RELIABILITY REPORT

FOR

MAX5712AUT

PLASTIC ENCAPSULATED DEVICES

November 6, 2008

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX5712AUT 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 MAX5712 is a small footprint, low-power, 12-bit digital- to-analog converter (DAC) that operates from a single +2.7V to +5.5V supply. The MAX5712 on-chip precision output amplifier provides rail-to-rail output swing. Drawing only 85µA supply current at +3V, the MAX5712 is ideally suited for portable battery-operated equipment. The MAX5712 utilizes a 3-wire serial-interface that is compatible with SPI™/QSPI™/MICROWIRE™ and DSP-interface standards. All logic inputs are CMOS-logic compatible and buffered with Schmitt triggers to allow direct interfacing to optocouplers. The MAX5712 incorporates a power-on reset (POR) circuit that ensures the DAC begins in a zero-volt-state upon power-up. A power-down mode that reduces current consumption to 0.3µA may be initiated through a software command. The MAX5712 is available in a small 6-pin SOT23 package. For dual and quad 12-bit versions, see the MAX5722 and MAX5742 data sheets. For single, dual, and quad 10-bit versions, see the MAX5711, MAX5721 and MAX5741 data sheets. The MAX5712 is specified over the automotive temperature range of -40°C to +125°C.

II. Manufacturing Information

A. Description/Function:	12-Bit, Low-Power, Rail-to-Rail Voltage-Output Serial DAC in SOT23
B. Process:	B6
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Carsem Malaysia, UTL Thailand
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	6-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	85Sn/15Pb plate
D. Die Attach:	None Epoxy
E. Bondwire:	High Pb Bump (6 mil.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0401-0544
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	185.5°C/W
K. Single Layer Theta Jc:	75°C/W
L. Multi Layer Theta Ja:	134.4°C/W
M. Multi Layer Theta Jc:	38.7°C/W

IV. Die Information

A. Dimensions:	45 X 75 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:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 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:	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 pending. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad \text{(Chi square value for MTTF upper limit)}$$

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

$\lambda = 13.4 \times 10^{-9}$

λ = 13.4 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 B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 DA94 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of 250 mA.

Table 1

Reliability Evaluation Test Results

MAX5712AUT

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	80	0
Moisture Testing (Note 2)				
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