RELIABILITY REPORT

FOR

MAX6143AASA10+

PLASTIC ENCAPSULATED DEVICES

August 22, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX6143AASA10+ 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 MAX6143 is a low-noise, high-precision voltage reference. The device features a proprietary temperature-coefficient curvature-correction circuit and laser-trimmed thin-film resistors that result in a very low 3ppm/°C temperature coefficient and excellent ±0.06% initial accuracy. The MAX6143 provides a TEMP output where the output voltage is proportional to die temperature, making the device suitable for a wide variety of temperature-sensing applications. The device also provides a TRIM input, allowing fine trimming of the output voltage with a resistive-divider network. Low temperature drift and low noise make the MAX6143 ideal for use with high-resolution A/D or D/A converters. The MAX6143 provides accurate preset +2.5V, +3.3V, +4.096V, +5.0V, and +10V reference voltages and accepts input voltages up to +40V. The device draws 340µA of supply current and sources 30mA or sinks 2mA of load current. The MAX6143 uses bandgap technology for low-noise performance and excellent accuracy. The MAX6143 does not require an output bypass capacitor for stability, and is stable with capacitive loads up to 100µF. Eliminating the output bypass capacitor saves valuable board area in space-critical applications. The MAX6143 is available in an 8-pin SO package and operates over the automotive (-40°C to +125°C) temperature range.

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II. Manufacturing Information

A. Description/Function:	High-Precision Voltage Reference with Temperature Sensor
B. Process:	B3
C. Number of Device Transistors:	429
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, or Thailand
F. Date of Initial Production:	January 24, 2004

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
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:	#05-9000-0926
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:	132°C/W
M. Multi Layer Theta Jc:	38°C/W

IV. Die Information

A. Dimensions:	120X65 mils
B. Passivation:	Si_3N_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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.7 \times 10^{-9}$

λ = 13.7 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 B3 Process results in a FIT Rate of 0.25 @ 25C and 4.2 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NI54BQ001D, D/C 0349)

The RF36-4 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.

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Table 1
Reliability Evaluation Test Results

MAX6143AASA10+

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	80	0	NI53BA162M, D/C 1403

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

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