



RELIABILITY REPORT
FOR
MAX6510CAUT+T
PLASTIC ENCAPSULATED DEVICES

April 1, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX6510CAUT+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 MAX6509/MAX6510 are fully integrated, resistor-programmable temperature switches with thresholds set by an external resistor. They require only one external resistor to set the temperature threshold within a wide $-40\pm C$ to $+125\pm C$ temperature range. The MAX6509 provides an open-drain output. The MAX6510 features three selectable output options: active-low, active-high, and open drain with an internal pull-up resistor. These switches operate with a +2.7V to +5.5V single supply while providing a temperature threshold accuracy of $\pm 0.5^{\circ}C$ (typ) or $\pm 4.7^{\circ}C$ (max). They typically consume 32 μA supply current. Hysteresis is pin selectable to 2 $^{\circ}C$ or 10 $^{\circ}C$. The MAX6509/MAX6510 are available in 5-pin and 6-pin SOT23 packages, respectively.

II. Manufacturing Information

A. Description/Function:	Resistor-Programmable SOT Temperature Switches
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	USA
E. Assembly Location:	Malaysia, Philippines and Thailand
F. Date of Initial Production:	January 22, 2000

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:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0076
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:	°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	230°C/W
M. Multi Layer Theta Jc:	76°C/W

IV. Die Information

A. Dimensions:	52 X 35 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 1.2 / Metal2 = 1.8 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 1.8 / Metal2 = 1.8 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: 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'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 S12 Process results in a FIT Rate of 0.03 @ 25C and 0.51 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot N8QBCA004B, D/C 0204)

The MS30-1 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

MAX6510CAUT+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	N8QADA019D

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