

RELIABILITY REPORT
FOR
MAX3188EEUT+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX3188EEUT+ 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 MAX3188E/MAX3189E single RS-232 transmitters in a SOT23-6 package are for space- and cost-constrained applications requiring minimal RS-232 communications. These devices consume only 150 μ A of supply current from ± 4.5 V to ± 6 V supplies. They feature a shutdown input that reduces current consumption to only 1 μ A and forces the transmitter output into a high-impedance state. RS-232 data transmission is guaranteed up to 250kbps with the MAX3188E and up to 1Mbps with the MAX3189E. The MAX3188E/MAX3189E are EIA/TIA-232 transmitters that convert CMOS/TTL logic levels to RS-232-compliant signals. The transmitter output is protected to ± 15 kV using the IEC 1000-4-2 Air-Gap Discharge method, to ± 8 kV using the IEC 1000-4-2 Contact Discharge method, and to ± 15 kV per the Human Body Model, ensuring strict compliance with international standards. The MAX3188E/MAX3189E transmitters have a standard inverting output.

II. Manufacturing Information

A. Description/Function:	±15kV ESD-Protected, 1Mbps, 1µA RS-232 Transmitters in SOT23-6
B. Process:	S3
C. Number of Device Transistors:	72
D. Fabrication Location:	Oregon
E. Assembly Location:	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:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1901-0230
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:	115°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	74.6°C/W
M. Multi Layer Theta Jc:	6.1°C/W

IV. Die Information

A. Dimensions:	42X59 mils
B. Passivation:	Si ₃ N 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S3 Process results in a FIT Rate of 0.03 @ 25C and 0.5 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot I7IAAQ001B, D/C 9949)

The RS79 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA.

Table 1
Reliability Evaluation Test Results

MAX3188EEUT+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	I7IAAQ001C, D/C 9949
	Biased	& functionality	80	0	I7IAAQ001C, D/C 9949
	Time = 192 hrs.				

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