RELIABILITY REPORT

FOR

MAX6174BASA+T

PLASTIC ENCAPSULATED DEVICES

August 1, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX6174BASA+ 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 MAX6173-MAX6177 are low-noise, high-precision voltage references. The devices feature 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 MAX6173-MAX6177 provide a TEMP output where the output voltage is proportional to the die temperature, making the devices suitable for a wide variety of temperature-sensing applications. The devices also provide a TRIM input, allowing fine trimming of the output voltage with a resistive divider network. Low temperature drift and low noise make the devices ideal for use with high-resolution A/D or D/A converters. The MAX6173-MAX6177 provide accurate preset +2.5V, +3.3V, +4.096V, +5.0V, and +10V reference voltages and accept input voltages up to +40V. The devices draw 320µA (typ) of supply current and source 30mA or sink 2mA of load current. The MAX6173-MAX6177 use bandgap technology for low-noise performance and excellent accuracy. The MAX6173-MAX6177 do not require an output bypass capacitor for stability, and are stable with capacitive loads up to 100µF. Eliminating the output bypass capacitor saves valuable board area in space-critical applications. The MAX6173-MAX6177 are available in an 8-pin SO package and operate over the automotive (-40°C to +125°C) temperature range.

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II. Manufacturing Information

A. Description/Function:	High-Precision Voltage References with Temperature Sensor
B. Process:	S3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, or Thailand
F. Date of Initial Production:	July 22, 2004

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	84-1lmisr4
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0921
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:	65 X 120 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: 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 244 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 0.9 \times 10^{-9}$

λ = 0.9 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 S3 Process results in a FIT Rate of 0.03 @ 25C and 0.5 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NI52BA007B, D/C 0419)

The RF36-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V 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

MAX6174BASA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	90	0	NI53BA108E, D/C 1032
	Biased	& functionality	79	0	NI53BA146D, D/C 1230
	Time = 1000 hrs.		75	0	NI53BA0109F, D/C 1033

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

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