RELIABILITY REPORT

FOR

MAX14770EATA+T

PLASTIC ENCAPSULATED DEVICES

February 18, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX14770EATA+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 MAX14770E is a half-duplex, ±35kV high ESD-protected transceiver for PROFIBUS-DP and RS-485 applications. In addition, it can be used for RS-422/V.11 communications. The MAX14770E is designed to meet IEC 61158-2, TIA/EIA-422-B, TIA/EIA-485-A, V.11, and X.27 standards. The MAX14770E operates from a +5V supply and has true fail-safe circuitry that guarantees a logic-high receiver output when the receiver inputs are open or shorted. The MAX14770E features a 1/4 standard-unit load receiver input impedance, allowing up to 128 1/4 unit load transceivers on the bus. Drivers are short-circuit current limited and are protected against excessive power dissipation by thermal-shutdown circuitry. The MAX14770E is available in an 8-pin SO and an 8-pin µMAX® specified over the extended temperature range. It is also available in a tiny TDFN (3mm x 3mm) package and specified over the automotive (-40°C to +125°C) temperature range.

II. Manufacturing Information

A. Description/Function:	High-ESD PROFIBUS RS-485 Transceiver
B. Process:	B8
C. Number of Device Transistors:	979
D. Fabrication Location:	California or Texas
E. Assembly Location:	Taiwan, Thailand, Malaysia
F. Date of Initial Production:	October 23, 2009

III. Packaging Information

A. Package Type:	8-pin TDFN 3x3
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:	#05-9000-3805
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:	54°C/W
K. Single Layer Theta Jc:	8.3°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.3°C/W

IV. Die Information

A. Dimensions:	54X86 mils
B. Passivation:	Si_3N_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:	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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ 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 0.01 @ 25C and 0.26 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot TXZZCQ002A, D/C 1018)

The RU43 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

MAX14770EATA+T

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	48	0	TXZZAQ001C, D/C 0922

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