RELIABILITY REPORT

FOR

MAX563CWN+T

PLASTIC ENCAPSULATED DEVICES

July 24, 2012

# MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

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

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**Conclusion**

The MAX563CWN+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 MAX563 is a +3.3V-powered EIA/TIA-562 transceiver with two transmitters and two receivers. Because it implements the EIA/TIA-562 standard, the MAX563 communicates with RS-232 transceivers, yet consumes far less power; this makes it ideal for battery-powered, hand-held computers. And, the MAX563 guarantees a 116kbps data rate while maintaining ±3.7V EIA/TIA-562 signal levels, which makes it compatible with LapLink® software. An on-board charge pump converts the +3.3V supply to the ±6.6V needed to produce the EIA/TIA-562 output voltage levels. Four 0.1µF charge-pump capacitors and a bypass capacitor of similar size are the only external components required. When the MAX563's charge pumps and transmitters are shut down to save power, the receivers remain active to continuously monitor signals from external devices (for example, ring indicator from modems). The two receivers' outputs can be enabled and disabled independently of the shutdown function to allow two ports-generally of different types-to be wire-OR connected at the UART.

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**II. Manufacturing Information**

| | |
|---|---|
| A. Description/Function: | +3.3V Powered, EIA TIA 562 Dual Transceiver with Receivers Active in Shutdown |
| B. Process: | SG5 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | Philippines |
| F. Date of Initial Production: | Pre 1997 |

**III. Packaging Information**

| | |
|---|---|
| A. Package Type: | 300 mil 18L SOIC |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-0701-0485 / F |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | 1 |
| J. Single Layer Theta Ja: | 105°C/W |
| K. Single Layer Theta Jc: | 22°C/W |
| L. Multi Layer Theta Ja: | 67°C/W |
| M. Multi Layer Theta Jc: | 23°C/W |

**IV. Die Information**

| | |
|---|---|
| A. Dimensions: | 70 X 109 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 5.0 microns (as drawn) |
| F. Minimum Metal Spacing: | 5.0 microns (as drawn) |
| G. Bondpad Dimensions: | |
| H. Isolation Dielectric: | $SiO_2$ |
| I. Die Separation Method: | Wafer Saw |

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**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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 4340 \times 474 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 0.4 \times 10^{-9}$

$\lambda$ = 0.4 F.I.T. (60% confidence level @ 25°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 SG5 Process results in a FIT Rate of 0.12 @ 25C and 2.04 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NETCIN006E D/C 9903)

The PS20-2 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.

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**Table 1**

Reliability Evaluation Test Results

**MAX563CWN+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 | NQS0AA864A, D/C 0722 |
| | Biased | & functionality | 80 | 0 | NQS0AA840A, D/C 0701 |
| | Time = 1000 hrs. | | 77 | 0 | NQS4AA805G, D/C 0640 |
| | | | 80 | 0 | NQS0S0AA807C, D/C 0640 |
| | | | 77 | 0 | NQS0AA752B, D/C 0612 |
| | | | 80 | 0 | NQS0AA730A, D/C 0548 |

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

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