

RELIABILITY REPORT  
FOR  
MAX14783ExUA+T / MAX14783ExTA+T / MAX14783ExSA+T  
PLASTIC ENCAPSULATED DEVICES

August 18, 2013

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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**Conclusion**

The MAX14783ExUA+T / MAX14783ExTA+T / MAX14783ExSA+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 MAX14783E is a 3.3V/5V ESD-protected transceiver intended for half-duplex RS-485/RS-422 communication up to 42Mbps. The device is optimized for high speeds over extended cable runs while maximizing tolerance to noise. The MAX14783E integrated protection features include short-circuit-protected outputs, hot-swap functionality, and a true fail-safe receiver, guaranteeing a logic-high receiver output when inputs are shorted or open. Hotswap capability eliminates undesired transitions on the bus during power-up or hot insertion. The transceiver draws 1.9mA (typ) supply current when unloaded or when fully loaded with the drivers disabled and draws less than 10 $\mu$ A (max) of supply current in low-power shutdown mode. The MAX14783E is available in 8-pin  $\mu$ MAX, 8-pin SO, and small, 8-pin (3mm x 3mm) TDFN-EP packages. The device in the TDFN-EP package operates over the -40°C to +125°C temperature range. The MAX14783E in the  $\mu$ MAX and SO packages operates over the -40°C to +85°C and -40°C to +125°C temperature ranges.

## II. Manufacturing Information

A. Description/Function:	High-Speed 3.3V/5V RS-485/RS-422 Transceiver with $\pm 35\text{kV}$ HBM ESD Protection		
B. Process:	B8		
C. Number of Device Transistors:	857		
D. Fabrication Location:	USA		
E. Assembly Location:	Philippines & Thailand	Malaysia Philippines & Thailand China	Taiwan & Thailand
F. Date of Initial Production:	June 27, 2013		

## III. Packaging Information

A. Package Type:	8-pin uMAX	8-pin SOIC	8-pin TDFN 3x3
B. Lead Frame:	Copper	Copper	Copper
C. Lead Finish:	100% matte Tin	100% matte Tin	100% matte Tin
D. Die Attach:	Conductive	Conductive	Conductive
E. Bondwire:	Au (0.8 mil dia.)	Au (0.8 mil dia.)	Au (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5276	#05-9000-5368	#05-9000-5277
H. Flammability Rating:	Class UL94-V0	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1	Level 1
J. Single Layer Theta Ja:	221°C/W	170°C/W	54°C/W
K. Single Layer Theta Jc:	42°C/W	40°C/W	8°C/W
L. Multi Layer Theta Ja:	206.3°C/W	132°C/W	41°C/W
M. Multi Layer Theta Jc:	42°C/W	38°C/W	8°C/W

## IV. Die Information

A. Dimensions:	55X81 mils
B. Passivation:	BCB
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:	1.2 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 13.7 \times 10^{-9}$$

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 0.05 @ 25C and 0.90 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot JAMI3Q001H, D/C 1323)

The RU82-1 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 and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results  
MAX14783ExUA+T / MAX14783ExSA+T / MAX14783ExTA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	JAMI3Q001H, D/C 1323

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