

RELIABILITY REPORT
FOR
MAX5207BEUB+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX5207BEUB+ 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 MAX5204-MAX5207 serial input, voltage-output 16-bit digital-to-analog converters (DACs) provide monotonic 16-bit output over temperature without any adjustments. The MAX5204/MAX5205 operate from a +5V single power supply and use an external reference ranging from +4V to VDD, while the MAX5206/MAX5207 operate from a +3V or +3.3V single power supply and use an external reference ranging from +2V to VDD. The MAX5204-MAX5207 DAC output range is typically from 0 to VDD. The MAX5204-MAX5207 feature a hardware reset input (active-low CLR) that when pulled low clears the output to zero code 0000 hex (MAX5205/MAX5207) or resets the output to midscale code 8000 hex (MAX5204/MAX5206). The 3-wire serial interface is compatible with SPI(tm)/QSPI(tm)/MICROWIRE(tm). All devices have a low-power shutdown mode that reduces the supply current consumption to 1µA. The MAX5204-MAX5207 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 MAX5200-MAX5203 data sheet for internal reference versions.

II. Manufacturing Information

A. Description/Function:	Low-Cost, Voltage-Output, 16-Bit DACs in μ MAX
B. Process:	C6Y
C. Number of Device Transistors:	10547
D. Fabrication Location:	Japan
E. Assembly Location:	05-9000-0153
F. Date of Initial Production:	October 26, 2002

III. Packaging Information

A. Package Type:	10-pin μ MAX
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:	#05-9000-0153
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:	62X87 mils
B. Passivation:	$\text{Si}_3\text{N}_4/\text{SiO}_2$ (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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

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

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

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 E9E3FA004A, 0930)

The DA95-3 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 and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX5207BEUB+

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	45	0	S9E1EA004A, D/C 0819

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