



PLX TECHNOLOGY QUARTERLY MONITOR REPORT

RELIABILITY TEST

Q3, 2011: Rev. 1



PROCESS TECHNOLOGY MATRIX

FOUNDRY FAB

TSMC, Taiwan

Epson, Japan

Renesas, Japan

PROCESS TECHNOLOGIES

0.040, 0.065, 0.09, 0.13, 0.18, 0.25 μm CMOS

0.35 μm , CMOS

0.15 μm CMOS

DIE RELIABILITY DATA OUTLINE

HTOL (IFR/EFR)

ASSEMBLY SUBCON

Amkor, Taiwan

ASE, Kaohsiung

ASE, Malaysia

Renesas, Japan

Seiko-Epson, Japan

STATS ChiPAC, Korea

STATS ChiPAC, Singapore

UTAC, Singapore

PACKAGE TECHNOLOGIES

HFCBGA

EPQFP, QFN, PBGA, HSBGA, HFCBGA

PQFP, PBGA, HSBGA

PQFP, PBGA, FBGA

PQFP, PBGA

PBGA, HSBGA

PQFP

PQFP, EPQFP

PACKAGE RELIABILITY DATA OUTLINE

TCT

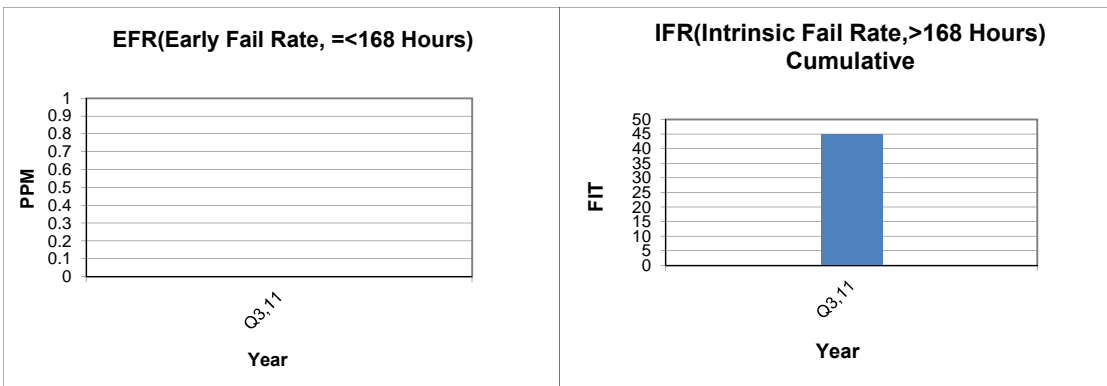
THBT/HAST

PCT



RELIABILITY HTOL DATA @115 °C

FOUNDRY: TSMC Taiwan, Process: 40 nm GP Low-K Cu CMOS							
EFR (Early Fail Rate, =< 168 Hours)				FITs @ 60% CL, 55C, Ea = 0.7eV			
YEAR	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
Q3,11	416	0	0	416	445,568	0	45
Note:							

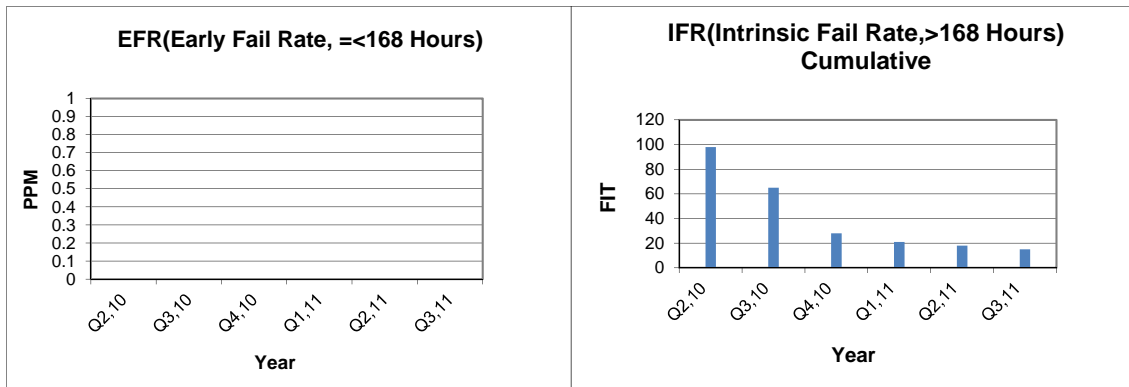




RELIABILITY HTOL DATA @125 °C

FOUNDRY: TSMC Taiwan, Process: 0.065 μm Low-K CMOS							
YEAR	EFR (Early Fail Rate, =< 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
Q2,10	120	0	0	120	120,000	0	98
Q3,10	1284	0	0	1284	181,632	0	65
Q4,10	2756	0	0	2756	427,968	0	28
Q1,11	120	0	0	120	547,968	0	21
Q2,11	120	0	0	120	667,968	0	18
Q3,11	120	0	0	120	787,968	0	15

Note:

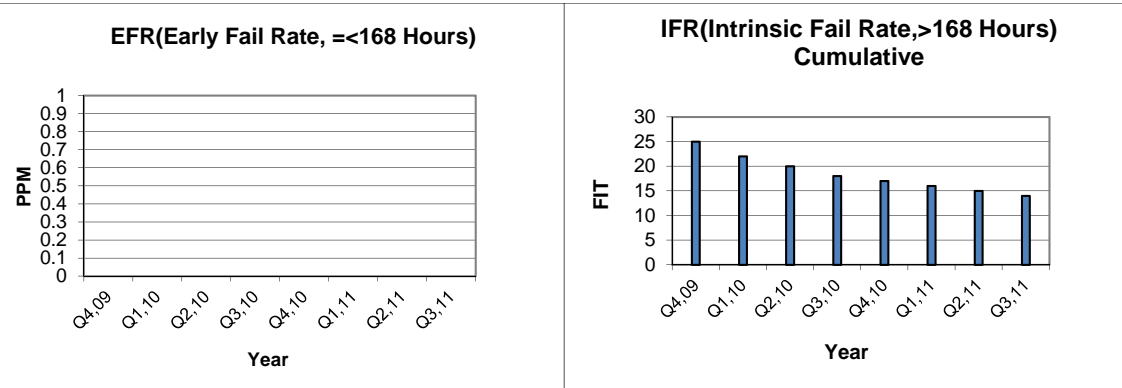




RELIABILITY HTOL DATA @125 °C

FOUNDRY: TSMC Taiwan, Process: 0.09 μm Low-K CMOS							
YEAR	EFR (Early Fail Rate,=< 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
Q1,08	120	0	0	120	60,000	0	196
Q2,08	120	0	0	120	210,000	0	56
Q3,08	120	0	0	120	330,000	1*	79
Q4,08	120	0	0	120	450,000	0	58
Q1,09	120	0	0	120	570,000	0	46
Q2,09	240	0	0	240	810,000	0	32
Q3,09	120	0	0	120	930,000	0	28
Q4,09	120	0	0	120	1,050,000	0	25
Q1,10	120	0	0	120	1,170,000	0	22
Q2,10	120	0	0	120	1,290,000	0	20
Q3,10	120	0	0	120	1,410,000	0	18
Q4,10	120	0	0	120	1,530,000	0	17
Q1,11	120	0	0	120	1,650,000	0	16
Q2,11	120	0	0	120	1,770,000	0	15
Q3,11	120	0	0	120	1,890,000	0	14

Note:
 *=1 unit damaged during failure analysis, root cause could not be determined, random failure.

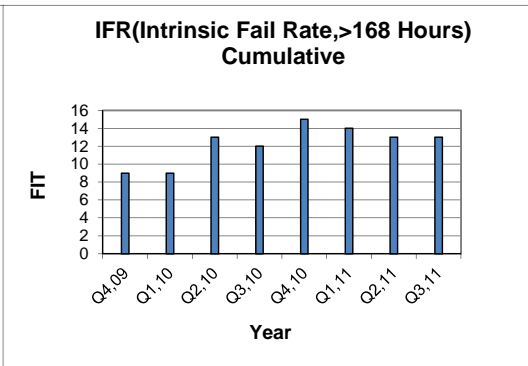
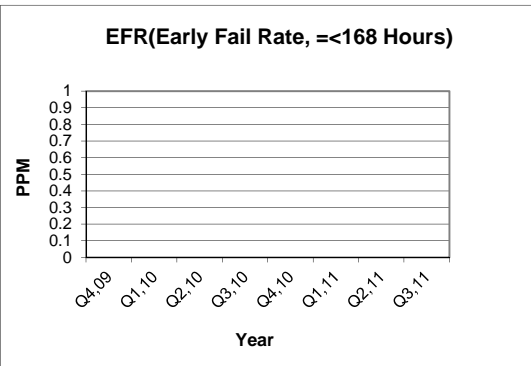




RELIABILITY HTOL DATA @125 °C

FOUNDRY: TSMC Taiwan, Process: 0.13 μm LVC MOS							
YEAR	EFR (Early Fail Rate, <= 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
2005	499	1*	0	499	359,500	0	25
2006	1200	0	0	1199	1,107,800	1**	11
Q1,07	360	0	0	360	1,467,800	0	8
Q2,07	240	0	0	240	1,607,960	0	7
Q4,07	120	0	0	120	1,727,960	0	7
Q1,08	120	0	0	120	1,787,960	0	7
Q2,08	120	0	0	120	1,847,960	0	6
Q3,08	120	0	0	119	1,966,960	1***	13
Q4,08	120	0	0	120	2,086,960	0	12
Q1,09	120	0	0	120	2,206,960	0	12
Q2,09	120	0	0	120	2,326,960	0	11
Q3,09	239	1****	0	239	2,565,960	0	10
Q4,09	240	0	0	240	2,805,960	0	9
Q1,10	240	0	0	240	2,985,960	0	9
Q2,10	240	0	0	240	3,165,960	1***	13
Q3,10	240	0	0	240	3,405,960	0	12
Q4,10	240	0	0	239	3,644,960	1***	15
Q1,11	240	0	0	240	3,884,960	0	14
Q2,11	120	0	0	120	4,004,960	0	13
Q3,11	120	0	0	120	4,124,960	0	13

Note:
 * = invalid reject at 168 hrs due to EOS
 ** = invalid reject due to mechanical damage after 1000 hrs
 *** = 1 unit functional failure, root cause could not be determined, random failure.
 **** = invalid reject at 168 hrs due to Assy related stitch bond issue.

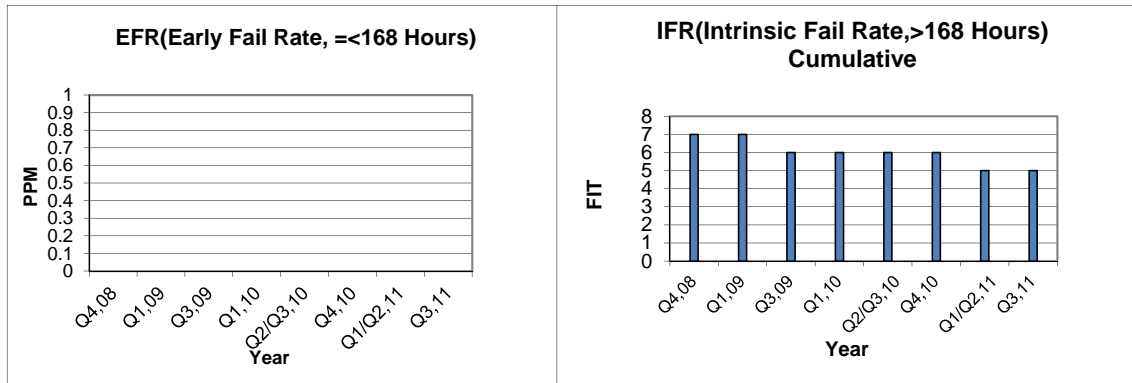




RELIABILITY HTOL DATA @125 °C

FOUNDRY: Renesas Japan, Process: 0.15 μm CMOS							
EFR (Early Fail Rate, =< 168 Hours)				FITs @ 60% CL, 55C, Ea = 0.7eV			
YEAR	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
2000-2007	1366	0	0	1366	1,366,000.00	0	9
Q1,08	120	0	0	120	1,486,000.00	0	8
Q2,08	120	0	0	120	1,606,000.00	0	7
Q3,08	96	0	0	96	1,654,000.00	0	7
Q4,08	96	0	0	96	1,702,000.00	0	7
Q1,09	72	0	0	72	1,774,000.00	0	7
Q3,09	72	0	0	72	1,846,000.00	0	6
Q1,10	44	0	0	44	1,890,000.00	0	6
Q2/Q3,10	45	0	0	45	1,935,000.00	0	6
Q4,10	120	0	0	120	2,055,000.00	0	6
Q1/Q2,11	48	0	0	48	2,151,000.00	0	5
Q3,11	72	0	0	72	2,295,000.00	0	5

Note:

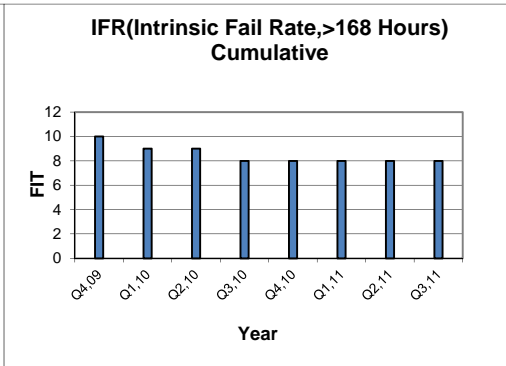
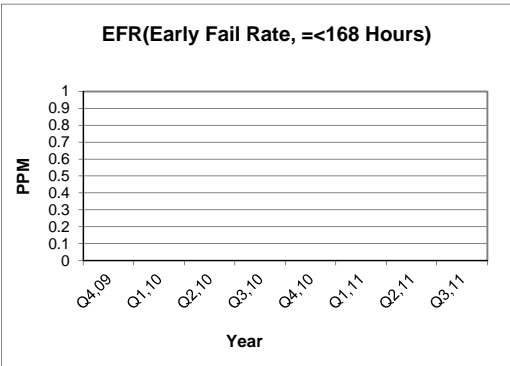




RELIABILITY HTOL DATA @125 °C

FOUNDRY: TSMC Taiwan, Process: 0.18 μm CMOS							
YEAR	EFR (Early Fail Rate, =< 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
2005	480	0	0	480	838,168	0	14
2006	480	0	0	479	1,314,668	1*	20
Q1,07	120	0	0	120	1,434,668	0	18
Q2,07	120	0	0	120	1,554,668	0	17
Q3,07	119	0	0	119	1,653,676	0	16
Q4,07	120	0	0	120	1,773,676	0	15
Q1,08	120	0	0	120	1,833,676	0	14
Q2,08	120	0	0	120	2,013,676	0	13
Q3,08	120	0	0	120	2,133,676	0	12
Q4,08	120	0	0	120	2,253,676	0	12
Q1,09	120	0	0	120	2,373,676	0	11
Q2,09	120	0	0	120	2,493,676	0	10
Q3,09	120	0	0	119	2,612,676	1**	10
Q4,09	120	0	0	120	2,732,676	0	10
Q1,10	120	0	0	120	2,852,676	0	9
Q2,10	120	0	0	120	2,972,676	0	9
Q3,10	120	0	0	120	3,092,676	0	8
Q4,10	120	0	0	119	3,211,676	1***	8
Q1,11	120	0	0	120	3,212,676	0	8
Q2,11	120	0	0	120	3,331,676	0	8
Q3,11	120	0	0	120	3,332,676	0	8

Note: * = 1 unit functional failure, root cause could not be determined, random failure.
 ** = invalid reject at 500 hrs due to missing solder balls
 *** = invalid reject at 1000 hrs due to EOS

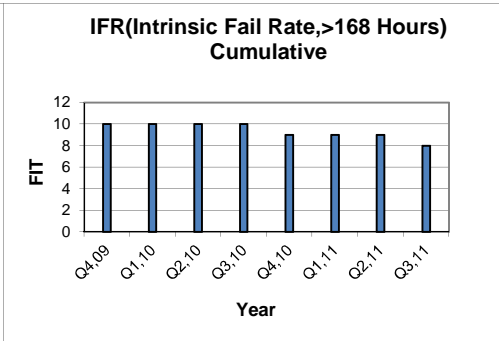
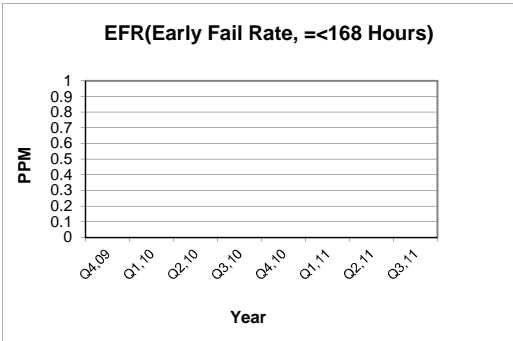




RELIABILITY HTOL DATA @125 °C

FOUNDRY: TSMC Taiwan, Process: 0.25 μm CMOS							
YEAR	EFR (Early Fail Rate, =< 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
2005	480	0	0	477	1,138,096	3*	10
2006	480	0	0	480	1,528,096	0	7
Q1,07	120	0	0	120	1,587,764	0	7
Q2,07	119	0	0	119	1,675,264	1*	7
Q3,07	120	0	0	111	1,786,264	9**	7
Q4,07	120	0	0	120	1,906,264	0	6
Q1,08	120	0	0	120	1,966,264	0	6
Q2,08	120	0	0	120	2,026,264	1***	13
Q3,08	100	0****	0	100	2,126,264	0****	12
Q1,09	100	0****	0	100	2,226,264	0****	12
Q2,09	100	0****	0	100	2,326,264	0****	11
Q3,09	100	0****	0	100	2,426,264	0****	11
Q4,09	100	0****	0	100	2,526,264	0****	10
Q1,10	100	0****	0	100	2,626,264	0****	10
Q2,10	100	0****	0	100	2,626,264	0****	10
Q3,10	100	0****	0	100	2,726,264	0****	10
Q4,10	100	0****	0	100	2,826,264	0****	9
Q1,11	100	0****	0	100	2,926,264	0****	9
Q2,11	100	0****	0	100	3,026,264	0****	9
Q3,11	100	0****	0	100	3,126,264	0****	8

Note: * = mechanical damage after 500 hrs
 ** = 9 mechanical damage after 1KH
 *** = 1 unit functional failure after 1000 hrs, root cause could not be determined, random failure.
 **** = TSMC Process HTOL Reliability Data.

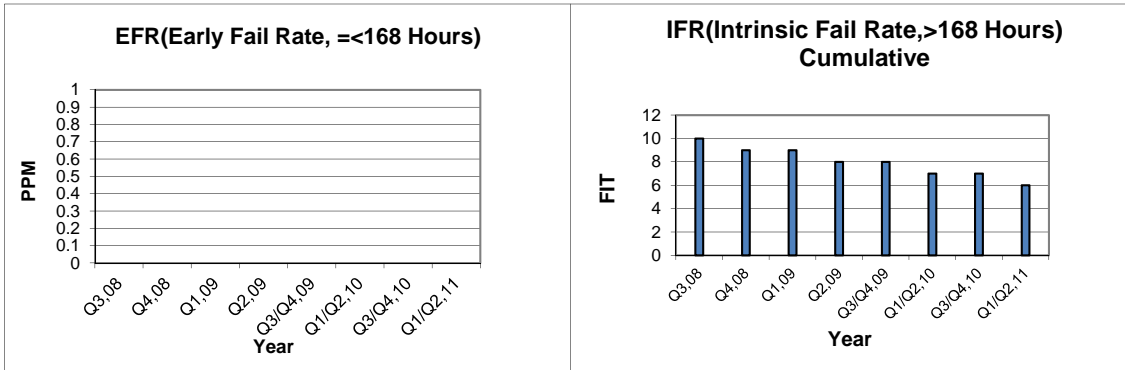




RELIABILITY HTOL DATA @125 °C

FOUNDRY: Epson Japan, Process: 0.35 μm CMOS							
YEAR	EFR (Early Fail Rate, =< 168 Hours)			FITs @ 60% CL, 55C, Ea = 0.7eV			
	Sample	# Failure	PPM	Sample	Cum Dev	# Failure	FITs
2003	315	0	0	315	240,120	0	24
2004	450	0	0	450	734,230	0	16
2005	225	0	0	225	914,240	0	13
2006	225	0	0	225	1,071,240	0	11
Q1,07	45	0	0	45	1,093,740	0	11
Q2,07	66	0	0	66	1,104,740	0	11
Q1,08	44	0	0	44	1,126,740	0	10
Q2,08	132	0	0	132	1,214,740	0	10
Q3,08	22	0	0	22	1,225,740	0	10
Q4,08	44	0	0	44	1,269,740	0	9
Q1,09	135	0	0	135	1,337,240	0	9
Q2,09	135	0	0	135	1,404,740	0	8
Q3/Q4,09	135	0	0	135	1,539,740	0	8
Q1/Q2,10	135	0	0	135	1,674,740	0	7
Q3/Q4,10	135	0	0	135	1,809,740	0	7
Q1/Q2,11	135	0	0	135	1,944,740	0	6

Note:





RELIABILITY STRESS DATA

Temperature Cycle Test >=500 Cycles, -65/+150 °C					
YEAR	PKG	SAMPLE	500 cycles	FAILURE RATE	FINAL RESULT
	TYPE	SIZE		(%)	(PASS/FAIL)
2008	H/FCBGA	270	0	0	PASS
2009	H/FCBGA	644	0	0	PASS
2010	H/FCBGA	541	0	0	PASS
Q1,11	H/FCBGA	86	0	0	PASS
Q2,11	H/FCBGA	95	0	0	PASS
Q3,11	H/FCBGA	45	0	0	PASS
2008	HSBGA	465	0	0	PASS
2009	HSBGA	909	0	0	PASS
2010	HSBGA	579	0	0	PASS
Q1,11	HSBGA	231	0	0	PASS
Q2,11	HSBGA	248	0	0	PASS
Q3,11	HSBGA	316	0	0	PASS
2004-2007	PBGA	4833	0	0	PASS
2008	PBGA	1785	0	0	PASS
2009	PBGA	932	0	0	PASS
2010	PBGA	678	0	0	PASS
Q1,11	PBGA	97	0	0	PASS
Q2,11	PBGA	120	0	0	PASS
Q3,11	PBGA	120	0	0	PASS
2010	QFN	255	0	0	PASS
Q1,11	QFN	121	0	0	PASS
Q2,11	QFN	78	0	0	PASS
Q3,11	QFN	98	0	0	PASS
2004-2007	QFP	1583	0	0	PASS
2008	QFP	651	0	0	PASS
2009	QFP	629	0	0	PASS
2010	QFP	622	0	0	PASS
Q1,11	QFP	267	0	0	PASS
Q2,11	QFP	170	0	0	PASS
Q3,11	QFP	241	0	0	PASS

Note:

ASSEMBLY SUBCON

Amkor, Taiwan
 ASE, Kaohsiung
 ASE, Malaysia
 Renesas, Japan
 Seiko-Epson, Japan
 STATS ChiPAC, Korea
 STATS ChiPAC, Singapore
 UTAC, Singapore

PACKAGE TECHNOLOGIES

HFCBGA
 EPQFP, QFN, PBGA, HSBGA, HFCBGA
 PQFP, PBGA, HSBGA
 PQFP, PBGA, FBGA
 PQFP, PBGA
 PBGA, HSBGA
 PQFP
 PQFP, EPQFP



RELIABILITY STRESS DATA

Temperature Humidity Test 85/85 or HAST				
YEAR	PKG	SAMPLE	FAILURE RATE	FINAL RESULT
	TYPE	SIZE	(%)	(PASS/FAIL)
2008	H/FCBGA	270	0	PASS
2009	H/FCBGA	585	0	PASS
2010	H/FCBGA	572	0	PASS
Q1,11	H/FCBGA	32	0	PASS
Q2,11	H/FCBGA	50	0	PASS
Q3,11	H/FCBGA	35	0	PASS
2008	HSBGA	465	0	PASS
2009	HSBGA	909	0	PASS
2010	HSBGA	497	0	PASS
Q1,11	HSBGA	210	0	PASS
Q2,11	HSBGA	338	0	PASS
Q3,11	HSBGA	407	0	PASS
2004-2007	PBGA	5047	0	PASS
2008	PBGA	1785	0	PASS
2009	PBGA	932	0	PASS
2010	PBGA	728	0	PASS
Q1,11	PBGA	97	0	PASS
Q2,11	PBGA	120	0	PASS
Q3,11	PBGA	120	0	PASS
2010	QFN	135	0	PASS
Q2,11	QFN	22	0	PASS
Q3,11	QFN	22	0	PASS
2004-2007	QFP	2305	0	PASS
2008	QFP	475	0	PASS
2009	QFP	327	0	PASS
2010	QFP	150	0	PASS
Q1,11	QFP	145	0	PASS
Q2,11	QFP	195	0	PASS
Q3,11	QFP	242	0	PASS

Note: Conditions for 85/85 are 1000 Hours, 85C, 85%RH.
HAST is an alternative stress with conditions of 96 Hours, 130C, 85%RH.

ASSEMBLY SUBCON

Amkor, Taiwan
ASE, Kaohsiung
ASE, Malaysia
Renesas, Japan
Seiko-Epson, Japan
STATS ChiPAC, Korea
STATS ChiPAC, Singapore
UTAC, Singapore

PACKAGE TECHNOLOGIES

HFCBGA
EPQFP, QFN, PBGA, HSBGA, HFCBGA
PQFP, PBGA, HSBGA
PQFP, PBGA, FBGA
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PBGA, HSBGA
PQFP
PQFP, EPQFP



RELIABILITY STRESS DATA

Pressure Cooker Test: 168 Hours, 121 °C/ 100% RH						
YEAR	PKG	SAMPLE	96 Hours	168 Hours	FAILURE RATE	FINAL RESULT
	TYPE	SIZE	(Ref)	(Accep)	(%)	(PASS/FAIL)
2008	HSBGA	150	0	0	0	PASS
2009	HSBGA	60	0	0	0	PASS
2010	HSBGA	120	0	0	0	PASS
Q1,11	HSBGA	30	0	0	0	PASS
Q2,11	HSBGA	60	0	0	0	PASS
Q3,11	HSBGA	105	0	0	0	PASS
2004-2007	PBGA	1130	0	0	0	PASS
2008	PBGA	120	0	0	0	PASS
2009	PBGA	120	0	0	0	PASS
2010	PBGA	90	0	0	0	PASS
Q1,11	PBGA	30	0	0	0	PASS
Q2,11	PBGA	30	0	0	0	PASS
Q3,11	PBGA	30	0	0	0	PASS
2010	QFN	205	0	0	0	PASS
Q1,11	QFN	45	0	0	0	PASS
Q2,11	QFN	22	0	0	0	PASS
Q3,11	QFN	76	0	0	0	PASS
2004-2007	QFP	6792	0	0	0	PASS
2008	QFP	474	0	0	0	PASS
2009	QFP	337	0	0	0	PASS
2010	QFP	358	0	0	0	PASS
Q1,11	QFP	132	0	0	0	PASS
Q2,11	QFP	100	0	0	0	PASS
Q3,11	QFP	165	0	0	0	PASS

Note:

ASSEMBLY SUBCON

Amkor, Taiwan
 ASE, Kaohsiung
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PACKAGE TECHNOLOGIES

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