RELIABILITY REPORT

FOR

MAX952ESA+

PLASTIC ENCAPSULATED DEVICES

February 3, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX952ESA+ 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 MAX951-MAX954 feature combinations of a micropower operational amplifier, comparator, and reference in an 8-pin package. In the MAX951 and MAX952, the comparator's inverting input is connected to an internal 1.2V ±2% bandgap reference. The MAX953 and MAX954 are offered without an internal reference. The MAX951/MAX952 operate from a single 2.7V to 7V supply with a typical supply current of 7µA, while the MAX953/MAX954 operate from 2.4V to 7V with a 5µA typical supply current. Both the op amp and comparator feature a common-mode input voltage range that extends from the negative supply rail to within 1.6V of the positive rail, as well as output stages that swing rail-to-rail. The op amps in the MAX951/MAX953 are internally compensated to be unity-gain stable, while the op amps in the MAX952/MAX954 feature 125kHz typical bandwidth, 66V/ms slew rate, and stability for gains of 10V/V or greater. These op amps have a unique output stage that enables them to operate with an ultra-low supply current while maintaining linearity under loaded conditions. In addition, they have been designed to exhibit good DC characteristics over their entire operating temperature range, minimizing input-referred errors. The comparator output stage of these devices continuously sources as much as 40mA. The comparators eliminate power-supply glitches that commonly occur when changing logic states, minimizing parasitic feedback and making the devices easier to use. In addition, they contain ±3mV internal hysteresis to ensure clean output switching, even with slow-moving input signals.

II. Manufacturing Information

A. Description/Function:	Ultra-Low-Power, Single-Supply Op Amp + Comparator + Reference
B. Process:	S3
C. Number of Device Transistors:	
D. F abrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	Pre 1997

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 (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-0601-0415
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:	58 X 84 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. B ackside Metallization:	None
E. Minimum Metal Width:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Is olation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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. S ampling 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 240 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 4.6 \times 10^{-9}$

λ = 4.6 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the S3 Process results in a FIT Rate of 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NDVBEB006A D/C 9805)

The OA64-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V 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

MAX952ESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	NDVAEA004F, D/C 9808
	Biased	& functionality	80	0	XDVADQ001A, D/C 9631
	Time = 192 hrs.		80	0	XDVBDQ001A, D/C 9631

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