RELIABILITY REPORT

FOR

MAX5512EUA+

PLASTIC ENCAPSULATED DEVICES

October 10, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX5512EUA+ 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 MAX5512-MAX5515 are dual, 8-bit, ultra-low-power, voltage-output, digital-to-analog converters (DACs) offering Rail-to-Rail buffered voltage outputs. The DACs operate from a 1.8V to 5.5V supply and consume less than 5µA, making the devices suitable for low-power and low-voltage applications. A shutdown mode reduces overall current, including the reference input current, to just 0.18µA. The MAX5512-MAX5515 use a 3-wire serial interface that is compatible with SPI(tm), QSPI(tm), and MICROWIRE(tm). Upon power-up, the MAX5512-MAX5515 outputs are driven to zero scale, providing additional safety for applications that drive valves or for other transducers that need to be off during power-up. The zero-scale outputs enable glitch-free power-up. The MAX5512 accepts an external reference input and provides unity-gain outputs. The MAX5513 contains a precision internal reference and provides a buffered external reference output with unity-gain DAC outputs. The MAX5514 accepts an external reference input and provides force-sense outputs. The MAX5515 contains a precision internal reference and provides a buffered external reference output with force-sense DAC outputs. The MAX5514/MAX5515 are available in a 4mm x 4mm x 0.8mm, 12-pin, thin QFN package. The MAX5512/MAX5513 are available in an 8-pin µMAX® package. All devices are guaranteed over the extended -40°C to +85°C temperature range. For 10-bit compatible devices, refer to the MAX5522-MAX5525 data sheet. For 12-bit compatible devices, refer to the MAX5532-MAX5535 data sheet.

II. Manufacturing Information

A. Description/Function:	Dual, Ultra-Low-Power, 8-Bit, Voltage-Output DACs
B. Process:	C6Y
C. Number of Device Transistors:	10684
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	October 25, 2003

III. Packaging Information

A. Package Type:	8L uMAX
B. Lead Frame:	Copper
C. Lead Finish:	NiPd
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0495
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	170°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	170°C/W
M. Multi Layer Theta Jc:	80°C/W

IV. Die Information

A. Dimensions:	75X88 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:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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 0.17 @ 25C and 2.89 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot IEP1BQ001E, D/C 0338)

The DB20-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX5512EUA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	IEP0BQ001F, D/C 0338

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