

RELIABILITY REPORT FOR MAX14900EAGM+

PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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Approved by
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Conclusion

The MAX14900EAGM+ 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

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The MAX14900E is an octal power switch that features per-channel configuration for high-side or push-pull operation. Low propagation delay, high-rate load-switching makes the device suitable for next-generation high-speed PLC systems. Each high-side switch sources 850mA continuous current with a low $165m\Omega$ (max) on-resistance at 500mA at TA = +125°C. The high-side switches feature 2us (max) input-to-output propagation delay when driving resistive loads. Long cables can be driven with switching rates of up to 100kHz for PWM/PPO control in push-pull operation. Multiple high-side switches can be connected in parallel to achieve higher drive currents. The device features a wide supply input range of 10V to 36V.

The MAX14900E is configured, monitored, and driven by an SPI and/or parallel interface. In parallel mode, eight logic inputs directly control the outputs and the serial interface can be used for configuration/monitoring. Serial mode utilizes the serial interface for both setting and configuration, and features CRC error detection to ensure robust SPI communication.

Current limiting and per-channel thermal shutdown protect each switch/driver. The device features a global diagnostics output as well as per-channel diagnostics and monitoring through the serial interface. The MAX14900E is available in a thermally- enhanced 48-pin (7mm x 7mm), side-wettable flank QFN-EP or standard 48-pin TQFN-EP package, and is specified over the -40°C to +125°C temperature range.



II. Manufacturing Information

- A. Description/Function:Octal, High-Speed, Industrial, High-Side SwitchB. Process:S18C. Number of Device Transistors:33961D. Fabrication Location:CaliforniaE. Assembly Location:Taiwan, China, Thailand
- F. Date of Initial Production: November 5, 2014

III. Packaging Information

A. Package Type:	48-pin TQFN 7x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (2 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5934
H. Flammability Rating:	Class UL94-V0
 Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C 	Level 1
J. Multi Layer Theta Ja:	18°C/W
K. Multi Layer Theta Jc:	1 °C/W

IV. Die Information

Α.	Dimensions:	198.8189X198.8189 mils
В.	Passivation:	$Si_3N_4/SiO_2\;$ (Silicon nitride/ Silicon dioxide)
C.	Interconnect:	Al with Ti/TiN Barrier
D.	Backside Metallization:	None
E.	Minimum Metal Width:	0.18um
F.	Minimum Metal Spacing:	0.18um
G.	Bondpad Dimensions:	
Н.	Isolation Dielectric:	SiO ₂
Ι.	Die Separation Method:	Wafer Saw



V. Quality Assurance Information

A.	Quality Assurance Contacts:	Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President of QA)
В.	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:

$$\lambda = 1 = 1.83$$
(Chi square value for MTTF upper limit)
MTTF 1000 x 4340 x 135 x 2
(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)
$$\lambda = 1.56 \times 10^{-9}$$

x = 1.56 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 0.05 @ 25C and 0.93 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SANJ4Q002A, D/C 1341)

The RU58-1 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

MAX14900EAGM+CKH

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS		
Static Life Test (Note 1)							
	Ta = 135°C	DC Parameters	90 45	0	SANJ4Q001Q, D/C 1420		
	Biased Time = 1000 hrs.	a functionality	40	0	SANJ40004Q, D/C 1420		

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