RELIABILITY REPORT

FOR

MAX3250xAI

PLASTIC ENCAPSULATED DEVICES

May 13, 2006

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Written by

Jim Pedicord
Quality Assurance
Manager, Reliability Operations

Conclusion

The MAX3250 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 MAX3250 is a 3.0V to 5.5V powered, ±50V isolated EIA/TIA-232 and V.28/V.24 communications interface with high data-rate capabilities. The MAX3250 is a dual die part that operates with up to ±50V difference between the RS-232 side and the logic side (ISOCOM to GND). This makes the device ideal for operation in noisy conditions with high common-mode voltages. This feature prevents damage to the device if RS-232 lines are inadvertently short-circuited to a +24V or ±48V power bus.

The MAX3250 is powered by a single 3V to 5.5V supply on the logic side. Power is transferred from the logic side to the isolated side by ±100V external capacitors.

The MAX3250 has two receivers (Rx) and two drivers (Tx) and is guaranteed to run at data rates of 250kbps while maintaining RS-232 output levels. The transceivers have a proprietary low-dropout transmitter output stage, delivering true RS-232 performance from a 3V to 5.5V supply with a dual charge pump. The device features a FAULT open-drain output to signal an excessive isolated-side voltage condition on any of the RS-232 inputs. This output can drive an alarm LED or can be monitored by the processor to prevent operation under these conditions. The receiver outputs are high impedance in shutdown, allowing multiple interfaces (IrDA, RS-232, RS-485) to be connected to the same UART.

The MAX3250 is available in a space-saving 28-pin SSOP package.

B. Absolute Maximum Ratings

Item	Rating
All Voltages Referenced to GND, Unless Otherwise Noted.	
VCC	-0.3V to +6V
ISOCOM	±80V
ISOVCC to ISOCOM	-0.3V to +6V
V+ to ISOCOM (Note 1)	-0.3V to +7V
V- to ISOCOM (Note 1)	+0.3V to -7V
V+ + |V-| (Note 1)	13V
Input Voltages	
T_IN, SHDN	-0.3V to +6V
R_IN to ISOCOM	±25V
Output Voltages	
T_OUT to ISOCOM	±13.2V
R_OUT	-0.3V to (VCC + 0.3V)
FAULT	-0.3V to +6V
C1-, C2-	-0.3V to (VCC + 0.3V)
C1+, C2+, C3+, C3-, C4+, C4- to ISOCOM	-0.3V to (ISOVCC + 0.3V)
T_OUT Current	30mA (continuous), 50mA (peak, 10µs)
R_IN Current	30mA (continuous), 50mA (peak, 10µs)
ISOCOM Current	30mA (continuous), 50mA (peak, 10µs)
Short-Circuit Duration T_OUT to ISOCOM	Continuous
Continuous Power Dissipation (TA = +70°C)	
28-Pin SSOP (derate 9.5mW/°C above +70°C)	762mW
Operating Temperature Ranges	
MAX3250CAI	0°C to +70°C
MAX3250EAI	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (soldering, 10s)	+300°C

II. Manufacturing Information

A. Description/Function:	±50V Isolated, 3.0V to 5.5V, 250kbps, 2 TX/2 RX, RS-232 Transceiver
B. Process:	S3 (Standard 3 micron silicon gate CMOS)
C. Number of Device Transistors:	2094
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Philippines or Malaysia
F. Date of Initial Production:	April, 2002

III. Packaging Information

A. Package Type:	**28-Lead SSOP**
B. Lead Frame:	Copper
C. Lead Finish:	Solder Plate or 100% Matte Tin
D. Die Attach:	Non Conductive Epoxy
E. Bondwire:	Gold (1.30 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	# 31-4774
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C:	Level 1

IV. Die Information

A. Dimensions:	144 x 107 mils
B. Passivation:	SiN/SiO (nitride/oxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	3 microns (as drawn)
F. Minimum Metal Spacing:	3 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 135°C biased (static) life test are shown in **Table 1**. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 274 \times 2}$$

(Chi square value for MTTF upper limit)

Temperature Acceleration factor assuming an activation energy of 0.8eV

$\lambda = 4.69 \times 10^{-9}$

λ = 4.69 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. # 06-5978) 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-1N**).

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 RT34 die type has been found to have all pins able to withstand a transient pulse of ± 2500V, per 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

MAX3250xAI

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 1000 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 D.I.P. 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

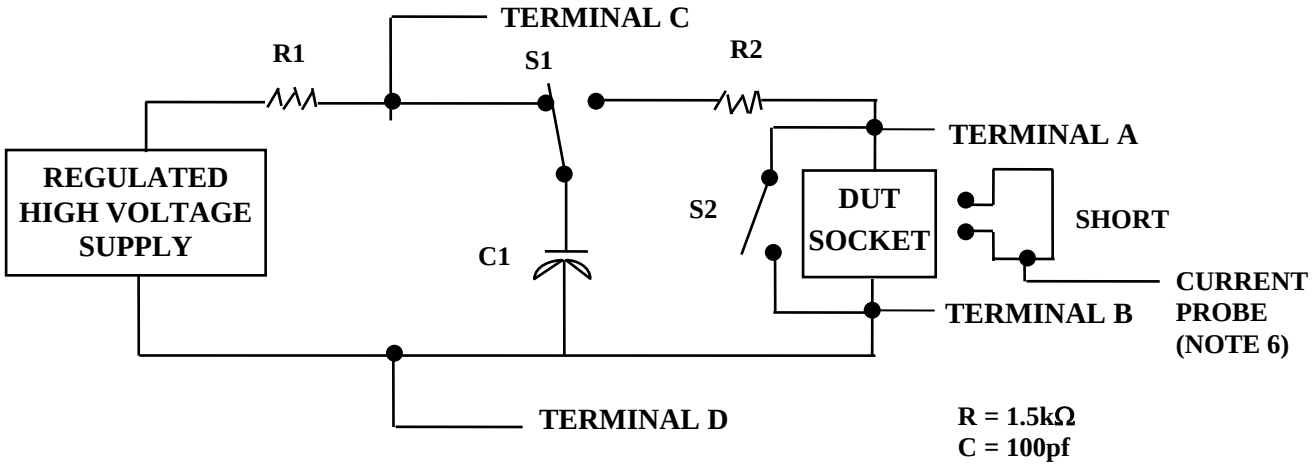
1/ Table II is restated in narrative form in 3.4 below.
2/ No connects are not to be tested.
3/ Repeat pin combination I for each named Power supply and for ground (e.g., where V_{PS1} is V_{DD}, V_{CC}, V_{SS}, V_{BB}, GND, $+V_S$, $-V_S$, V_{REF}, etc).

3.4 Pin combinations to be tested.

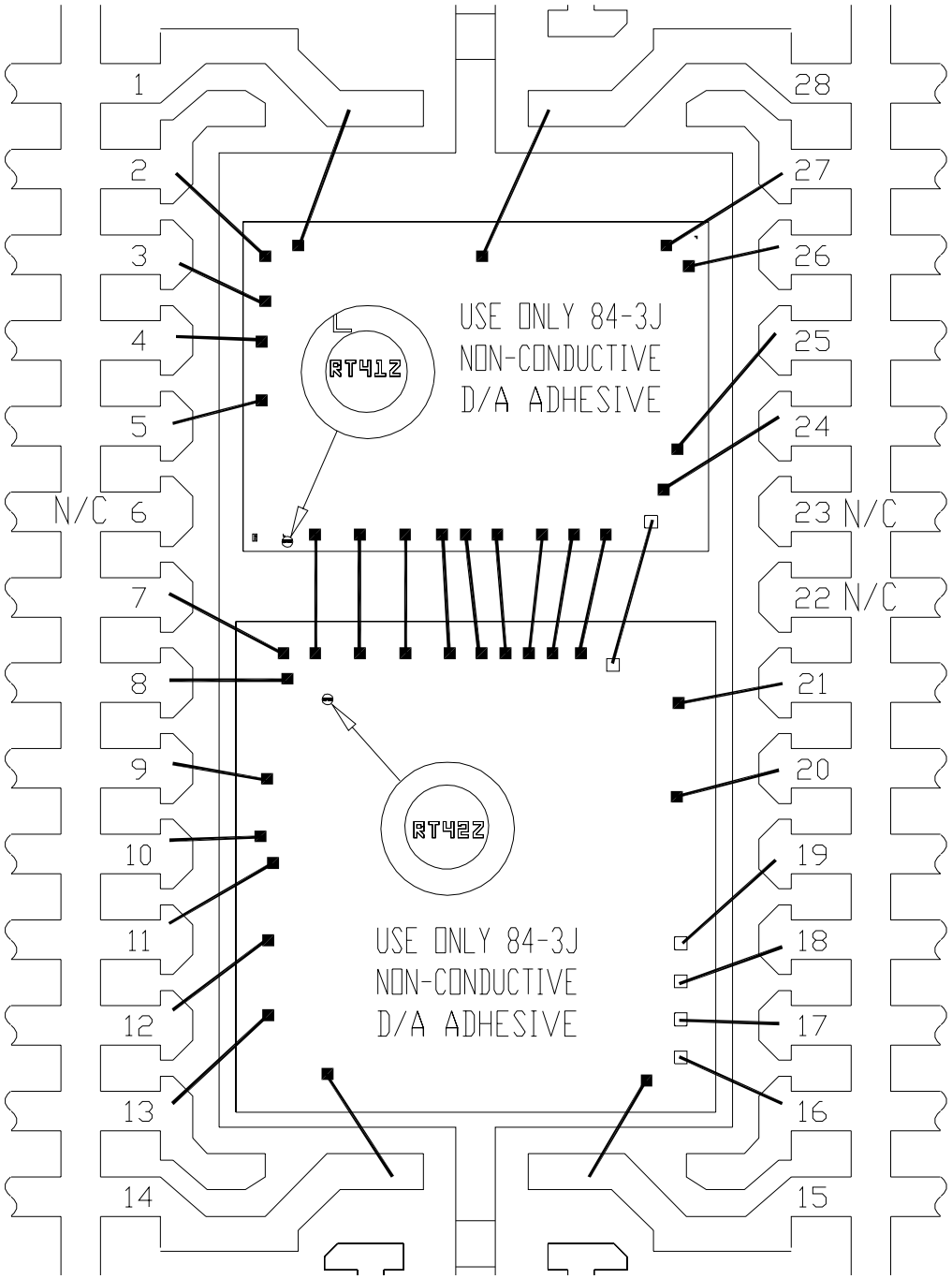
a. Each pin individually connected to terminal A with respect to the device ground pin(s) connected to terminal B. All pins except the one being tested and the ground pin(s) shall be open.

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



A28M-3

154X291

NOTE:
USE ONLY 84-3J
NON-CONDUCTIVE
D/A ADHESIVE

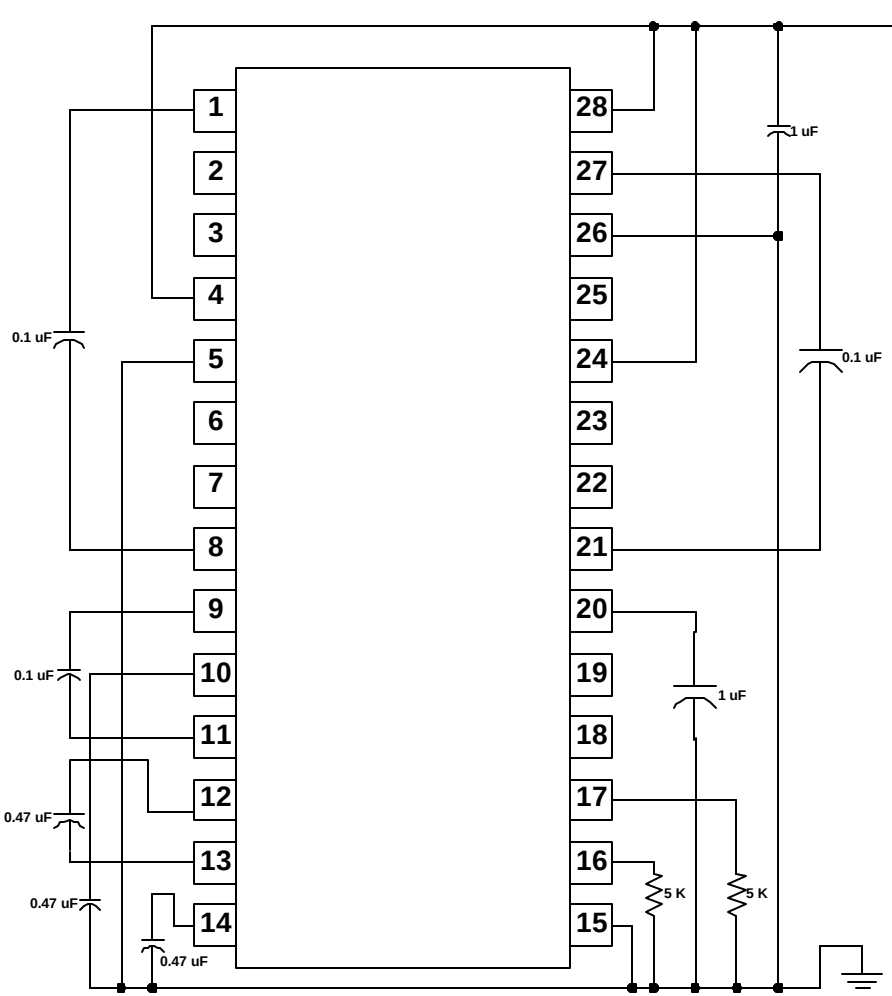
MAXIM
120 SAN GABRIEL DR SUNNYVALE CA 94086 FAX (408) 737 7194

RT34A ASSEMBLY DIAGRAM
TITLE

1/1

31-4774 B
DOCUMENT CONTROL NUMBER REV

ONCE PER SOCKET



ONCE PER BOARD

DEVICES: MAX 3250 (RT34A)
PACKAGE: 28-SSOP
MAX. EXPECTED CURRENT = 70mA

NOTES: