

RELIABILITY REPORT
FOR
MAX6634MSA+
PLASTIC ENCAPSULATED DEVICES

July 28, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX6634MSA+ 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 MAX6633/MAX6634/MAX6635 combine a temperature sensor, a programmable overtemperature alarm, and an SMBus™/I²C-compatible serial interface into a single package. They convert their die temperatures into digital values using internal analog-to-digital converters (ADCs). The result of the conversion is then held in a temperature register as a 12-bit + sign value, allowing 0.0625°C resolution, readable at any time through the serial interface. The devices are capable of reading temperatures up to +150°C. The MAX6633/MAX6634/MAX6635 feature a shutdown mode that saves power by turning off everything except the power-on reset (POR) and the serial interface. The devices can be configured to separate addresses, allowing multiple devices to be used on the same bus. The MAX6633 has four address pins, allowing up to 16 devices to be connected to a single bus. The MAX6634 has three address pins, allowing up to eight devices to be connected to a single bus. The MAX6635 has two address pins, allowing up to four devices to be connected to a single bus. The MAX6633/MAX6634/MAX6635 make temperature data available for transfer over the serial interface. The MAX6634 incorporates a dual-mode active-low ALERT output (open drain) and can serve as an upgraded alternative to the LM75. The MAX6635 includes an active-low ALERT output and an active-low OVERT output (both open drain) and can function as an upgraded replacement for the LM76 in most applications. The MAX6634/MAX6635 feature user-programmable temperature thresholds. All three devices come in an 8-pin SO package.

II. Manufacturing Information

A. Description/Function:	12-Bit Plus Sign Temperature Sensors with SMBus/I ² C-Compatible Serial Interface
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Philippines, Thailand, Malaysia
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2901-0018
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:	73 X 80 mils
B. Passivation:	Si ₃ N 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: Ken Wendel (Director, Reliability Engineering)
Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.4 \times 10^{-9}$$

$\lambda = 13.4$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the B8 Process results in a FIT Rate of 1.29 @ 25C and 15.6 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The TS24-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-150 mA.

Table 1
Reliability Evaluation Test Results

MAX6634MSA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2) Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data