RELIABILITY REPORT

FOR

MAX823SExK

PLASTIC ENCAPSULATED DEVICES

August 2, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Conclusion

The MAX823S 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 MAX823S microprocessor (µP) supervisory circuit combines reset output, watchdog, and manual reset input functions in 5-pin SOT23 and SC70 packages. It significantly improve system reliability and accuracy compared to separate ICs or discrete components. The MAX823S is specifically designed to ignore fast transients on V_{CC}.

The MAX823S has a eset threshold voltage of 2.93V. The device has an active-low reset output, which is guaranteed to be in the correct state for V_{CC} down to 1V. The MAX823 offers a watchdog input and manual reset input.

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B. Absolute Maximum Ratings

Item	Rating
VCC	-0.3V to +6.0V
All Other Pins	-0.3V to (VCC + 0.3V)
Input Current, All Pins Except RESET and RESET	20mA
Output Current, RESET, RESET	20mA
Operating Temperature Range	
MAX823SEXK.	-40°C to +85°C
MAX823SEUK	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Continuous Power Dissipation (TA = +70°C)	
5-Pin SOT23	571mW
5-Pin SC70	247mW
Derates above +70°C	
5-Pin SOT23	7.1mW/°C
5-Pin SC70	3.1mW/°C

II. Manufacturing Information

A. Description/Function:	5-Pin Microprocessor Supervisory Circuits With Watchdog Timer and Manual Reset
B. Process:	B12 (Standard 1.2 micron silicon gate CMOS)
C. Number of Device Transistors:	607
D. Fabrication Location:	California, USA
E. Assembly Location:	Malaysia or Thailand
F. Date of Initial Production:	January, 1997

III. Packaging Information

	5-Lead SOT23	**5-Lead SC70**
A. Package Type:		
B. Lead Frame:	Copper	Alloy 42
C. Lead Finish:	Solder Plate	Solder Plate
D. Die Attach:	Silver-Filled Epoxy	Non-Conductive Epoxy
E. Bondwire:	Gold (1.0 mil dia.)	Gold (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	Buildsheet # 05-1601-0010	Buildsheet # 05-1601-0111
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-112:	Level 1	Level 1

IV. Die Information

A. Dimensions:	42 x 36 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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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**)**
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. # 06-5033) 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 MS04-3 die type has been found to have all pins able to withstand a transient pulse of ±1500V 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

MAX823SExK

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	SOT23 SC70	77 77	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

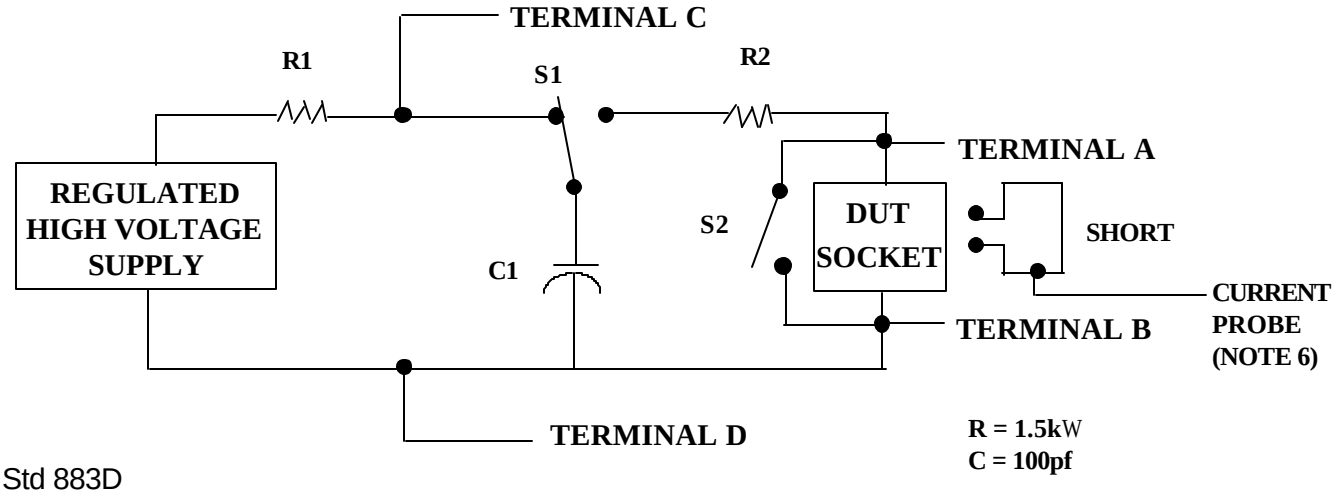
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

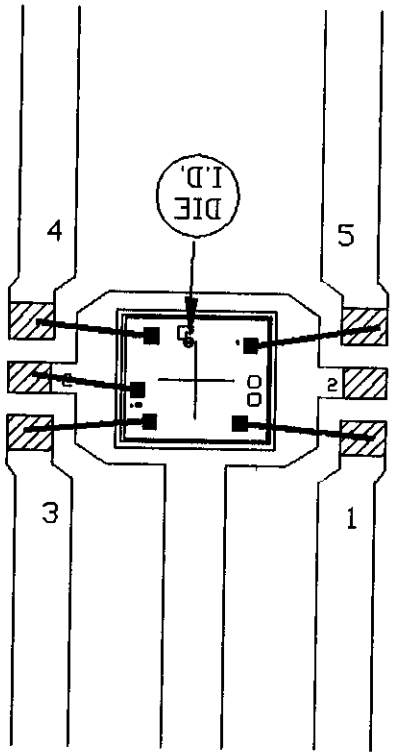
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

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.



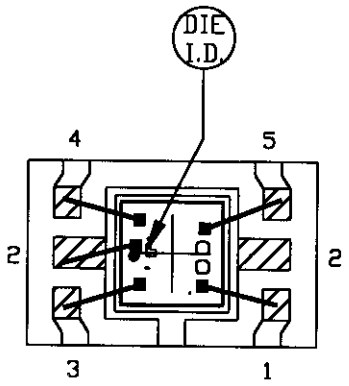
Mil Std 883D
Method 3015.7
Notice 8



▨ - BONDING AREA

NOTE: CAVITY DOWN

PKG.CODE: U5-1		APPROVALS	DATE	MAXIM
CAV./PAD SIZE: 64X45	PKG. DESIGN			BUILDSHEET NUMBER: 05-1601-0010 / REV.: A



USE NON-CONDUCTIVE EPOXY

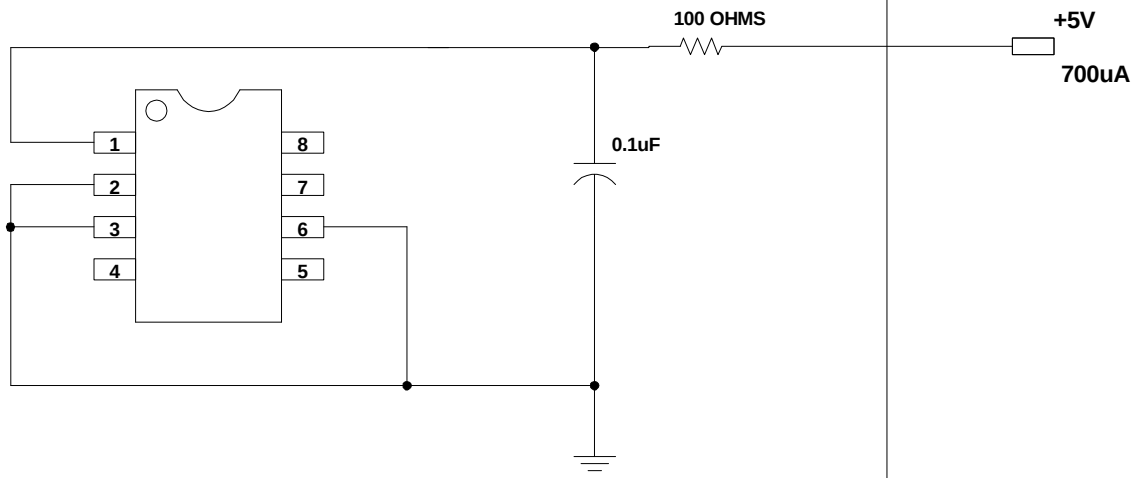
▨ BONDABLE AREA

NOTE: CAVITY DOWN

PKG. CODE: X5-1		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY
CAV./PAD SIZE: 35x34	PKG.			BOND DIAGRAM #: 05-1601-0111 / REV: A
	DESIGN			

ONCE PER SOCKET

ONCE PER BOARD



8-DIP

DEVICES: MAX 941/809/810/823/824/825/803 MAX 6381/6835 MAX. EXPECTED CURRENT = 700uA AND 15uA	DRAWN BY: NOTES: 15 uA FOR MAX 6381