RELIABILITY REPORT

FOR

MAX708xxA

PLASTIC ENCAPSULATED DEVICES

January 31, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Conclusion

The MAX708 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 MAX708 microprocessor (µP) supervisory circuit reduceS the complexity and number of components required to monitor power-supply and battery functions in µP systems. This device significantly improves system reliability and accuracy compared to separate ICs or discrete components.

The MAX708 is the same as the MAX705/MAX706, except an active-high reset is substituted for the watchdog timer. Two supply-voltage monitor levels are available: The MAX708 generates a reset pulse below 4.40V.

B. Absolute Maximum Ratings

Item	Rating
Terminal Voltage (with respect to GND)	
V_{CC}	-0.3V to 6.0V
All Other Inputs (Note 1)	-0.3V to (V_{CC} + 0.3V)
Input Current	
V_{CC}	20mA
GND	20mA
Output Current (all outputs)	20mA
Continuous Power Dissipation	
8 Lead Plastic DIP	727mW
8 Lead SO	471mW
8 Lead µMAX	330mW
Derates above +70°C	
8 Lead Plastic DIP	9.09mW/°C
8 Lead SO	5.88mW/°C
8 Lead µMAX	4.10mW/°C
Operating Temperature Ranges	
MAX708C	0°C to +70°C
MAX708E	-40°C to +85°C
Storage Temperature Range	-65°C to +160°C
Lead Temperature (soldering, 10sec)	+300°C

Note 1: The input voltage limits on PFI and MR can be exceeded if the input current is less than 10mA.

II. Manufacturing Information

A. Description/Function:	Low-Cost, µP Supervisory Circuit
B. Process:	S3 (Standard 3 micron silicon gate CMOS)
C. Number of Device Transistors:	572
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Philippines, Malaysia or Thailand
F. Date of Initial Production:	December, 1993

III. Packaging Information

A. Package Type:	**8-Pin PDIP**	**8-Pin SO**	**8-Pin uMAX**
B. Lead Frame:	Copper	Copper	Copper
C. Lead Finish:	Solder Plate	Solder Plate	Solder Plate
D. Die Attach:	Silver-filled Epoxy	Silver-filled Epoxy	Silver-filled Epoxy
E. Bondwire:	Gold (1.3 mil dia.)	Gold (1mil dia.)	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-1701-0103	# 05-1701-0104	# 05-1701-0187
H. Flammability Rating:	Class UL94-V0	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-112:	Level 1	Level 1	Level 1

IV. Die Information

A. Dimensions:	51 x 74 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 (Reliability Lab Manager)
Bryan Preeshl (Executive Director**)**
Kenneth Huening (Vice President)

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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 320 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 3.39 \times 10^{-9}$

$\lambda = 3.39$ 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. # 06-5260) 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 PW27-3 die type has been found to have all pins able to withstand a transient pulse of ±2500V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA and/or ±20V.

Table 1
Reliability Evaluation Test Results

MAX708xxA

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		320	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	PDIP SO uMAX	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		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

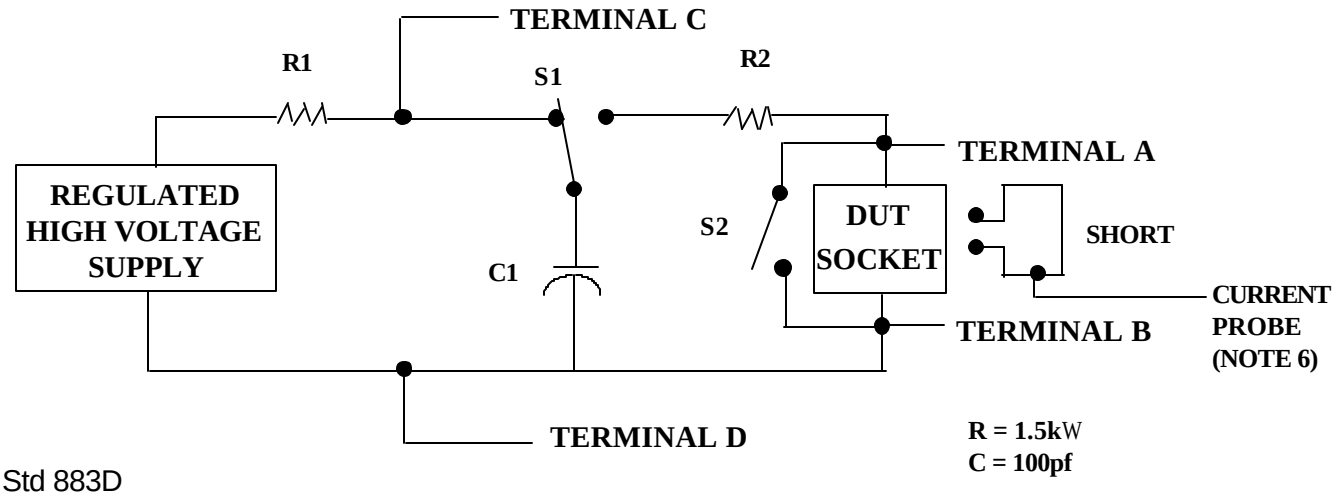
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

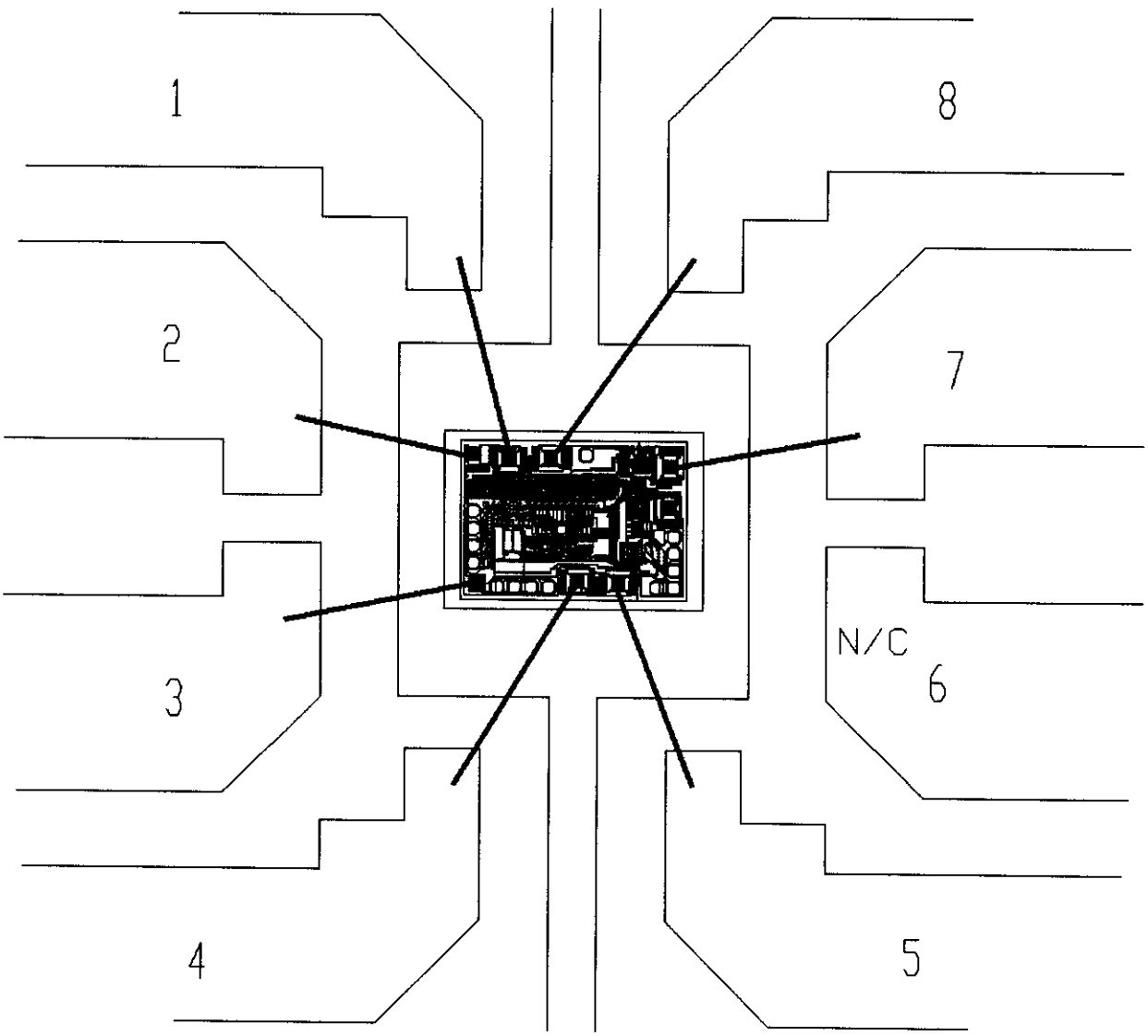
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

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.

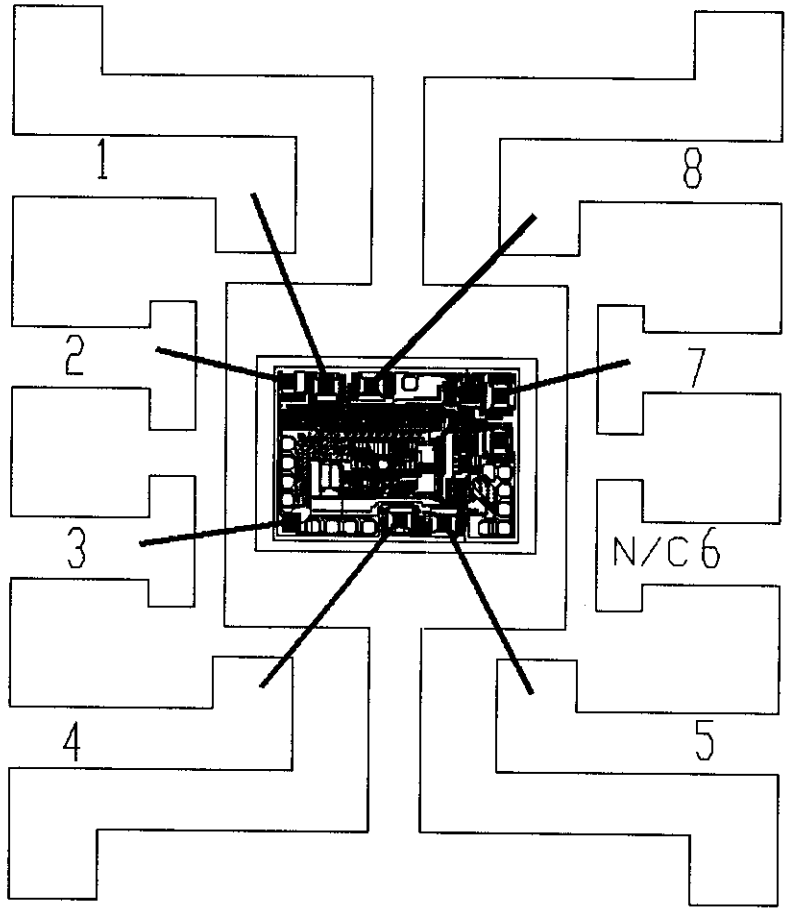
c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



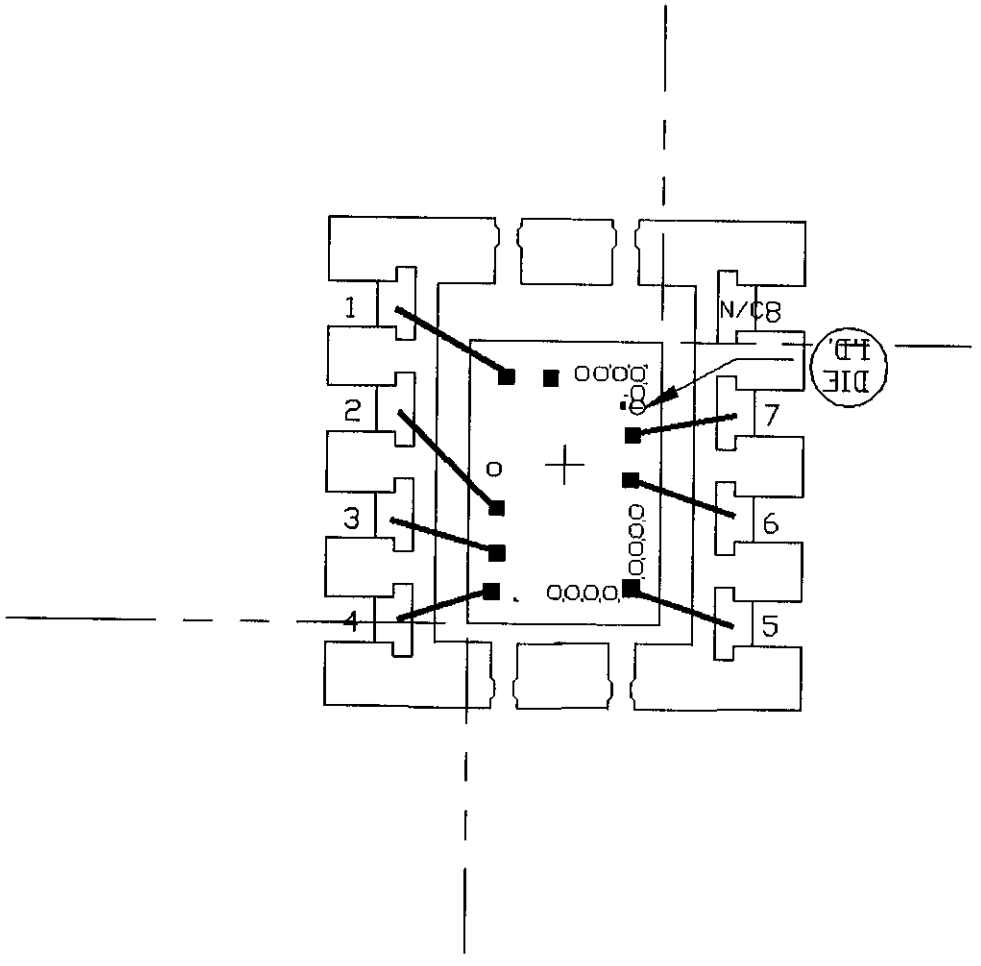
Mil Std 883D
Method 3015.7
Notice 8



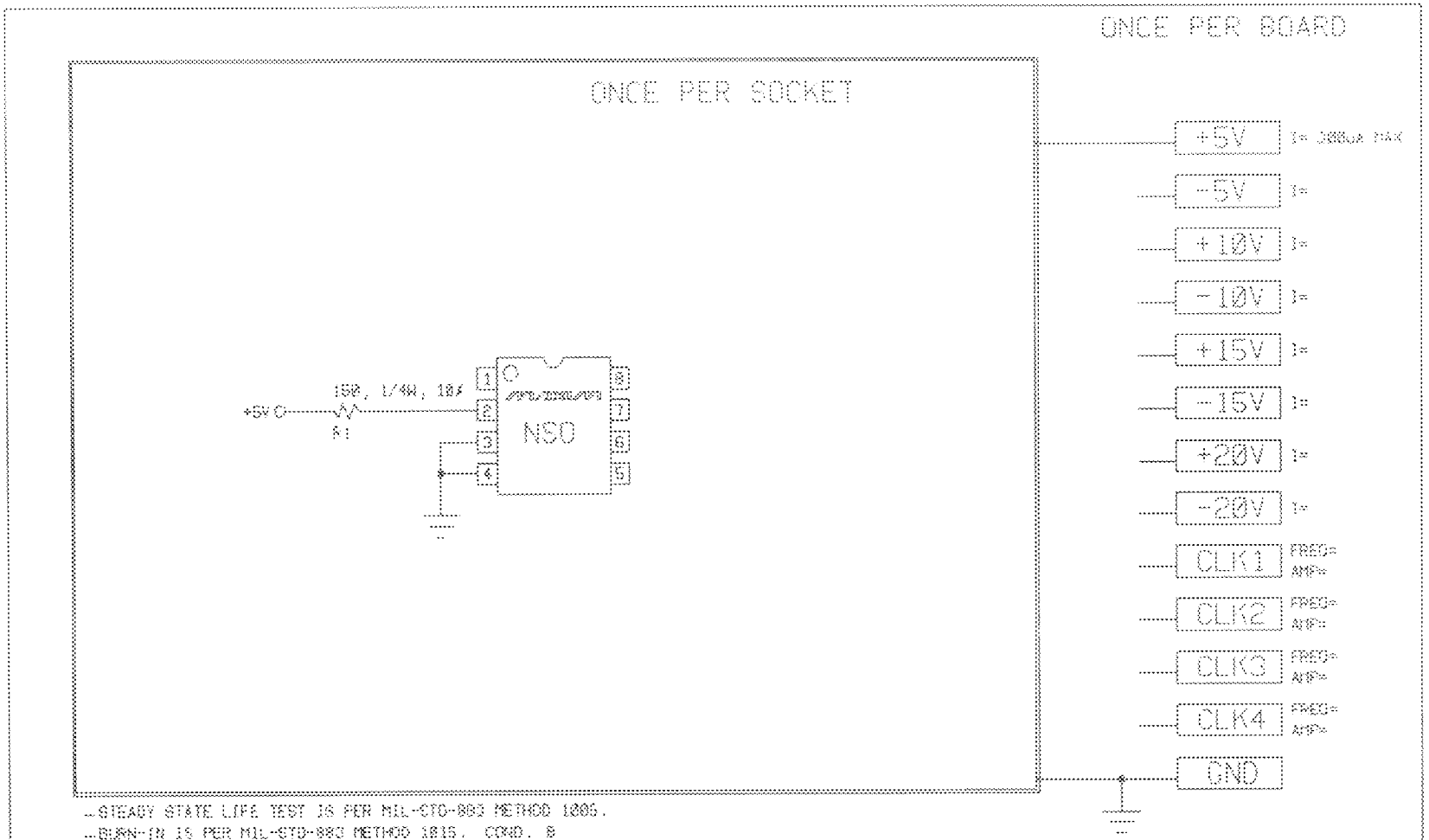
PKG.CODE: P8-1		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 100 X 100	PKG.	[redacted]	12/7/92	BUILDSHEET NUMBER: 05-1701-0103 REV.: A
	DESIGN		12/14/92	



PKG.CODE: S8-2		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 90 X 90	PKG.	[redacted]	12/7/92	BUILDSHEET NUMBER: 05-1701-0104 / REV.: A
	DESIGN		12/14/92	



PKG.CODE: U8-1		APPROVALS	DATE	MAXIM	
CAV./PAD SIZE: 68X94	PKG.	[redacted]	2/4/94	BUILDSHEET NUMBER: 05-1701-0187	REV.: A
	DESIGN		2/4/94		



NOTES:

1. TEMPERATURE: 125C OR EQUIVALENT
2. TIME: 160 HOURS MIN. OR EQUIVALENT
3. ALL COMPONENTS AND MATERIAL MUST STAND 150C CONTINUOUS
4. APPROVED FOR [X] COMMERCIAL
   [X] MR/883

SPEC. NO. 06-5260 REV. A

DATE: 12/25/96

DRAWN BY: C. JONES

MAXIM BURN-IN SCHEMATIC

DEVICE TYPE:
MAX705/6/7/8/9
MAX811/812 MAX814/6315