RELIABILITY REPORT

FOR

MAX1669EEE+

PLASTIC ENCAPSULATED DEVICES

December 1, 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 MAX1669EEE+ 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 MAX1669 fan controller includes a precise digital thermometer that reports the temperature of a remote sensor. The remote sensor is a diode-connected transistor-typically a low-cost, easily mounted 2N3906 PNP type-replacing conventional thermistors or thermocouples. Remote accuracy is ±3°C for transistors from multiple manufacturers, with no calibration needed. The MAX1669 has an independent fan controller with a low-current logic output requiring external power components to interface to a DC brushless fan. The fan controller has two modes of operation: a low-frequency (20Hz to 160Hz) PWM mode intended for driving the fan motor, or a high-impedance DAC output that generates a variable DC control voltage. In PWM mode, the FAN frequency can be synchronized to an external clock. Other key features include general-purpose inputs/outputs (GPIOs) for fan presence detection and a thermostat output intended as a fan override signal in case the host system loses the ability to communicate. The internal ADC has a wide input voltage range and gives overrange readings when too large an input voltage is applied. Other error-checking includes temperature out-of-range indication and diode open/short faults. The MAX1669 is available in a space-saving 16-pin QSOP package that allows it to fit adjacent to the SLOT1 connector.

II. Manufacturing Information

A. Description/Function:	Fan Controller and Remote Temperature Sensor with SMBus Serial Interface
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Texas or Oregon
E. Assembly Location:	Malaysia
F. Date of Initial Production:	October 23, 1999

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 (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1101-0121
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:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	67 X 112 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 396 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 2.8 \times 10^{-9}$

λ = 2.8 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 S8OAFQ001C D/C 0413, Latchup lot S8OAFQ001B D/C 0413)

The PX75 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V 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

MAX1669EEE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	80	0	S8OAFQ001B, D/C 0413
	Biased	& functionality	79	0	I8OAEA004A, D/C 0020
	Time = 192 hrs.		80	0	I8OADQ003A, D/C 0006
			79	0	I8OACQ001D, D/C 0003
			78	0	I8OABQ001D, D/C 9937

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