RELIABILITY REPORT

FOR

MAX5202AEUB+T

PLASTIC ENCAPSULATED DEVICES

February 28, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer

Conclusion

The MAX5202AEUB+T successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX5200-MAX5203 serial input, voltage-output, 16-bit digital-to-analog converters (DACs) provide monotonic 16-bit output over temperature without any adjustments. The MAX5200/MAX5201 operate from a +5V single power supply featuring a +2.5V internal reference and an internal gain of 2, while the MAX5202/MAX5203 operate from a +3V or +3.3V single power supply featuring a +1.5V internal reference and an internal gain of 2. The MAX5200-MAX5203 DAC output range is typically 0 to VDD. The MAX5200-MAX5203 feature a hardware reset input (active-low CLR) that, when pulled low, clears the output to zero code 0000 hex (MAX5201/MAX5203) or resets the output to midscale code 8000 hex (MAX5200/MAX5202). The 3-wire serial interface is SPI(tm)/QSPI(tm)/MICROWIRE(tm) compatible. All devices have a low-power shutdown mode that reduces the supply current consumption to 1µA. The MAX5200-MAX5203 are available in a space-saving 10-pin µMAX® package and are guaranteed over the extended temperature range (-40°C to +105°C). Refer to the MAX5204-MAX5207 data sheet for external reference versions.

II. Manufacturing Information

A. Description/Function:	Low-Cost, Voltage-Output, 16-Bit DACs with Internal Reference in µMAX
B. Process:	C6Y
C. Number of Device Transistors:	10547
D. Fabrication Location:	Japan
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	January 23, 2003

III. Packaging Information

A. Package Type:	10-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0152
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

IV. Die Information

A. Dimensions:	62 X 87 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:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering) Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 90 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 12.2 \times 10^{-9}$

$\lambda = 12.2$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the C6Y Process results in a FIT Rate of 0.04 @ 25C and 0.73 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot I9E1BQ001C D/C 0247)

The DA95-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX5202AEUB+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	45	0	I9E2BQ001D, D/C 0239
	Biased	& functionality	45	0	S9E1EA004A, D/C 0819
	Time = 192 hrs.				

Note 1: Life Test Data may represent plastic DIP qualification lots.