RELIABILITY REPORT

FOR

MAX5812LEUT+

PLASTIC ENCAPSULATED DEVICES

January 5, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX5812LEUT+ 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 MAX5812 is a single, 12-bit voltage-output, digital-to-analog converter (DAC) with an I²C-compatible 2-wire interface that operates at clock rates up to 400kHz. The device operates from a single 2.7V to 5.5V supply and draws only 100µA at VDD = 3.6V. A low-power power-down mode decreases current consumption to less than 1µA. The MAX5812 features three software-selectable power-down output impedances: 100k , 1k , and high impedance. Other features include an internal precision rail-to-rail output buffer and a power-on reset circuit that powers up the DAC in the 100k power-down mode. The MAX5812 features a double-buffered I²C-compatible serial interface that allows multiple devices to share a single bus. All logic inputs are CMOS-logic compatible and buffered with Schmitt triggers, allowing direct interfacing to optocoupled and transformer-isolated interfaces. The MAX5812 minimizes digital noise feedthrough by disconnecting the clock (SCL) signal from the rest of the device when an address mismatch is detected. The MAX5812 is specified over the extended temperature range of -40°C to +85°C and is available in a space-saving 6-pin SOT23 package. Refer to the MAX5811 for the 10-bit version.

II. Manufacturing Information

A. Description/Function:	12-Bit Low-Power, 2-Wire, Serial Voltage-Output DAC
B. Process:	C6Y
C. Number of Device Transistors:	7176
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand
F. Date of Initial Production:	January 25, 2002

III. Packaging Information

A. Package Type:	6-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-3901-0003
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:	75 X 45 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
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 shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (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 life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the C6Y Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 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 DB04 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX5812LEUT+

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)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	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