

RELIABILITY REPORT
FOR
MAX13431EEUB+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX13431EEUB+ 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 MAX13430E-MAX13433E are full- and half-duplex RS-485 transceivers that feature an adjustable low-voltage logic interface for operation in multivoltage systems. This allows direct interfacing to low-voltage ASIC/FPGAs without extra components. The MAX13430E-MAX13433E RS-485 transceivers operate with a VCC voltage supply from +3V to +5V. The low-voltage logic interface operates with a voltage supply from +1.62V to VCC. The MAX13430E/MAX13432E feature reduced slew-rate drivers that minimize EMI and reduce reflections caused by improperly terminated cables, allowing error-free data transmission up to 500kbps. The MAX13431E/MAX13433E driver slew rates are not limited, enabling data transmission up to 16Mbps. The MAX13430E/MAX13431E are intended for half-duplex communications, and the MAX13432E/MAX13433E are intended for full-duplex communications. The MAX13430E/MAX13431E are available in 10-pin μ MAX® and 10-pin TDFN packages. The MAX13432E/MAX13433E are available in 14-pin TDFN and 14-pin SO packages.

II. Manufacturing Information

A. Description/Function:	RS-485 Transceivers with Low-Voltage Logic Interface
B. Process:	B8
C. Number of Device Transistors:	952
D. Fabrication Location:	California or Texas
E. Assembly Location:	Philippines, Thailand, or Malaysia
F. Date of Initial Production:	October 25, 2008

III. Packaging Information

A. Package Type:	10-pin uMAX
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:	#05-9000-3229
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:	180°C/W
K. Single Layer Theta Jc:	41.9°C/W
L. Multi Layer Theta Ja:	113.1°C/W
M. Multi Layer Theta Jc:	41.9°C/W

IV. Die Information

A. Dimensions:	54 X 87 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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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: 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 79 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.9 \times 10^{-9}$$

$$\lambda = 13.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B8 Process results in a FIT Rate of 0.04 @ 25C and 0.73 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot TNUYBQ001C, D/C 0835)

The RU35-1 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.

Table 1
Reliability Evaluation Test Results

MAX13431EEUB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	79	0	TNUXBA020E, D/C 1227

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