DG508AxWE
Rev. A

RELIABILITY REPORT

FOR

DG508AxWE

PLASTIC ENCAPSULATED DEVICES

December 17, 2002

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Conclusion

The DG508A 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

Maxim's DG508A is a monolithic CMOS analog multiplexer. The DG508A is a single 8 channel (1 of 8) multiplexer.

This device features break-before-make switching. Maxim guarantees that this multiplexer will not latch-up if the power supplies are turned off with the input signals still present. Maxim also guarantees continuous operation when this device is powered by supplies ranging from ±4.5V to ±18V. The multiplexer operates over a wide range of power supplies from ±4.5V to ±18V.

The DG508A is a plug-in upgrade for the industry-standard DG508A. Maxim's parts have lower on resistance, faster enable switching times, and significantly lower leakage currents. The DG508A also consumes significantly lower power, making it ideal for portable equipment.

B. Absolute Maximum Ratings

Item	Rating
Voltage Referenced to V-	
V+	+44V
GND	+25V
Digital Inputs V_S, V_D (Note 1)	-2V to (V+ + 2V) or 20mA, whichever occurs first
Current (Any Terminal Except S or D)	30mA
Continuous Current, S or D	20mA
Peak Current, S or D (Pulse at 1msec, 10% duty cycle max)	40mA
Storage Temp.	-65°C to +150°C
Storage Temp.	-65°C to +150°C
Lead Temp. (10 sec.)	+300°C
Power Dissipation	762mW
Derates above +70°C	9.52mW/°C

Note 1: Signals on S_, D_, or IN_ exceeding V+ or V- will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

II. Manufacturing Information

A. Description/Function:	Monolithic CMOS Analog Multiplexer
B. Process:	MV6 (Medium voltage 6 micron metal gate CMOS)
C. Number of Device Transistors:	152
D. Fabrication Location:	California, USA
E. Assembly Location:	Philippines or Malaysia
F. Date of Initial Production:	December, 1990

III. Packaging Information

A. Package Type:	**16 Lead Wide SO**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate
D. Die Attach:	Silver-filled Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	Buildsheet # 05-0301-0311
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1

IV. Die Information

A. Dimensions:	93 x 119 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:	6 microns (as drawn)
F. Minimum Metal Spacing:	6 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, Rel Operations)
Bryan Preeshl (Executive Director of QA)
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 400 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 2.71 \times 10^{-9}$

$\lambda = 2.71$ 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. # 06-4529) 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 AG41-1 die type has been found to have all pins able to withstand a transient pulse of ± 600V, 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
DG508AxWE

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	400	0
Moisture Testing				
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 96hrs.	DC Parameters & functionality	77	0
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality (generic test vehicle)	77	0
Mechanical Stress				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters (generic test vehicle)	77	0

Note 1: Life Test Data may represent plastic D.I.P. qualification lots for the Small Outline package.

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

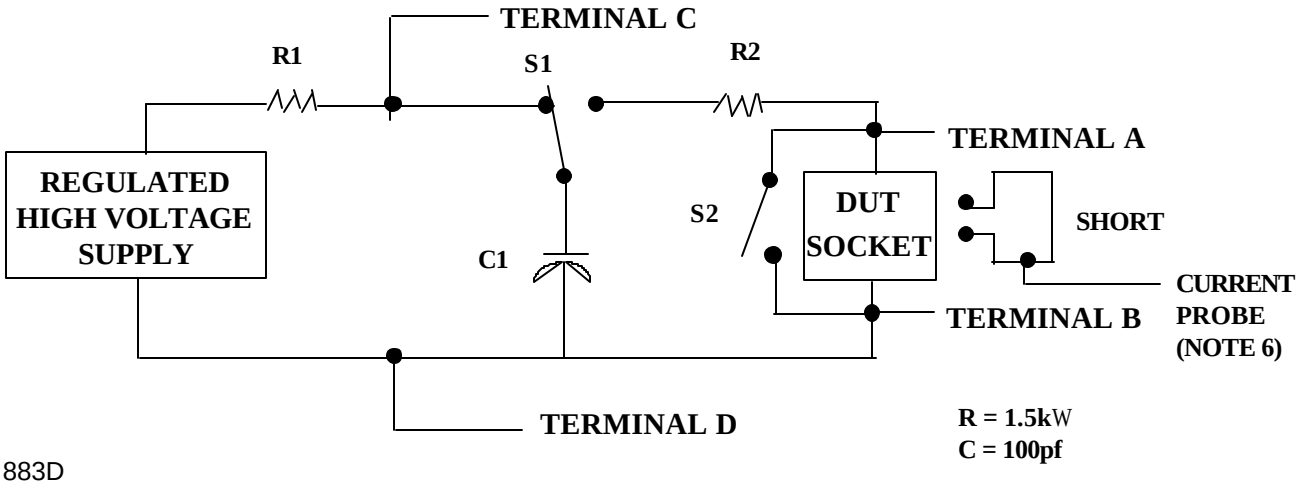
1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground (e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

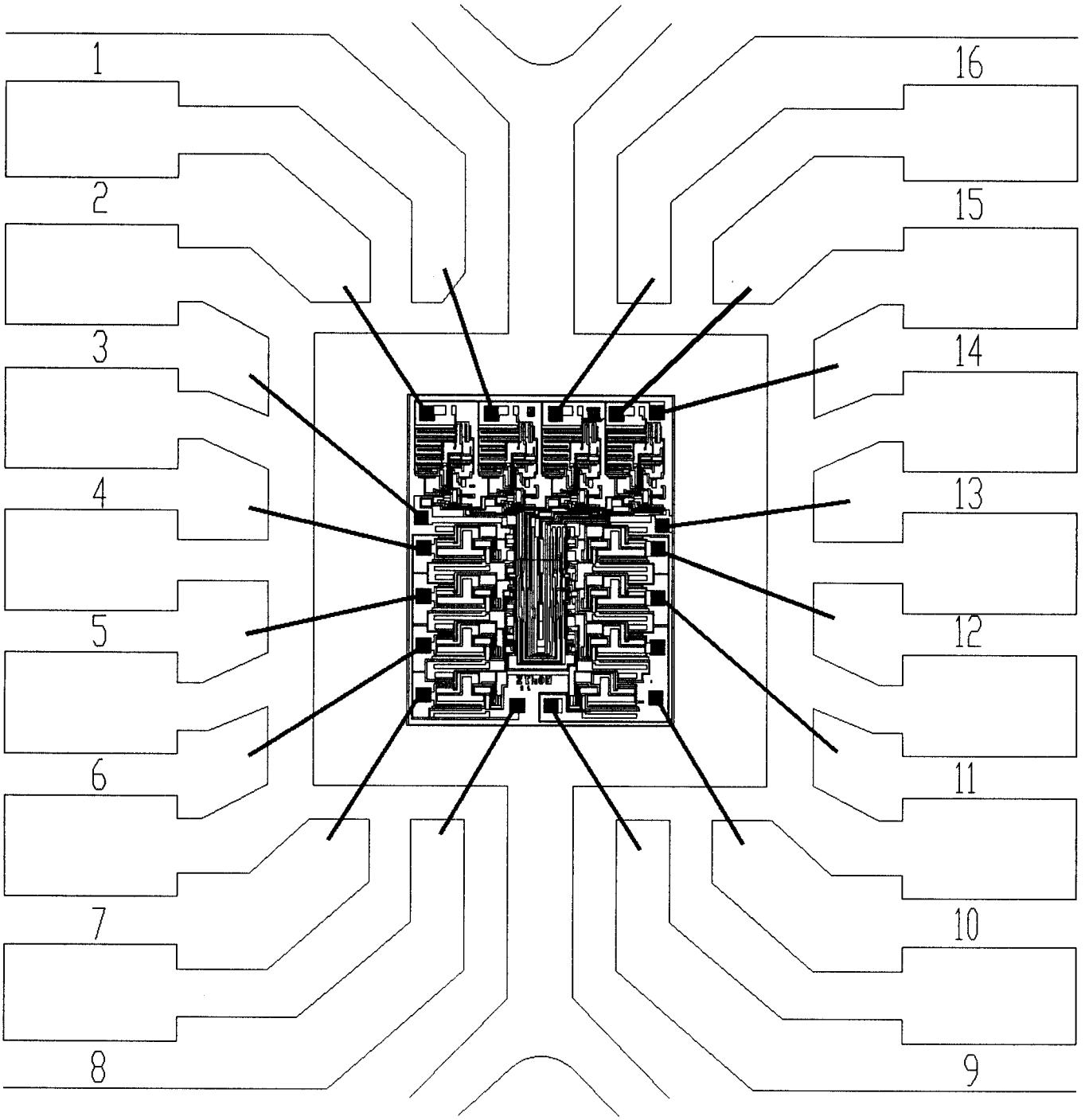
3.4 Pin combinations to be tested.

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.

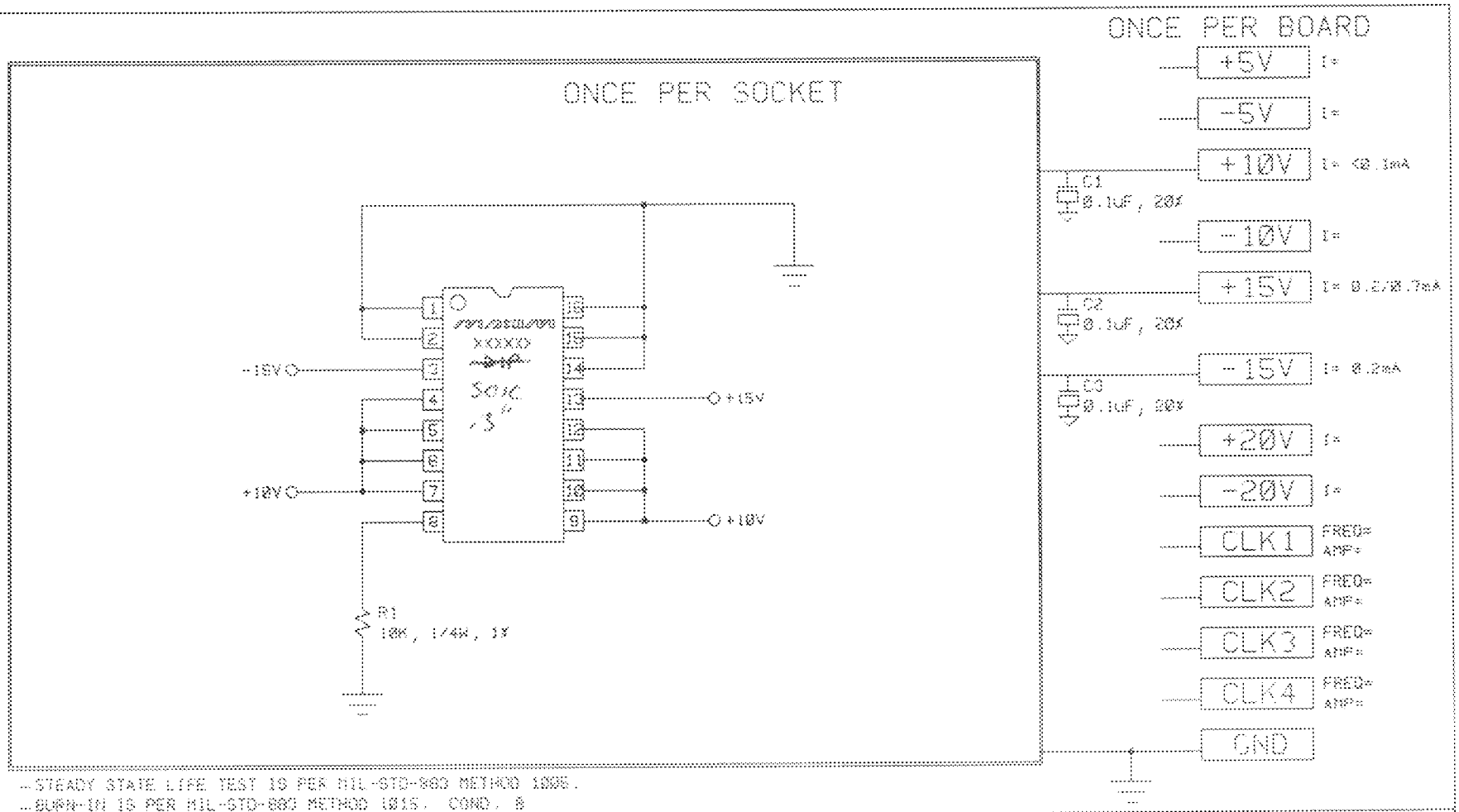
b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall 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: W16-2		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 150 X 150	PKG. DESIGN			BUILDSHEET NUMBER: 05-0301-0311 / REV.: A



--STEADY STATE LIFE TEST IS PER MIL-STD-883 METHOD 1005.
--BURN-IN IS PER MIL-STD-883 METHOD 1015. COND. B

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
   [ ] HR/883

SPEC. NO. 06-4529 REV. A

DATE: 4/10/92

DRAWN BY:

MAXIM BURN-IN SCHEMATIC

DEVICE TYPE:

MAX320/60/78, DG500, IH6109
HI1-0508, HI3-0508