RELIABILITY REPORT

FOR

MAX6660AEE+

PLASTIC ENCAPSULATED DEVICES

April 18, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX6660AEE+ 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 MAX6660 is a remote temperature sensor and fan-speed regulator that provides a complete fan-control solution. The remote temperature sensor is typically a common-collector PNP, such as a substrate PNP of a microprocessor, or a diode-connected transistor, typically a low-cost, easily mounted 2N3904 NPN type or 2N3906 PNP type. The device also incorporates a closed-loop fan controller that regulates fan speed with tachometer feedback. The MAX6660 compares temperature data to a fan threshold temperature and gain setting, both programmed over the SMBus™ by the user. The result is automatic fan control that is proportional to the remote-junction temperature. The temperature feedback loop can be broken at any time for system control over the speed of the fan. Fan speed is voltage controlled as opposed to PWM controlled, greatly reducing acoustic noise and maximizing fan reliability. An on-chip power device drives fans rated up to 250mA. Temperature data is updated every 0.25s and is readable at any time over the SMBus interface. The MAX6660 is accurate to 1°C (max) when the remote junction is between +60°C to +100°C. Data is formatted as a 10-bit + sign word with 0.125°C resolution. The MAX6660 is specified for -40°C to +125°C and is available in a 16-pin QSOP package.

II. Manufacturing Information

A. Description/Function:	Remote-Junction Temperature-Controlled Fan-Speed Regulator with SMBus 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:	October 27, 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:	#05-2901-0026
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:	86X144 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:	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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 135 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.56 \times 10^{-9}$

$\lambda = 1.56$ 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 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot S3U0EQ001C, D/C 0320)

The TS11 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

MAX6660AEE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	135	0	S3U0EQ001B, D/C 0324

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