

RELIABILITY REPORT
FOR
MAX4968AECM+T
PLASTIC ENCAPSULATED DEVICES

June 12, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX4968AECM+T 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 MAX4968/MAX4968A are 16-channel, high-linearity, high-voltage, bidirectional SPST analog switches with 18Ω (typ) on-resistance. The devices are ideal for use in applications requiring high-voltage switching controlled by a low-voltage control signal, such as ultrasound imaging and printers. The MAX4968A provides integrated bleed resistors on each switch terminal to discharge capacitive loads. Using HVCMOS technology, these switches combine high-voltage bilateral MOS switches and low-power CMOS logic to provide efficient control of high-voltage analog signals. The MAX4968 is pin-to-pin compatible with the MAX14802 and Supertex HV2601. The MAX4968A is pin-to-pin compatible with the MAX14803 and Supertex HV2701. The only difference is the VPP positive supply voltage level. The MAX4968/MAX4968A require a low voltage (VPP) of +10V (typ), whereas the MAX14802/MAX14803 and HV2601/HV2701 require a high supply voltage of +100V. In a typical ultrasound application, the MAX4968/ MAX4968A do not require a dedicated HV supply, which implies a significant simplification of system requirement. The negative voltage supply can be shared with the transmitter and the positive voltage supply is typically +10V. The devices are available in the 48-pin TQFP package and are specified over the -40C to +85C extended temperature range.

II. Manufacturing Information

A. Description/Function:	16-Channel, Linear, High-Voltage Analog Switches
B. Process:	DM200
C. Number of Device Transistors:	2348
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia and Taiwan
F. Date of Initial Production:	June 29, 2012

III. Packaging Information

A. Package Type:	48-pin LQFP
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:	#05-9000-4061
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	44°C/W
M. Multi Layer Theta Jc:	10°C/W

IV. Die Information

A. Dimensions:	214.17X198.43 mils
B. Passivation:	Si ₃ N 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:	0.8 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:	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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 312 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 3.5 \times 10^{-9}$$

$$\lambda = 3.5 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 DM200 Process results in a FIT Rate of 0.33 @ 25C and 5.67 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot JZMZG2019A, D/C 1220)

The AJ70-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 250mA.

Table 1
Reliability Evaluation Test Results

MAX4968AECM+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C	DC Parameters	78	0	JZMZAQ001B, D/C 0948
	Biased	& functionality	80	0	JZMZCQ002C, D/C 1040
	Time = 192 hrs.		77	0	JZMZG2019A, D/C 1220
				77	0

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