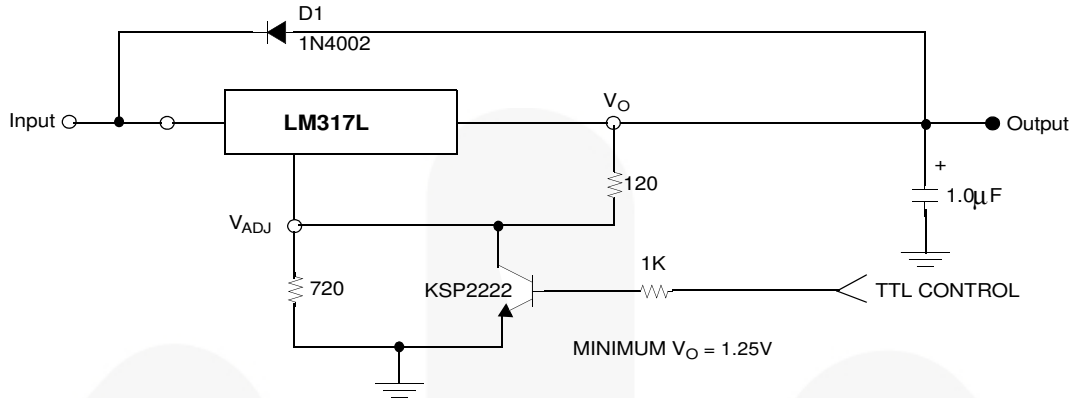


Figure 2. 5V Electronic Shutdown Regulator

D1 protects the device during an input short circuit.

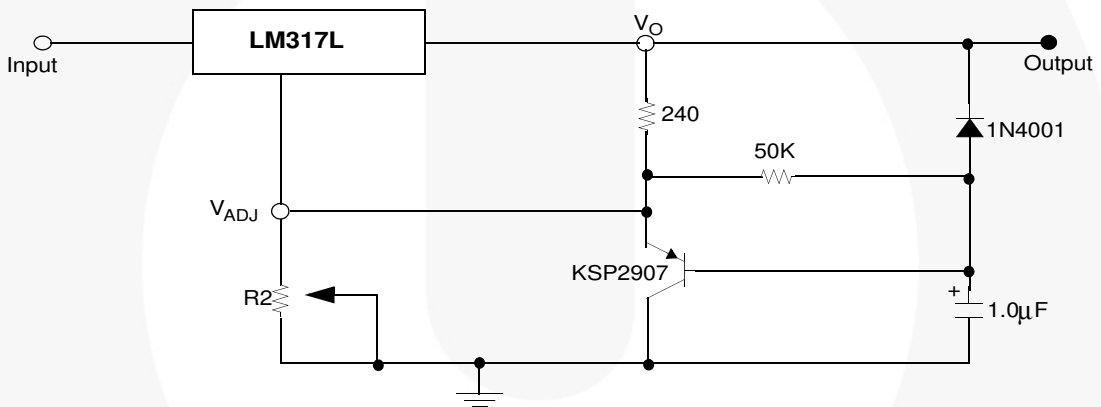


Figure 3. Slow Turn-On Regulator

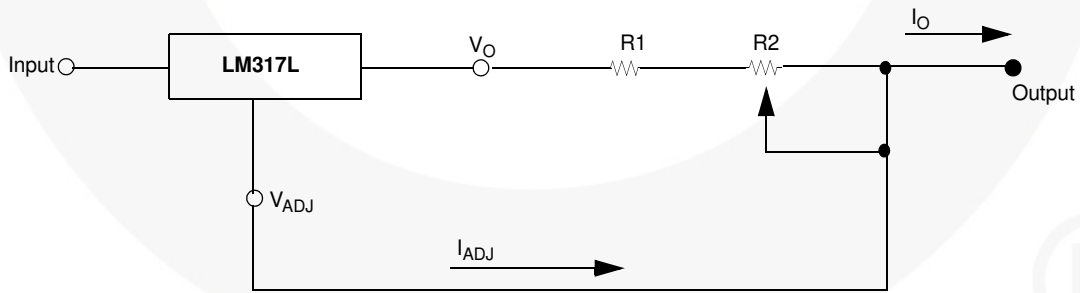


Figure 4. Current Regulator

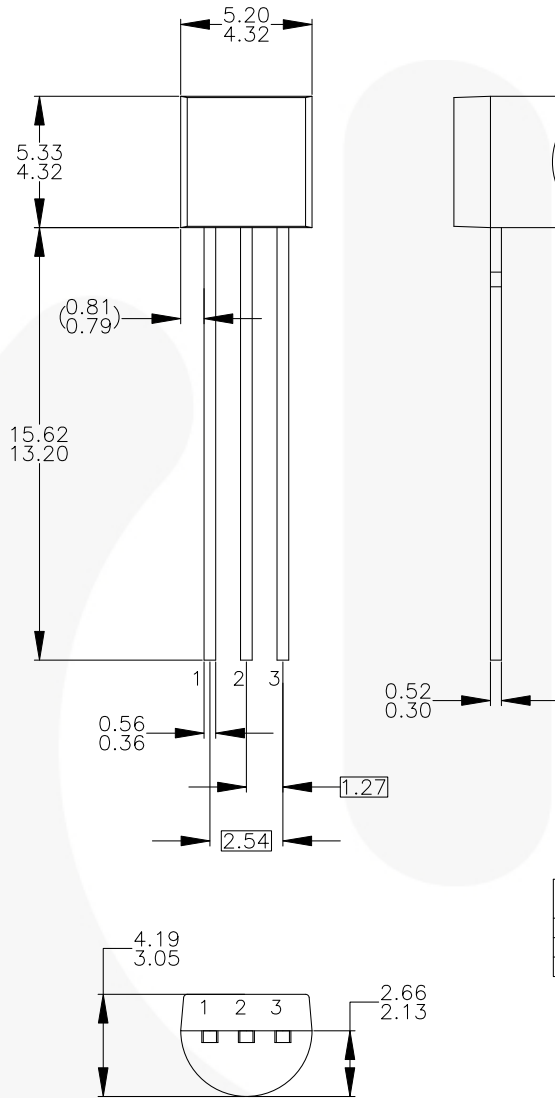
$$I_{O\text{MAX}} = \left(\frac{V_{\text{REF}}}{R_1} \right) + I_{\text{ADJ}} @ \frac{1.25\text{V}}{R_1}$$

$$I_{O\text{MAX}} = \left(\frac{V_{\text{REF}}}{R_1 + R_2} \right) + I_{\text{ADJ}} @ \frac{1.25\text{V}}{R_1 + R_2}$$

$$5\text{mA} < I_O < 500\text{mA}$$

Physical Dimensions

TO-92 Bulk Type



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:

- P - BIPOLAR
- F - JFET
- M - DMOS
- E - EMITTER
- B - BASE
- C - COLLECTOR
- D - DRAIN
- S - SOURCE
- G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03DREV3.

Figure 5. 3-Lead, TO-92, Molded, Standard Straight Lead

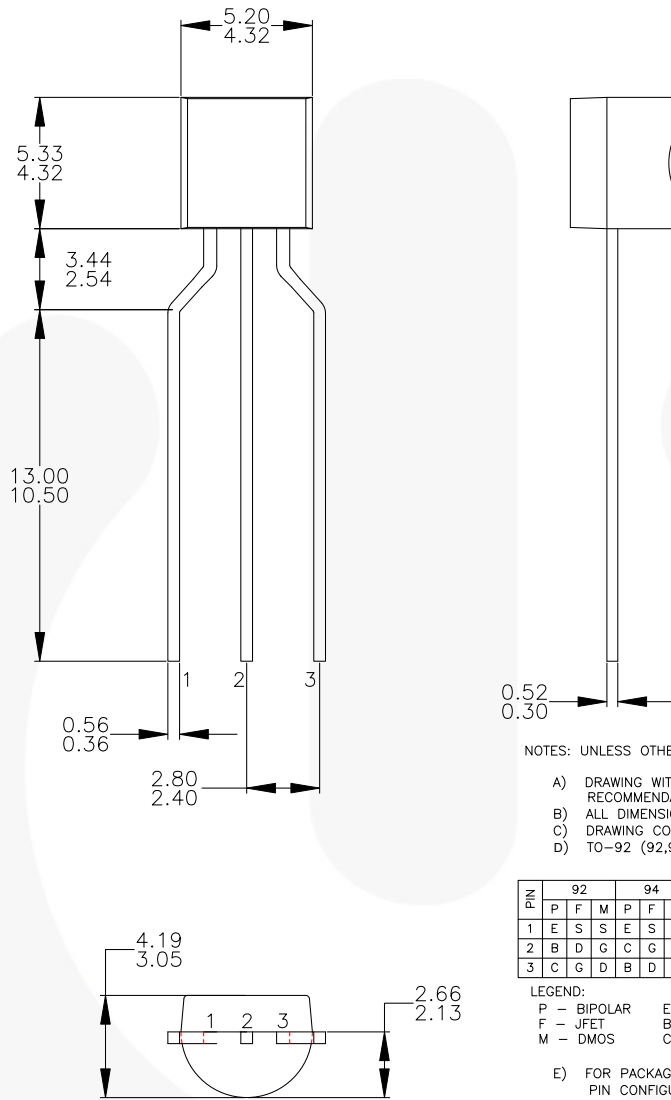
Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications 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/>

Physical Dimensions

TO-92 Tape and Reel Type



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DRAWING CONFORMS TO ASME Y14.5M-1994.
- D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:
P - BIPOLAR E - EMITTER D - DRAIN
F - JFET B - BASE S - SOURCE
M - DMOS C - COLLECTOR G - GATE

- E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEABLE AT JFET "F" OPTION.
- F) DRAWING FILENAME: MKT-ZA03FREV2.

Figure 6. 3-Lead, TO-92, Molded, 0.200 in Line Spacing Lead Form

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/>.

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/products/discrete/pdf/to92_tr.pdf.

Physical Dimensions (Continued)

8-SOIC

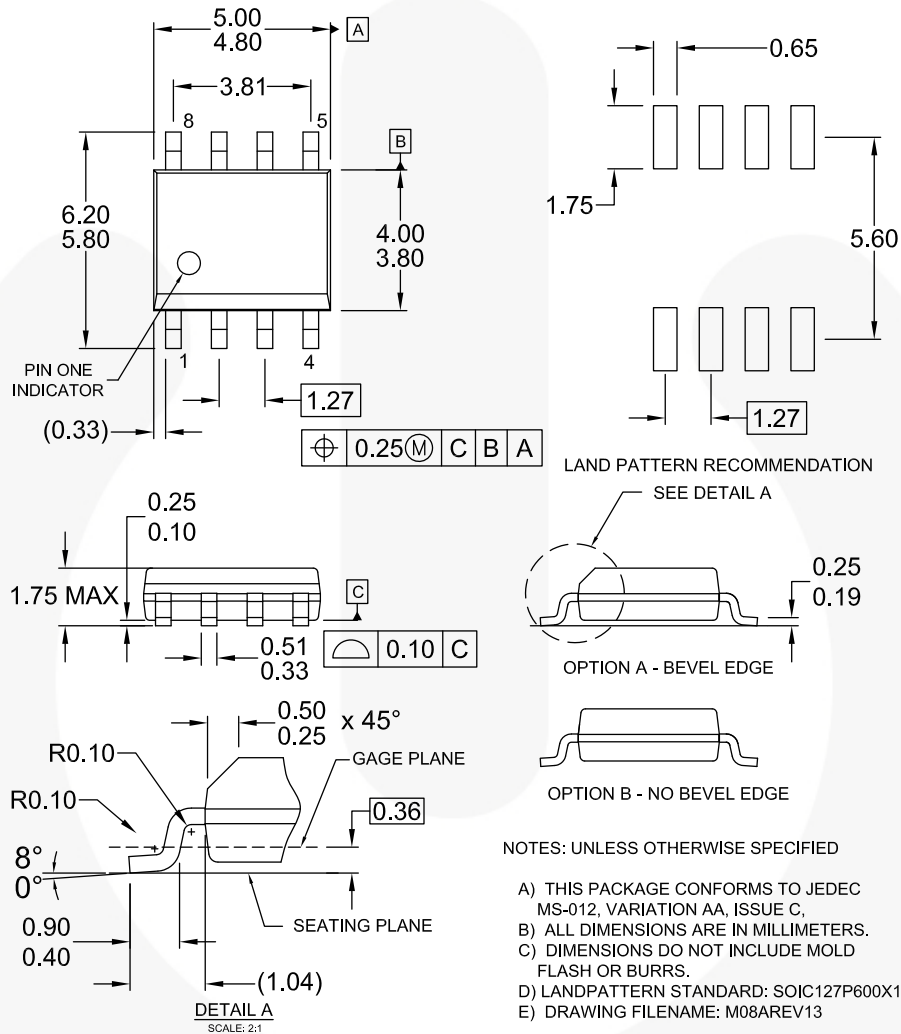


Figure 7. 8-Lead, SOIC, JEDEC MS 0-12, 0.150 inch Narrow Body

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/>

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/products/discrete/pdf/soic8_tr.pdf



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- | | | | |
|--|--|--|---|
| 2Cool™ | F-PFS™ | PowerTrench® | The Power Franchise® |
| AccuPower™ | FRFET® | PowerXS™ | the power franchise |
| AX-CAP™* | Global Power Resource SM | Programmable Active Droop™ | TinyBoost™ |
| BitSiC™ | GreenBridge™ | QFET® | TinyBuck™ |
| Build it Now™ | Green FPS™ | QS™ | TinyCalc™ |
| CorePLUS™ | Green FPS™ e-Series™ | Quiet Series™ | TinyLogic® |
| CorePOWER™ | Gmax™ | RapidConfigure™ | TINYOPTO™ |
| CROSSVOLT™ | GTO™ |  ™ | TinyPower™ |
| CTL™ | IntelliMAX™ | Saving our world, 1mW/W/kW at a time™ | TinyPWM™ |
| Current Transfer Logic™ | ISOPLANAR™ | SignalWise™ | TinyWire™ |
| DEUXPEED® | Making Small Speakers Sound Louder and Better™ | SmartMax™ | TranSiC™ |
| Dual Cool™ | MegaBuck™ | SMART START™ | TriFault Detect™ |
| EcoSPARK® | MICROCOUPLER™ | Solutions for Your Success™ | TRUECURRENT®* |
| EfficientMax™ | MicroFET™ | SPM® | µSerDes™ |
| ESBC™ | MicroPak™ | STEALTH™ |  SerDes® |
|  Fairchild® | MicroPak2™ | SuperFET® | UHC ^{OS} |
| Fairchild Semiconductor® | MillerDrive™ | SuperSOT™-3 | Ultra FRFET™ |
| FACT Quiet Series™ | MotionMax™ | SuperSOT™-6 | UniFET™ |
| FACT® | mW saver™ | SuperSOT™-8 | VCX™ |
| FAST® | OptoHiT™ | SupreMOS® | VisualMax™ |
| FastvCore™ | OPTOLOGIC® | SyncFET™ | VoltagePlus™ |
| FETBench™ | OPTOPLANAR® | Sync-Lock™ | XS™ |
| FPS™ | |  SYSTEM GENERAL®* | |

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

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 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, and (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 a significant injury of the user.
2. A critical component in 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.

PRODUCT STATUS DEFINITIONS

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.

Rev. I63