RELIABILITY REPORT

FOR

MAX3983UGK

PLASTIC ENCAPSULATED DEVICES

October 30, 2007

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

Jim Pedicord
Quality Assurance
Reliability Lab Manager

Reviewed by

Bryan J. Preeshl
Quality Assurance
Executive Director

Conclusion

The MAX3983 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 MAX3983 is a quad copper-cable signal conditioner that operates from 2.5Gbps to 3.2Gbps. It provides compensation for 4x copper InfiniBand and 10Gbase-CX4 Ethernet links, allowing spans of 20m with 24AWG and 15m with 28AWG. The cable driver section provides four selectable pre-emphasis levels. The input to the cable driver compensates for up to 0.5m of FR4 circuit board material. The cable receiver section provides additional fixed input equalization while offering selectable preemphasis to drive FR4 circuit boards up to 0.5m.

The MAX3983 also features signal detection on all eight inputs and internal loopback that allows for diagnostic testing. It is packaged in a 10mm x 10mm 68-pin QFN and operates from 0°C to +85°C.

B. Absolute Maximum Ratings

Item	Rating
Supply Voltage, VCC	-0.5V to +6.0V
Continuous CML Output Current at TX_OUT[1:4]±, RX_OUT[1:4]±	±25mA
Voltage at TX_IN[1:4]±, RX_IN[1:4]±, RX_SD[1:4], TX_SD[1:4], RX_ENABLE, TX_ENABLE, RX_PE, TX_PE[0:1], LOOPBACK, POR(with series resistor =4.7k?)	-0.5V to (VCC + 0.5V)
Continuous Power Dissipation (TA = +85°C) 68-Pin QFN (3x3)	2700mW
Derates above +85°C 68-Pin QFN (3x3)	41.7mW/°C

II. Manufacturing Information

A. Description/Function:	Quad Copper-Cable Signal Conditioner
B. Process:	GST4-F60
C. Number of Device Transistors:	7493
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Korea
F. Date of Initial Production:	July, 2003

III. Packaging Information

A. Package Type:	**68-Pin QFN (10x10)**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	# 05-9000-0567
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 3

IV. Die Information

A. Dimensions:	140 x 150 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1: 1.2; Metal2: 1.2; Metal3: 1.2; Metal4: 5.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1: 1.6; Metal2: 1.6; Metal3: 1.6; Metal4: 4.2 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 (Managing Director 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 150°C biased (static) life test are shown in **Table 1**. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 9823 \times 45 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 10.78 \times 10^{-8}$ $\lambda = 10.78$ F.I.T. (60% confidence level @ 25°C)

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure reliability of its processes. The reliability required for lots which receive a burn-in qualification 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 rejects from lots exceeding this level. The Burn-In Schematic (Spec.# 06-7135) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Reports (**RR-1M** & **RR-B3A**).

B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

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

The HD54 die type has been found to have all pins able to withstand a transient pulse of:

ESD HBM: +/-2500V, per Mil-Std-883 Method 3015.7
ESD CDM: +/-750V per JESD22, C101

Latch-Up testing has shown that this device withstands a current of ±250mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX3983UGK

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0
Moisture Testing (Note 2)				
Pressure Pot	Ta = 121°C P = 15 psi. RH= 100% Time = 168hrs.	DC Parameters & functionality	77	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 process/package 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

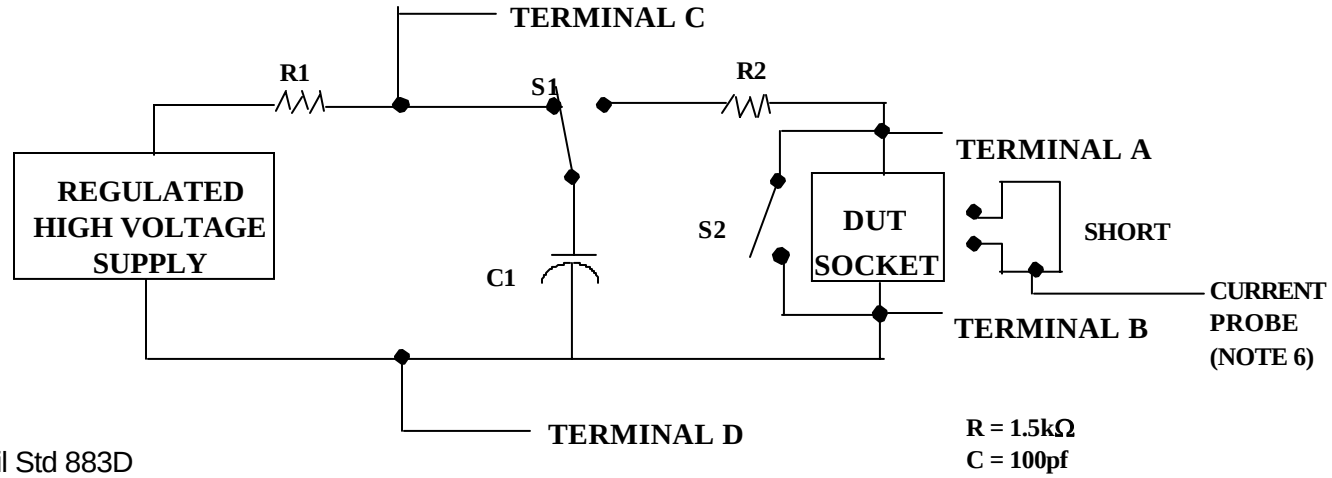
(e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

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.

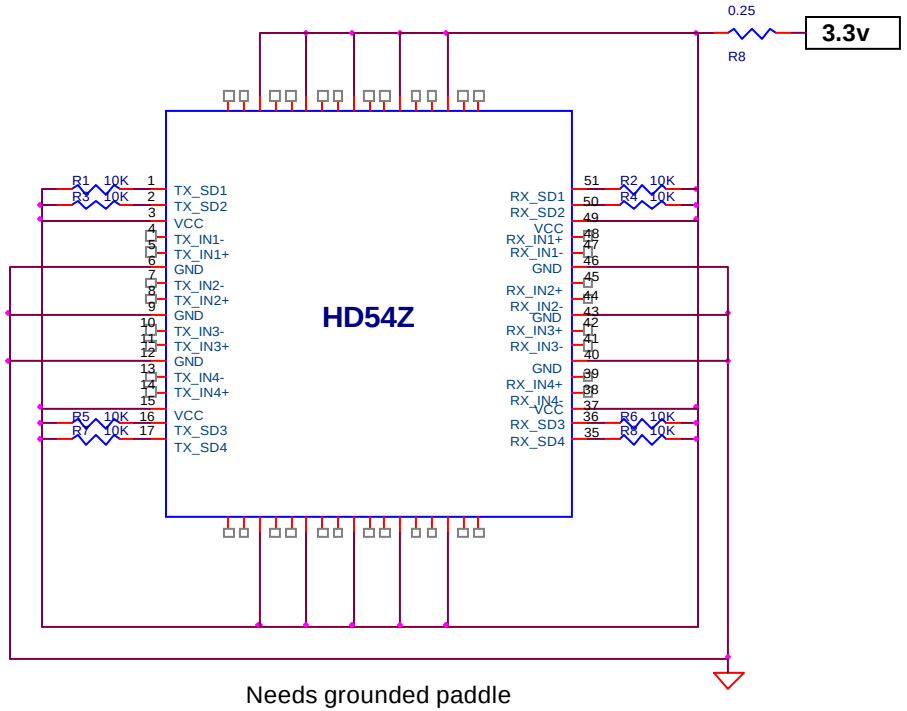
c. Each input and each output individually connected to terminal A with respect to a combination of all the other input and output pins connected to terminal B. All pins except the input or output pin being tested and the combination of all the other input and output pins shall be open.



HD54Z BURN IN SCHMATIC

R8 Once per socket

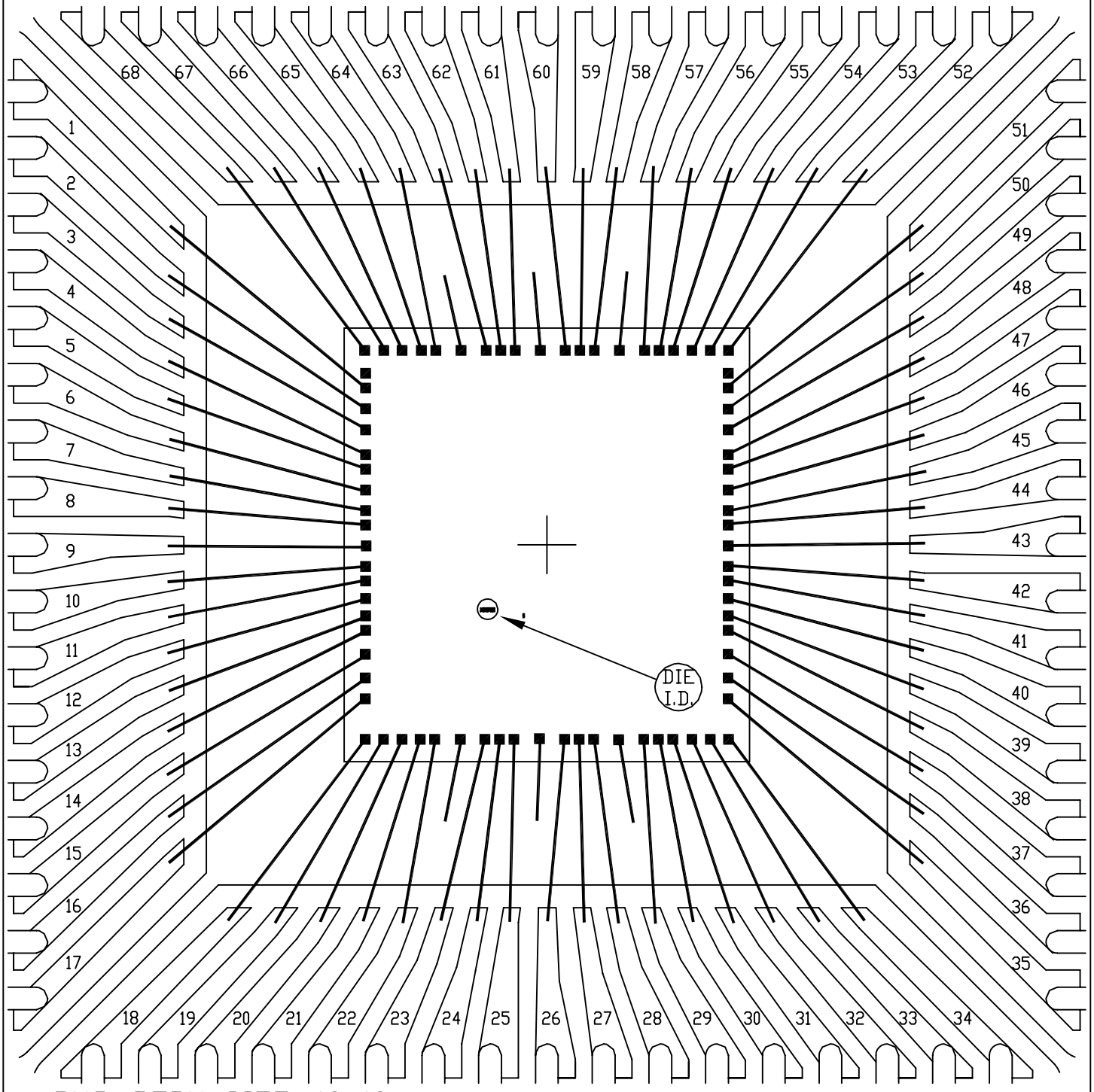
R8 , 5Watt



Needs grounded paddle

Package is G6800-4

Max current 550mA



PKG. BODY SIZE: 10x10 mm

EXPOSED PAD PKG.

PKG. CODE: G6800-4		SIGNATURES	DATE	MAXIM CONFIDENTIAL & PROPRIETARY
CAV./PAD SIZE: 236x236	PKG.			BOND DIAGRAM #: 05-9000-0567 REV: A
	DESIGN			