



RELIABILITY REPORT
FOR
MAX6902ETA-T
PLASTIC ENCAPSULATED DEVICES

January 12, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Conclusion

The MAX6902ETA-T 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 MAX6902 SPI-compatible real-time clock contains a real-time clock/calendar and 31 x 8 bits of static random-access memory (SRAM). The real-time clock/calendar provides seconds, minutes, hours, day, date, month, year, and century information. A time/date programmable polled ALARM is included in the MAX6902. The end-of-the-month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year up to the year 2100. The clock operates in either the 24hr or 12hr format with an AM/PM indicator. The MAX6902 operates with a supply voltage of +2V to +5.5V, is available in the ultra-small 8-pin TDFN package, and works over the -40°C to +85°C industrial temperature range.

II. Manufacturing Information

A. Description/Function:	SPI-Compatible RTC in a TDFN
B. Process:	TSMC 0.5µm Silicon Gate CMOS
C. Number of Device Transistors:	0
D. Fabrication Location:	Taiwan
E. Assembly Location:	ISPL Philippines, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	8-pin TDFN 3x3
B. Lead Frame:	Copper
C. Lead Finish:	85Sn/15Pb plate D.
Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0546
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:	54°C/W
K. Single Layer Theta Jc:	8.3°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.3°C/W

IV. Die Information

A. Dimensions:	70 X 45 mils
B. Passivation:	SiO ₂ (Oxide)/Si ₃ N ₄ (Nitride)
C. Interconnect:	Al/Cu (0.5%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.5µm
F. Minimum Metal Spacing:	0.5µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	Silicon dioxide
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 128 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 8.4 \times 10^{-9}$$

$$\lambda = 8.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 TSMC 0.5um Process results in a FIT Rate of 4.5 @ 25C and 77.5 @ 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 DW11 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 Volts per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX6902ETA-T

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	128	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