

RELIABILITY REPORT  
FOR  
MAX6697  
PLASTIC ENCAPSULATED DEVICES

December 22, 2016

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

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## Conclusion

The MAX6697 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 MAX6697 precision multichannel temperature sensor monitors its own temperature and the temperatures of up to six external diode-connected transistors. All temperature channels have programmable alert thresholds. Channels 1,4,5 and 6 also have programmable overtemperature thresholds. When the measured temperature of a channel exceeds the respective threshold, a status bit is set in one of the status registers. Two open-drain outputs, OVERT and ALERT, assert corresponding to these bits in the status register. The 2-wire serial interface supports the standard system management bus (SMBus™) protocols: write byte, read byte, send byte, and receive byte for reading the temperature data and programming the alarm thresholds. The MAX6697 is specified for an operating temperature range of -40C to +125C and is available in 20-pin QSOP and 20-pin TSSOP packages.

## II. Manufacturing Information

A. Description/Function:	7-Channel Precision Temperature Monitor
B. Process:	B8
C. Number of Device Transistors:	21278
D. Fabrication Location:	USA
E. Assembly Location:	Philippines
F. Date of Initial Production:	October 23, 2004

## III. Packaging Information

A. Package Type:	20-pin QSOP	20-pin TSSOP
B. Lead Frame:	Copper	Copper
C. Lead Finish:	85Sn/15Pb plate	100% matte Tin
D. Die Attach:	Conductive	Conductive
E. Bondwire:	Au (1 mil dia.)	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1206	05-9000-1207
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	110°C/W	91°C/W
K. Single Layer Theta Jc:	34°C/W	20°C/W
L. Multi Layer Theta Ja:	90.5°C/W	73.8°C/W
M. Multi Layer Theta Jc:	34°C/W	20°C/W

## IV. Die Information

A. Dimensions:	77X107 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (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 <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: Eric Wright (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 ( $\lambda$ ) is calculated as follows:

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

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

$$\lambda = 22.91 \times 10^{-9}$$

$$\lambda = 22.91 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing

The TS63 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM: +/- 2000V per JEDEC JESD22-A114  
ESD-MM: +/- 50 V per JEDEC JESD22-A115

Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX6697**

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

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