



RELIABILITY REPORT
FOR
MAX4928A/BETN+, Rev TWZA
MAX4928BETN+, Rev, TWYA
PLASTIC ENCAPSULATED DEVICES

April 30, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX4928A/BETN+ 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 MAX4928A/MAX4928B high-speed passive switches route PCI Express® (PCIe) data and/or DisplayPort(tm) signals between two possible destinations in desktop or laptop PCs. The MAX4928A is intended to be used with the ATX form factor desktop PCs, while the MAX4928B is expected to be used in the BTX form factor. The MAX4928A/MAX4928B are hex double-pole/double-throw (6 x DPDT) switches. The MAX4928A/MAX4928B feature a single digital control input (SEL) to switch signal paths and a latch input (LE) that holds the switches in a given state. The MAX4928A/MAX4928B are fully specified to operate from a single +3.3V (typ) power supply. The MAX4928A/MAX4928B are available in an industry standard 5mm x 11mm, 56-pin TQFN package. Both devices operate over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	DisplayPort/PCIe Passive Switches
B. Process:	0.18um 1 Poly 6 Metal CMOS
C. Number of Device Transistors:	
D. Fabrication Location:	Taiwan
E. Assembly Location:	UTL Thailand
F. Date of Initial Production:	Jan 26, 2008

III. Packaging Information

A. Package Type:	56-pin TQFN 5x11
B. Lead Frame:	Copper
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. Multi Layer Theta Ja:	24.4°C/W
K. Multi Layer Theta Jc:	1.5°C/W

IV. Die Information

A. Dimensions:	65 X 210 mils
B. Passivation:	Laser/TEOS Ox - Pass/Nit -PreLP+GenLP
C. Interconnect:	Al/Cu 0.5%
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18um
F. Minimum Metal Spacing:	0.18um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO2
I. Die Separation Method:	Wafer 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:

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

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

$$\lambda = 22.4 \times 10^{-9}$$

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 TSMC 0.18um Process results in a FIT Rate of 0.8 @ 25C and 13.1 @ 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 AJ77/AJ77-1 die types have been found to have all pins able to withstand a HBM transient pulse of +/-2500 mA per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX4928A/BETN+

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	48	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