

RELIABILITY REPORT FOR DS1090U-1/2/4/8/16/32 PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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Conclusion

The DS1090U-1/2/4/8/16/32 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 DS1090 is a low-cost, dithered oscillator intended to be used as an external clock for switched-mode power supplies and other low-frequency applications. The dithering or sweeping function reduces peak-radiated emissions from the power supply at its fundamental frequency, as well as harmonic frequencies. The device consists of a resistor-programmed master oscillator, factory-programmed clock pre-scaler, and a pin programmed dither circuit. These features allow the DS1090 to be used in applications where a spread spectrum clock is desired to reduce radiated emissions. A combination of factory-set pre-scalers and external resistor allows for output frequencies ranging from 125kHz to 8MHz. Both dither frequency and dither percentage are set using control pins.

II. Manufacturing Information

A. Description/Function: low-cost, dithered oscillator to be used as an external clock for switched-mode power supplies B. Process: E6H C. Number of Device Transistors: 222456 D. Fabrication Location: USA E. Assembly Location: Thailand F. Date of Initial Production: July 15, 2003

III. Packaging Information

B. Passivation:

C. Interconnect:

D. Backside Metallization:

E. Minimum Metal Width:

G. Bondpad Dimensions: H. Isolation Dielectric:

I. Die Separation Method:

F. Minimum Metal Spacing:

| | A. Package Type: | 8-pin uMAX |
|---------|---|-----------------------------------|
| | B. Lead Frame: | Copper |
| | C. Lead Finish: | Sn plate 100% |
| | D. Die Attach: | 8200T Ablebond Silverfilled Epoxy |
| | E. Bondwire: | Au (1.0 mil dia.) |
| | F. Mold Material: | Sumitomo G600 |
| | G. Assembly Diagram: | #05-MAXCIM-0317 |
| | 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: | 221°C/W |
| | K. Single Layer Theta Jc: | 42°C/W |
| | L. Multi Layer Theta Ja: | 206.3°C/W |
| | M. Multi Layer Theta Jc: | 42°C/W |
| IV. Die | Information | |
| | A. Dimensions: | 52 x 52 mils |



Al/0.5%Cu

SiO₂, SiN

Wafer Saw

0.8 microns (as drawn)

1.0 microns (as drawn)

None

NRL Laser w/ Nov TEOS Oxide-Nitride





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V. Quality Assurance Information

| A. | Quality Assurance Contacts: | Eric Wright (Reliability Engineering) Brian Standley (Manager, Reliability) 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

 $\frac{\lambda}{MTF} = \frac{1.83}{408 \times 2454 \times 77 \times 2}$ (Chi square value for MTTF upper limit)

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

∝ = 11.9 x 10⁻⁹

x = 11.9 FIT (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 https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html. Cumulative monitor data for the E6 Process results in a FIT Rate of 0.79 @ 25C and 13.6 @ 55C (0.8 eV, 60% UCL)

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

The A10T90A die type has been found to have all pins able to withstand an HBM transient pulse of +/-4000V per JEDEC JESD22- A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.



Table 1 Reliability Evaluation Test Results

DS1090U-1/2/4/8/16/32

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES | COMMENTS |
|------------------------|--|----------------------------------|-------------|-----------------------|----------|
| Static Life Test (Note | 1) Ta = 125C Biased Time = 408 hrs. | DC Parameters & functionality | 77 | 0 | |

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