

RELIABILITY REPORT
FOR
MAX14575BETA+
PLASTIC ENCAPSULATED DEVICES

July 11, 2013

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX14575BETA+ successfully meets 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.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX14575A/MAX14575AL/MAX14575B/MAX14575C programmable current-limit switches feature internal current limiting to prevent damage to host devices due to faulty load conditions. These current-limit switches feature a low 32m Ω (typ) on-resistance and operate from a +2.3V to +5.5V input-voltage range. The current limit is adjustable from 250mA to 2.5A, making these devices ideal for charging a large load capacitor, as well as for high-current load switching applications. Each device in the family handles an overcurrent event differently depending on the option selected. The MAX14575A/MAX14575AL feature an autoretry mode; the MAX14575A has active-high EN polarity, while the MAX14575AL has active-low EN polarity. The MAX14575B has latch-off mode, and the MAX14575C features a continuous current-limit mode. Additional safety features include thermal-shutdown protection to prevent overheating and reverse-current blocking to prevent current from being driven back into the source. The MAX14575A/MAX14575AL/MAX14575B/MAX14575C are available in a small 2mm x 2mm, 8-pin TDFN package and operate over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	250mA to 2.5A Adjustable Current-Limit Switches
B. Process:	S18
C. Number of Device Transistors:	5398
D. Fabrication Location:	California
E. Assembly Location:	Taiwan, China, or Thailand
F. Date of Initial Production:	September 28, 2012

III. Packaging Information

A. Package Type:	8-pin TDFN 2x2
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-5068
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:	110°C/W
K. Single Layer Theta Jc:	8°C/W
L. Multi Layer Theta Ja:	83.9°C/W
M. Multi Layer Theta Jc:	8°C/W

IV. Die Information

A. Dimensions:	34.6457X63.7795 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
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:

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

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

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

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 @ 25C and 0.93 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot SAHJ9Q001A, D/C 1225)

The AL13-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX14575BETA+

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	SAHJ8Q001B, D/C 1225

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