

RELIABILITY REPORT
FOR
MAX6359SVUT+T
PLASTIC ENCAPSULATED DEVICES

August 28, 2014

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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| Approved by |
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| Quality Assurance |
| Reliability Engineer |

Conclusion

The MAX6359SVUT+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 MAX6351-MAX6360 microprocessor (μ P) supervisors with multiple reset voltages significantly improve system reliability and accuracy compared to separate ICs or discrete components. If any input supply voltage drops below its associated preset threshold, all reset outputs are asserted. In addition, the outputs are valid as long as either input supply voltage remains greater than +1.0V. All devices in this series have an active-low debounced manual reset input. In addition, the MAX6358/MAX6359/MAX6360 offer a watchdog-timer input with a 46.4s startup timeout period and a 2.9s timeout period. The MAX6355/MAX6356/MAX6357 offer an additional voltage monitor input to monitor a third voltage. The MAX6351 features two active-low, push-pull reset outputs, one is referenced to VCC1 and the other is referenced to VCC2. The MAX6353/MAX6356/MAX6359 offer an active-low, push-pull reset output referenced to VCC1. The MAX6354/MAX6357/MAX6360 offer an active-low, push-pull reset output referenced to VCC2. All these devices are offered with a wide variety of voltage threshold levels, as shown in the *Voltage Threshold Levels* table. They are available in 5- and 6-pin SOT23 packages and operate over the extended (-40°C to +85°C) temperature range.

II. Manufacturing Information

| | |
|----------------------------------|--|
| A. Description/Function: | Dual/Triple-Voltage μ P Supervisory Circuits |
| B. Process: | B12 |
| C. Number of Device Transistors: | 856 |
| D. Fabrication Location: | Oregon, California or Texas |
| E. Assembly Location: | Malaysia, Philippines, or Thailand |
| F. Date of Initial Production: | October 22, 1999 |

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: | #05-1601-0070 |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level 1 |
| J. Single Layer Theta Jb: | N/A |
| 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: | 35X55 mils |
| B. Passivation: | $\text{Si}_3\text{N}_4/\text{SiO}_2$ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 1.2 microns (as drawn) |
| F. Minimum Metal Spacing: | 1.2 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 150 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 7.33 \times 10^{-9}$$

$$\lambda = 7.33 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B12 Process results in a FIT Rate of 0.05 @ 25C and 0.92 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (ESD lot I6EIBQ002J D/C 9935, Latch-Up lot S6EIEA017B D/C 0507)

The MS19-12 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

MAX6359SVUT+T

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|----------------------------------|-----------------|------------------------|-------------|--------------------|----------------------|
| Static Life Test (Note 1) | Ta = 135°C | DC Parameters | 80 | 0 | I6EABQ002E, D/C 9936 |
| | Biased | & functionality | 70 | 0 | I6EABQ002F, D/C 9936 |
| | Time = 192 hrs. | | | | |

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