



RELIABILITY REPORT
FOR
MAX887HESA+
PLASTIC ENCAPSULATED DEVICES

June 8, 2012

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX887HESA+ 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	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX887 high-efficiency, step-down DC-DC converter provides an adjustable output from 1.25V to 10.5V. It accepts inputs from 3.5V to 11V and delivers 600mA. Operation to 100% duty cycle minimizes dropout voltage (300mV typ at 500mA). Synchronous rectification reduces output rectifier losses, resulting in efficiency as high as 95%. Fixed-frequency pulse-width modulation (PWM) reduces noise in sensitive communications applications. Using a high-frequency internal oscillator allows tiny surface-mount components to reduce PC board area, and eliminates audio-frequency interference. A SYNC input allows synchronization to an external clock to avoid interference with sensitive RF and data-acquisition circuits. The MAX887 features current-mode operation for superior load/line-transient response. Cycle-by-cycle current limiting protects the internal MOSFET and rectifier. A low-current (2.5 μ A typ) shutdown mode conserves battery life.

II. Manufacturing Information

A. Description/Function:	100% Duty Cycle, Low-Noise, Step-Down, PWM DC-DC Converter
B. Process:	S12
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:	150 mil 8L SOIC
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:	#05-1701-0330 / 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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	132°C/W
M. Multi Layer Theta Jc:	38°C/W

IV. Die Information

A. Dimensions:	80 X 115 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:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 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 (lot IHJCIA007C D/C 0038)

The PW63-2 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 +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX887HESA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	IHJCHA029A, D/C 9823
	Biased	& functionality	80	0	IHJCI3002A, D/C 9931
	Time = 192 hrs.				

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