RELIABILITY REPORT

FOR

MAX5980GTJ+T

PLASTIC ENCAPSULATED DEVICES

December 13, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX5980GTJ+T 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 MAX5980 is a quad, power-sourcing equipment (PSE) power controller designed for use in IEEE® 802.3at/af-compliant PSE. This device provides powered device (PD) discovery, classification, current limit, and load disconnect detection. The device supports both fully automatic operation and software programmability. The device also supports new 2-event classification and Class 5 for detection and classification of high-power PDs. The device supports single-supply operation, provides up to 70W to each port (Class 5 enabled), and still provides high-capacitance detection for legacy PDs. The device features an I²C-compatible, 3-wire serial interface, and is fully software configurable and programmable. The device provides instantaneous readout of port current and voltage through the I²C interface. The device's extensive programmability enhances system flexibility, enables field diagnosis, and allows for uses in other, nonstandard applications. The device is available in a space-saving, 32-pin TQFN (5mm x 5mm) power package and is rated for the automotive (-40°C to +105°C) temperature range.

II. Manufacturing Information

A. Description/Function:	Quad, IEEE 802.3at/af PSE Controller for Power-over-Ethernet
B. Process:	S45
C. Number of Device Transistors:	147621
D. Fabrication Location:	USA
E. Assembly Location:	China, Malaysia, Taiwan and Thailand
F. Date of Initial Production:	March 2, 2011

III. Packaging Information

A. Package Type:	32-pin TQFN 5x5
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:	#05-9000-4213
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:	47°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	140 X 112 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:	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:	
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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 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 S45 Process results in a FIT Rate of 0.06 @ 25C and 1.0 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SQ3ZCQ001B, D/C 1044)

The NQ62 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 100mA and overvoltage per JEDEC JESD78, except the SENSEx pins which pass +/- 30mA and OUTx pins which pass +/- 60mA.

Table 1

Reliability Evaluation Test Results

MAX5980GTJ+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	48	0	SQ3ZBQ001E, D/C 1033

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