

RELIABILITY REPORT  
FOR  
MAX14871EUE+T  
PLASTIC ENCAPSULATED DEVICES

June 8, 2015

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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Quality Assurance
Reliability Engineer

## Conclusion

The MAX14871EUE+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 MAX14871 DC motor driver provides a low-power and simple solution for driving and controlling brushed motors with voltages between 4.5V and 36V. Very low driver on resistance reduces power during dissipation. The MAX14871 features a charge-pump-less design for reduced external components and low supply current. Integrated current regulation allows user-defined peak startup motor currents and requires minimal external components. The MAX14871 includes 3 modes of current regulation: fast decay, slow decay, and 25% current ripple modes. Current regulation based on 25% ripple simplifies the design and enables regulation independent of motor characteristics. A separate voltage sense input (SNS) reduces current-sensing errors due to parasitic trace resistance. The MAX14871 features shoot-through protection and internal free-wheeling diodes that absorb inductive motor currents. Driver outputs are short-circuit-protected from shorts to ground, to the supply, and between M1 and M2. An active-low FAULT output signals thermal overload and overcurrents during fault conditions. The MAX14871 is available in a 16-pin TSSOP-EP package and operates over the -40°C to +85°C temperature range.

## II. Manufacturing Information

A. Description/Function:	4.5V to 36V Full-Bridge DC Motor Driver
B. Process:	S18
C. Number of Device Transistors:	3007
D. Fabrication Location:	California
E. Assembly Location:	Philippines, Thailand
F. Date of Initial Production:	September 26, 2014

## III. Packaging Information

A. Package Type:	16-pin TSSOP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5531
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:	47°C/W
K. Single Layer Theta Jc:	3°C/W
L. Multi Layer Theta Ja:	38.3°C/W
M. Multi Layer Theta Jc:	3°C/W

## IV. Die Information

A. Dimensions:	66.9291X95.6693 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (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:	
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- |                                   |   |
|-----------------------------------|---|
| A. Quality Assurance Contacts:    | Don Lipps (Manager, Reliability Engineering)<br>Bryan Preeshl (Vice President of QA)            |
| B. Outgoing Inspection Level:     | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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 ( $\lambda$ ) 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 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 EATA2Q002E, D/C 1420)

The RU97-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX14871EUE+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	EATA2Q002E, D/C 1420

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