

RELIABILITY REPORT
FOR
MAX771ESA+
PLASTIC ENCAPSULATED DEVICES

June 24, 2011

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX771ESA+ 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 MAX770-MAX773 step-up switching controllers provide 90% efficiency over a 10mA to 1A load. A unique current-limited pulse-frequency-modulation (PFM) control scheme gives these devices the benefits of pulse-width-modulation (PWM) converters (high efficiency at heavy loads), while using less than 110 μ A of supply current (vs. 2mA to 10mA for PWM converters). These ICs use tiny external components. Their high switching frequencies (up to 300kHz) allow surface-mount magnetics of 5mm height and 9mm diameter. The MAX770/MAX771/MAX772 accept input voltages from 2V to 16.5V. Output voltages are preset at 5V, (MAX770), 12V (MAX771), and 15V (MAX772); they can also be adjusted using two resistors. The MAX773 accepts inputs from 3V to 16.5V. For a wider input range, it features an internal shunt regulator that allows unlimited higher input voltages. The MAX773's output can be set to 5V, 12V, or 15V, or it can be adjusted with two resistors. The MAX770-MAX773 drive external N-channel MOSFET switches, allowing them to power loads up to 15W. If less power is required, use the MAX756/MAX757 or MAX761/MAX762 step-up switching regulators with on-board MOSFETs.

II. Manufacturing Information

A. Description/Function:	5V/12V/15V or Adjustable, High-Efficiency Low-I_Q, Step-Up DC-DC Controllers
B. Process:	SG5
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	8-pin SOIC (N)
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:	#05-1701-0124
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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	128.4°C/W
M. Multi Layer Theta Jc:	36°C/W

IV. Die Information

A. Dimensions:	80 X 126 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:	5.0 microns (as drawn)
F. Minimum Metal Spacing:	5.0 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 121 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 1.8 \times 10^{-9}$$

$$\lambda = 1.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 SG5 Process results in a FIT Rate of 0.12 @ 25C and 2.04 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NTTBF4043A D/C 9919)

The PW09-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-200mA.

Table 1
Reliability Evaluation Test Results

MAX771ESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	121	0	NTTFFA417D, D/C 0613

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