



RELIABILITY REPORT  
FOR  
MAX683EUA+  
PLASTIC ENCAPSULATED DEVICES

April 27, 2012

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX683EUA+ 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.

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### I. Device Description

#### A. General

The MAX682/MAX683/MAX684 charge-pump regulators generate 5V from a 2.7V to 5.5V input. They are specifically designed to serve as high-efficiency auxiliary supplies in applications that demand a compact design. The MAX682, MAX683, and MAX684 deliver 250mA, 100mA, and 50mA output current, respectively. These complete 5V regulators require only one resistor and three external capacitors; no inductors are needed. High switching frequencies (externally adjustable up to 2MHz) and a unique regulation scheme allow the use of capacitors as small as 1 $\mu$ F per 100mA of output current. The MAX683/MAX684 are offered in a space-saving 8-pin  $\mu$ MAX package that is only 1.1mm high, while the MAX682 is available in an 8-pin SO.

## II. Manufacturing Information

A. Description/Function:	3.3V Input to Regulated 5V Output Charge Pumps
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia
F. Date of Initial Production:	January 24, 1998

## III. Packaging Information

A. Package Type:	3x3 mm 8L UMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1701-0322 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	221°C/W
K. Single Layer Theta Jc:	42°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	42°C/W

## IV. Die Information

A. Dimensions:	80 X 58 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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 microns (as drawn)
G. Bondpad Dimensions:	
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 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{4.04}{192 \times 4340 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 10.1 \times 10^{-9}$$

$$\lambda = 10.1 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 S12 Process results in a FIT Rate of 0.17 @ 25C and 3.00 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (ESD lot NQPACA004A D/C 9843, Latch-Up lot NGPAHA004A D/C 0101)

The PW94 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX683EUA+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C	DC Parameters	80	0	NQPBHA005B, D/C 0105
	Biased	& functionality	80	1	IQPBGA009D, D/C 0014
	Time = 192 hrs.		80	0	IQPBEQ001C, D/C 9936

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