

RELIABILITY REPORT
FOR
MAX6667AUT+T
PLASTIC ENCAPSULATED DEVICES

April 25, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX6667AUT+T 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 MAX6666/MAX6667 are high-accuracy, low-cost, low-power temperature sensors with a single-wire output. The MAX6666/MAX6667 convert the ambient temperature into a ratiometric PWM output with temperature information contained in the duty cycle of the output square wave. The MAX6666 has a push-pull output and the MAX6667 has an open-drain output. The MAX6666/MAX6667 operate at supply voltages from +3V to +5.5V. The typical unloaded supply current at 5.0V is 200μA. Both devices feature a single-wire output that minimizes the number of pins necessary to interface with a microprocessor (μP). The output is a square wave with a nominal frequency of 35Hz (±20%) at +25°C. The output format is decoded as follows: $\text{Temperature (}^{\circ}\text{C)} = 235 - (400 \times t_1)/t_2$ Where t_1 is fixed with a typical value of 10ms and t_2 is modulated by the temperature (Figure 1 in the full data sheet). The MAX6666/MAX6667 operate from -40° to +125° and are available in space-saving SOT23 packages.

II. Manufacturing Information

A. Description/Function:	High-Accuracy PWM Output Temperature Sensors
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Taiwan or Thailand
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	6-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	HL (6 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-2901-0022
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:	185.5°C/W
K. Single Layer Theta Jc:	75°C/W
L. Multi Layer Theta Ja:	134.4°C/W
M. Multi Layer Theta Jc:	38.7°C/W

IV. Die Information

A. Dimensions:	80 X 45 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:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

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|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| A. Quality Assurance Contacts: | Richard Aburano (Manager, Reliability Engineering)
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:

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

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ } 25^{\circ}\text{C)}$$

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 0.04 @ 25C and 0.73 @ 55C (0.8 eV, 60% UCL).

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

The TS13-1 and TS20-2 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2000V per Mil-Std 883 Method 3015.7 Lot# I441BQ002B, D/C 0242.
ESD-CDM:	+/- 750V per JEDEC JESD22-C101 Lot# PBZ33430, D/C 0923.

Latch-Up testing has shown that this device withstands a current of +/- 250mA.

Table 1
Reliability Evaluation Test Results

MAX6667AUT+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	I441BQ002A, D/C 0301

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