RELIABILITY REPORT

FOR

MAX5533EUA+

PLASTIC ENCAPSULATED DEVICES

June 11, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX5533EUA+ 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 MAX5532-MAX5535 are dual, 12-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 MAX5532-MAX5535 use a 3-wire serial interface that is compatible with SPI(tm), QSPI(tm), and MICROWIRE(tm). Upon power-up, the MAX5532-MAX5535 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 MAX5532 accepts an external reference input and provides unity-gain outputs. The MAX5533 contains a precision internal reference and provides a buffered external reference output with unity-gain DAC outputs. The MAX5534 accepts an external reference input and provides force-sense outputs. The MAX5535 contains a precision internal reference and provides a buffered external reference output with force-sense DAC outputs. The MAX5534/MAX5535 are available in a 4mm x 4mm x 0.8mm, 12-pin, thin QFN package. The MAX5532/MAX5533 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 8-bit compatible devices, refer to the MAX5512-MAX5515 data sheet.

II. Manufacturing Information

A. Description/Function:	Dual, Ultra-Low-Power, 12-Bit, Voltage-Output DACs
B. Process:	C6Y C.
Number of Device Transistors:	10684
D. Fabrication Location:	Japan
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	October 25, 2003

III. Packaging Information

A. Package Type:	8-Pin µMAX 3x3mm
B. Lead Frame:	Copper Alloy
C. Lead Finish:	Matte Sn Plate
D. Die Attach:	Non Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	170°C/W
K. Single Layer Theta Jc:	8°C/W
L. Multi Layer Theta Ja:	170°C/W
M. Multi Layer Theta Jc:	8°C/W

IV. Die Information

A. Dimensions:	75 X 88 mils
B. Passivation:	SiO2/SiN3
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6um
F. Minimum Metal Spacing:	0.6um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO2
I. Die Separation Method:	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:

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

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

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ 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 C6Y Process results in a FIT Rate of 0.82 @ 25C and 14.21 @ 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 DB20-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V 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

MAX5533EUA+

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	48	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