



PEX8509-AA25BI &, PEX8509-AA25BI G

Device Reliability Test Report
9/5/2007

Sitro

1.0 Purpose

PEX8509-AA25BI and PEX8509-AA25BI G are new devices with an 8 Lane, 8 Port, Gen 1 PCI Express (PCIe) Switch. The purpose of the following reliability tests is to qualify these new devices prior to releasing for volume manufacturing.

2.0 Scope

This report covers the qualification of PEX8509-AA25BI and PEX8509-AA25BI G. The actual tests were conducted on the lead free devices with the leaded version being qualified by structural similarity.

3.0 Product Die Description

Part Type (Family)	PEX8509-AA
Die Revision	AA
Wafer Technology	CMOS 0.13 μ m
Poly / Metal	1P/6m
Fabrication Location	TSMC, Taiwan

PEX8509-AA25BI uses the same process technology in the same wafer fabrication location as the PEX8518-AB25BI and PEX8518-AC25BI. Similarity data for these devices is used in this qualification.

3.1 Die Qualification Test Result (PEX8509-AA)

3.1.1 High Temperature Operating Life Test (JESD22-A108-B), Condition: Ta= 125°C

Qual lot #	48 hrs	168 hrs	500 hrs	1000 hrs	Comment
	Rej / Qty	Rej / Qty	Rej / Qty	Rej / Qty	
1	0 / 120	0 / 120	0 / 120	0 / 120	PEX8509-AA Lot: N63419.00 / 0723, Completion: 8/24/07
2	0 / 120	0 / 120	0 / 120	0 / 120	PEX8518-AC Lot: GT0278.3E / 0714, Completion: 6/15/07
3	0 / 120	0 / 120	0 / 120	0 / 120	PEX8518-AB Lot: GP1449.4A / Completion: 2/12/07

- Total device hours of the device family = 960,240 hrs
- FIT=12, MTBF = 8.3×10^7 hrs based on confidence level 60% UCL, 55 °C & Activation energy 0.7 eV

3.1.2 ESD (HBM JESD22-A114C)

Lot #	Qty	Stress Level	Result	Comment
1	5	± 2,000V	Pass	PEX8509-AA Lot: N63419.00 / 0723, Completion: 7/18/07

3.1.3 ESD (CDM JESD22-C101C)

Lot #	Qty	Stress Level	Result	Comment
1	5	± 500V	Pass	PEX8509-AA Lot: N63419.00 / 0723, Completion: 7/18/07

3.1.4 Latch-up (JESD78A, Condition II)

Lot#	Qty	Stress Level	Result	Comment
1	6	1.5 X Vcc Max, Current injection ± 150 mA	Pass	PEX8509-AA Lot: N63419.00 / 0723, Completion: 7/18/07

3.2 Package Qualification Test Results

PEX8509-AA25BI (Green and Non-Green) use the same assembly location, BGA package type and construction as the PEX8517-AA25BI (PBGA-H 27mmx27mm, 312L).

PEX8509-AA25BI (Green and Non-Green) are assembled in a smaller PBGA package (15x15) and hence are qualified by extension to the larger PEX8517-AA25BI PBGA-H package.

Package Description (8509-AA25BI Green and Non-Green)

Package	PBGA
Pin Count	196
Assembly Location	STATS ChipPAC Korea
Body Dimensions	15 x 15 x 1.80 (mm ³)
Solder ball composition	SAC 305 – lead free 63Sn/37Pb – non- lead free

3.2.1 Pre-condition Level 3 (JESD-A113D), 192hrs 30°C/60%RH

Lot #	Qty	Electrical Test Fail/Pass	SAM Result Fail/Pass
3 lots	135*	0/135	0/10

* 135 from 45 x 3 assembly date code lots

3.2.1.1 Pressure Cooker Test (JESD-A102-C), 168 Hrs @ 121°C/100% RH

Lot #	Qty	Result Fail/Pass
3 lots	45*	0/45

* 15 x 3 assembly lots from 3.2.1 above after precondition

3.2.1.2 Temperature Cycle Test (JESD22-A104B, Condition C), -65°C to 150°C

Lot #	Qty	250 Cycles		500 Cycles		1000 cycles	
		Reject	Pass	Reject	Pass	Reject	Pass
3 lots	45	0	45	0	45	0	45

* 15 x 3 assembly lots from 3.1.1 above after precondition

3.2.1.3 THBT 85/85 (JESD22-A101-B), -85/85%RH, 1000 hours

Lot #	Qty	250 Hours		500 Hours		1000 Hours	
		Reject	Pass	Reject	Pass	Reject	Pass
3 lots	45	0	45	0	45	0	45

* 15 x 3 assembly lots from 3.1.1 above after precondition

3.2.1.4 High Temperature Storage Life (JESD22-A103-B), 150°C, 1000 hours

Lot #	Qty	Result Fail/Pass
3 lots	45**	0/135

** 15 x 3 assembly lots

3.2.2 Die Shear

Specification (mean-3σ)	Lot#	Qty	Avg.kgF	σ kgF	Result (mean-3σ)
>5 kgF	1	10	21.42	2.56	13.74
>5 kgF	2	10	21.11	2.38	13.97
>5 kgF	3	10	20.91	2.10	14.61

3.2.4 Bonding Wire Pull Strength

Specification (mean-3 σ)	Lot#	Qty	avg (g)	σ (g)	Result (mean-3 σ)
>5 gram	1	20	6.38	0.18	5.84
>5 gram	2	20	6.50	0.28	5.66
>5 gram	3	20	6.72	0.15	6.27

3.2.5 Solder Ball Shear As-built

Specification (mean-3 σ)	Lot#	Qty	avg (g)	σ (g)	Result (mean-3 σ)
700gm	1	25	1033.4	100.79	932.6
700gm	2	25	1054.0	78.03	819.91
700gm	3	25	1026.5	113.75	685.25

3.2.6 Solder Ball Shear after 1000 hrs THBT

Specification (mean-3 σ)	Lot#	Qty	avg (g)	σ (g)	Result (mean-3 σ)
500gm	1	25	963.6	124.59	589.83
500gm	2	25	1006.2	153.22	546.54
500gm	3	25	1057.8	122.93	689.01

3.2.7 Solder Ball Shear after 1000 cycle Temperature Cycle Test

Specification (mean-3 σ)	Lot#	Qty	avg (g)	σ (g)	Result (mean-3 σ)
500gm	1	25	979.60	105.62	662.74
500gm	2	25	1014.2	146.48	574.76
500gm	3	25	1057.8	122.93	689.01

4.0 CONCLUSION

PEX8509-AA25BI (Green and Non-Green) have successfully passed all the qualifications tests required prior to its full release to volume manufacturing.