

RELIABILITY REPORT
FOR
MAX535AxxA+, MAX535BxxA+

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134



Sheena Karlyn Basinang
Engineer, Reliability



Ryan Wall
Manager, Reliability

Conclusion

The MAX535 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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX535/MAX5351 combine a low-power, voltage output, 13-bit digital-to-analog converter (DAC) and a precision output amplifier in an 8-pin μ MAX or DIP package. The MAX535 operates from a single +5V supply and the MAX5351 operates from a single +3.3V supply. Both devices draw only 280 μ A of supply current.

The output amplifier's inverting input is available to the user, allowing specific gain configurations, remote sensing, and high output current capability. This makes the MAX535/MAX5351 ideal for a wide range of applications, including industrial process control. Other features include a software shutdown and power-on reset.

The serial interface is compatible with either SPI™/ QSPI™ or Microwire™. The DAC has a double-buffered input, organized as an input register followed by a DAC register. A 16-bit serial word loads data into the input register. The DAC register can be updated independently or simultaneously with the input register. All logic inputs are TTL/CMOS-logic compatible and buffered with Schmitt triggers to allow direct interfacing to optocouplers.

II. Manufacturing Information

A. Description/Function:	Low-Power, 13-Bit Voltage-Output DACs with Serial Interface
B. Process:	SG12EIF
C. Device Count:	N/A
D. Fabrication Location:	USA
E. Assembly Location:	Thailand, Philippines
F. Date of Initial Production:	1996

III. Packaging Information

A. Package Type:	uMAX	PDIP
B. Lead Frame:	Cu194	Cu194
C. Lead Finish:	Matte Tin	Matte Tin
D. Die Attach:	AB8290/84-1LMISR4	AB8390A
E. Bondwire:	1 mil Au	1 mil Au
F. Mold Material:	G700K/G600	G600
G. Assembly Diagram:	05-0401-0475	05-0401-0473
H. Flammability Rating:	UL-94 (V-0 Rating)	UL-94 (V-0 Rating)
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	221 °C/W	110 °C/W
K. Single Layer Theta Jc:	42 °C/W	40 °C/W
L. Multi Layer Theta Ja:	206.30 °C/W	N/A
M. Multi Layer Theta Jc:	42 °C/W	N/A

IV. Die Information

A. Dimensions:	58X84 mils
B. Passivation:	N/A

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 2454 \times 80 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 24.3 \times 10^{-9}$$

$$\lambda = 24.3 \text{ FITs (60\% confidence level @25°C)}$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html>.

B. ESD and Latch-Up Testing

The MAX535 has been found to have all pins able to withstand an HBM transient pulse of ± 2000 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ± 100 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results
MAX535BCPA

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 192 hrs.	DC parameters & functionality	80	0	

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