

RELIABILITY REPORT  
FOR  
MAX5235AEUB+  
PLASTIC ENCAPSULATED DEVICES

March 12, 2012

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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## Conclusion

The MAX5235AEUB+ 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 MAX5234/MAX5235 precision, dual-output, 12-bit digital-to-analog converters (DACs) consume only 360 $\mu$ A from a single 5V (MAX5235) or 325 $\mu$ A from a single 3V (MAX5234) supply. These devices feature output buffers that swing rail-to-rail. The internal gain amplifiers maximize the dynamic range of the DAC output. The MAX5234/MAX5235 feature a 13.5MHz 3-wire serial interface compatible with SPI<sup>®</sup>, QSPI<sup>®</sup>, and MICROWIRE<sup>®</sup>. Each DAC input is organized as an input register followed by a DAC register. A 16-bit shift register loads data into the input registers. Input registers update the DAC registers independently or simultaneously. In addition, programmable control bits allow power-down with 1k or 200k internal loads. The MAX5234/MAX5235 are fully specified over the extended industrial temperature range (-40°C to +85°C) and are available in space-saving 10-pin  $\mu$ MAX packages.

## II. Manufacturing Information

A. Description/Function:	Single-Supply 3V/5V, Voltage-Output, Dual, Precision 12-Bit DACs
B. Process:	S6
C. Number of Device Transistors:	4184
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	January 26, 2002

## III. Packaging Information

A. Package Type:	3x3 mm 10L UMAX
B. Lead Frame:	Copper
C. Lead Finish:	NICKEL-PALLADIUM
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0401-0555 / C
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	144°C/W
K. Single Layer Theta Jc:	43.6°C/W
L. Multi Layer Theta Ja:	116°C/W
M. Multi Layer Theta Jc:	43.6°C/W

## IV. Die Information

A. Dimensions:	75 X 88 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (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 <sub>2</sub>
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 24.4 \times 10^{-9}$$

$$\lambda = 24.4 \text{ F.I.T. (60\% confidence level @ } 25^{\circ}\text{C)}$$

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 S6 Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot I6P0AQ001F D/C 0152)

The DA91 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

**MAX5235AEUB+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0	N/A

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