

RELIABILITY REPORT
FOR
MAX6193AESA+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX6193AESA+ 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 MAX6190-MAX6195/MAX6198 precision, micro-power, low-dropout voltage references offer high initial accuracy and very low temperature coefficient through a proprietary curvature-correction circuit and laser-trimmed precision thin-film resistors. These series-mode bandgap references draw a maximum of only 35 μ A quiescent supply current, making them ideal for battery-powered instruments. They offer a supply current that is virtually immune to input voltage variations. Load-regulation specifications are guaranteed for source and sink currents up to 500 μ A. These devices are internally compensated, making them ideal for applications that require fast settling, and are stable with capacitive loads up to 2.2nF.

II. Manufacturing Information

A. Description/Function:	Precision, Micropower, Low-Dropout Voltage References
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon, California or Texas
E. Assembly Location:	Thailand
F. Date of Initial Production:	April 23, 1999

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	84-1Imisr4
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0901-0152
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:	40 °C/W
L. Multi Layer Theta Ja:	136 °C/W
M. Multi Layer Theta Jc:	38 °C/W

IV. Die Information

A. Dimensions:	44X31 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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: 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 228 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 0.93 \times 10^{-9}$$

$$\lambda = 0.93 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B12 Process results in a FIT Rate of 0.05 @ 25C and 0.92 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SQ9LCQ002B, D/C 0333)

The RF23-11 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

MAX6193AESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	75	0	IQ9ACA090J, D/C 0141
	Biased	& functionality	76	0	IQ9ACA090K, D/C 0141
	Time = 1000 hrs.		77	0	IQ9ACA090I, D/C 0141

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