RELIABILITY REPORT

FOR

MAX4786EXS+T

PLASTIC ENCAPSULATED DEVICES

May 11, 2015

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer

Conclusion

The MAX4786EXS+T 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.

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I. Device Description

A. General

The MAX4785-MAX4788 family of switches feature internal current limiting to prevent host devices from being damaged due to faulty load conditions. These analog switches have a low 0.7 on-resistance and operate from a 2.3V to 5.5V input voltage range. They are available with guaranteed 50mA and 100mA current limits, making them ideal for 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 MAX4785 and MAX4787 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 MAX4786 and MAX4788 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 MAX4785 and MAX4787 are available in a tiny space-saving 4-pin or 5-pin SC70 package. The MAX4786 and MAX4788 are available only in the 4-pin SC70 package. For higher current current-limiting switches, refer to the MAX4789-MAX4794 and MAX1693 data sheets.

II. Manufacturing Information

A. Description/Function:	50mA/100mA Current-Limit Switches
B. Process:	C6Y
C. Number of Device Transistors:	1659
D. Fabrication Location:	Japan
E. Assembly Location:	Malaysia
F. Date of Initial Production:	October 26, 2002

III. Packaging Information

A. Package Type:	4-pin SC70
B. Lead Frame:	Alloy42
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:	#05-1201-0300
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:	327°C/W
K. Single Layer Theta Jc:	115°C/W
L. Multi Layer Theta Ja:	322.6°C/W
M. Multi Layer Theta Jc:	115°C/W

IV. Die Information

A. Dimensions:	30X30 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:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	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:	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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1000 \times 4340 \times 152 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 1.39 \times 10^{-9}$

λ = 1.39 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 C6Y Process results in a FIT Rate of 0.16 @ 25C and 2.89 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SKM1FQ001A, D/C 0926)

The AH96-1 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 +/-100mA and overvoltage per JEDEC JESD78.

Table 1

Reliability Evaluation Test Results

MAX4786EXS+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 1000 hrs.	DC Parameters & functionality	152	0	IKM1BQ002Q, D/C 1115

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