



RELIABILITY REPORT  
FOR  
MAX8677CETG+T  
PLASTIC ENCAPSULATED DEVICES

October 9, 2010

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
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## Conclusion

The MAX8677CETG+T successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

## Table of Contents

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

### I. Device Description

#### A. General

The MAX8677C is an integrated 1-cell Li+ charger and Smart Power Selector(tm) with dual (DC and USB) power inputs. It can operate with either separate inputs for USB and AC adapter power, or from a single input that accepts both. All power switches for charging and switching the load between battery and external power are included on-chip. No external MOSFETs are required. The MAX8677C features a Smart Power Selector to make the best use of limited USB or adapter power. The battery charge current and input current limit are independently set up to 1.5A and 2A, respectively. Input power not used by the system charges the battery. USB input current can be set to 100mA or 500mA. Automatic input selection switches the system load from battery to external power. Other features include overvoltage protection (OVP), charge status and fault outputs, power-OK monitors, charge timer, and battery thermistor monitor. Additionally, on-chip thermal limiting reduces the battery charge rate to prevent overheating. The MAX8677C is available in a 4mm x 4mm, 24-pin TQFN-EP package.

**II. Manufacturing Information**

A. Description/Function:	1.5A Dual-Input USB/AC Adapter Charger and Smart Power Selector
B. Process:	S45
C. Number of Device Transistors:	
D. Fabrication Location:	California, Texas or Japan
E. Assembly Location:	China, Malaysia, Philippines, Thailand
F. Date of Initial Production:	April 21, 2007

**III. Packaging Information**

A. Package Type:	24-pin TQFN 4x4
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:	#05-9000-2503
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	36°C/W
M. Multi Layer Theta Jc:	2.7°C/W

**IV. Die Information**

A. Dimensions:	100 X 100 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (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:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

A. Quality Assurance Contacts:	Richard Aburano (Manager, Reliability Operations) 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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 24.4 \times 10^{-9}$$

$$\lambda = 24.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.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 (lot TAOVB4055E, D/C 0941)

The PP87-4 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
ESD-MM:	+/- 250V per JEDEC JESD22-A115 (lot TAOXG3021C, D/C 0824)

Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX8677CETG+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	45	0	SAOXEA005A, D/C 0705

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