

RELIABILITY REPORT
FOR
MAX706TxxA
PLASTIC ENCAPSULATED DEVICES

October 10, 2002

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by



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Conclusion

The MAX706T 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 MAX706T microprocessor (μ P) supervisory circuits reduce the complexity and number of components required to monitor +3V power-supply levels in +3V to +5V μ P systems. These devices significantly improve system reliability and accuracy compared to separate ICs or discrete components.

The MAX706x supervisory circuits provide the following four functions:

1. A Reset output during power-up, power-down and brownout conditions.
2. An independent watchdog output that goes low if the watchdog input has not been toggled within 1.6sec.
3. A 1.25V threshold detector for power-fail warning, low-battery detection, or for monitoring a power supply other than the main supply.
4. An active-low manual-reset input.

The MAX706T has a reset-threshold voltage level of 3.08V with an active-low reset output signal.

B. Absolute Maximum Ratings

<u>Item</u>	<u>Rating</u>
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
Storage Temp.	-65°C to +160°C
Lead Temp. (10 sec.)	+300°C
Continuous Power Dissipation (TA = +70°C)	
8-Lead NSO	471mW
8-Lead PDIP	727mW
8-Lead uMAX	330mW
Derates above +70°C	
8-Lead NSO	5.88mW/°C
8-Lead NSO	9.09mW/°C
8-Lead NSO	4.1mW/°C

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

II. Manufacturing Information

A. Description/Function:	+3V Voltage Monitoring, Low-Cost, uP Supervisory Circuit
B. Process:	SG3 (Standard 3 micron silicon gate CMOS)
C. Number of Device Transistors:	572
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Philippines, Malaysia, Thailand or Korea
F. Date of Initial Production:	July, 1992

III. Packaging Information

A. Package Type:	8 Lead NSO	8 Lead DIP	8 Lead 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 (1.0 mil dia.)	Gold (1.3 mil dia.)	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-1701-0101	# 05-1701-0100	# 05-1701-0164
H. Flammability Rating:	Class UL94-V0	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1	Level 1	Level 1

IV. Die Information

A. Dimensions:	51x74 mils
B. Passivation:	SiN/SiO (nitride/oxide)
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 (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: < 100 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4389 \times 1020 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

↓
Temperature Acceleration factor assuming an activation energy of 0.8eV

$$\lambda = 1.06 \times 10^{-9}$$

$$\lambda = 1.06 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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. # 06-4556) 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 PW27-4 die type has been found to have all pins able to withstand a transient pulse of $\pm 1500\text{V}$, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of $\pm 100\text{mA}$ and/or $\pm 20\text{V}$.

Table 1
Reliability Evaluation Test Results

MAX706TxxA

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		1020	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	NSO	77	0
			PDIP	77	0
			uMAX	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 (generic test vehicle)		77	0

Note 1: Life Test Data may represent plastic D.I.P. qualification lots.

Note 2: Generic Process/Package 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

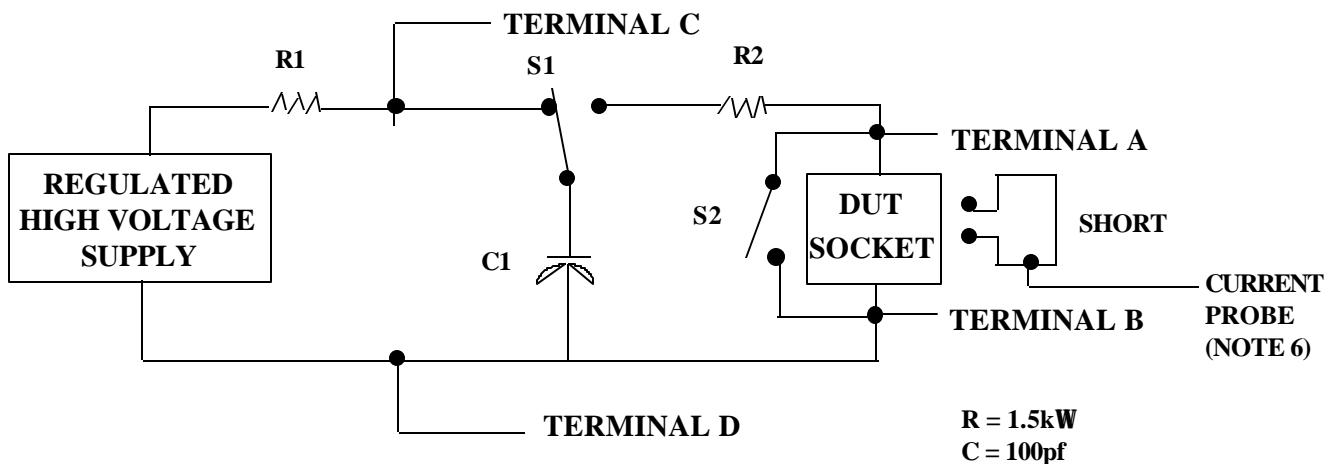
1/ Table II is restated in narrative form in 3.4 below.

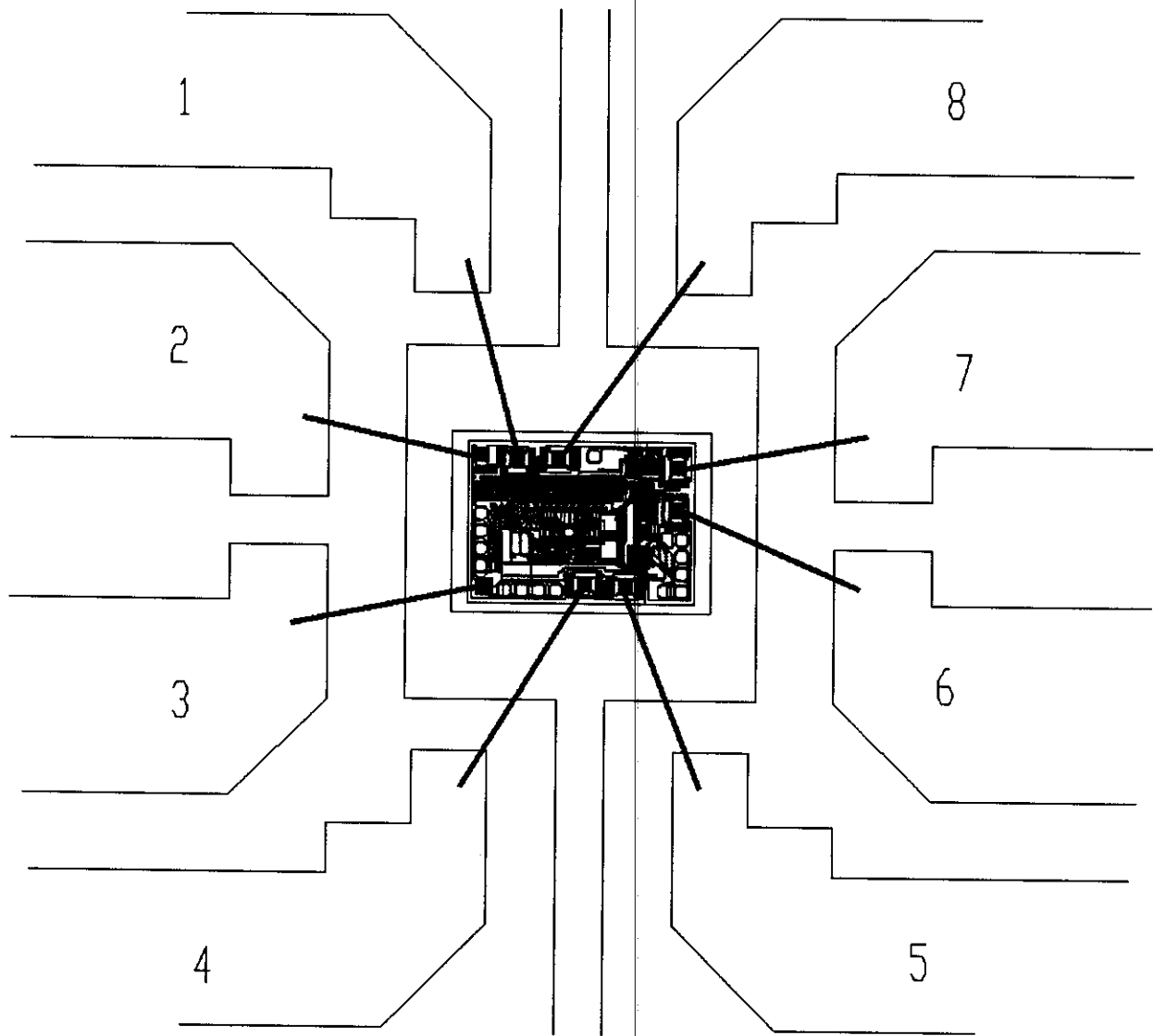
2/ No connects are not to be tested.

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: P8-1

CAV./PAD SIZE: 100 X 100

APPROVALS

PKG.
DESIGN

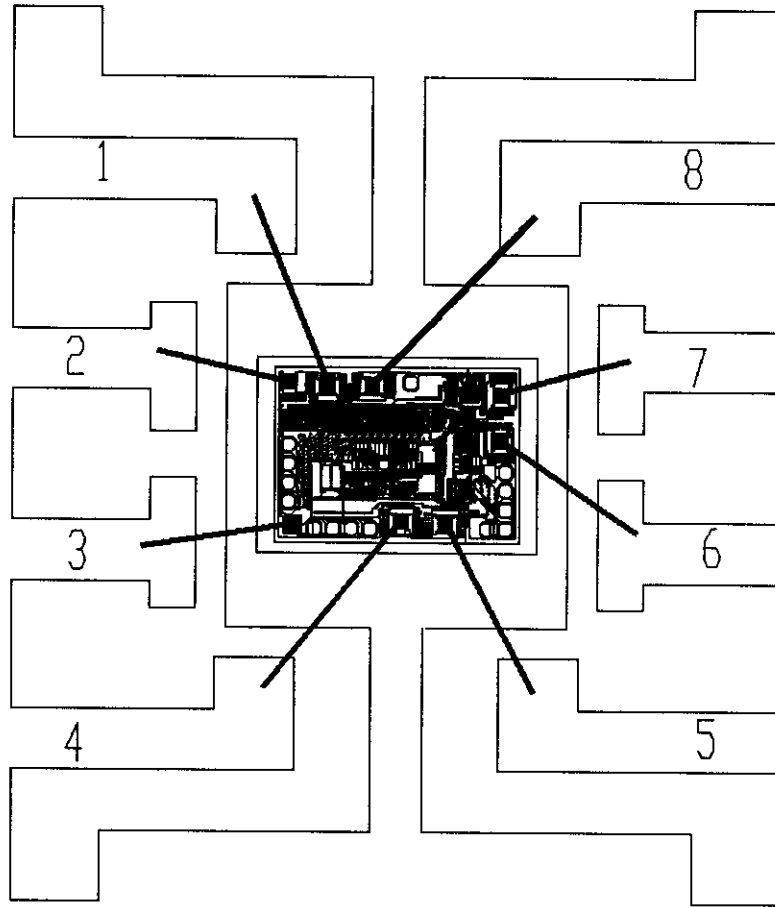
DATE

12/7/92

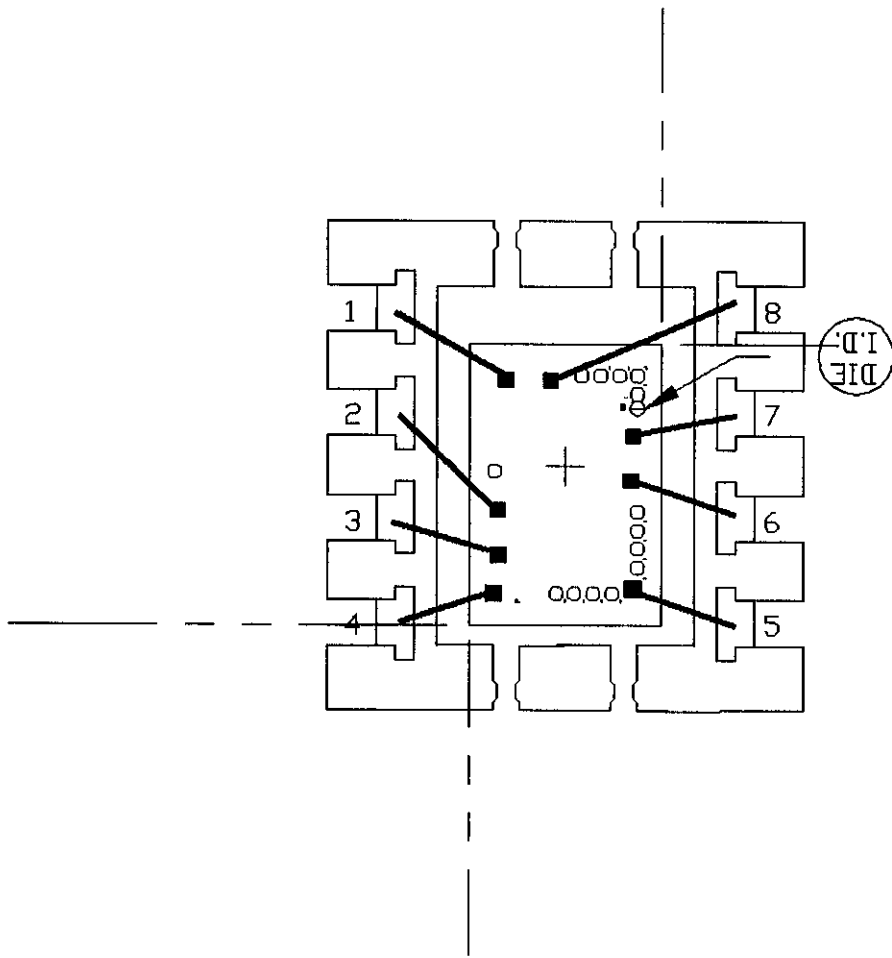
MAXIM

BUILDSHEET NUMBER:
05-1701-0100

REV.:
A



PKG.CODE: S8-2		APPROVALS	DATE	MAXIM	
CAV./PAD SIZE: 90 X 90	PKG. DESIGN		12/17/92	BUILDSHEET NUMBER:	REV.:
			12/14/92	05-1701-0101	A



PKG.CODE: U8-1

CAV./PAD SIZE:
68X94

APPROVALS

PKG.
DESIGN

DATE

2/4/94
2/4/94

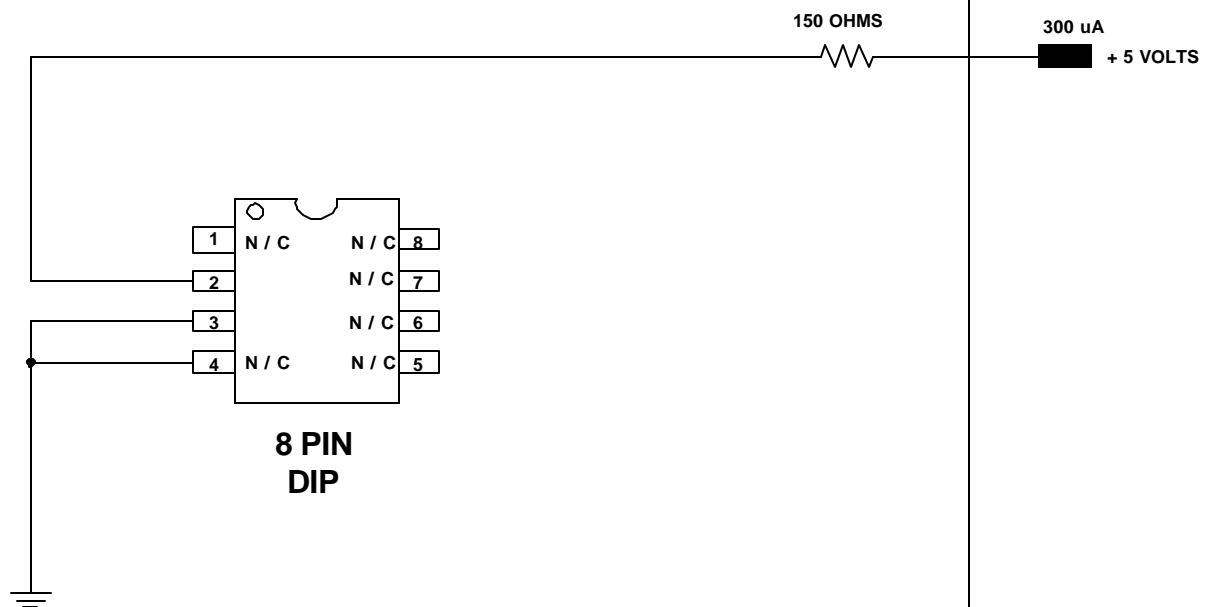
MAXIM

BUILDSHEET NUMBER:
05-1701-0164

REV:
B

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 μ A

DRAWN BY: TODD BEJSOVEC
NOTES: MS17 only for MAX 6326-28