

RELIABILITY REPORT
FOR
MAX3430ESA+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX3430ESA+ 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 MAX3430 fault-protected RS-485 transceiver features $\pm 80\text{V}$ protection from overvoltage signal faults on communication bus lines. Each device contains one driver and one receiver, and the output pins can withstand faults, with respect to ground, of up to $\pm 80\text{V}$. Even if the faults occur when the transceiver is active, shut down, or powered off, the device will not be damaged. The MAX3430 operates from a 3.3V supply and features a slew-rate-limited driver that minimizes EMI and reduces reflections caused by improperly terminated cables, allowing error-free data transmission at data rates up to 250kbps. The MAX3430 has a 1/4-unit-load receiver input impedance allowing up to 128 transceivers on a single bus and features fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open. Hot-swap circuitry eliminates false transitions on the data cable during circuit initialization or connection to a live backplane. Short-circuit current limiting and thermal-shutdown circuitry protect the driver against excessive power dissipation. The MAX3430 is available in 8-pin SO and 8-pin PDIP packages, and is specified over commercial and industrial temperature ranges.

II. Manufacturing Information

A. Description/Function:	±80V Fault-Protected, Fail-Safe, 1/4-Unit Load, +3.3V RS-485 Transceiver
B. Process:	BCD8
C. Number of Device Transistors:	4352
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand, Philippines, or Malaysia
F. Date of Initial Production:	January 24, 2003

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
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:	#05-9000-1550
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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	128.4°C/W
M. Multi Layer Theta Jc:	36°C/W

IV. Die Information

A. Dimensions:	86 X 146 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

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

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 144 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 7.6 \times 10^{-9}$$

$$\lambda = 7.6 \text{ F.I.T. (60\% confidence level @ } 25^{\circ}\text{C)}$$

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 BCD8 Process results in a FIT Rate of 0.04 @ 25C and 0.71 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot JDG0FQ002A, D/C 1046)

The RT51 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX3430ESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	NDG0DQ001D, D/C 0440
	Biased	& functionality	48	0	IDG0AQ001C, D/C 0246
	Time = 192 hrs.		48	0	NDG0CQ002B, D/C 0426

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