RELIABILITY REPORT

FOR

MAX6023EBT30+

CHIP SCALE PACKAGE

July 5, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX6023EBT30+ 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 MAX6023 is a family of low-dropout, micropower voltage references in a 5-bump, chip-scale package (UCSP™). The MAX6023 series-mode (three-terminal) references, which operate with input voltages from 2.5V to 12.6V (1.25V and 2.048V options) or (VOUT + 0.2V) to 12.6V (all other voltage options), are available with output voltage options of 1.25V, 2.048V, 2.5V, 3.0V, 4.096V, 4.5V, and 5.0V. These devices are guaranteed an initial accuracy of ±0.2% and 30ppm/°C temperature drift over the -40°C to +85°C extended temperature range. UCSPs offer the benefit of moving to smaller footprint and lower profile devices, significantly smaller than even SC70 or SOT23 plastic surface-mount packages. The significantly lower profile (compared to plastic SMD packages) of the UCSP makes the device ideal for height-critical applications. Miniature UCSP packages also enable device placement close to sources and allow more flexibility in a complex or large design layout. The MAX6023 voltage references use only 27µA of supply current. And unlike shunt-mode (two-terminal) references, the supply current of the MAX6023 family varies only 0.8µA/V with supply-voltage changes, translating to longer battery life. Additionally, these internally compensated devices do not require an external compensation capacitor and are stable up to 2.2nF of load capacitance. The low-dropout voltage and the low supply current make these devices ideal for battery-operated systems.

II. Manufacturing Information

A. Description/Function:	Precision, Low-Power, Low-Dropout, UCSP Voltage Reference
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	Japan
F. Date of Initial Production:	October 19, 2001

III. Packaging Information

A. Package Type:	6-pin UCSP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	#05-0901-0164
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1

IV. Die Information

A. Dimensions:	63 X 43 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Al/0.5%Cu
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:	Ken Wendel (Director, Reliability Engineering) 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 57 \times 2}$$ (Chi square value for MTTF upper limit)

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 18.8 \times 10^{-9}$

$\lambda = 18.8$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B12 Process results in a FIT Rate of 3.13 @ 25C and 54.16 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The RF39-6 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500 per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX6023EBT30+

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	57	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2 & 3)				
Temperature Cycle	-40ºC/125ºC 1000 Cycles (Note 3)	DC Parameters & functionality	77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data
Note 3: Ramp rate 11ºC/minute, dwell=15 minutes, One cycle/hour.