RELIABILITY REPORT

FOR

MAX6773+

PLASTIC ENCAPSULATED DEVICES

August 4, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX6773+ 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 MAX6765-MAX6774B are low-quiescent-current, high-voltage linear regulators that operate from 4V to 72V and deliver up to 100mA of load current. These low-power devices consume only 31µA of quiescent current, making them ideal for always-on automotive modules. These devices are offered with fixed standard output options of 5.0V, 3.3V, 2.5V, and 1.8V, or can be adjusted from 1.8V to 11V with two external resistors. The MAX6765-MAX6774B feature a push-pull or open-drain, active-low RESET output with either fixed or adjustable thresholds. Whenever the regulator's output falls below the reset threshold, the active-low RESET output asserts and remains asserted for at least the minimum reset timeout period after the output voltage exceeds its threshold. The minimum reset timeout period is offered with fixed values from 75µs to 200ms or can be adjusted externally with a small capacitor. These devices provide three regulator enable modes to accommodate several power-on schemes. The MAX6765/MAX6766/MAX6769/MAX6770/MAX6773/MAX6773B/MAX6774/MAX6774B feature a single traditionalenable input (ENABLE) to turn on and off the regulator. The MAX6771/MAX6772 provide dual enable inputs (ENABLE1 and ENABLE2) to turn on and off the regulator either through an ignition switch or a bus transceiver. The MAX6767/MAX6768 provide a hold input (active-low HOLD) in addition to the enable input to allow for the implementation of a self-holding circuit without requiring external components. Setting active-low HOLD low after enabling the regulator forces the regulator to remain on even if ENABLE is subsequently set low. Releasing active-low HOLD shuts down the regulator. The MAX6773/MAX6773B/MAX6774/MAX6774B also include a watchdog input that monitors a pulse train from the microprocessor (µP) and generates a reset pulse if the watchdog input remains high or low for a duration longer than the 1.6s (typ) (MAX6773/MAX6774) or 50ms (typ) (MAX6773B/MAX6774B) watchdog timeout period. The MAX6765-MAX6774B are available in a small, thermally enhanced 3mm x 3mm TDFN package that can dissipate up to 1.951W, thereby supporting continuous regulator operation during high ambient temperatures, high battery voltage, and high load-current conditions. The MAX6765-MAX6774B are fully specified for a -40°C to +125°C operating temperature range.

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II. Manufacturing Information

A. Description/Function:	Automotive Micropower Linear Regulators with Supervisor
B. Process:	BCD88
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Philippines, Malaysia, China, Thailand
F. Date of Initial Production:	October 21, 2006

III. Packaging Information

A. Package Type:	8-pin TDFN 3x3
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:	#05-9000-2475
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:	8.3°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8.3°C/W

IV. Die Information

A. Dimensions:	70 X 94 mils
B. Passivation:	Si_3N_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:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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 BCD88 Process results in a FIT Rate of 0.81 @ 25C and 14.05 @ 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 MT06-6 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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Table 1
Reliability Evaluation Test Results

MAX6773+

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

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