RELIABILITY REPORT

FOR

LMX339ASD+

PLASTIC ENCAPSULATED DEVICES

November 14, 2013

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer

Conclusion

The LMX339ASD+ 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 LMX331/LMX393/LMX339 single/dual/quad comparators are drop-in, pin-for-pin-compatible replacements for the LMV331/LMV393/LMV339. The LMX331H/LMX393H/LMX339H offer the performance of the LMX331/LMX393/LMX339 with the added benefit of internal hysteresis to provide noise immunity, preventing output oscillations even with slow-moving input signals. Advantages of the LMX331/LMX393/LMX339 series include low supply voltage, small package, and low cost. The LMX331 is available in both 5-pin SC70 and SOT23 packages, LMX393 is available in both 8-pin µMAX® and smaller SOT23 packages, and the LMX339 is available in 14-pin TSSOP and SO packages. They are manufactured using advanced submicron CMOS technology. Designed with the most modern techniques, the LMX331/LMX393/LMX339 achieve superior performance over BiCMOS or bipolar versions on the market. The LMX331/LMX393/LMX339 offer performance advantages such as wider supply voltage range, wider operating temperature range, better CMRR and PSRR, improved response time characteristics, reduced offset, reduced output saturation voltage, reduced input bias current, and improved RF immunity.

II. Manufacturing Information

A. Description/Function:	General-Purpose, Low-Voltage, Single/Dual/Quad, TinyPack(tm) Comparators
B. Process:	TS50
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	Malaysia, Thailand, or Philippines
F. Date of Initial Production:	April 28, 2001

III. Packaging Information

A. Package Type:	14-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:	#05-1501-0257
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	84°C/W
M. Multi Layer Theta Jc:	34°C/W

IV. Die Information

A. Dimensions:	36X42 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:	0.50um
F. Minimum Metal Spacing:	0.50um
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 45 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 24.4 \times 10^{-9}$

$\lambda = 24.4$ 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 TS50 Process results in a FIT Rate of 0.3 @ 25C and 5.07 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot K220AQ001D, D/C 0106)

The CM85 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.

Table 1
Reliability Evaluation Test Results

LMX339ASD+

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	45	0	K220AQ001E, D/C 0106

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