



RELIABILITY REPORT
FOR
MAX14891EATP+T
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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Conclusion

The MAX14891EATP+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 MAX14891E quad fault-protected RS-485/RS-422 receiver is ideal for applications requiring high data rates and reduced noise in rugged environments. Each receiver features a wide common-mode input range of -20V to +20V and is guaranteed to receive data at speeds up to 35Mbps. All receiver inputs are fault-protected against voltage shorts in the $\pm 40\text{V}$ range. Per-channel fault detection provides warning of irregular conditions, such as short circuits and open connections. The MAX14891E is available in a 20-pin TQFN-EP (4mm x 4mm) and operates over the -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	Quad Fault-Protected RS-485/RS-422 Receiver with Fault Detection
B. Process:	S18
C. Number of Device Transistors:	25038
D. Fabrication Location:	Japan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	December 19, 2014

III. Packaging Information

A. Package Type:	20-pin TQFN
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	En4900g
E. Bondwire:	CuPd (0.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5683
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:	59°C/W
K. Single Layer Theta Jc:	6°C/W
L. Multi Layer Theta Ja:	39°C/W
M. Multi Layer Theta Jc:	6°C/W

IV. Die Information

A. Dimensions:	75.5905X64.5669 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Minimum Metal Width:	0.23 microns (as drawn)
E. Minimum Metal Spacing:	0.23 microns (as drawn)
F. Isolation Dielectric:	SiO ₂
G. 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:

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

(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 S18 Process results in a FIT Rate of 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

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

The RU96-1 die type has been found to have all pins able to withstand an 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
MAX14891EATP+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C	DC Parameters & functionality	80	0	
	Biased Time = 192 hrs.				

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