RELIABILITY REPORT

FOR

MAX4311EEE+

PLASTIC ENCAPSULATED DEVICES

September 21, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX4311EEE+ 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 MAX4310-MAX4315 single-supply mux-amps combine high-speed operation, low-glitch switching, and excellent video specifications. The six products in this family are differentiated by the number of multiplexer inputs and the gain configuration. The MAX4310/MAX4311/MAX4312 integrate 2-/4-/8-channel multiplexers, respectively, with an adjustable gain amplifier optimized for unity-gain stability. The MAX4313/MAX4314/MAX4315 integrate 2-/4-/8-channel multiplexers, respectively, with a +2V/V fixed-gain amplifier. All devices have 40ns channel switching time and low 10mVp-p switching transients, making them ideal for video-switching applications. They operate from a single +4V to +10.5V supply, or from dual supplies of ±2V to ±5.25V, and they feature Rail-to-Rail outputs and an input common-mode voltage range that extends to the negative supply rail. The MAX4310/MAX4311/MAX4312 have a -3dB bandwidth of 280MHz/345MHz/265MHz and up to a 460V/µs slew rate. The MAX4313/MAX4314/MAX4315, with 150MHz/127MHz/97MHz -3dB bandwidths up to a 540V/µs slew rate, and a fixed gain of +2V/V, are ideally suited for driving back-terminated cables. Quiescent supply current is as low as 6.1mA, while low-power shutdown mode reduces supply current to as low as 560µA and places the outputs in a high-impedance state. The MAX4310-MAX4315's internal amplifiers maintain an open-loop output impedance of only 8 over the full output voltage range, minimizing the gain error and bandwidth changes under loads typical of most rail-to-rail amplifiers. With differential gain and phase errors of 0.06% and 0.08°, respectively, these devices are ideal for broadcast video applications.

II. Manufacturing Information

A. Description/Function:	High-Speed, Low-Power, Single-Supply Multichannel, Video Multiplexer-Amplifiers
B. Process:	CB2
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	April 23, 1999

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-3001-0074
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:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	58X66 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation 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. Sampling Plan:	Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 150C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 9706 \times 160 \times 2}$$ (Chi square value for MTTF upper limit)

(where 9706 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 3.07 \times 10^{-9}$

$\lambda = 3.07$ 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 CB2 Process results in a FIT Rate of 0.06 @ 25C and 0.95 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NWWADQ001D, D/C 0120)

The OP52 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V 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

MAX4311EEE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 150°C	DC Parameters	80	0	NWWADQ001D, D/C 0120
	Biased	& functionality	80	0	BWWACQ003B, D/C 9911
	Time = 192 hrs.				

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