8.1 Device Reliability Test Data – FLASH

8.1.1 F90nm Process: 300 mm FAB

Hot Carrier Effect Test

1. F90nm / 3.3V WinStack DPTM Flash Process (F09810A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
681982400	NL W/L=10/0.3	2.03E+05	Pass
	NH W/L=10/0.45	2.63E+04	Pass
	PL W/L=10/0.35	6.64E+14	Pass
	PH W/L=10/0.45	1.10E+15	Pass
68239D200	NL W/L=10/0.3	1.28E+05	Pass
	NH W/L=10/0.45	9.86E+05	Pass
	PL W/L=10/0.35	1.27E+14	Pass
	PH W/L=10/0.45	6.04E+16	Pass
68339H700	NL W/L=10/0.3	5.68E+04	Pass
	NH W/L=10/0.45	2.23E+05	Pass
	PL W/L=10/0.35	2.61E+14	Pass
	PH W/L=10/0.45	6.07E+16	Pass

2. F90nm / 1.8V WinStack DPTM Flash Process (F09840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
69460K600	NL W/L=10/0.16	3.64E+03	Pass
	NH W/L=10/0.6	1.83E+04	Pass
	PL W/L=10/0.17	5.40E+09	Pass
	PH W/L=10/0.6	6.85E+11	Pass
693702700	NL W/L=10/0.16	4.19E+03	Pass
	NH W/L=10/0.6	2.35E+03	Pass
	PL W/L=10/0.17	6.05E+11	Pass
	PH W/L=10/0.6	7.00E+13	Pass
693703800	NL W/L=10/0.16	2.59E+03	Pass
	NH W/L=10/0.6	2.71E+04	Pass
	PL W/L=10/0.17	3.21E+12	Pass
	PH W/L=10/0.6	2.03E+15	Pass

NBTI Test

1. F90 nm / 3.3V WinStack DPTM Flash Process (F09810A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
60365W30001	PL W/L=10/0.35	6.10E+02	Pass
	PH W/L=10/0.45	3.77E+03	Pass
60365Y50001	PL W/L=10/0.35	5.74E+03	Pass
	PH W/L=10/0.45	5.41E+02	Pass
660400J00001	PL W/L=10/0.35	2.93E+02	Pass
	PH W/L=10/0.45	5.80E+02	Pass

2. F90 nm / 1.8V WinStack DPTM Flash Process (F09840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
69460K600	PL W/L=10/0.17	9.07E+01	Pass
	PH W/L=10/0.6	2.61E+01	Pass
693703800	PL W/L=10/0.17	5.14E+03	Pass
	PH W/L=10/0.6	7.78E+01	Pass
69469L700	PL W/L=10/0.17	1.43E+02	Pass
	PH W/L=10/0.6	4.02E+03	Pass

TDDB Test

1. F90nm / 3.3V WinStack DPTM Flash Process (F09810A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
681892400	NL 65A	8.15E+02	Pass
	NH 147A	4.73E+08	Pass
	PL 65 A	3.56E+03	Pass
	PH 147A	2.64E+10	Pass
68239D200	NL 65A	2.11E+02	Pass
	NH 147A	9.74E+08	Pass
	PL 65 A	1.56E+02	Pass
	PH 147A	2.26E+09	Pass
68339H700	NL 65A	8.25E+01	Pass
	NH 147A	2.66E+08	Pass
	PL 65 A	6.01E+01	Pass
	PH 147A	3.37E+07	Pass

2. F90nm / 1.8V WinStack DPTM Flash Process (F09840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6933AY700	NL 48A	3.05E+05	Pass
	NH 152A	1.95E+07	Pass
	PL 48 A	1.42E+04	Pass
	PH 152A	3.12E+08	Pass
6933AX600	NL 48A	1.97E+05	Pass
	NH 152A	3.66E+07	Pass
	PL 48 A	3.17E+04	Pass
	PH 152A	5.74E+07	Pass
693703800	NL 48A	2.15E+04	Pass
	NH 152A	1.64E+09	Pass
	PL 48 A	3.33E+05	Pass
	PH 152A	1.37E+09	Pass

Electromigration

F90nm WinStack DPTM Flash Process

Structure	M1	M2	M3	V2	V3
682098300	8.40E+02Khrs	4.66E+03Khrs	4.32E+02Khrs	4.29E+02Khrs	1.48E+02Khrs
68229U800	2.39E+02Khrs	8.11E+03Khrs	2.77E+02Khrs	2.54E+02Khrs	2.54E+02Khrs
68148W000	3.22E+02Khrs	7.33E+03 Khrs	1.79E+02Khrs	1.78E+02Khrs	1.88E+02Khrs

SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @250 C.

8.1.2 F58nm Process: 300 mm FAB

Hot Carrier Effect Test

1. F58nm / 3.3V WinStack DPTM Flash Process (F05811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6028AY200	NL W/L=10/0.3	1.29E+03	Pass
	NH W/L=10/0.60	7.66E+05	Pass
	PL W/L=10/0.35	3.31E+10	Pass
	PH W/L=10/0.60	2.03E+14	Pass
6028AY2AK	NL W/L=10/0.3	1.01E+03	Pass
	NH W/L=10/0.60	4.37E+04	Pass
	PL W/L=10/0.35	1.68E+11	Pass
	PH W/L=10/0.60	4.47E+12	Pass
6028AX1AW	NL W/L=10/0.3	7.88E+02	Pass
	NH W/L=10/0.60	9.12E+04	Pass
	PL W/L=10/0.35	4.80E+09	Pass
	PH W/L=10/0.60	1.85E+11	Pass

2. F58nm / 1.8V WinStack DPTM Flash Process (F05840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6146F4700	NL W/L=10/0.16	5.99E+04	Pass
	NH W/L=10/0.6	2.44E+05	Pass
	PL W/L=10/0.22	1.00E+21	Pass
	MVPL W/L=10/0.22	1.53E+18	Pass
	PH W/L=10/0.6	5.37E+18	Pass
61519V400	NL W/L=10/0.16	1.31E+04	Pass
	NH W/L=10/0.6	2.87E+05	Pass
	PL W/L=10/0.22	3.26E+21	Pass
	MVPL W/L=10/0.22	1.13E+17	Pass
	PH W/L=10/0.6	3.27E+18	Pass
6149B7900	NL W/L=10/0.16	3.43E+04	Pass
	NH W/L=10/0.6	4.16E+04	Pass
	PL W/L=10/0.22	1.82E+23	Pass
	MVPL W/L=10/0.22	3.10E+17	Pass
	PH W/L=10/0.6	1.02E+18	Pass

NBTI Test

1. F58 nm / 3.3V WinStack DPTM Flash Process (F05811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6104B2500	PL W/L=10/0.35	1.89E+02	Pass
	PH W/L=10/0.60	3.02E+02	Pass
6101F3800	PL W/L=10/0.35	4.54E+03	Pass
	PH W/L=10/0.60	1.29E+02	Pass
611500300	PL W/L=10/0.35	9.50E+02	Pass
	PH W/L=10/0.60	6.34E+01	Pass

2. F58 nm / 1.8V WinStack DPTM Flash Process (F05840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6146F4700	PL W/L=10/0.22	4.25E+03	Pass
	MVPL W/L=10/0.22	8.74E+03	Pass
	PH W/L=10/0.60	5.25E+03	Pass
61519V400	PL W/L=10/0.22	3.60E+02	Pass
	MVPL W/L=10/0.22	7.30E+02	Pass
	PH W/L=10/0.60	6.32E+02	Pass
6149B7900	PL W/L=10/0.22	8.50E+03	Pass
	MVPL W/L=10/0.22	1.31E+04	Pass
	PH W/L=10/0.60	1.80E+03	Pass

TDDB Test

1 F58nm / 3.3V WinStack DPTM Flash Process (F05811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6028AY200	NL 75A	4.04E+02	Pass
	NH 155A	1.92E+08	Pass
	PL 75 A	1.91E+02	Pass
	PH 155A	3.04E+06	Pass
6028AY2AK	NL 75A	3.13E+02	Pass
	NH 155A	1.00E+09	Pass
	PL 75 A	3.09E+03	Pass
	PH 155A	2.14E+07	Pass
6028AX1AW	NL 75A	1.22E+02	Pass
	NH 155A	4.33E+06	Pass
	PL 75 A	3.51E+02	Pass
	PH 155A	6.89E+08	Pass

2. F58nm / 1.8V WinStack DPTM Flash Process (F05840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6146F4700	NL 46A	5.71E+04	Pass
	NH 148A	8.46E+04	Pass
	PL 46 A	3.59E+04	Pass
	PH 148A	6.97E+05	Pass
61519V400	NL 46A	6.05E+04	Pass
	NH 148A	4.60E+06	Pass
	PL 46 A	1.84E+04	Pass
	PH 148A	2.47E+06	Pass
6149B7900	NL 46A	5.77E+03	Pass
	NH 148A	1.03E+06	Pass
	PL 46 A	2.93E+03	Pass
	PH 148A	4.46E+06	Pass

Electromigration

F58nm WinStack DPTM Flash Process

Structure	M1	M2	M3	V2	V3
S10300100	>1000 Khrs	>1000 Khrs	2.59E+03 Khrs	7.41E+02 Khrs	5.88E+03 Khrs
S103001AA	>1000 Khrs	>1000 Khrs	2.14E+03 Khrs	3.62E+02 Khrs	6.31E+03 Khrs
S103001AD	>1000 Khrs	>1000 Khrs	1.51E+03 Khrs	3.64E+02 Khrs	3.37E+03 Khrs

SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @250 C.

8.1.3 F58u Process: 300 mm FAB

Hot Carrier Effect Test

F58u / 1.5V WinStack Flash Process (F05961A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6731D5700	NL W/L=10/0.2	8.66E+07	Pass
	NH W/L=10/0.6	8.42E+04	Pass
	PL W/L=10/0.22	5.31E+13	Pass
	PH W/L=10/0.65	4.44E+06	Pass
6731D6800	NL W/L=10/0.2	6.46E+07	Pass
	NH W/L=10/0.6	5.50E+04	Pass
	PL W/L=10/0.22	3.05E+12	Pass
	PH W/L=10/0.65	4.60E+06	Pass
6745DY200W	NL W/L=10/0.2	3.57E+07	Pass
	NH W/L=10/0.6	1.04E+05	Pass
	PL W/L=10/0.22	1.21E+13	Pass
	PH W/L=10/0.65	4.80E+06	Pass

NBTI Test

F58u / 1.5V WinStack Flash Process (F05961A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6731D5700	PL W/L=10/0.22	1.11E+03	Pass
	PH W/L=10/0.65	2.44E+05	Pass
6731D6800	PL W/L=10/0.22	2.69E+02	Pass
	PH W/L=10/0.65	2.40E+04	Pass
6745DY200	PL W/L=10/0.22	1.16E+02	Pass
	PH W/L=10/0.65	2.71E+04	Pass

TDDB Test

F58u / 1.5V WinStack Flash Process (F05961A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6731D5700	NL 26A	2.51E+02	Pass
	NH 143A	1.11E+04	Pass
	PL 26 A	4.66E+04	Pass
	PH 143A	7.52E+03	Pass
6731D6800	NL 26A	1.92E+03	Pass
	NH 143A	7.93E+03	Pass
	PL 26 A	1.00E+04	Pass
	PH 143A	7.61E+04	Pass
6745DY200	NL 26A	3.65E+03	Pass
	NH 143A	4.87E+04	Pass
	PL 26 A	8.46E+04	Pass
	PH 143A	3.99E+04	Pass

Electromigration

F58u / 1.5V WinStack Flash Process (F05961A)

M1	M2	M3	M4	V2	V3	V4
3.80E+02 Khrs	3.12E+02 Khrs	3.81E+02 Khrs	1.32E+02 Khrs	3.39E+02 Khrs	1.59E+02 Khrs	2.05E+02 Khrs
2.22E+02 Khrs	1.25E+02 Khrs	8.24E+02 Khrs	2.36E+02 Khrs	3.32E+02 Khrs	2.00E+02 Khrs	1.81E+02 Khrs
2.07E+02 Khrs	1.33E+02 Khrs	6.43E+02 Khrs	1.72E+02 Khrs	3.76E+02 Khrs	1.75E+02 Khrs	2.77E+02 Khrs

SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @175 C.

8.1.4 F46nm Process: 300 mm FAB

Hot Carrier Effect Test

1. F46nm / 3.3V DPTM NAND Flash Process (F04811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
654802600	LVN W/L=10/0.3	2.12E+06	Pass
	LVN W/L=10/0.5	6.46E+01	Pass
	MVN W/L=10/0.9	7.70E+07	Pass
	LVP W/L=10/0.35	4.73E+10	Pass
	LVP W/L=10/0.5	3.45E+18	Pass
	MVP W/L=10/1	2.70E+09	Pass
654803700	LVN W/L=10/0.3	2.83E+05	Pass
	LVN W/L=10/0.5	1.33E+02	Pass
	MVN W/L=10/0.9	3.06E+06	Pass
	LVP W/L=10/0.35	6.13E+11	Pass
	LVP W/L=10/0.5	9.56E+15	Pass
	MVP W/L=10/1	1.45E+07	Pass
654800400	LVN W/L=10/0.3	1.92E+07	Pass
	LVN W/L=10/0.5	2.06E+02	Pass
	MVN W/L=10/0.9	3.81E+04	Pass
	LVP W/L=10/0.35	2.04E+11	Pass
	LVP W/L=10/0.5	5.95E+17	Pass
	MVP W/L=10/1	3.72E+07	Pass

2. F46nm / 1.8V DPTM NAND Flash Process (F04840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6809DT800	LVN W/L=10/0.3	1.82E+04	Pass
	MVN W/L=10/0.9	2.26E+08	Pass
	LVP W/L=10/0.35	5.82E+12	Pass
	MVP W/L=10/1	9.71E+14	Pass
6803FG1AL	LVN W/L=10/0.3	2.72E+05	Pass
	MVN W/L=10/0.9	2.27E+08	Pass
	LVP W/L=10/0.35	4.69E+12	Pass
	MVP W/L=10/1	1.34E+15	Pass
6803FJ400	LVN W/L=10/0.3	5.16E+05	Pass
	MVN W/L=10/0.9	1.31E+09	Pass
	LVP W/L=10/0.35	3.38E+12	Pass
	MVP W/L=10/1	1.71E+14	Pass

NBTI Test

1. F46 nm / 3.3V DPTM NAND Flash Process (F04811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
654802600	LVP W/L=10/0.35	5.15E+03	Pass
	LVP W/L=10/0.5	2.76E+01	Pass
	MVP W/L=10/1	2.89E+02	Pass
654803700	LVP W/L=10/0.35	6.74E+01	Pass
	LVP W/L=10/0.5	4.52E+01	Pass
	MVP W/L=10/1	7.93E+02	Pass
654800400	LVP W/L=10/0.35	9.06E+01	Pass
	LVP W/L=10/0.5	2.15E+01	Pass
	MVP W/L=10/1	6.59E+02	Pass

2. F46 nm / 1.8V DPTM NAND Flash Process (F04840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6809DT800	LVP W/L=10/0.35	1.50E+03	Pass
	MVP W/L=10/1	4.30E+01	Pass
6803FG1AL	LVP W/L=10/0.35	2.46E+03	Pass
	MVP W/L=10/1	3.05E+01	Pass
6803FJ400	LVP W/L=10/0.35	2.61E+03	Pass
	MVP W/L=10/1	4.58E+01	Pass

TDDB Test

1. F46 nm / 3.3V DPTM NAND Flash Process (F04811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
654802600	LVN	5.24E+01	Pass
	MVN	1.03E+12	Pass
	LVP	1.97E+02	Pass
	MVP	1.17E+16	Pass
654803700	LVN	6.76E+01	Pass
	MVN	2.87E+11	Pass
	LVP	1.95E+02	Pass
	MVP	1.52E+15	Pass
654800400	LVN	5.28E+02	Pass
	MVN	2.62E+15	Pass
	LVP	3.46E+02	Pass
	MVP	5.82E+16	Pass

2. F46 nm / 1.8V DPTM NAND Flash Process (F04840A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
654802600	LVN	2.09E+02	Pass
	MVN	3.75E+11	Pass
	LVP	1.46E+03	Pass
	MVP	5.03E+15	Pass
654803700	LVN	3.41E+02	Pass
	MVN	1.08E+11	Pass
	LVP	1.23E+03	Pass
	MVP	7.11E+14	Pass
654800400	LVN	2.80E+03	Pass
	MVN	1.20E+15	Pass
	LVP	2.35E+03	Pass
	MVP	3.04E+16	Pass

Electromigration

1. F46 nm / 3.3V DPTM NAND Flash Process (F04811A)

M1	M2	V1	V2
>1000 khrs	2.61E+03 khrs	6.35E+03 khrs	5.90E+03 khrs
>1000 khrs	2.08E+03 khrs	6.24E+03 khrs	4.81E+03 khrs
>1000 khrs	2.08E+03 khrs	6.48E+03 khrs	8.02E+03 khrs

2. F46 nm / 1.8V DPTM NAND Flash Process (F04840A)

M1	M2	V1	V2
>1000 khrs	7.39E+02 khrs	1.39E+03 khrs	1.57E+03 khrs
>1000 khrs	5.88E+02 khrs	1.37E+03 khrs	1.28E+03 khrs
>1000 khrs	5.88E+02 khrs	1.42E+03 khrs	2.14E+03 khrs

SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @250 C.

8.1.5 F32um Process: 300 mm FAB

Hot Carrier Effect Test

F32 / 1.8V DPQM NAND Flash Process (F03811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6718C0600	LVN W/L=10/0.3	8.53E+11	Pass
	LVN W/L=10/0.5	1.58E+01	Pass
	MVN W/L=10/0.9	1.73E+08	Pass
	LVP W/L=10/0.35	5.42E+24	Pass
	LVP W/L=10/0.5	5.62E+10	Pass
	MVP W/L=10/1	8.67E+23	Pass
6718C06BT	LVN W/L=10/0.3	1.92E+11	Pass
	LVN W/L=10/0.5	1.84E+01	Pass
	MVN W/L=10/0.9	1.24E+08	Pass
	LVP W/L=10/0.35	5.12E+22	Pass
	LVP W/L=10/0.5	1.08E+10	Pass
	MVP W/L=10/1	8.51E+23	Pass
6718C06BU	LVN W/L=10/0.3	5.90E+11	Pass
	LVN W/L=10/0.5	2.43E+01	Pass
	MVN W/L=10/0.9	6.40E+07	Pass
	LVP W/L=10/0.35	1.21E+23	Pass
	LVP W/L=10/0.5	5.20E+10	Pass
	MVP W/L=10/1	3.95E+24	Pass

NBTI Test

F32 / 1.8V DPQM NAND Flash Process (F03811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6718C0600	LVP W/L=10/0.35	1.24E+05	Pass
	LVP W/L=10/0.5	1.50E+03	Pass
	MVP W/L=10/1	1.49E+01	Pass
6718C06BT	LVP W/L=10/0.35	3.35E+04	Pass
	LVP W/L=10/0.5	1.47E+03	Pass
	MVP W/L=10/1	1.39E+01	Pass
6718C06BU	LVP W/L=10/0.35	4.53E+04	Pass
	LVP W/L=10/0.5	1.50E+03	Pass
	MVP W/L=10/1	1.46E+01	Pass

TDDB Test

F32 / 1.8V DPQM NAND Flash Process (F03811A)

Lot No	Device Type	Life Time (Years)	Pass/Fail
6718C0600	LVN	5.64E+01	Pass
	MVN	1.40E+15	Pass
	LVP	2.45E+02	Pass
	MVP	7.73E+14	Pass
	ONOCAP+	1.13E+02	Pass
	ONOCAP-	1.40E+02	Pass
6718C06BT	LVN	2.48E+01	Pass
	MVN	9.84E+13	Pass
	LVP	4.72E+02	Pass
	MVP	1.90E+15	Pass
	ONOCAP+	1.97E+02	Pass
	ONOCAP-	1.29E+02	Pass
6718C06BU	LVN	1.24E+01	Pass
	MVN	5.02E+10	Pass
	LVP	2.86E+02	Pass
	MVP	1.13E+11	Pass
	ONOCAP+	7.36E+01	Pass
	ONOCAP-	1.21E+02	Pass

Electromigration

F32 / 1.8V DPQM NAND Flash Process (F03811A)

M1	M2	M3	V1	V2	V3
2.55E+03 Khrs	9.27E+03 Khrs	1.63E+03 Khrs	1.76E+03 Khrs	6.84E+02 Khrs	3.26E+02 Khrs
6.09E+03 Khrs	3.40E+03 Khrs	2.69E+03 Khrs	1.72E+03 Khrs	8.43E+02 Khrs	3.90E+02 Khrs
3.28E+03 Khrs	4.58E+03 Khrs	1.76E+03 Khrs	1.85E+03 Khrs	7.01E+02 Khrs	2.98E+02 Khrs

SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @175 C.

8.2 Device Reliability Test Data – DRAM

8.2.1 65nm Process: 300 mm FAB

1. TDDB

(years)							Pass/
	Ntn	Ntk	Ptn	Ptk	Array	CAP	Fail
1 st Qual.	3.83E+04	2.46E+02	7.47E+02	8.96E+01	1.99E+03	1.83E+02	Pass
2 nd Qual.	4.64E+02	6.11E+02	8.84E+02	3.79E+01	4.02E+02	4.39E+03	Pass
3 rd Qual.	3.12E+02	3.27E+02	3.05E+02	2.34E+01	2.14E+02	4.30E+03	Pass

2. HCE:

AC(years)	NFET			NFET			Pass/
	nf	nf	nf	nflo	nflo	nflo	Fail
	L=0.08	L=0.10	L=0.14	L=0.10	L=0.12	L=0.15	
1 st Qual.	3.61E+05	3.40E+05	2.02E+10	1.37E+05	1.44E+10	3.63E+15	Pass
2 nd Qual.	2.39E+05	1.10E+06	3.62E+07	1.93E+07	2.74E+15	1.12E+20	Pass
3 rd Qual.	3.21E+05	1.07E+07	3.22E+12	6.05E+09	3.49E+09	7.10E+11	Pass

AC(years)	NFET			NFET			Pass/Fail
	nflotk	nflotk	nflotk	nftk	nftk	nftk	
	L=0.16	L=0.20	L=0.30	L=0.16	L=0.21	L=0.30	
1 st Qual.	>1.04E+03	6.21E+06	7.45E+09	>2.63E+01	6.46E+03	9.20E+05	Pass
2 nd Qual.	>1.31E+03	2.33E+06	1.31E+08	>4.14E+01	4.43E+03	2.76E+05	Pass
3 rd Qual.	>2.05E+03	1.68E+06	9.85E+07	>5.21E+02	5.29E+03	7.20E+04	Pass

(years)	PFET			PFET			Pass/
	pf	pf	pf	pflo	pflo	pflo	Fail
	L=0.08	L=0.10	L=0.14	L=0.10	L=0.12	L=0.14	
1 st Qual.	1.06E+09	7.18E+06	6.74E+09	3.03E+07	4.13E+04	7.58E+12	Pass
2 nd Qual.	5.21E+07	3.97E+07	1.97E+06	1.50E+05	5.61E+02	6.19E+09	Pass
3 rd Qual.	9.35E+05	1.09E+05	3.85E+07	2.10E+05	3.94E+03	1.76E+06	Pass

(years)	PFET				PFET				Pass/ Fail
	pflotk	pflotk	pflotk	pflotk	pftk	pftk	pftk	pftk	
	L=0.14	L=0.16	L=0.21	L=0.30	L=0.14	L=0.16	L=0.21	L=0.30	
1 st Qual.	>6.07E+05	>9.19E+05	1.29E+08	1.51E+05	>6.16E+05	>6.73E+04	3.18E+02	9.60E+07	Pass
2 nd Qual.	>4.68E+05	>2.00E+06	1.46E+08	6.32E+05	>2.20E+05	>1.01E+05	1.59E+04	3.71E+06	Pass
3 rd Qual.	>5.90E+05	>6.76E+06	1.32E+07	4.14E+05	>4.38E+05	>1.55E+05	3.23E+04	1.21E+07	Pass

3. NBTI:

DC(years)	Pf	Pftk	Pass/ Fail
	L=0.08	L=0.14	
1 st Qual.	1.23E+03	1.15E+02	Pass
2 nd Qual.	1.99E+03	1.46E+02	Pass
3 rd Qual.	4.49E+04	6.02E+02	Pass

4. EM:

Lot	Structure	Stress	Condition	Lifetime	Pass / Fail
		T (C)	Current (mA)	(Hours)	
Lot#1	C1_us_110 M1	235	0.385	1.76E+05	Pass
	CL_us_250 ML	235	4.250	3.27E+05	Pass
	C1_us_110 C1	235	0.320	3.24E+05	Pass
	CL_us_250 CL	235	0.588	5.48E+05	Pass
Lot#2	C1_us_110 M1	235	0.385	2.10E+05	Pass
	CL_us_250 ML	235	4.250	3.25E+05	Pass
	C1_us_110 C1	235	0.320	3.50E+05	Pass
	CL_us_250 CL	235	0.588	5.44E+05	Pass
Lot#3	C1_us_110 M1	235	0.385	2.16E+05	Pass
	CL_us_250 ML	235	4.250	3.90E+05	Pass
	C1_us_110 C1	235	0.320	4.06E+05	Pass
	CL_us_250 CL	235	0.588	6.05E+05	Pass

5. SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @250C.

8.2.2 46nm Process: 300 mm FAB

1. TDDB

(years)								Pass/ Fail
	Ntn	Ntk	Ptn	Ptk	Array	STC-Plate+	STC-Node+	
1 st Qual.	3.40E+03	1.16E+01	6.16E+03	1.21E+03	4.01E+01	7.84E+04	3.98E+01	Pass
2 nd Qual.	1.83E+03	1.51E+01	9.15E+03	1.11E+02	6.28E+01	8.51E+03	8.21E+01	Pass
3 rd Qual.	2.30E+04	1.37E+01	5.34E+03	3.57E+02	1.25E+02	8.45E+02	3.59E+01	Pass

2. HCE:

(years)	NFET		Pass/ Fail
	nf	nflo	
	L=0.065	L=0.08	
1 st Qual.	3.37E+09	3.19E+07	Pass
2 nd Qual.	1.77E+10	2.30E+07	Pass
3 rd Qual.	3.46E+09	9.29E+08	Pass

(years)	NFET		Pass/Fail
	nflotk	nftk	
	L=0.14	L=0.125	
1 st Qual.	8.76E+01	3.32E+01	Pass
2 nd Qual.	9.85E+01	3.39E+01	Pass
3 rd Qual.	5.33E+01	6.51E+01	Pass

(years)	PFET		Pass/ Fail
	pf	pflo	
	L=0.065	L=0.08	
1 st Qual.	1.04E+10	2.20E+10	Pass
2 nd Qual.	3.06E+09	3.19E+10	Pass
3 rd Qual.	8.72E+09	4.47E+08	Pass

(years)	PFET		Pass/ Fail
	pflotk	pftk	
	L=0.14	L=0.125	
1 st Qual.	1.73E+03	6.67E+04	Pass
2 nd Qual.	5.44E+03	4.27E+05	Pass
3 rd Qual.	4.33E+03	8.29E+04	Pass

3. NBTI:

(years)	Pf	Pftk	Pass/ Fail
	L=0. 065	L=0.125	
1 st Qual.	2.20E+01	6.54E+02	Pass
2 nd Qual.	1.32E+01	4.10E+02	Pass
3 rd Qual.	5.49E+01	7.35E+01	Pass

4. EM:

Lot	Structure	Lifetime (K Hours)	Pass / Fail
Lot#1	M1	2.94E+04	Pass
	ML	1.23E+04	Pass
	C1	2.22E+05	Pass
	CL	9.45E+04	Pass
Lot#2	M1	2.32E+05	Pass
	ML	1.17E+04	Pass
	C1	1.34E+05	Pass
	CL	1.63E+05	Pass
Lot#3	M1	8.91E+04	Pass
	ML	1.19E+04	Pass
	C1	1.99E+05	Pass
	CL	1.96E+05	Pass

5. SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @250C.

8.2.3 38nm Process: 300 mm FAB

1. TDDB

(years)									Pass/ Fail
	Ntn	Ntk	Ptn	Ptk	Array	STC-Plate+	STC-Node+	MIM	
1 st Qual.	3.17E+03	3.98E+01	3.56E+03	4.74E+01	1.37E+03	9.71E+04	1.40E+02	1.21E+02	Pass
2 nd Qual.	3.05E+02	5.22E+01	2.64E+04	8.83E+01	4.38E+01	2.51E+05	1.43E+02	1.69E+02	Pass
3 rd Qual.	1.37E+03	9.23E+01	3.53E+04	6.69E+01	1.12E+02	1.32E+05	6.84E+02	3.51E+02	Pass

2. HCE:

(years)	NFET		Pass/ Fail
	nf	nflo	
	L=0.065	L=0.08	
1 st Qual.	1.34E+09	7.88E+07	Pass
2 nd Qual.	3.90E+06	6.12E+06	Pass
3 rd Qual.	4.41E+07	2.58E+07	Pass

(years)	NFET		Pass/Fail
	nflotk	nftk	
	L=0.14	L=0.122	
1 st Qual.	1.76E+02	1.83E+02	Pass
2 nd Qual.	1.45E+02	9.63E+01	Pass
3 rd Qual.	2.15E+02	5.77E+01	Pass

(years)	PFET		Pass/ Fail
	pf	pflo	
	L=0.065	L=0.08	
1 st Qual.	1.23E+10	7.30E+07	Pass
2 nd Qual.	4.03E+09	8.25E+09	Pass
3 rd Qual.	4.17E+10	3.83E+08	Pass

(years)	PFET		Pass/ Fail
	pflotk	pftk	
	L=0.14	L=0.122	
1 st Qual.	3.23E+04	5.52E+03	Pass
2 nd Qual.	1.28E+03	1.46E+04	Pass
3 rd Qual.	9.38E+02	8.14E+03	Pass

(years)	N/PFET		Pass/ Fail
	nflo_SA	Pflo_SA	
	L=0.11	L=0.11	
1 st Qual.	3.86E+10	7.89E+07	Pass
2 nd Qual.	6.52E+09	1.39E+05	Pass
3 rd Qual.	5.29E+09	1.34E+06	Pass

3. NBTI:

(years)	Pf	Pftk	Pass/ Fail
	L=0. 065	L=0.122	
1 st Qual.	3.06E+04	9.45E+03	Pass
2 nd Qual.	4.55E+04	7.64E+04	Pass
3 rd Qual.	5.08E+04	4.56E+04	Pass

4. EM:

Lot	Structure	Lifetime (K Hours)	Pass / Fail
Lot#1	M1	3.03E+02	Pass
	M2	4.20E+02	Pass
	ML	2.85E+02	Pass
	C1	>1000	Pass
	C2	1.58E+04	Pass
	CL	3.42E+03	Pass
Lot#2	M1	2.22E+02	Pass
	M2	6.06E+02	Pass
	ML	6.30E+02	Pass
	C1	>1000	Pass
	C2	1.32E+04	Pass
	CL	3.63E+03	Pass
Lot#3	M1	2.94E+02	Pass
	M2	7.30E+02	Pass
	ML	3.00E+02	Pass
	C1	>1000	Pass
	C2	1.51E+04	Pass
	CL	3.87E+03	Pass

5. SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @225C.

8.2.4 25nm Process: 300 mm FAB

1. TDDB

(years)									Pass/
	Ntn	Ntk	Ptn	Ptk	Array	STC-Plate+	STC-Node+	MIM	Fail
1 st Qual.	3.11E+02	6.71E+01	5.77E+01	2.12E+01	1.56E+01	1.76E+04	1.63E+02	2.73E+02	Pass
2 nd Qual.	5.02E+01	1.73E+02	3.16E+01	2.66E+02	7.81E+01	1.11E+04	3.83E+01	1.01E+01	Pass
3 rd Qual.	2.99E+02	2.00E+02	2.69E+01	2.44E+01	3.61E+01	4.78E+04	8.14E+02	1.95E+01	Pass

2. HCE:

(years)	NFET		Pass/
	nf	nflo	Fail
	L=0.06	L=0.08	
1 st Qual.	9.21E+04	1.28E+05	Pass
2 nd Qual.	2.42E+04	3.21E+05	Pass
3 rd Qual.	3.43E+04	7.16E+04	Pass

(years)	NFET		Pass/Fail
	nflotk	nftk	
	L=0.136	L=0.136	
1 st Qual.	4.95E+02	6.83E+02	Pass
2 nd Qual.	8.40E+02	1.87E+03	Pass
3 rd Qual.	9.13E+02	2.71E+03	Pass

(years)	PFET		Pass/ Fail
	pf	pflo	
	L=0.06	L=0.1	
1 st Qual.	6.57E+07	3.94E+09	Pass
2 nd Qual.	2.53E+07	1.20E+09	Pass
3 rd Qual.	1.52E+07	1.60E+09	Pass

(years)	PFET		Pass/ Fail
	pflotk	pftk	
	L=0.2	L=0.136	
1 st Qual.	8.73E+07	1.05E+05	Pass
2 nd Qual.	3.82E+07	5.01E+04	Pass
3 rd Qual.	6.62E+07	9.39E+04	Pass

(years)	N/PFET		Pass/ Fail
	nflo_SA	Pflo_SA	
	L=0.108	L=0.108	
1 st Qual.	1.36E+03	3.69E+07	Pass
2 nd Qual.	1.13E+03	1.82E+07	Pass
3 rd Qual.	3.53E+02	2.18E+06	Pass

3. NBTI:

(years)	Pf	Pftk	Pass/ Fail
	L=0. 06	L=0.136	
1 st Qual.	1.18E+01	1.76E+03	Pass
2 nd Qual.	1.47E+02	5.48E+03	Pass
3 rd Qual.	1.96E+01	1.45E+03	Pass

4. EM:

Lot	Structure	Lifetime (K Hours)	Pass / Fail
Lot#1	M1	3.07E+02	Pass
	M2	2.34E+03	Pass
	ML	1.95E+02	Pass
	C1	>1000	Pass
	C2	1.44E+03	Pass
	CL	3.98E+03	Pass
Lot#2	M1	3.16E+02	Pass
	M2	2.58E+02	Pass
	ML	2.03E+02	Pass
	C1	>1000	Pass
	C2	1.58E+03	Pass
	CL	5.26E+03	Pass
Lot#3	M1	2.94E+02	Pass
	M2	2.54E+03	Pass
	ML	1.95E+02	Pass
	C1	>1000	Pass
	C2	1.54E+03	Pass
	CL	4.02E+03	Pass

5. SM: Pass. There is no sample with $\Delta R>10\%$ after 1000hrs stress @225C.