

RELIABILITY REPORT
FOR
MAX5083ATE+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX5083ATE+ 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 MAX5082/MAX5083 are 250kHz PWM step-down DC-DC converters with an on-chip, 0.3 μ A high-side switch. The input voltage range is 4.5V to 40V for the MAX5082 and 7.5V to 40V for the MAX5083. The output is adjustable from 1.23V to 32V and can deliver up to 1.5A of load current. Both devices utilize a voltage-mode control scheme for good noise immunity in the high-voltage switching environment and offer external compensation allowing for maximum flexibility with a wide selection of inductor values and capacitor types. The switching frequency is internally fixed at 250kHz and can be synchronized to an external clock signal through the SYNC input. Light load efficiency is improved by automatically switching to a pulse-skip mode. All devices include programmable undervoltage lockout and soft-start. Protection features include cycle-by-cycle current limit, hiccup-mode output short-circuit protection, and thermal shutdown. Both devices are available in a space-saving, high-power (2.7W), 16-pin TQFN package and are rated for operation over the -40°C to +125°C temperature range.

II. Manufacturing Information

A. Description/Function:	1.5A, 40V, MAXPower Step-Down DC-DC Converters
B. Process:	BCD8
C. Number of Device Transistors:	2925
D. Fabrication Location:	Oregon
E. Assembly Location:	Taiwan, China, Thailand
F. Date of Initial Production:	April 19, 2005

III. Packaging Information

A. Package Type:	16-pin TQFN 5x5
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:	#05-9000-1600
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:	1.7°C/W
L. Multi Layer Theta Ja:	30°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	132X129 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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)

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

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

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 BCD8 Process results in a FIT Rate of 0.05 @ 25C and 0.98 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NYL3AA001A, D/C 0449)

The NP73-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V 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

MAX5083ATE+

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	NYL3AA001A, D/C 0449

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