RELIABILITY REPORT

FOR

MAX6341

PLASTIC ENCAPSULATED DEVICES

July 3, 2003

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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Conclusion

The MAX6341 successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX6325/MAX6341/MAX6350 are low-noise, precision voltage references with extremely low, 0.5ppm/°C typical temperature coefficients and excellent, ±0.02% initial accuracy. These devices feature buried-zener technology for lowest noise performance. Load-regulation specifications are guaranteed for source and sink currents up to 15mA. Excellent line and load regulation and low output impedance at high frequencies make them ideal for high-resolution data-conversion systems up to 16 bits. The MAX6325 is set for a 2.5V output, the MAX6341 is set for a 4.096V output, and the MAX6350 is set for a 5V output. All three provide for the option of external trimming and noise reduction.

B. Absolute Maximum Ratings

Item	Rating
IN to Gnd	-0.3V to +42V
OUT, TRIM to Gnd	-0.3V to +12V
NR to GND	-0.3V to +6V
OUT Short Circuit to GND Duration (VIN <= 12V)	Continuous
OUT Short Circuit to GND Duration (VIN <= 42V)	5s
OUT Short Circuit to IN Duration (VIN <= 12V)	Continuous
Operating Temp Range	-40^0C to $+125^0$C
Storage Temp Range	-65^0C to $+150^0$C
Lead Temp Range (soldering, 10s)	$+300^0$C
Continuous Power Dissipation (TA = +70°C)	
8-Lead NSO	471mW
Derates above +70°C	
8-Lead NSO	5.9mW/°C

II. Manufacturing Information

A. Description/Function:	1ppm/°C, Low-Noise, +2.5V/+4.096V/+5V Voltage References
B. Process:	S3
C. Number of Device Transistors:	435
D. Fabrication Location:	USA
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	April 17, 1997

III. Packaging Information

A. Package Type:	**8-Lead NSO**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate
D. Die Attach:	Non-Conductuve Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	Buildsheet # 05-0901-0148
H. Flammability Rating:	Class UL94-V0

I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112: Level 1

IV. Die Information

A. Dimensions:	85 x 145 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/Si (Aluminum/ Silicon)
D. Backside Metallization:	None
E. Minimum Metal Width:	3 microns (as drawn)
F. Minimum Metal Spacing:	3 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:

Jim Pedicord	(Manager, Reliability Operations)
Bryan Preeshl	(Executive Director of QA)
Kenneth Huening	(Vice President)

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 135°C biased (static) life test are shown in **Table 1**. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 720 \times 2}$$

(Chi square value for MTTF upper limit)

Thermal acceleration factor assuming a 0.8eV activation energy

$\lambda = 1.51 \times 10^{-9}$ $\lambda = 1.51$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure the reliability of its processes. The reliability required for lots which receive a burn-in qualification is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on lots exceeding this level. The following Burn-In Schematic (Spec. #06-5394) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (**RR-1M**).

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

C. E.S.D. and Latch-Up Testing

The RF20 die type has been found to have all pins able to withstand a transient pulse of ±2000V, per Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA and/or ±20V.

Table 1
Reliability Evaluation Test Results

MAX6341

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased functionality Time = 192 hrs.	DC Parameters & 	720	0
Moisture Testing (Note 2)				
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	77	0
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters	77	0

Note 1: Life Test Data may represent plastic D.I.P. qualification lots for the uMax package.
Note 2: Generic package/process data