RELIABILITY REPORT

FOR

MAX14629EETJ+

PLASTIC ENCAPSULATED DEVICES

April 27, 2012

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX14629EETJ+ 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 MAX14598E/MAX14629E are complete detection solutions allowing for USB-compliant battery charging, Its charger-detection block can detect all USB chargers , Apple chargers, and others, The USB enumeration block simplifies the charging of a dead battery while remaining 100% USB compliant.

The devices include support for USB Battery Charger Detection Revision 1.2, including data-contact detection (DCD), The USB charger-detection circuitry detects USB standard downstream port (SOP), USB charging downstream port (COP), or dedicated charger port (DCP), This circuitry also detects Apple chargers (500mA, 1A, and 2A) and other chargers (with 0+/0- bias voltages), The USB enumeration function operates when an SOP is detected to enable USB-compliant dead battery charging with no support from the host microprocessor.

External chargers are controlled through three open-drain outputs (ISET1, ISET2, and SUSP) This feature makes the device ideal to support most battery chargers (single Li+ cell and dual series Li+ cells) with external control. The charger control can be a combination of GPIO and 12C through the microprocessor host. The device includes overvoltage protection (OVP) and 5,25V (typ) LDO mode to protect against VBUS voltages up to 28V.

The MAX14598E/MAX14629E are optionally available in a 30-bump, O.4mm pitch wafer-level package (WLP) and a 32-pin , TOFN package, The devices operate over the extended -40°C to +85°C temperature range.

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II. Manufacturing Information

A. Description/Function:	USB Charger Detector with Enumeration
B. Process:	S18
C. Number of Device Transistors:	95067
D. Fabrication Location:	Japan
E. Assembly Location:	China
F. Date of Initial Production:	March 28, 2012

III. Packaging Information

A. Package Type:	32L TQFN
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:	#05-9000-4904 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	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:	98.03 X 87.8 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18µm
F. Minimum Metal Spacing:	0.18µm
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: 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 79 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 13.9 \times 10^{-9}$

λ = 13.9 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 S18 Process results in a FIT Rate of 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot EAEF6A020A D/C 1204)

The AL31-1 die type has been found to have all pins able to withstand a HBM transient pulse of:

ESD-HBM: +/-2500V per JEDEC JESD22-A114
ESD-MM: +/-160V per JEDEC JESD22-A115

Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

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Table 1
Reliability Evaluation Test Results

MAX14629EETJ+

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	79	0	E1KZCQ003B, D/C 1125

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

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