RELIABILITY REPORT

FOR

MAX16071ETL+

PLASTIC ENCAPSULATED DEVICES

July 25, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Sokhom Chum
Quality Assurance
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Conclusion

The MAX16070ETL+ 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.

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I. Device Description

A. General

The MAX16070/MAX16071 flash-configurable system monitors supervise multiple system voltages. The MAX16070/MAX16071 can also accurately monitor (±2.5%) one current channel using a dedicated high-side current-sense amplifier. The MAX16070 monitors up to twelve system voltages simultaneously, and the MAX16071 monitors up to eight supply voltages. These devices integrate a selectable differential or single-ended analog-to-digital converter (ADC). Device configuration information, including overvoltage and undervoltage limits and timing settings are stored in nonvolatile flash memory. During a fault condition, fault flags and channel voltages can be automatically stored in the nonvolatile flash memory for later read-back. The internal 1% accurate 10-bit ADC measures each input and compares the result to one overvoltage, one undervoltage, and one early warning limit that can be configured as either undervoltage or overvoltage. A fault signal asserts when a monitored voltage falls outside the set limits. Up to three independent fault output signals are configurable to assert under various fault conditions. Because the MAX16070/MAX16071 support a power-supply voltage of up to 14V, they can be powered directly from the 12V intermediate bus in many systems. The MAX16070/MAX16071 include eight/six programmable general-purpose inputs/outputs (GPIOs). GPIOs are flash configurable as dedicated fault outputs, as a watchdog input or output, or as a manual reset. The MAX16070/MAX16071 feature nonvolatile fault memory for recording information during system shutdown events. The fault logger records a failure in the internal flash and sets a lock bit protecting the stored fault data from accidental erasure. An SMBus(tm) or a JTAG serial interface configures the MAX16070/MAX16071. The MAX16070/MAX16071 are available in a 40-pin, 6mm x 6mm, TQFN package. Both devices are fully specified from -40°C to +85°C.

II. Manufacturing Information

A. Description/Function:	12-Channel/8-Channel, Flash-Configurable System Monitors with Nonvolatile Fault Registers
B. Process:	S4
C. Number of Device Transistors:	181965
D. Fabrication Location:	California
E. Assembly Location:	Taiwan
F. Date of Initial Production:	October 16, 2009

III. Packaging Information

A. Package Type:	40-pin TQFN 6x6
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3867
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:	38°C/W
K. Single Layer Theta Jc:	1°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1°C/W

IV. Die Information

A. Dimensions:	121 X 114 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
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:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Engineering) 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 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)

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

$\lambda = 22.9$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the S4 Process results in a FIT Rate of 0.05 @ 25C and 0.83 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot STZZCQ001D D/C 0921)

The MT16 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX16070ETL+

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	STZZCQ001D, D/C 0921

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