RELIABILITY REPORT

FOR

MAX15068ATP+T

PLASTIC ENCAPSULATED DEVICES

February 4, 2016

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX15068ATP+T successfully met 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 MAX15068 offers ORing function and hot-swap features for two input-supply-rail applications requiring the safe insertion and removal of circuit line cards from a live backplane. The device integrates dual ORing MOSFET controllers, a single hot-swap controller, electronic circuit-breaker protection, and power monitoring in a single package. The device is designed to operate from 3.7V to 18V supply voltages. The device regulates the forward voltage drop across the ORing MOSFETs to ensure smooth current transfer from one supply to the other without oscillation. The ORing MOSFET turns on quickly to reduce the load voltage droop during supply switchover. If the input supply fails or is shorted, a fast turn-off minimizes reverse-current transients. The device implements a foldback current limit during hot-swap startup in order to control inrush current, thereby lowering di/dt and keeping the operation of the hot-swap MOSFET under safe operating area (SOA). An internal 70ms timer starts counting when the device enters the hot-swap startup phase. After the hot-swap startup cycle is completed, on-chip comparators provide active current-limit protection against short-circuit and overcurrent faults. The load is disconnected from the input quickly in the event of a fault condition. The device provides current monitoring from 3A to 10A (VIN = 12V, TA = +25°C with RSENSE = 3m) with ±0.6% accuracy. A voltage proportional to the input current delivered to the system could be read directly at the IPMON pin. The device is factory-calibrated to deliver accurate overcurrent protection with ±5% accuracy. During an overcurrent-fault condition, the device enters an autoretry mode. The device features an adjustable slew-rate control during startup. Additional features include power-good and fault-indicator outputs. The MAX15068 is available in a 20-pin, (4mm x 5mm) TQFN package and is specified from a -40°C to +125°C operating temperature range.

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II. Manufacturing Information

A. Description/Function:	Dual ORing, Single Hot-Swap Controller with Accurate Current Monitoring
B. Process:	S18
C. Number of Device Transistors:	28092
D. Fabrication Location:	Japan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	December 20, 2013

III. Packaging Information

A. Package Type:	20-pin TQFN
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Cu (.8 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5472
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:	N/A°C/W
K. Single Layer Theta Jc:	N/A°C/W
L. Multi Layer Theta Ja:	21.4°C/W
M. Multi Layer Theta Jc:	20°C/W

IV. Die Information

A. Dimensions:	83.0708 X 114.9606 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/.05%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.7 \times 10^{-9}$

λ = 13.7 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 S18 Process results in a FIT Rate of 0.05 @ 25°C and 0.93 @ 55°C (0.8 eV, 60% UCL)

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

The NS01 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM: +/- 2000V per JEDEC JESD22-A114
ESD-CDM: +/- 750V per JEDEC JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

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Table 1
Reliability Evaluation Test Results

MAX15068ATP+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	80	0	EAXF1Q001B, D/C 1440

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

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