RELIABILITY REPORT

FOR

MAX850_SA+T

PLASTIC ENCAPSULATED DEVICES

March 14, 2017

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX850_SA+T 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 MAX850-MAX853 low-noise, inverting, charge-pump power supplies are ideal for biasing GaAsFETs in cellular telephone transmitter amplifiers. The MAX850-MAX852 offer both preset (-4.1V) and adjustable (-0.5V to -9.0V) output voltages. The MAX853 uses an external positive control voltage to set the negative output voltage. Input voltage range for all four devices is 4.5V to 10V. Output current is 5mA. An internal linear regulator reduces the output voltage ripple to 2mVP-P. With a well-filtered control voltage (VCTRL), the MAX853 achieves typical output ripple of less than 1mVP-P. Supply current is 3mA max, and shutdown current is less than 1µA max over temperature (5µA max for MAX851).

II. Manufacturing Information

A. Description/Function:	Low-Noise, Regulated, Negative Charge Pump Power Supplies for GaAsFET Bias
B. Process:	M5
C. Fabrication Location:	USA
D. Assembly Location:	Thailand, Philippines
E. 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 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1701-0168
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:	85X127 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/1.0%Si
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. Isolation Dielectric:	SiO_2
H. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Eric Wright (Reliability Engineering) Brian Standley (Manager, Reliability) 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 715 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.73 \times 10^{-9}$

$\lambda = 1.73$ 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 M5 Process results in a FIT Rate of 0.34 @ 25C and 5.79 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The PW33 die type has been found to have all pins able to withstand an 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 and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX850_SA+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	715	0	

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