RELIABILITY REPORT

FOR

MAX15027ATB+
(MAX15027/MAX15028)

PLASTIC ENCAPSULATED DEVICES

April 13, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX15027ATB+ 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 MAX15027/MAX15028 low-dropout linear regulators operate from input voltages as low as 1.425V and deliver up to 1A of continuous output current with a typical dropout voltage of only 75mV. The output voltage is adjustable from 0.5V to VIN and is ±2% accurate over load and line variations, from -40°C to +125°C. The MAX15028 features a BIAS input of 3V to 5.5V from an always-on power supply. The BIAS input current is reduced down to less than 2µA during shutdown. These regulators use small, 1µF ceramic input capacitors and 4.7µF ceramic output capacitors to deliver 1A output current. High bandwidth provides excellent transient response and limits the output voltage deviation to 15mV for a 500mA load step, with only a 4.7µF ceramic output capacitor, and the voltage deviations can be reduced further by increasing the output capacitor. These devices offer a logic-controlled shutdown input to reduce input current (IIN) consumption down to less than 5.5µA in standby mode. Other features include a soft-start to reduce inrush current, short-circuit protection, and thermal-overload protection. The MAX15028 features a BIAS input allowing a secondary supply to keep the LDO's internal circuitry alive if the voltage on IN goes to 0V. Both devices are fully specified from -40°C to +125°C and are available in a 10-pin thermally enhanced TDFN package (3mm x 3mm) that includes an exposed pad for optimal power dissipation. For a 500mA version of these LDOs, refer to the MAX15029/MAX15030 data sheet.

II. Manufacturing Information

A. Description/Function:	1.425V to 3.6V Input, 1A Low-Dropout Regulators with BIAS Input
B. Process:	S4
C. Number of Device Transistors:	2664
D. Fabrication Location:	Texas
E. Assembly Location:	ASAT China, Hana Thailand, UTL Thailand
F. Date of Initial Production:	January 24, 2009

III. Packaging Information

A. Package Type:	10-pin TDFN 3x3
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	54°C/W
K. Single Layer Theta Jc:	8.5°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.5°C/W

IV. Die Information

A. Dimensions:	46 X 72 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/0.5%Cu
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. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 48 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the S4 Process results in a FIT Rate of 4.6 @ 25C and 79.2 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

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

The NQ10 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCC Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX15027ATB+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2)				
Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data