RELIABILITY REPORT

FOR

MAX6659MEE+

PLASTIC ENCAPSULATED DEVICES

December 8, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX6659MEE+ 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 MAX6657/MAX6658/MAX6659 are precise, two-channel digital temperature sensors. Each accurately measures the temperature of its own die and one remote PN junction, and reports the temperature in digital form on a 2-wire serial interface. The remote junction can be a diode-connected transistor like the low-cost NPN type 2N3904 or 2N3906 PNP type. The remote junction can also be a common-collector PNP, such as a substrate PNP of a microprocessor. The 2-wire serial interface accepts standard System Management Bus (SMBus(tm)) commands such as Write Byte, Read Byte, Send Byte, and Receive Byte to read the temperature data and program the alarm thresholds and conversion rate. The MAX6657/MAX6658/MAX6659 can function autonomously with a programmable conversion rate, which allows the control of supply current and temperature update rate to match system needs. For conversion rates of 4Hz or less, the temperature is represented in extended mode as 10 bits + sign with a resolution of 0.125°C. When the conversion rate is faster than 4Hz, output data is 7 bits + sign with a resolution of 1°C. The MAX6657/MAX6658/MAX6659 also include an SMBus timeout feature to enhance system reliability. Remote accuracy is ±1°C between +60°C and +100°C with no calibration needed. The MAX6657 measures temperatures from 0°C to +125°C and the MAX6658/MAX6659 from -55°C to +125°C. The MAX6659 has the added benefit of being able to select one of three addresses through an address pin, and a second over-temperature alarm pin for greater system reliability.

II. Manufacturing Information

A. Description/Function:	±1°C, SMBus-Compatible Remote/Local Temperature Sensors with Overtemperature Alarms
B. Process:	B8
C. Number of Device Transistors:	16989
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#05-2901-0017
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	105°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	85 X 106 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:	5 mil. Sq.
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 320 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 3.4 \times 10^{-9}$

λ = 3.4 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim"s reliability monitor program. Maxim performs quarterly 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 (lot S102IQ001B D/C 0411)

The TS27-2 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

MAX6659MEE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	S102IQ001B, D/C 0411
	Biased	& functionality	80	0	I102CA020B, D/C 0229
	Time = 192 hrs.		80	0	I102BQ001B, D/C 0202
			80	0	I102BQ001C, D/C 0111

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