RELIABILITY REPORT

FOR

MAX709LxxA

PLASTIC ENCAPSULATED DEVICES

July 17, 2006

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

Jim Pedicord
Quality Assurance
Manager, Reliability Operations

Conclusion

The MAX709L 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.

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I. Device Description

A. General

The MAX709 provides a system reset during power-up, power-down, and brownout conditions. When VCC falls below the reset threshold, RESET goes low and holds the μP in reset for 140ms min after VCC rises above the threshold.

The RESET output is guaranteed to be in the correct state with VCC down to 1V. The MAX709 provides excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, or +3V powered systems. The MAX709 is available 8-pin DIP, μMAX, and SO packages.

B. Absolute Maximum Ratings

Item	Rating
Terminal Voltage (with respect to GND)	
VCC	-0.3V to 6.0V
RESET	-0.3V to (VCC + 0.3V)
Input Current, VCC	20mA
Output Current, RESET	20mA
Rate-of-Rise, VCC	100V/μs
Continuous Power Dissipation (TA = +70°C)	
Plastic DIP (derate 9.09mW/°C above +70°C)	727mW
μMAX (derate 4.10mW/°C above +70°C)	330mW
SO (derate 5.88mW/°C above +70°C)	471mW
Operating Temperature Ranges	
MAX709_C___	0°C to +70°C
MAX709_E___	-40°C to +85°C
Storage Temperature Range	-65°C to +160°C
Lead Temperature (soldering, 10sec)	+300°C

II. Manufacturing Information

A. Description/Function: Power-Supply Monitor with Reset

B. Process: S3 - Standard 3 micron silicon gate CMOS

C. Number of Device Transistors: 380

D. Fabrication Location: Oregon, USA

E. Assembly Location: Malaysia, Philippines, Thailand

F. Date of Initial Production: April, 1993

III. Packaging Information

	5-pin PDIP	8-pin μMAX	8-pin SO
A. Package Type:	**5-pin PDIP**	**8-pin μMAX**	**8-pin SO**
B. Lead Frame:	Copper	Copper	Copper
C. Lead Finish:	Solder Plate or 100% Matte Tin (all packages)		
D. Die Attach:	Silver-filled Epoxy	Silver-filled Epoxy	Silver-filled Epoxy
E. Bondwire:	Gold (1 mil dia.)	Gold (1 mil dia.)	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-1701-0197	# 05-1701-0349	# 05-1701-0198
H. Flammability Rating:	Class UL94-V0	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C:	Level 1	Level 1	Level 1

IV. Die Information

A. Dimensions: 46 x 54 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: 3 microns (as drawn)

F. Minimum Metal Spacing: 3 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 (Manager, Reliability Operations)
Bryan Preeshl (Managing Director of QA)

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

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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 13.74 \times 10^{-9}$ λ = 13.74 F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure reliability of its processes. The reliability required for lots which receive a burn-in qualification 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 rejects from lots exceeding this level. The attached Burn-In Schematic (Spec. # 06-4556) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (**RR-1N**). Current monitor data for the S3 Process results in a FIT Rate of 0.15 @ 25C and 2.60 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

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

The PW54 die type has been found to have all pins able to withstand a transient pulse of ±3000V, 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

MAX709LxxA

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	PACKAGE	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)					
	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality		80	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	SO PDIP μMAX	77 77 77	0 0 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 & functionality		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

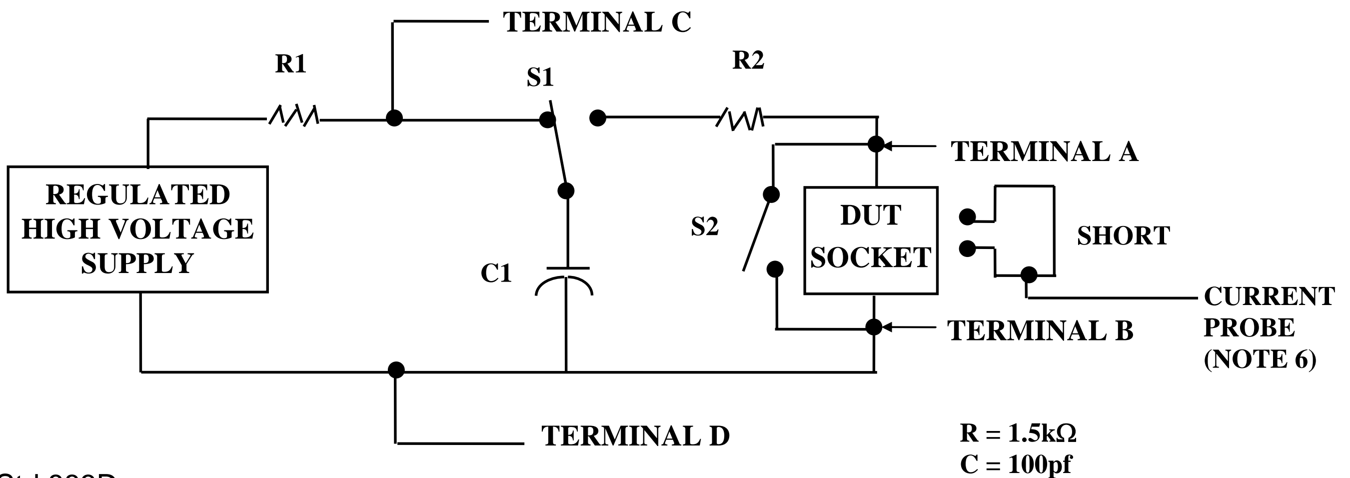
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

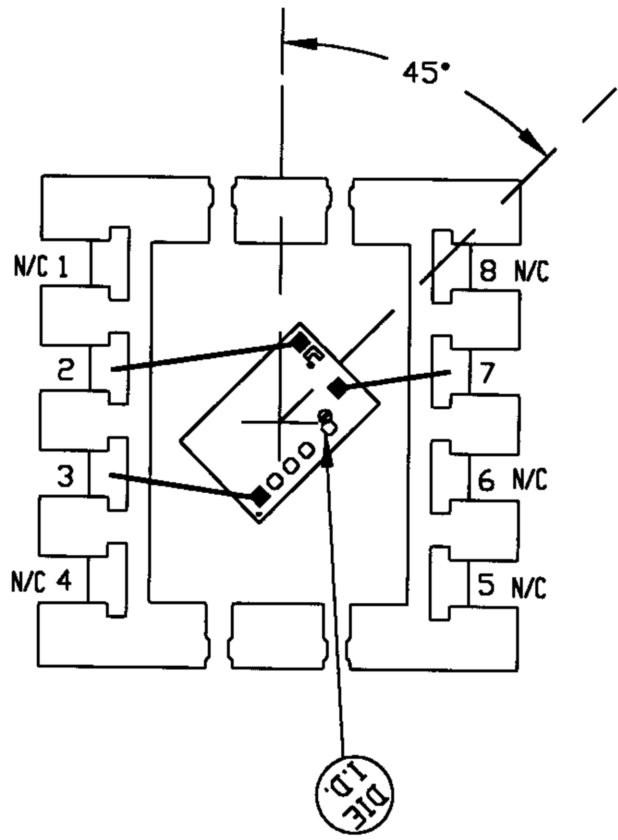
3.4 Pin combinations to be tested.

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.

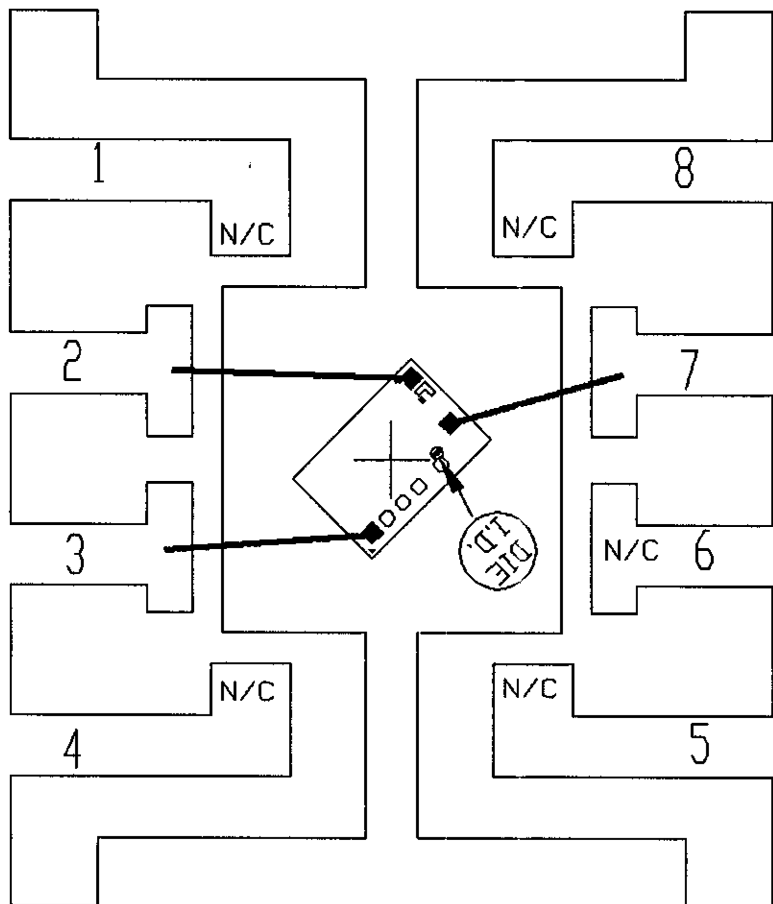
b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall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

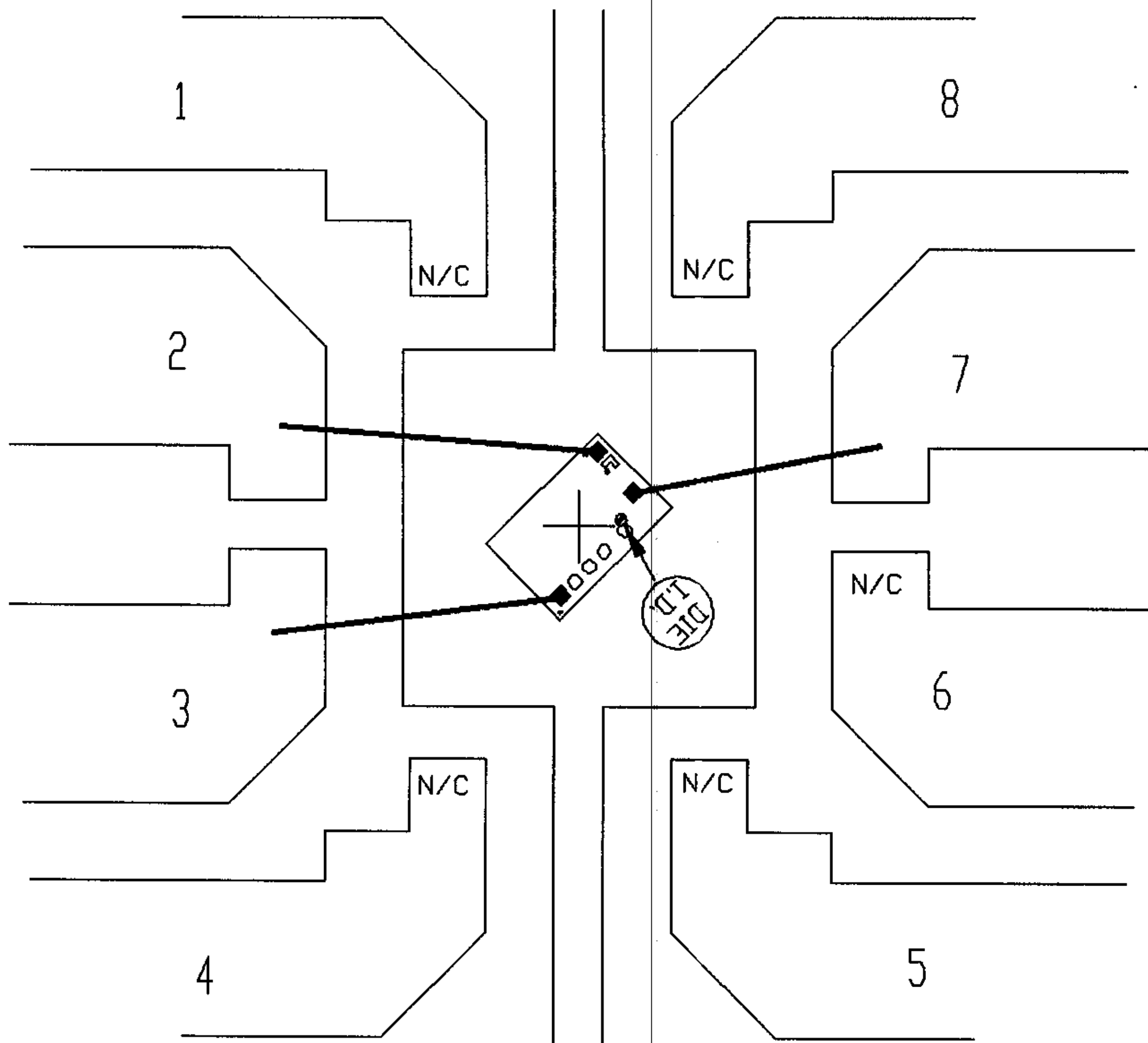




PKG.CODE: U8-1		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 68X94	PKG. DESIGN			BUILDSHEET NUMBER: 05-1701-0349 / REV.: A



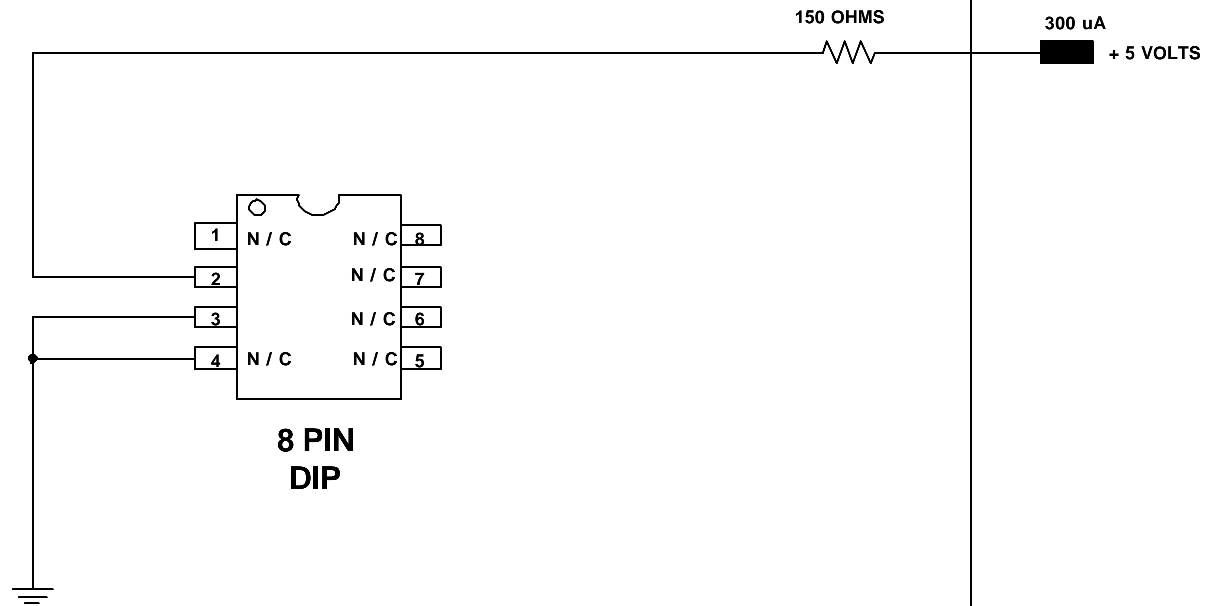
PKG.CODE: S8-2		APPROVALS	DATE	MAXIM	
CAV./PAD SIZE: 90 X 90	PKG. DESIGN			BUILDSHEET NUMBER: 05-1701-0198	REV.: A



PKG.CODE: P8-1		APPROVALS	DATE	MAXIM	
CAV./PAD SIZE: 100 X 100	PKG. DESIGN			BUILDSHEET NUMBER: 05-1701-0197	REV.: A

ONCE PER SOCKET

ONCE PER BOARD



DEVICES: MAX 705/706/707/708/709/809/811/812/813/821/822/6314/6315/6326/6327/6328
MAX. EXPECTED CURRENT = 300 uA

NOTES: MS17 only for MAX 6326-28