RELIABILITY REPORT

FOR

MAX1562HESA+

PLASTIC ENCAPSULATED DEVICES

December 24, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX1562HESA+ 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 MAX1562/MAX1562H/MAX1563 single current-limited switches provide up to 4A to power up to eight USB ports. They operate from a 4V to 5.5V input supply and consume only 40µA of quiescent current when operating and only 3µA in shutdown. The MAX1562/MAX1562H/MAX1563s' autoreset feature latches the switch off if the output is shorted, thereby saving system power. When the short is removed, the switch is reactivated. A fault-blanking feature enables the circuit to ignore momentary faults, such as those caused when hot swapping a capacitive load, preventing false alarms to the host system. Fault blanking also prevents fault signals from being issued when the device powers up the load. The MAX1562/MAX1562H/MAX1563 provide several safety features to protect the USB port. Built-in thermal-overload protection turns off the switch when the die temperature exceeds +160°C. Accurate internal current-limiting circuitry protects the input supply against both overload and short-circuit conditions. An open-drain fault signal (FAULT) notifies the microprocessor when a thermal-overload, current-limit, undervoltage lockout (UVLO), or short-circuit fault occurs. The MAX1562 has an active-low ON, and the MAX1562H has an active-high ON enable input. The MAX1563 has a selectable active-high or active-low, logic-controlled enable. The current limit is programmed from 1A to 4A using a resistor. The MAX1562/MAX1562H are available in 8-pin SO packages and are pin-compatible upgrades to the MIC2545A/MIC2549A. The MAX1563 provides the same features and higher current performance in a smaller 12-pin (4mm x 4mm) Thin QFN package. These devices operate over an extended temperature range (-40°C to +85°C). An evaluation kit is available to speed designs.

II. Manufacturing Information

A. Description/Function:	Programmable, 4A, USB, Current-Limited Switches with Autoreset and Fault Blanking
B. Process:	B8
C. Number of Device Transistors:	2876
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	July 08, 2003

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (2 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0095
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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	136°C/W
M. Multi Layer Theta Jc:	38°C/W

IV. Die Information

A. Dimensions:	80X80 mils
B. Passivation:	Si_3N_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:	0.8 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:	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:

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

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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 B8 Process results in a FIT Rate of 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SMG0FQ001A, D/C 0317)

The PM92-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1

Reliability Evaluation Test Results

MAX1562HESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SMG2GQ001A, D/C 0318

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