

RELIABILITY REPORT
FOR
MAX8682ETM+
PLASTIC ENCAPSULATED DEVICES

October 26, 2012

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX8682ETM+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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX8682 power-management IC (PMIC) provides a compact and complete power-supply solution for Digital Single-Lens Reflex (DSLR) cameras. Six DC-DC converters with internal switches provide up to 94% efficiency to generate the critical power-supply voltages required in DSLR camera systems. The two H-bridge and three step-down DC-DC converters are internally compensated and switch only as necessary at light loads to optimize efficiency. The H-bridge channels utilize Maxim's proprietary H-bridge topology, providing a seamless transition through all operating modes without the glitches commonly seen in competing H-bridge converters. All six converters offer True Shutdown™ short-circuit protection, and overload protection. To prevent current runaway in the event of a hard short, channels 1 and 2 latch off immediately if the output voltage drops below 1.25V anytime after startup. The white LED step-up converter provides regulated current and dimming control. If a short-circuit condition is detected on the output capacitor of the white LED converter, only this converter turns off. If a short or overload condition is detected on any other output for at least 66ms, the PMIC turns off all converters.

II. Manufacturing Information

A. Description/Function:	Smallest 6-Channel, 2-Cell Li+ PMIC for Digital SLR Cameras
B. Process:	S45
C. Number of Device Transistors:	36633
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	October 13, 2010

III. Packaging Information

A. Package Type:	48-pin TQFN 6x6
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:	#05-9000-3132
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:	38°C/W
K. Single Layer Theta Jc:	1.4°C/W
L. Multi Layer Theta Ja:	27°C/W
M. Multi Layer Theta Jc:	1.4°C/W

IV. Die Information

A. Dimensions:	123 X 157 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 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 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: Richard Aburano (Manager, Reliability Engineering)
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 68 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 16.1 \times 10^{-9}$$

$$\lambda = 16.1 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S45 Process results in a FIT Rate of 0.49 @ 25C and 8.49 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (ESD lot EGTZDQ002A D/C 0821, Latch-Up lot EGTZDQ003A D/C 0849)

The PQ16 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.

Table 1
Reliability Evaluation Test Results

MAX8682ETM+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	43	0	EGTZDQ003A, D/C 0849
	Biased	& functionality	25	0	EGTZDQ002B, D/C 0821
	Time = 192 hrs.				

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