

RELIABILITY REPORT
FOR
MAX14130FAEE+T
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX14130FAEE+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 MAX14930-MAX14932 are a family of 4-channel, 2.75kVRMS and 3.75kVRMS digital isolators utilizing Maxim's proprietary process technology. The MAX14130-MAX14131 are 4-channel 1kVRMS digital isolators in smaller footprint QSOP packages. For applications requiring 5kV RMS of isolation, see the MAX14934-MAX14936. The MAX14930-MAX14932 family transfers digital signals between circuits with different power domains at ambient temperatures up to +125°C. The MAX14930-MAX14932 family offers all three possible unidirectional channel configurations to accommodate any 4-channel design; including SPI, RS-232, RS-485, and digital I/O applications. For applications requiring bidirectional channels, such as I²C, see the MAX14933. Devices are available with data rates from DC up to 1Mbps, 25Mbps, or 150Mbps. Each device is also available in either a default high or default low configuration. The default is the state an output goes to when its input is unpowered. See the *Ordering Information and Selector Guide* in the full data sheet for the suffixes associated with each option. Independent 1.71V to 5.5V supplies on each side of the isolator also make the devices suitable for use as level translators. The MAX14930-MAX14932 are available in both a 16-pin wide body (10.3mm x 7.5mm) and narrow body (9.9mm x 3.9mm) SOIC package. The MAX14130-MAX14131 are available in a 16-pin (6mm x 5mm) QSOP package. All devices are rated for operation at ambient temperatures of -40°C to +125°C.

II. Manufacturing Information

A. Description/Function:	4-Channel, 1kV _{RMS} , 2.75kV _{RMS} , and 3.75kV _{RMS} Digital Isolators
B. Process:	S18
C. Fabrication Location:	USA
D. Assembly Location:	USA, Thailand
E. Date of Initial Production:	September 01, 2016

III. Packaging Information

A. Package Type:	16-pin QSOP
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:	#31-4962
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:	N/A°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	103.7°C/W
M. Multi Layer Theta Jc:	37°C/W

IV. Die Information

A. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
B. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
C. Backside Metallization:	None
D. Minimum Metal Width:	0.23 microns (as drawn)
E. Minimum Metal Spacing:	0.23 microns (as drawn)
F. Bondpad Dimensions:	
G. Isolation Dielectric:	SiO ₂
H. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: Eric Wright (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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 400 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 2.75 \times 10^{-9}$$

$$\lambda = 2.75 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 0.06@ 25C and 0.93@ 55C (0.8 eV, 60% UCL)

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

The RU66-10 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

MAX14130FAEE+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	400	0	

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