RELIABILITY REPORT

FOR

MAX8511EXKxx

PLASTIC ENCAPSULATED DEVICES

November 25, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Quality Assurance
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Reviewed by

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Conclusion

The MAX8511 successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

Table of Contents

I. Device Description

A. General

The MAX8511 ultra-low-noise, low-dropout (LDO) linear regulator is designed to deliver up to 120mA continuous output current from a tiny 5-pin SC70 plastic package. This regulators achieves a low 120mV dropout for 120mA load current. The MAX8510 uses an advanced architecture to achieve ultra-low output voltage noise of $11\mu V_{RMS}$ and PSRR of 54dB at 100kHz.

The MAX8511 does not require a bypass capacitor, hence achieving the smallest PC board areaThe MAX8511 is preset to a variety of voltages in the 1.5V to 4.5V range. Designed with a P-channel MOSFET series pass transistor, the MAX8511 maintains very low ground current (40µA).

The regulators are designed and optimized to work with low-value, low-cost ceramic capacitors

B. Absolute Maximum Ratings

Item	Rating
IN to GND	-0.3V to +7V
Output Short-Circuit Duration	Infinite
OUT, SHDN to GND	-0.3V to (IN + 0.3V)
FB, BP, N.C. to GND	-0.3V to (OUT + 0.3V)
?JA	324°C/W
Operating Temperature Range	-40°C to +85°C
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Continuous Power Dissipation (TA = +70°C)	
5-Pin SC70	247mW
Derates above +70°C	
5-Pin SC70	3.1mW/°C

II. Manufacturing Information

A. Description/Function:	Ultra-Low-Noise, High PSRR, Low-Dropout, 120mA Linear Regulators
B. Process:	B8 (Standard 0.8 micron silicon gate CMOS)
C. Number of Device Transistors:	284
D. Fabrication Location:	California, USA
E. Assembly Location:	Malaysia, Thailand or Philippines
F. Date of Initial Production:	January, 2003

III. Packaging Information

A. Package Type:	**5-Pin SC70**
B. Lead Frame:	Copper or Alloy 42
C. Lead Finish:	Solder Plate or 100% Matte Tin
D. Die Attach:	Silver-Filled Epoxy
E. Bondwire:	Gold (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	# 05-3501-0046
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-TSD-020-C:	Level 1

IV. Die Information

A. Dimensions:	31 x 30 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts: Jim Pedicord (Reliability Lab Manager)
Bryan Preeshl (Managing Director**)**

B. Outgoing Inspection Level: 0.1% for all electrical parameters guaranteed by the Datasheet.
0.1% For all Visual Defects.

C. Observed Outgoing Defect Rate: < 50 ppm

D. Sampling Plan: Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

B.

The results of the 135°C biased (static) life test are shown in **Table 1**. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 47 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 23.10 \times 10^{-9}$

$\lambda = 23.10$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability monitor program. In addition to routine production Burn-In, Maxim pulls a sample from every fabrication process three times per week and subjects it to an extended Burn-In prior to shipment to ensure its reliability. The reliability control level for each lot to be shipped as standard product is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on any lot that exceeds this reliability control level. Attached Burn-In Schematic (Spec. # 06-6022) shows the static Burn-In circuit. Maxim also performs quarterly 1000 hour life test monitors. This data is published in the Product Reliability Report (**RR-1M**).

B. Moisture Resistance Tests

Maxim pulls pressure pot samples from every assembly process three times per week. Each lot sample must meet an LTPD = 20 or less before shipment as standard product. Additionally, the industry standard 85°C/85%RH testing is done per generic device/package family once a quarter.

C. E.S.D. and Latch-Up Testing

The PM21-1 die type has been found to have all pins able to withstand a transient pulse of ±1000V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

MAX8511EXKxx

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	PACKAGE	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality		47	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	SC70	77	0
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality		77	0
Mechanical Stress (Note 2)					
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters		77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

	Terminal A (Each pin individually connected to terminal A with the other floating)	Terminal B (The common combination of all like-named pins connected to terminal B)
1.	All pins except V_{PS1} 3/	All V_{PS1} pins
2.	All input and output pins	All other input-output pins

1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground

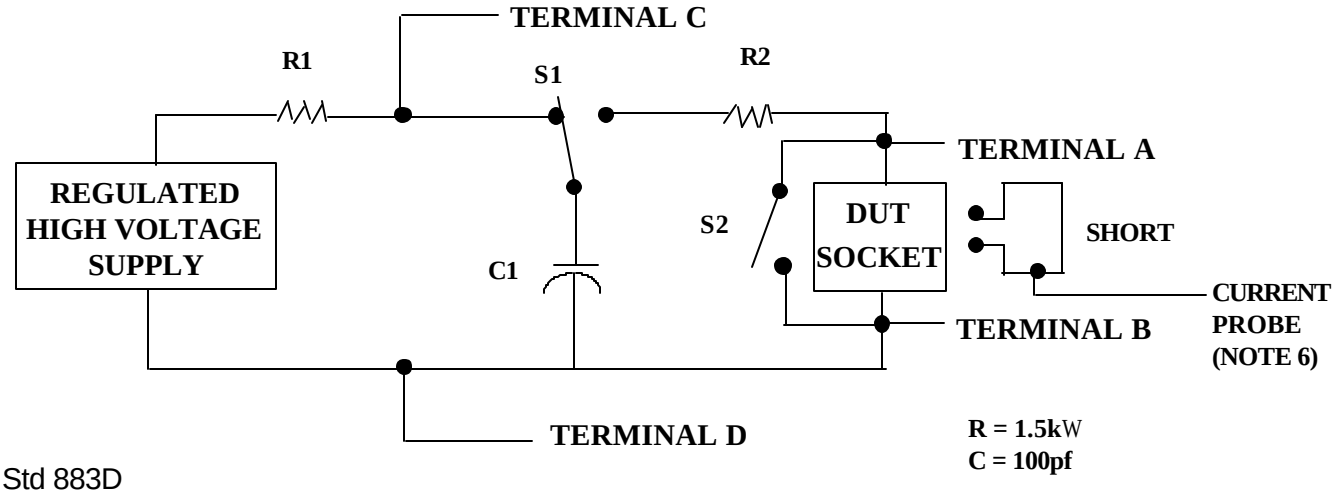
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

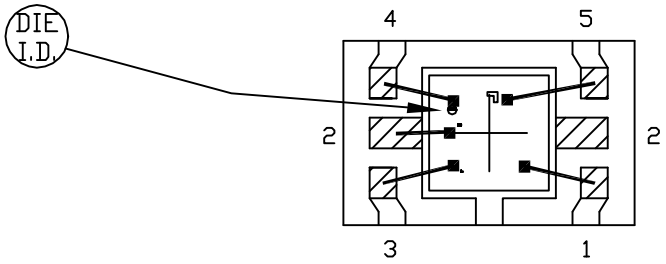
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.

c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



Mil Std 883D
Method 3015.7
Notice 8



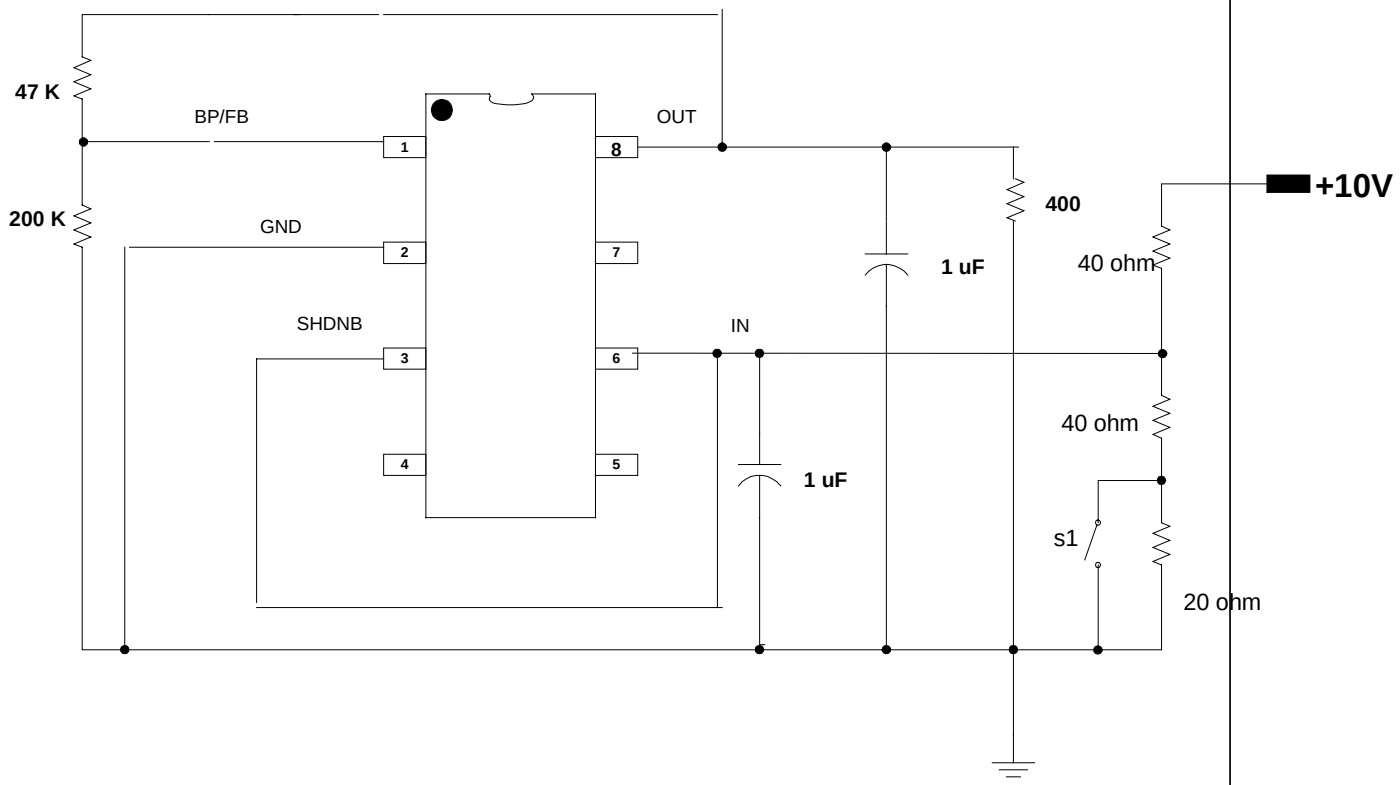
▨ BONDABLE AREA

NOTE: CAVITY DOWN

PKG. CODE: X5-1		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 35x34	PKG.			BOND DIAGRAM #: 05-3501-0046	REV: A
	DESIGN				

ONCE PER SOCKET

ONCE PER BOARD



S1 close ==> 5V supply, expected current=130mA;
S1 open ==>6V supply, expected current=105mA

DEVICES: MAX 8510/11/12
PACKAGE: 8-uMAX
MAX. EXPECTED CURRENT = 130mA

DRAWN BY: TEK TAN
NOTES: