



RELIABILITY REPORT
FOR
MAX3190EEUT+T
PLASTIC ENCAPSULATED DEVICES

March 23, 2017

MAXIM INTEGRATED

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Conclusion

The MAX3190EEUT+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 MAX3190/MAX3190E 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 200 μ A of supply current from $\pm 7.5V$ to $\pm 12V$ supplies. The MAX3190/MAX3190E transmitter outputs are RS-232 compatible when powered from $\pm 6V$ to $\pm 7.5V$ 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-compliant data transmission is guaranteed up to 460kbps. The MAX3190/MAX3190E are EIA/TIA-232 transmitters that convert CMOS/TTL logic levels to RS-232-compliant signals. The MAX3190E transmitter output is protected to $\pm 15kV$ per the Human Body Model, $\pm 8kV$ per IEC 1000-4-2 Contact Discharge, and $\pm 15kV$ per IEC 1000-4-2 Air-Gap Discharge, providing protection against harsh environments. The MAX3190/ MAX3190E transmitters have a standard inverting output.

II. Manufacturing Information

A. Description/Function:	±15kV ESD-Protected, 460kbps, RS-232 Transmitters in SOT23-6
B. Process:	S3
C. Fabrication Location:	USA
D. Assembly Location:	Malaysia, Thailand
E. Date of Initial Production:	January 27, 2001

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:	#05-2601-0036
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°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	115°C/W
M. Multi Layer Theta Jc:	80°C/W

IV. Die Information

A. Dimensions:	57X35 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. Isolation Dielectric:	SiO ₂
H. Die Separation Method:	Wafer Saw

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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 312 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 3.52 \times 10^{-9}$$

$$\lambda = 3.52 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 0.04 @ 25C and 0.69 @ 55C (0.8 eV, 60% UCL)

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

The RT04 die type has been found to have all pins able to withstand an HBM transient pulse of +/-600V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX3190EEUT+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	312	0	

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