RELIABILITY REPORT

FOR

MAX7356ETG+
(MAX7356/MAX7357/MAX7358)

PLASTIC ENCAPSULATED DEVICES

March 7, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

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Conclusion

The MAX7356ETG+ 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

II. ....Manufacturing Information

III. ....Packaging Information

.....Attachments

V. ....Quality Assurance Information

VI. ....Reliability Evaluation

IV. ....Die Information

I. Device Description

A. General

The MAX7356/MAX7357/MAX7358 8-channel I²C switches/multiplexers expand the main I²C bus to any combination of 8 extended I²C buses. They enable a master on the main bus to isolate and communicate with devices or groups of devices that may otherwise have slave address conflicts. Any extended bus can be connected or disconnected by control packets from the main I²C bus writing to the main control register of these I²C switches. The MAX7357 and MAX7358 feature an enhanced mode that includes a built-in timer used to monitor all extended buses for lock-up conditions. If the clock or data line of any of these buses is low for more than 25ms (typ), a lock condition is detected. An optional interrupt can be generated through the bidirectional active-low RST/active-low INT. The master can read the bus lock-up register to find out which extended bus is locked up. The master can also enable the MAX7357 or the MAX7358 to send a "flush-out" sequence on the faulty channel. There is an optional preconnection check that can be enabled to toggle the extended bus clock and data line low then high to ensure the downstream bus is not locked high prior to connecting it to the host bus. The MAX7356/MAX7357/MAX7358 are transparent to signals sent and received at each channel, allowing multiple masters. Any device connected to an I²C bus can transmit and receive signals; however, only the master connected to the host side of the MAX7356/MAX7357/MAX7358 should address the device. The MAX7356/MAX7357/MAX7358 are available in 24-pin TSSOP and TQFN packages and are specified over the extended -40°C to +85°C temperature range.

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II. Manufacturing Information

A. Description/Function: 1-to-8 I²C Bus Switches/Multiplexers with Bus Lock-up Detection, Isolation, and Notification

B. Process: S4

C. Number of Device Transistors: 38391

D. Fabrication Location: Texas

E. Assembly Location: ASAT China, UTL Thailand, Unisem Malaysia

F. Date of Initial Production: July 24, 2008

III. Packaging Information

A. Package Type: 24-pin TQFN 4x4

B. Lead Frame: Copper

C. Lead Finish: 100% matte Tin

D. Die Attach: Conductive Epoxy

E. Bondwire: Au (1.0 mil dia.)

F. Mold Material: Epoxy with silica filler

G. Assembly Diagram: #

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: 48°C/W

K. Single Layer Theta Jc: 2.7°C/W

L. Multi Layer Theta Ja: 36°C/W

M. Multi Layer Theta Jc: 2.7°C/W

IV. Die Information

A. Dimensions: 83 X 83 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: Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)

F. Minimum Metal Spacing: Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)

G. Bondpad Dimensions: 5 mil. Sq.

H. Isolation Dielectric: SiO_2

I. Die Separation Method: Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: Ken Wendel (Director, Reliability Engineering)
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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.4 \times 10^{-9}$

λ = 22.4 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the S4 Process results in a FIT Rate of 4.6 @ 25C and 79.2 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The HC18 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250mA, 1.5X VCCMax Overvoltage per JESD78.

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Table 1
Reliability Evaluation Test Results

MAX7356ETG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2) 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

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