

RELIABILITY REPORT
FOR
MAX8815AETB+T
PLASTIC ENCAPSULATED DEVICES

May 11, 2015

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX8815AETB+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 MAX8815A DC-DC step-up converter is a high-efficiency, low quiescent current, synchronous step-up converter with True Shutdown(tm) and inrush-current limiting. The MAX8815A generates any output voltage from 3.3V to 5V from a 2-cell NiMH/NiCd or a single-cell Li+/Li polymer battery. The MAX8815A uses two modes of operation. The first mode of operation (normal) uses only 30µA (typ) quiescent current and allows the converter to switch only when needed at no load and light loads. Under moderate and heavy loads (typically above 90mA), the MAX8815A uses a fixed-frequency pulse-width modulation (PWM) technique. This mode allows maximum efficiency at light loads. The second mode of operation is a fixed-frequency forced-pulse-width modulation (FPWM) mode where the converter switches at a fixed frequency irrespective of the load. This mode allows for easy noise filtering and lower output ripple. The MAX8815A has a preset 2.5A current limit, allowing 500mA load at 1.8V input and 1A load at 2.5V input when the output is set to 5V. Features include soft-start, which limits inrush current during startup, True Shutdown, and internal compensation. The MAX8815A is available in a compact 10-pin, 3mm x 3mm TDFN package. The MAX8815A evaluation kit can help shorten the time required for system design.

II. Manufacturing Information

A. Description/Function:	1A, 97% Efficiency, 30µA Quiescent Current, Step-Up Converter with True Shutdown
B. Process:	S45
C. Number of Device Transistors:	
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	Taiwan, China, Thailand, Malaysia
F. Date of Initial Production:	April 26, 2008

III. Packaging Information

A. Package Type:	10-pin TDFN 3x3
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:	#05-9000-3022
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:	8.5°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.5°C/W

IV. Die Information

A. Dimensions:	48X82 mils
B. Passivation:	Si ₃ N 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:	Metal1 = 0.5 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 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:

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

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

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

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 S45 Process results in a FIT Rate of 0.13 @ 25C and 2.31 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TKPZBA015C, D/C 1036)

The PQ10 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114
ESD-CDM:	+/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX8815AETB+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	TKPZBQ001E, D/C 0812

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