RELIABILITY REPORT

FOR

MAX4782ExE

PLASTIC ENCAPSULATED DEVICES

April 3, 2004

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

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Conclusion

The MAX4782 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.

Table of Contents

I. Device Description

A. General

The MAX4782 is a high-speed, low-voltage, low on-resistance, CMOS analog multiplexers/ switches configured as dual 4-channel multiplexers.

This device operates with a +1.6V to +3.6V single supply. When powered from a +3V supply, MAX4782 features a 1Ω max on-resistance (R_{ON}), with 0.4Ω (max) R_{ON} matching between channels, and 0.2Ω (max) R_{ON} flatness. This device handles Rail-to-Rail® analog signals and offer fast switching times of less than 25ns while consuming less than 3µW of quiescent power. It is available in space-saving 16-pin thin QFN (3mm x 3mm) and TSSOP packages.

B. Absolute Maximum Ratings

Item	Rating
Voltages Referenced to GND	
VCC, A, B, C, and ENABLE	-0.3V to +4V
Voltage at Any Other Terminal (Note 1)	-0.3V to (VCC + 0.3V)
Continuous Current into A, B, C, ENABLE	±10mA
Continuous Current into X, Y, Z, X_, Y_, Z_	±150mA
Peak Current into X, Y, Z, X_, Y_, Z_	
(pulsed at 1ms, 10% duty cycle)	±300mA
Operating Temperature Range	-40°C to +85°C
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C
Continuous Power Dissipation (TA = +70°C)	
16-Pin Thin QFN	1349mW
16-Pin TSSOP	457mW
Derates above +70°C	
16-Pin Thin QFN	16.9mW/°C
16-Pin TSSOP	5.7mW/°C

Note 1: Signals on X, Y, Z, X_, Y_, and Z_ exceeding VCC or GND are clamped by internal diodes. Limit forward-diode current to maximum current rating.

II. Manufacturing Information

A. Description/Function:	High-Speed, Low-Voltage, 1 Ohm CMOS Analog Switches/Multiplexers
B. Process:	TC35
C. Number of Device Transistors:	121
D. Fabrication Location:	Taiwan
E. Assembly Location:	Thailand or Philippines
F. Date of Initial Production:	July, 2002

III. Packaging Information

A. Package Type:	**16-Pin Thin QFN**	**16-Pin TSSOP**
B. Lead Frame:	Copper	Copper
C. Lead Finish:	Solder Plate	Solder Plate
D. Die Attach:	Silver-Filled Epoxy	Silver-Filled Epoxy
E. Bondwire:	Gold (1.0 mil dia.)	Gold (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-9000-1140	# 05-1201-0295
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-A:	Level 1	Level 1

IV. Die Information

A. Dimensions:	60 x 58 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal 1 = 0.5 / Metal 2 = 0.6 / Metal 3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal 1 = 0.45 / Metal 2 = 0.5 / Metal 3 = 0.6 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**)**
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4389 \times 42 \times 2}$$ (Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 25.85 \times 10^{-9}$

$\lambda = 25.85$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability monitor program. In addition to routine production Burn-In, Maxim pulls a sample from every fabrication process three times per week and subjects it to an extended Burn-In prior to shipment to ensure its reliability. The reliability control level for each lot to be shipped as standard product 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 any lot that exceeds this reliability control level. Attached Burn-In Schematic (Spec. # 06-5994) shows the static Burn-In circuit. Maxim also performs quarterly 1000 hour life test monitors. This data is published in the Product Reliability Report (**RR-1M**).

B. Moisture Resistance Tests

Maxim pulls pressure pot samples from every assembly process three times per week. Each lot sample must meet an LTPD = 20 or less before shipment as standard product. Additionally, the industry standard 85°C/85%RH testing is done per generic device/package family once a quarter.

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

The AH82-1 die type has been found to have all pins able to withstand a transient pulse of ±1500V Mil-Std-883 Method 3015 (reference attached ESD Test Circuit). Latch-Up testing has shown that this device withstands a current of ±250mA.

Table 1
Reliability Evaluation Test Results

MAX4782ExE

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	PACKAGE	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality		42	0
Moisture Testing (Note 2)					
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	TSSOP QFN	77 77	0 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 & functionality		77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

Attachment #1

TABLE II. Pin combination to be tested. 1/ 2/

	Terminal A (Each pin individually connected to terminal A with the other floating)	Terminal B (The common combination of all like-named pins connected to terminal B)
1.	All pins except V_{PS1} 3/	All V_{PS1} pins
2.	All input and output pins	All other input-output pins

1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground

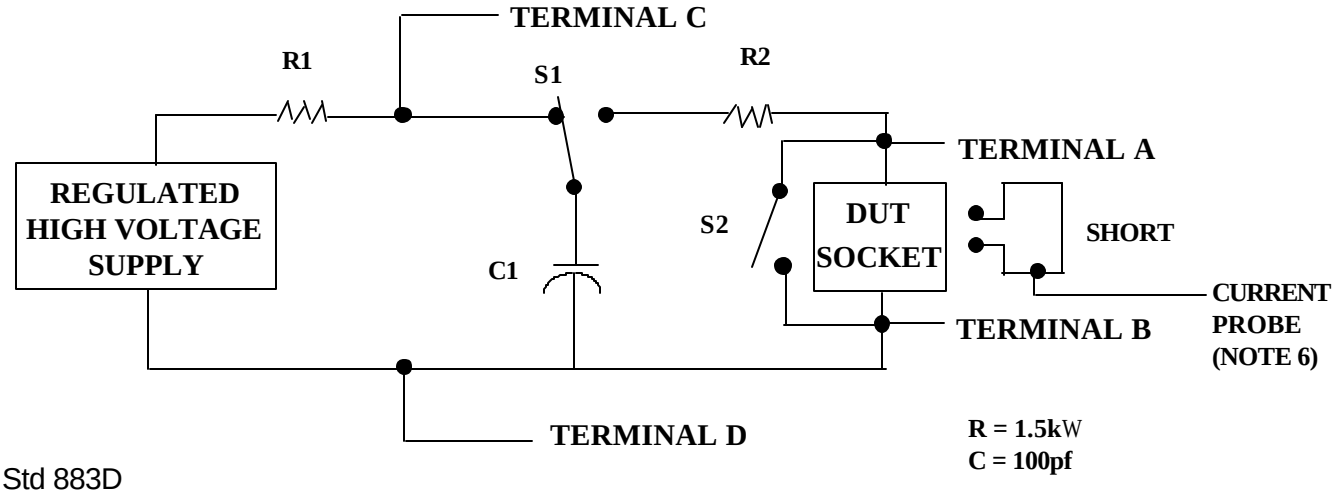
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

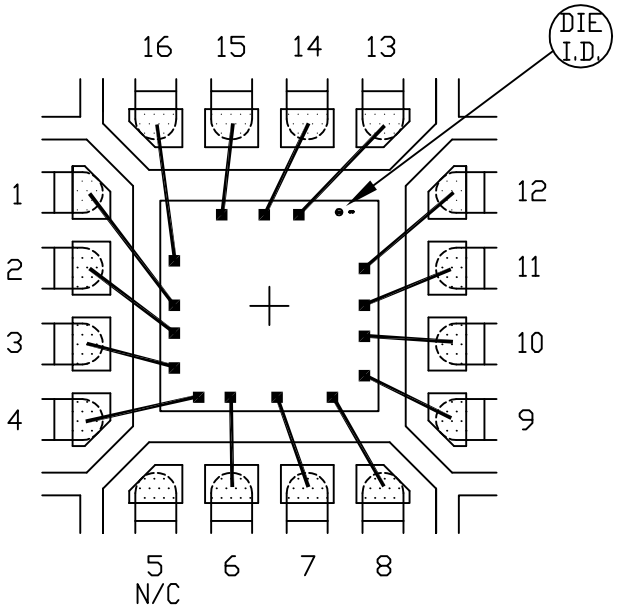
b. Each pin individually connected to terminal A with respect to each different set of a combination of all named power supply pins (e.g., V_{SS1}, or V_{SS2} or V_{SS3} or V_{CC1}, or V_{CC2}) connected to terminal B. All pins except the one being tested and the power supply pin or set of pins shall be open.

c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



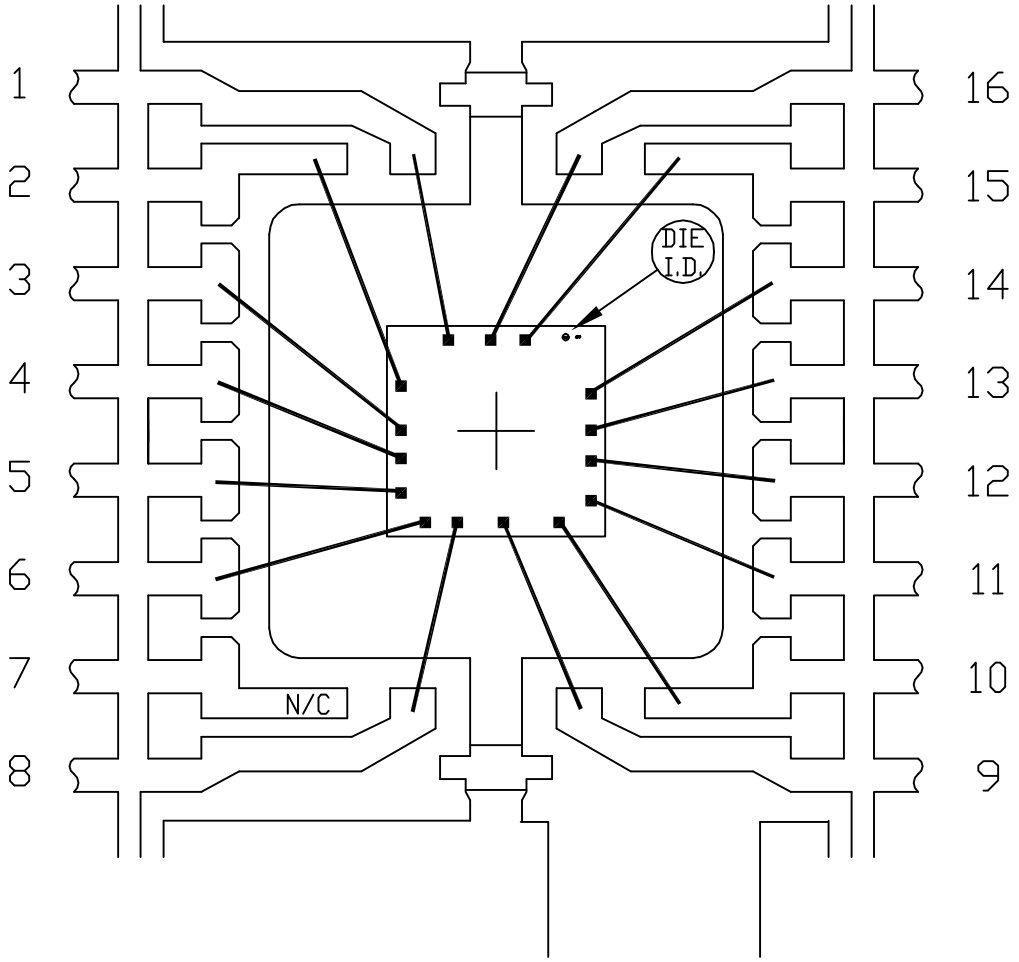
Mil Std 883D
Method 3015.7
Notice 8

3x3x0.80mm THIN QFN PKG. EXPOSED PAD PKG.



BONDABLE AREA

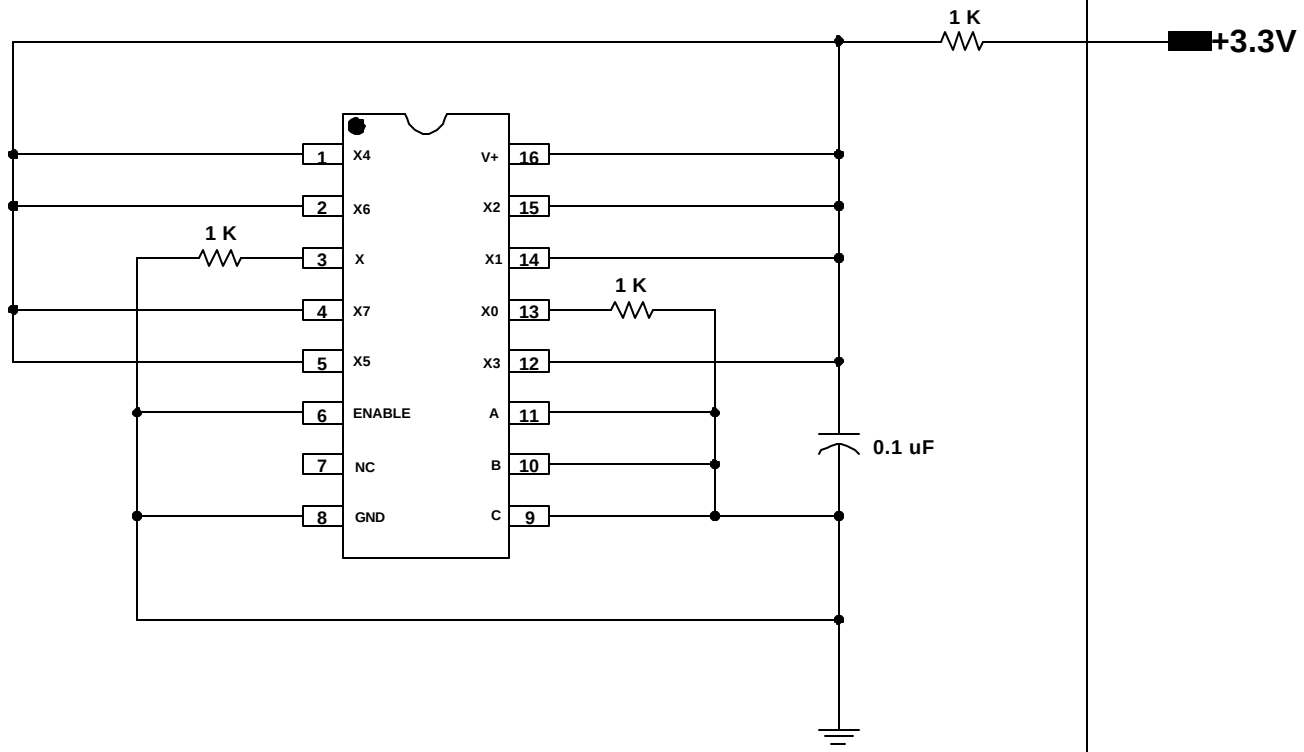
PKG. CODE: T1633-4		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 71x71	PKG.			BOND DIAGRAM #: 05-9000-1140	REV: B
	DESIGN				



PKG. CODE: U16-2		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY	
CAV./PAD SIZE: 118X118	PKG.			BOND DIAGRAM #: 05-1201-0295	REV: A
	DESIGN				

ONCE PER SOCKET

ONCE PER BOARD



DEVICES: MAX4781 (AH82Z)
PACKAGE: 16-TSSOP.
MAX. EXPECTED CURRENT = 5uA.