

Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

August 2014

LP2951
Adjustable Micro-Power Voltage Regulator

Features

- Adjustable or Fixed 5 V Output Voltage
- Low Quiescent Current
- Low Dropout Voltage
- Low Temperature Coefficient
- Tight Line and Load Regulation
- Guaranteed 100 mA Output Current
- Internal Short Current and Thermal Limit
- Error Signals of Output Dropout
- External Shut Down

Applications

- Automotive Electronics
- Voltage Reference

Description

The LP2951 is an adjustable micro-power voltage regulator suitable for battery-powered systems. This regulator has various functions such as alarm that warns of a low output voltage often due to falling batteries on the input, the external shutdown enables the regulator to be switched on and off, current and temperature limiting.

8-SOIC



Ordering Information

Part Number	Operating Temperature Range	Top Mark	Package	Packing Method
LP2951CM	-40°C to +125°C	LP2951CM	SOIC 8L	Rail
LP2951CMX	-40°C to +125°C	LP2951CM	SOIC 8L	Tape and Reel

Block Diagram

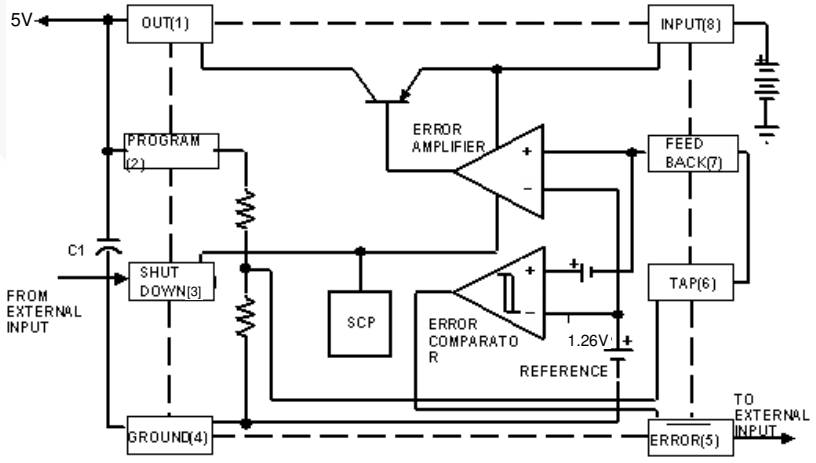


Figure 1. Block Diagram

© 2002 Fairchild Semiconductor Corporation

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°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{IN}	Input Supply Voltage	-0.3 to 30.0	V
P_D	Power Dissipation	Internally Limited	W
$R_{\theta JA}$	Thermal Resistance Junction-to-Air	127.5	°C/W
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_{OPR}	Operating Junction Temperature Range	-40 to 125	°C

Electrical Characteristics

FEEDBACK (Pin 7) tied to TAP (Pin 6), V_{OUT} (Pin 1) tied to PROGRAM (Pin 2). Values are at T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Fixed Output Voltage	I_L = 50 mA	4.9	5.0	5.1	V
ALL VOLTAGE OPTIONS						
$\Delta V/\Delta T$	Output Voltage Temperature Coefficient[1]			50		ppm/°C
ΔV	Line Regulation[2]	$(V_O + 1)\ V \le V_{IN} \le 28\ V$, I_L = 50 mA			0.4	%
ΔV	Load Regulation[2]	100 µA ≤ I_L ≤ 100 mA			0.3	%
V_D	Dropout Voltage	I_L = 100 µA			150	mV
		I_L = 100 mA			600	
I_G	Ground Current	I_L = 100 µA			140	µA
		I_L = 100 mA			7	mA
I_{CL}	Current Limit	V_O = 0 V	110	165	220	mA
V_{REF}	Reference Voltage	$V_{IN} = (V_O + 1)\ V$, I_L = 100 µA	1.235	1.260	1.285	V
		[3]	1.225	1.260	1.295	
I_{FB}	Feedback Bias Current			20		nA
ERROR COMPARATOR						
V_{OL}	Output Low Voltage	$V_{IN} = (V_O - 0.5)\ V$, I_{OL} = 400 µA		150	400	mV
V_{TH}	High Threshold Voltage[4]		25	60		mV
V_{TL}	Low Threshold Voltage[4]			75	140	mV
V_{HYS}	Hysteresis[4]			15		mV
SHUTDOWN INPUT						
V_{SD}	Shutdown Threshold Range	[5]	0.6	1.3	2.0	V
I_{SD}	Shutdown Input Current	V_{SD} = 2.4 V		30	100	µA
		V_{SD} = 28 V		450	750	

Notes:

1. Output or reference voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.
2. Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle.
3. $V_{REF} \le V_{OUT} \le (V_{IN} - 1\ V)$, $2.5\ V \le V_{IN} \le 28\ V$, $100\ \mu A \le I_L \le 100\ mA$, $T_A \le T_{AMAX}$.
4. Threshold and hysteresis are expressed in terms of voltage differential at the feedback terminal below the normal reference. To express these thresholds in terms of output voltage change, multiply by the error amplifier gain $= V_O / V_{REF} = (R1 + R2) / R2$.
5. $V_{shutdown} \le 0.6\ V$, V_{OUT} = ON, $V_{shutdown} \ge 2.0\ V$, V_{OUT} = OFF.

© 2002 Fairchild Semiconductor Corporation

Typical Performance Characteristics

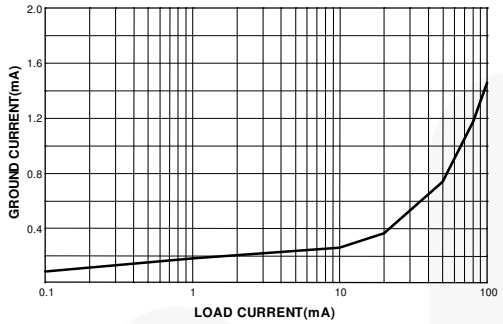


Figure 2. Quiescent Current

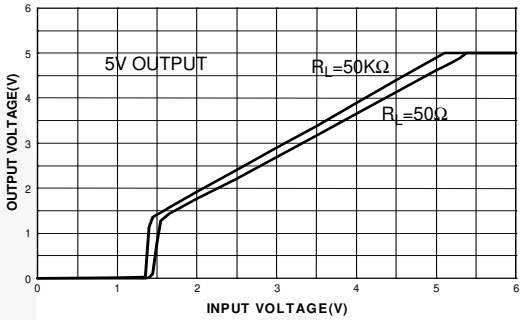


Figure 3. Dropout Characteristics

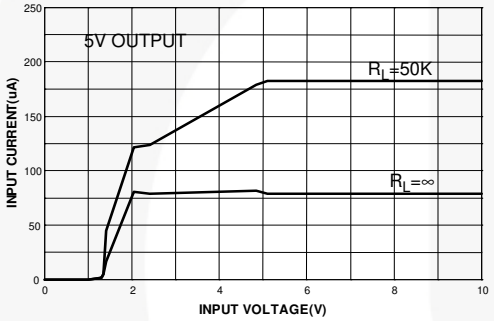


Figure 4. Input Current

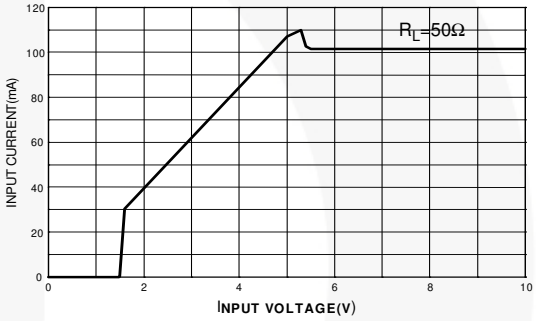


Figure 5. Input Current

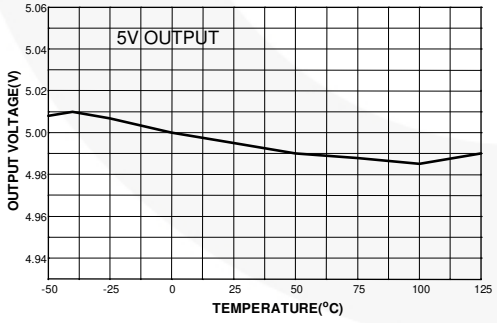


Figure 6. Output Voltage vs. Temperature

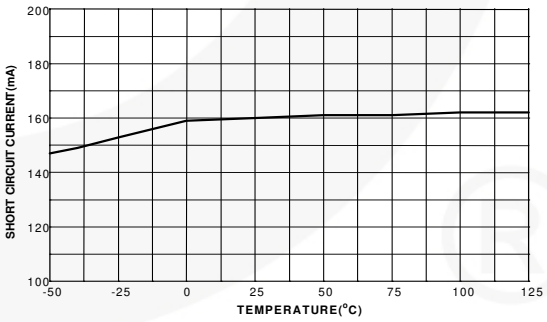


Figure 7. Short-Circuit Current

© 2002 Fairchild Semiconductor Corporation

Typical Performance Characteristics (Continued)

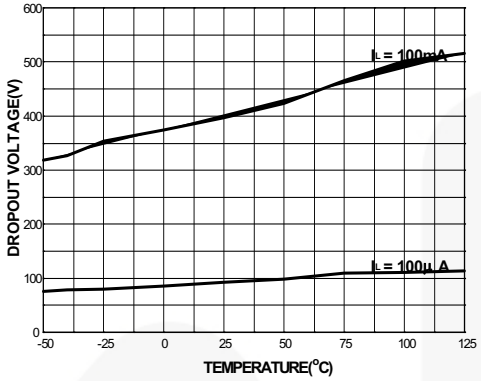


Figure 8. Dropout Voltage

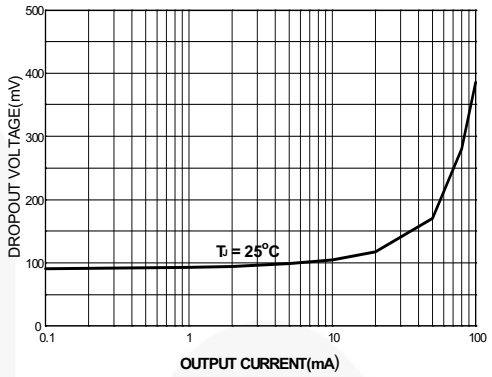
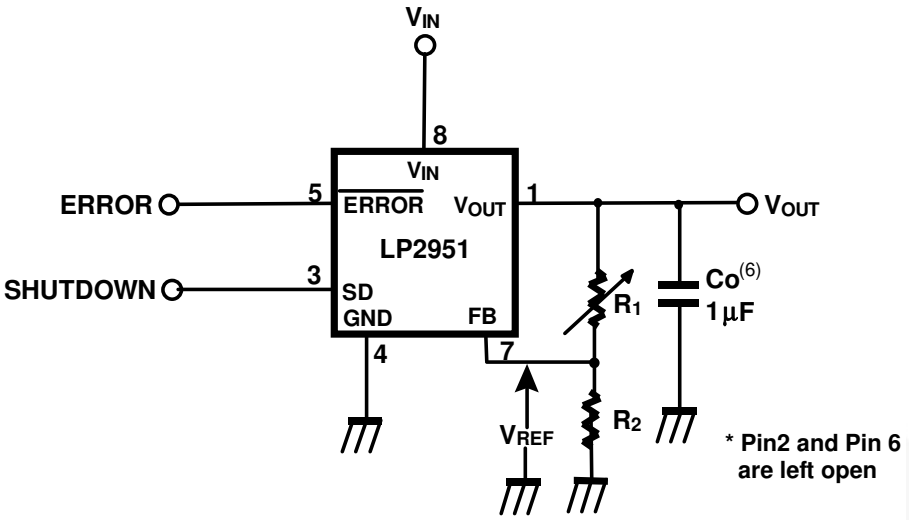


Figure 9. Dropout Voltage

© 2002 Fairchild Semiconductor Corporation

Typical Application



$$V_O = V_{REF} \ (1 + R_i / R_2) + I_{FB} R_1$$

Figure 10. Adjustable Regulator

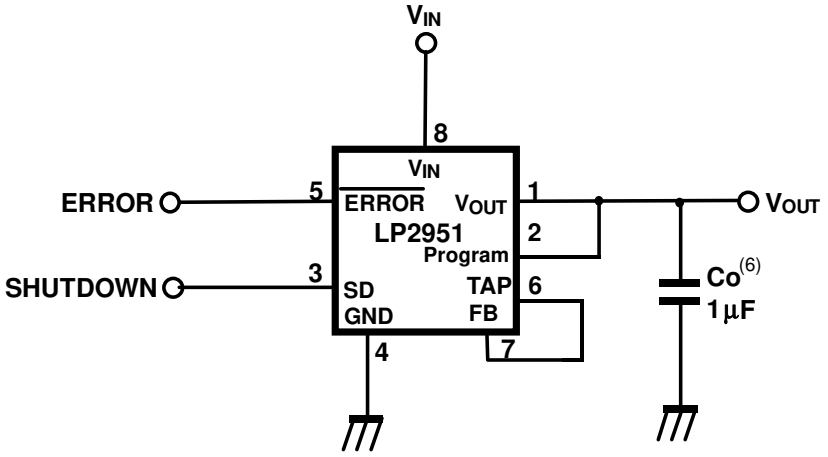


Figure 11. Fixed Output 5 V

Note:

6. C_O is required between the output and ground for stability at output voltages of 5 V or more. Since I_{FB} is controlled to less than 40 nA, the error associated with this term is negligible in most applications. At lower output voltage, more capacitance is required. without this capacitance the part oscillates.

© 2002 Fairchild Semiconductor Corporation

Typical Application (Continued)

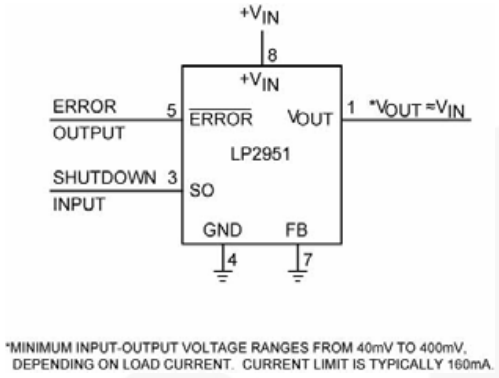


Figure 12. Wide Input Voltage Range Current Limiter

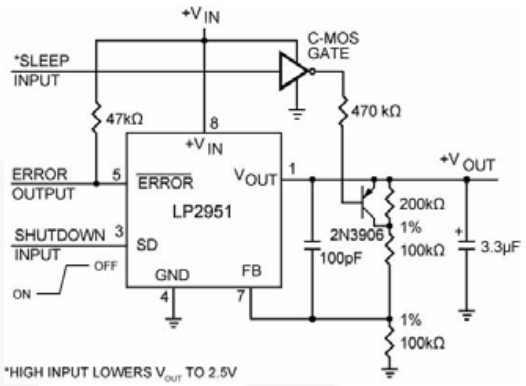


Figure 13. 5 V Regulator with 2.5 V Sleep Function

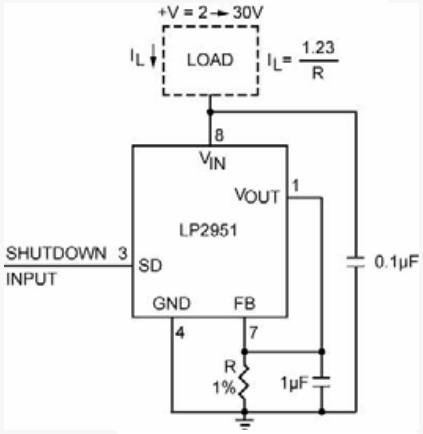


Figure 14. Low Drift Current Source

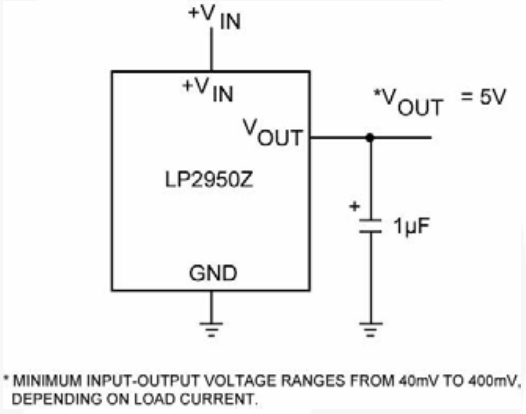


Figure 15. 5 V Current Limiter

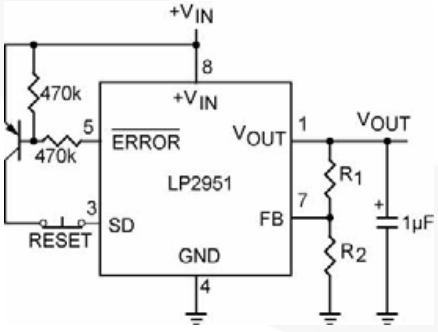


Figure 16. Latch Off When Error Flag Occurs

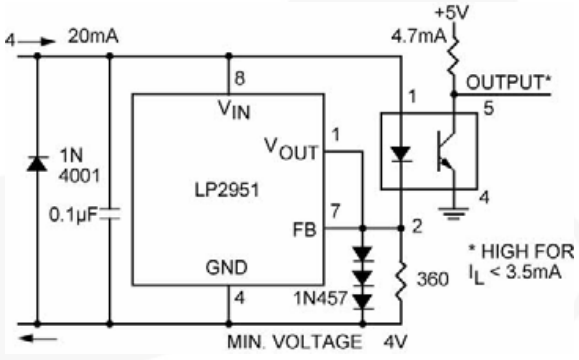
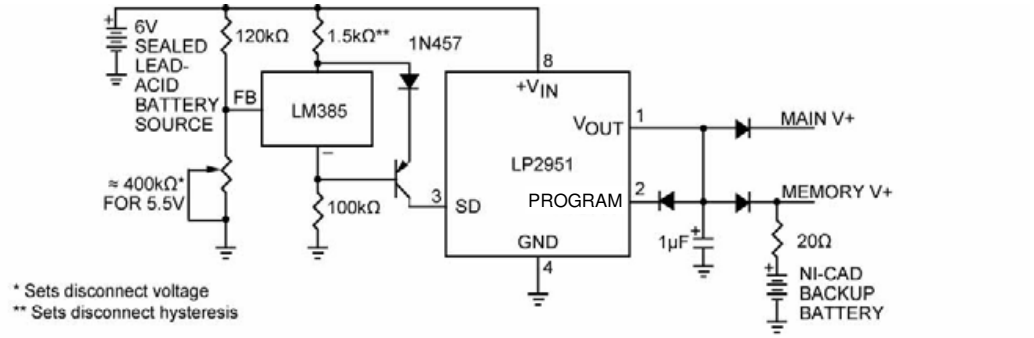


Figure 17. Open Circuit Detector for 4 mA to 20 mA Current Loop

© 2002 Fairchild Semiconductor Corporation

Typical Application (Continued)



For values shown, Regulator shuts down when V_{IN} < 5.5 V and turns on again at 6.0 V. Current drain in disconnected mode is 150µA.

Figure 18. Low Battery Disconnect

Physical Dimensions

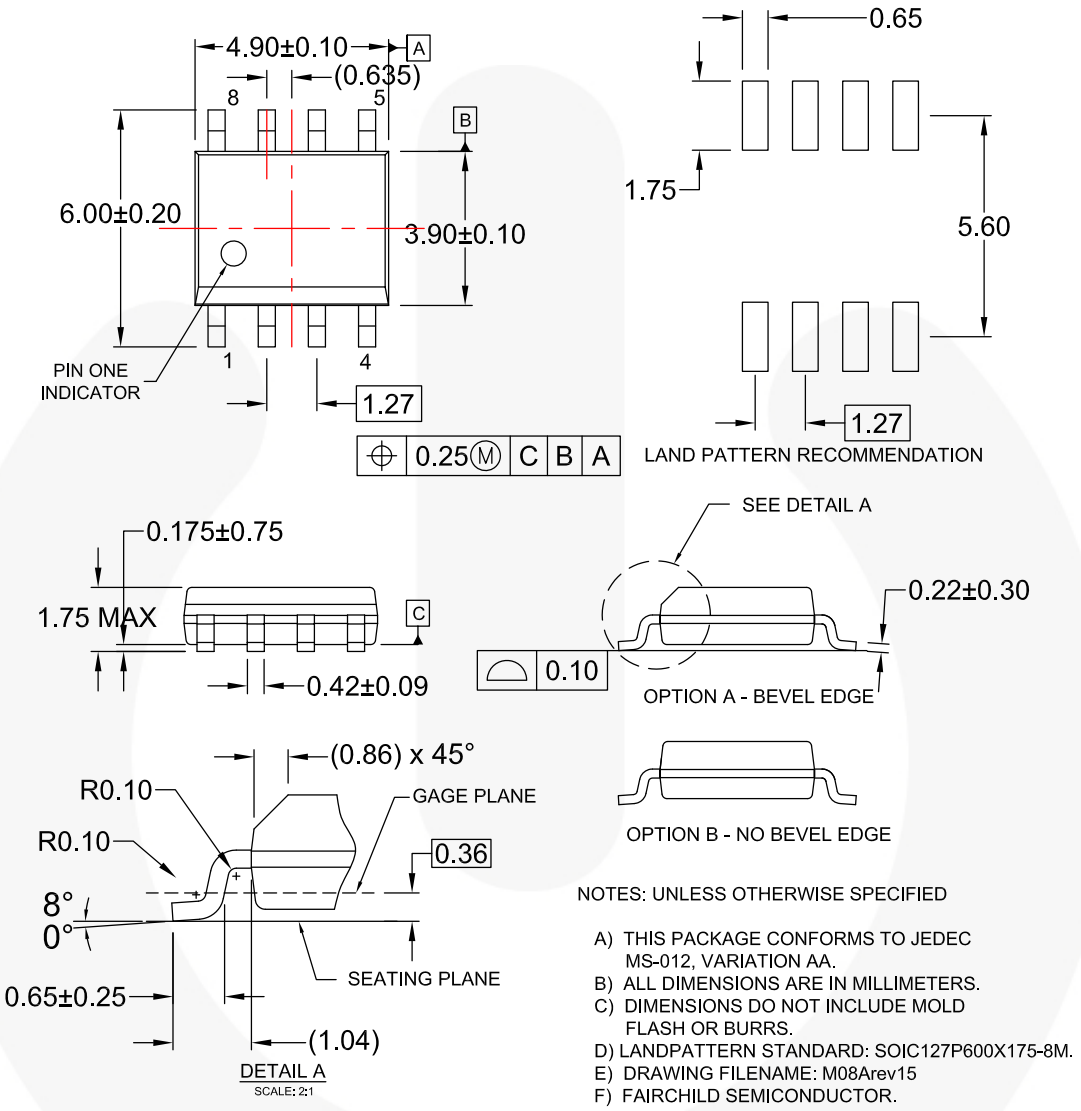


Figure 19. 8 Lead, SOIC, JEDEC MS-012, 0.150 inch NARROW BODY

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/dwg/M0/M08A.pdf.

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/packing_dwg/PKG-M08A.pdf.

© 2002 Fairchild Semiconductor Corporation

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.

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

* 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. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT HTTP://WWW.FAIRCHILDSEMI.COM. 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.

© Fairchild Semiconductor Corporation

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative