RELIABILITY REPORT

FOR

MAX6648MUA+

PLASTIC ENCAPSULATED DEVICES

February 29, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX6648MUA+ 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 MAX6648/MAX6692 are precise, two-channel digital temperature sensors. They accurately measure the temperature of their own die and a remote PN junction, and report the temperature in digital form using a 2-wire serial interface. The remote PN junction is typically the emitter-base junction of a common-collector PNP on a CPU, FPGA, or ASIC. The 2-wire serial interface accepts standard System Management Bus (SMBus(tm)) write byte, read byte, send byte, and receive byte commands to read the temperature data and to program the alarm thresholds. To enhance system reliability, the MAX6648/MAX6692 include an SMBus timeout. A fault queue prevents the active-low ALERT and active-low OVERT outputs from setting until a fault has been detected one, two, or three consecutive times (programmable). The MAX6648/MAX6692 provide two system alarms: active-low ALERT and active-low OVERT. Active-low ALERT asserts when any of four temperature conditions are violated: local overtemperature, remote overtemperature, local undertemperature, or remote undertemperature. Active-low OVERT asserts when the temperature rises above the value in either of the two active-low OVERT limit registers. The active-low OVERT output can be used to activate a cooling fan, or to trigger a system shutdown. Measurements can be done autonomously, with the conversion rate programmed by the user, or in a single-shot mode. The adjustable conversion rate allows the user to optimize supply current and temperature update rate to match system needs. Remote accuracy is ±0.8°C maximum error between +25°C and +125°C with no calibration needed. The MAX6648/MAX6692 operate from -55°C to +125°C, and measure temperatures between 0°C and +125°C. The MAX6648 is available in an 8-pin µMAX® package, and the MAX6692 is available in 8-pin µMAX and SO packages.

II. Manufacturing Information

A. Description/Function:	Precision SMBus-Compatible Remote/Local Temperature Sensors with Overtemperature Alarms
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	Malaysia
F. Date of Initial Production:	October 25, 2002

III. Packaging Information

A. Package Type:	3x3 mm 8L UMAX
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:	#05-9000-1108 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	221°C/W
K. Single Layer Theta Jc:	42°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	42°C/W

IV. Die Information

A. Dimensions:	61 X 85 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:	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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 180 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 6.1 \times 10^{-9}$

$\lambda = 6.1$ 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (ESD lot IE21AQ001B D/C 0222, Latch-Up lot SE21GA005A D/C 0444)

The TS47-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V 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

MAX6648MUA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	45	0	TE20IQ001A, D/C 0522
	Biased	& functionality	45	0	SE20EQ001B, D/C 0413
	Time = 192 hrs.		45	0	SE20D3025E, D/C 0328
			45	0	IE20BQ001C, D/C 0222

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