

RELIABILITY REPORT
FOR
MAX4792EUS+
(MAX4789–MAX4794)
PLASTIC ENCAPSULATED DEVICES

March 24, 2009

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX4792EUS+ 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 MAX4789–MAX4794 family of switches feature internal current limiting to prevent damage to host devices due to faulty load conditions. These analog switches have a low 0.2 Ω on-resistance and operate from 2.3V to 5.5V input voltage range. They are available with guaranteed 200mA, 250mA, and 300mA current limits, making them ideal for SDIO and other load switching applications.

When the switch is on and a load is connected to the port, a guaranteed blanking time of 14ms ensures that the transient voltages settle down. If after this blanking time the load current is greater than the current limit, the MAX4789, MAX4791, and MAX4793 enter a latch-off state where the switch is turned off and active-low FLAG is issued to the microprocessor. The switch can be turned on again by cycling the power or the ON pin.

The MAX4790, MAX4792, and MAX4794 have an autoretry feature where the switch turns off after the blanking time and then continuously checks to see if the overload condition is present. The switch remains on after the overload condition disappears.

The MAX4789-MAX4794 are available in 6-pin 3mm x 3mm TDFN and tiny space-saving 4-pin SOT143 packages. The MAX4789/MAX4791/MAX4793 are also available in a tiny 5-pin SOT23 package. For lower current current-limiting switches, refer to the MAX4785-MAX4788 data sheet.

II. Manufacturing Information

A. Description/Function:	200mA/250mA/300mA Current-Limit Switches
B. Process:	C6
C. Number of Device Transistors:	1408
D. Fabrication Location:	California
E. Assembly Location:	Carsem Malaysia
F. Date of Initial Production:	October 26, 2002

III. Packaging Information

A. Package Type:	4-pin SOT
B. Lead Frame:	Alloy42
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	250°C/W
K. Single Layer Theta Jc:	130°C/W

IV. Die Information

A. Dimensions:	42 X 29 mils
B. Passivation:	SiO ₂ /SiN ₃
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6um
F. Minimum Metal Spacing:	0.6um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Saw

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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 126 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 8.5 \times 10^{-9}$$

$$\lambda = 8.5 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 C6Y Process results in a FIT Rate of 1.6 @ 25C and 19.9 @ 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 AH97-3 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX4792EUS+

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	126	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