

The Reliability Data Program

October 1, 1996
Expanded Version

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Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D, XC2000, XC3000/A, XC3100/A, XC4000
 Package Type: Various
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.58 ev for EPROM, 0.90 ev for LCA

XC1700D	XC2000	XC3000/A	XC3100/A	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	25	3	41	31	58
Combined Completed Lots:	25	3	41	31	58
Failures:	0	0	3	5	7
Device on test:	2,165	137	2,803	2,031	3,411
Actual device hours @ 145C:	2,288,818	107,682	2,555,666	1,909,881	2,923,918
Mean :	1,057	786	912	940	857
Equivalent device hours @ Tj=125C:	8,025,848	377,592	8,961,563	6,697,088	10,252,856
Equivalent device hours @ Tj=70C:	57,526,575	25,289,008	600,195,556	448,533,607	686,679,163
Equivalent device hours @ Tj=25C:	5.1E+10	2.50E+09	5.93E+10	4.43E+10	6.79E+10
Failure Rate in Fit @ Tj=70C:	0	0	5	11	10
Failure Rate in Fit @ Tj=25C:	0	0	0.05	0.11	0.10



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E, XC5000, XC7000, XC9500
 Package Type: Various
 Actual Temperature: 145C (125C & 150C for XC7000 & XC9500)
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.58 ev for EPROM, 0.90 ev for LCA

XC4000E

XC5000

XC7000

XC9500

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	28	17	20	3
Combined Completed Lots:	28	17	20	3
Failures:	4	1	0	0
Device on test:	2,228	1,610	1,939	236
Actual device hours @ 145C:	2,299,479	1,656,011	1,381,899	244,885
Mean :	1,032	1,029	713	1,038
Equivalent device hours @ Tj=125C:	8,063,231	5,806,881	1,381,899	1,153,490
Equivalent device hours @ Tj=70C:	540,030,300	388,912,496	92,551,893	77,254,361
Equivalent device hours @ Tj=25C:	5.34E+10	3.84E+10	9.15E+09	7.64E+09
Failure Rate in Fit @ Tj=70C:	7	3	0	0
Failure Rate in Fit @ Tj=25C:	0.08	0.03	0	0



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD8, PLCC-20, DD-8
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.58 ev

XC1718D

XC1736D

XC1765D

XC1765L

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	5	9	1
Combined Completed Lots:	2	5	9	1
Failures:	0	0	0	0
Device on test:	181	442	715	76
Actual device hours:	184,480	431,169	568,544	89,756
Mean :	1,019	975	795	1,181
Equivalent device hours @ Tj=125C:	646,888	1,511,914	1,99,626	314,734
Equivalent device hours @ Tj=70C:	43,324,940	101,259,600	1,521,979	21,079,105
Equivalent device hours @ Tj=25C:	4.28E+09	1.00E+10	1.2E+10	2.08E+09
Failure Rate in FITS @ Tj=70C:	0	0	0	0
Failure Rate in FITS @ Tj=25C:	0	0	0	0

Failure Analysis:



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD8, PLCC-20, DD-8
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.58 ev

XC17128D

XC17256D

XC17256L

XC1700D

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	5	1	25
Combined Completed Lots:	2	5	1	25
Failures:	0	0	0	0
Device on test:	246	428	77	2,165
Actual device hours:	263,466	672,863	78,540	2,288,818
Mean :	1,071	1,572	1,020	1,057
Equivalent device hours @ Tj=125C:	923,856	2,59,426	275,404	8,025,848
Equivalent device hours @ Tj=70C:	61,874,722	158,021,190	18,445,039	57,526,575
Equivalent device hours @ Tj=25C:	6.12E+09	1.56E+10	1.82E+09	5.1E+10
Failure Rate in FITS @ Tj=70C:	0	0	0	0
Failure Rate in FITS @ Tj=25C:	0	0	0	0

Failure Analysis:



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC2000 Microcircuit Group
 Package Type: PLCC- 84
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC2018

XC2000

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	3	3	
Combined Completed Lots:	3	3	
Failures:	0	0	
Device on test:	137	137	
Actual device hours:	107,682	107,682	
Mean :	786	786	
Equivalent device hours @ Tj=125C:	377,592	377,592	
Equivalent device hours @ Tj=70C:	25,289,008	25,289,008	
Equivalent device hours @ Tj=25C:	2.50E+09	2.50E+09	
Failure Rate in FITS @ Tj=70C:	0	0	
Failure Rate in FITS @ Tj=25C:	0	0	

Failure Analysis:



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3000/A Microcircuit Group
 Package Type: PLCC- 68 & 84, PGA-175
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC3020/A XC3030/A XC3042/A XC3064/A XC3090/A XC3000/A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	8	6	10	2	8	34
Combined Completed Lots:	8	6	10	2	8	34
Failures:	0	0	0	0	1	1
Device on test:	519	417	778	94	541	2,349
Actual device hours:	583,518	412,288	636,396	142,974	531,832	2,307,008
Mean :	1,124	989	818	1,521	983	982
Equivalent device hours @ Tj=125C:	2,046,133	1,445,707	2,231,553	501,345	1,864,894	8,089,632
Equivalent device hours @ Tj=70C:	137,038,608	96,825,417	149,456,952	33,577,298	124,900,203	541,798,478
Equivalent device hours @ Tj=25C:	1.35E+10	9.57E+09	1.48E+10	3.32E+09	1.23E+10	5.63E+10
Failure Rate in FITS @ Tj=70C:	0	0	0	0	8	6
Failure Rate in FITS @ Tj=25C:	0	0	0	0	0.08	0.06

Failure Analysis:

F/A95017(1)-ORG

Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3100/A Microcircuit Group
 Package Type: PLCC-84, PGA-132 & 175, PQFP-160,175 & CB-160
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC3120/A XC3130/A XC3142/A XC3164/A XC3190/A XC3195/A XC3100/A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	5	7	1	12	5	31
Combined Completed Lots:	1	5	7	1	12	5	31
Failures:	0	0	5	0	0	0	5
Device on test:	43	308	477	129	786	288	2,031
Actual device hours:	45,666	288,346	432,492	133,515	779,825	230,037	1,909,881
Mean :	1,062	936	907	1,035	992	799	940
Equivalent device hours @ Tj=125C:	160,130	1,011,099	1,516,554	468,177	2,734,493	806,636	6,697,088
Equivalent device hours @ Tj=70C:	10,724,614	67,717,764	101,570,305	31,355,862	183,141,107	54,023,955	448,533,607
Equivalent device hours @ Tj=25C:	1.06E+09	6.69E+09	1.00E+10	3.10E+09	1.81E+10	5.34E+09	4.43E+10
Failure Rate in FITS @ Tj=70C:	0	0	49	0	0	0	11
Failure Rate in FITS @ Tj=25C:	0	0	0.50	0	0	0	0.11

Failure Analysis:

F/A 96002(1)-VIM
 F/A 96043(4)-NDF



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: PLCC-84, PGA-120, 156, 191, & 223,
 CB-196
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

	XC4002	XC4003	XC4004	XC4005	XC4006
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Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	4	6	3	22	1
Combined Completed Lots:	4	6	3	22	1
Failures:	0	1	0	4	0
Device on test:	183	378	135	1,180	47
Actual device hours:	185,700	237,945	136,935	1,064,091	95,786
Mean :	1,015	629	1,014	902	2,038
Equivalent device hours @ Tj=125C:	651,166	834,365	480,169	3,731,285	335,878
Equivalent device hours @ Tj=70C:	43,611,456	55,881,141	32,159,045	249,900,687	22,495,244
Equivalent device hours @ Tj=25C:	4.31E+09	5.52E+09	3.18E+09	2.47E+10	2.22E+09
Failure Rate in FITS @ Tj=70C:	0	18	0	16	0
Failure Rate in FITS @ Tj=25C:	0	0.18	0	0.16	0

Failure Analysis:

F/A94148(1)-BCALS

F/A-94116(3)-VUO
 F/A-95077(1)-PFMP



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: PLCC-84, PGA-120, 156, 191, & 223,
 PQFP-208, CB-196
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC4010	XC4013	XC4025	XC4000
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Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	14	7	1	58
Combined Completed Lots:	14	7	1	58
Failures:	1	1	0	7
Device on test:	851	592	45	3,411
Actual device hours:	710,674	479,467	13,320	2,923,918
Mean :	835	810	296	857
Equivalent device hours @ Tj=125C:	2,492,012	1,681,274	46,707	10,252,856
Equivalent device hours @ Tj=70C:	166,901,065	112,602,336	3,128,188	686,679,163
Equivalent device hours @ Tj=25C:	1.65E+10	1.11E+10	3.09E+08	6.79E+10
Failure Rate in FITS @ Tj=70C:	6	9	0	10
Failure Rate in FITS @ Tj=25C:	0.06	0.09	0	0.10

Failure Analysis: F/A96075(1)-FANC F/A94129(1)-INC



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E Microcircuit Group
 Package Type: PLCC-84, PGA- 156, 191, 223 & 299, PQFP-208
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC4003E

XC4005E

XC4006E

XC4008E

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	8	2	1
Combined Completed Lots:	1	8	2	1
Failures:	0	2	1	0
Device on test:	76	666	152	76
Actual device hours:	76,152	688,444	157,795	79,420
Mean :	1,002	1,034	1,038	1,045
Equivalent device hours @ Tj=125C:	267,031	2,414,061	553,316	278,490
Equivalent device hours @ Tj=70C:	17,884,220	161,680,372	37,057,995	18,651,706
Equivalent device hours @ Tj=25C:	1.77E+09	1.60E+10	3.66E+09	1.84E+09
Failure Rate in FITS @ Tj=70C:	0	12	27	0
Failure Rate in FITS @ Tj=25C:	0	0.13	0.27	0

Failure Analysis:

F/A95141(1)-VIM
F/A96032(1)-PALM

F/A95092(1)-NDF



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E Microcircuit Group
 Package Type: PLCC-84, PGA- 156, 191, 223 & 299, PQFP-208
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC4010E XC4013E XC4020E XC4025E XC4000E

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	5	8	1	2	28
Combined Completed Lots:	5	8	1	2	28
Failures:	1	0	0	0	4
Device on test:	371	660	76	151	2,228
Actual device hours:	378,625	686,514	76,000	156,529	2,299,479
Mean :	1,021	1,040	1,000	1,037	1,032
Equivalent device hours @ Tj=125C:	1,327,666	2,407,294	266,498	548,8876	8,063,231
Equivalent device hours @ Tj=70C:	88,919,695	161,227,113	17,848,523	36,760,676	540,030,300
Equivalent device hours @ Tj=25C:	8.79E+09	1.59E+10	1.76E+09	3.63E+09	5.34E+10
Failure Rate in FITS @ Tj=70C:	11	0	0	0	7
Failure Rate in FITS @ Tj=25C:	0.11	0	0	0	0.08

Failure Analysis: F/A96009(1)-FANC



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC5000 Microcircuit Group
 Package Type: PLCC-84
 Actual Temperature: 145C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC5202 XC5204 XC5206 XC5210 XC5215 XC5000

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	2	3	9	1	17
Combined Completed Lots:	2	2	3	9	1	17
Failures:	0	1	0	0	0	1
Device on test:	152	116	282	955	105	1,610
Actual device hours:	153,582	123,571	293,042	978,821	106,995	1,656,011
Mean :	1,010	1,065	1,039	1,025	1,019	1,029
Equivalent device hours @ Tj=125C:	538,543	433,308	1,027,566	3,432,282	375,183	5,806,881
Equivalent device hours @ Tj=70C:	36,068,576	29,020,523	68,820,615	229,875,114	25,127,667	388,912,496
Equivalent device hours @ Tj=25C:	3.57E+09	2.87E+09	6.8E+09	2.27E+10	2.48E+09	3.84E+10
Failure Rate in FITS @ Tj=70C:	0	34	0	0	0	3
Failure Rate in FITS @ Tj=25C:	0	0.35	0	0	0	0.03

Failure Analysis: F/A95090(1)-RAND



Reliability Testing Summary

High Temperature Operating Life

Qualification & Monitor

Technology: Si Gate CMOS
 Device Type: XC7000 Microcircuit Group
 Package Type: PLCC-84, WC44, 68 & 84, & PQFP-160
 Actual Temperature: 125C * & 150C**
 Actual Voltage: 5.0V +/-0.25* & 5.7V +/-0.25**
 Assumed Activation Energy: 0.90 ev

XC73108	XC73108	XC7336Q	XC7336	XC7372
*	**	*	**	*

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	2	1	4	4
Combined Completed Lots:	1	2	1	4	4
Failures:	0	0	0	0	0
Device on test:	45	213	105	435	414
Actual device hours :	45,270	61,753	108,465	57,841	152,971
Mean :	1,006	290	1,033	133	369
Equivalent device hours @ Tj=125C:	45,270	290,877	510,907	272,450	152,971
Equivalent device hours @ Tj=70C:	3,031,932	19,481,342	34,217,671	18,247,216	10,245,145
Equivalent device hours @ Tj=25C:	3.00E+08	1.93E+09	3.38E+09	1.80E+09	1.01E+09
Failure Rate in FITS @ Tj=70C:	0	0	0	0	0
Failure Rate in FITS @ Tj=25C:	0	0	0	0	0

Failure Analysis:



Reliability Testing Summary High Temperature Operating Life Qualification & Monitor

Technology: Si Gate CMOS
Device Type: XC7000 Microcircuit Group
Package Type: PLCC-84, WC44, 68 & 84, & PQFP-160
Actual Temperature: 125C * & 150C**
Actual Voltage: 5.0V +/-0.25* & 5.7V +/-0.25**
Assumed Activation Energy: 0.90 ev

XC7236	XC7272A	XC73144	XC7354	XC7354	XC7000
**	*	*	*	**	@ 125 C

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	3	1	2	1	20
Combined Completed Lots:	1	3	1	2	1	20
Failures:	0	0	0	0	0	0
Device on test:	107	223	73	214	107	1,939
Actual device hours :	50,718	159,247	16,133	28,034	14,766	1,381,899
Mean :	474	714	221	131	138	713
Equivalent device hours @ Tj=125C:	238,899	159,247	16,133	28,034	69,553	1,381,899
Equivalent device hours @ Tj=70C:	16,000,109	10,665,477	1,080,4989	1,877,561	4,658,260	92,551,893
Equivalent device hours @ Tj=25C:	1.58E+09	1.05E+09	1.07E+08	1.86E+08	4.6E+08	9.15E+09
Failure Rate in FITS @ Tj=70C:	0	0	0	0	0	0
Failure Rate in FITS @ Tj=25C:	0	0	0	0	0	0

Failure Analysis:



Reliability Testing Summary High Temperature Operating Life Qualification & Monitor

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PLCC-84 & HQFP-208
Actual Temperature: 150C & 145C*
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

XC95108

XC95216

XC9500

*

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	3
Combined Completed Lots:	2	1	3
Failures:	0	0	0
Device on test:	158	78	236
Actual device hours :	163,609	81,276	244,885
Mean :	1,036	1,042	1,038
Equivalent device hours @ Tj=125C:	770,653	382,837	1,153,490
Equivalent device hours @ Tj=70C:	51,614,059	25,640,302	77,254,361
Equivalent device hours @ Tj=25C:	5.10E+09	2.53E+09	7.64E+09
Failure Rate in FITS @ Tj=70C:	0	0	0
Failure Rate in FITS @ Tj=25C:	0	0	0

Failure Analysis:



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D, XC2000, XC3000/A, XC3100/A, XC4000,
 Package Type: Various
 Test Condition: T=85C, R.H.=85%
 Bias Voltages: 5.0V +/- .25V

	XC1700D	XC2000	XC3000/A	XC3100/A	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996				
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Combined Started Lot:	12	3	13	3	33
Combined Completed Lots:	12	3	13	3	33
Failures:	0	0	0	0	1
Device on test:	799	135	647	135	2,057
Mean Test Hour s/Device:	950	1,052	1,046	1,157	983
Total Device Hours:	759,073	142,065	676,923	156,195	2,022,413



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E, XC5000, XC7000, XC9500
 Package Type: Various
 Test Condition: T=85C, R.H.=85%
 Bias Voltages: 5.0V +/- .25V

XC4000E

XC5000

XC7000

XC9500

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	5	4	3	2
Combined Completed Lots:	5	4	3	2
Failures:	0	0	0	0
Device on test:	380	411	202	90
Mean Test Hour s/Device:	1,024	1,020	1,009	1,019
Total Device Hours:	389,082	419,386	203,731	91,710



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD8, PLCC-20, VOIC-8 & SOIC-8
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

	XC1718D	XC1736D	XC1765D	XC17256D	XC1700D
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Period:	Oct 1, 1994 to Oct 1, 1996				
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Combined Started Lot:	3	3	3	3	12
Combined Completed Lots:	3	3	3	3	12
Failures:	0	0	0	0	0
Device on test:	132	273	135	259	799
Mean Test Hour s/Device:	1,017	1,031	1,005	802	950
Total Device Hours:	134,217	281,433	135,720	207,703	759,073



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC2000 Microcircuit Group
 Package Type: PLCC- 84
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC2018

XC2000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	3	3
Combined Completed Lots:	3	3
Failures:	0	0
Device on test:	135	135
Mean Test Hour s/Device:	1,052	1,052
Total Device Hours:	142,065	142,065



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3000/A Microcircuit Group
 Package Type: PLCC-84, PQFP-100, & 160, HTFP-176,
 TQFP-100, & 176, PPGA-132,175
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC3020/A XC3030/A XC3042/A XC3064/A XC3090/A XC3000/A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	2	5	3	13
Combined Completed Lots:	2	1	2	5	3	13
Failures:	0	0	0	0	0	0
Device on test:	90	45	90	256	166	647
Mean Test Hour s/Device:	1,047	1,002	1,240	1,012	1,005	1,046
Total Device Hours:	94,230	45,090	111,600	259,176	166,827	676,923
Failure Analysis Number:						



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3100/A Microcircuit Group
 Package Type: PLCC-84, PQFP-100, VQFP-100
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC3142/A

XC3190/A

XC3100/A

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	3
Combined Completed Lots:	2	1	3
Failures:	0	0	0
Device on test:	90	45	135
Mean Test Hour s/Device:	1,228	1,015	1,157
Total Device Hours:	110,520	45,675	156,195
Failure Analysis Number:			



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: PLCC-84, BGA-225, 432, HQFP-304
 PQFP- 208 & 240, MQFP-208 & 240
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC4003	XC4005	XC4010	XC4013	XC4025	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	1	9	13	6	4	33
Combined Completed Lots:	1	9	13	6	4	33
Failures:	0	0	0	0	1	1
Device on test:	45	686	869	254	203	2,057
Mean Test Hour s/Device:	1,000	1,018	966	958	967	983
Total Device Hours:	45,000	698,260	839,408	243,380	196,365	2,022,413
Failure Analysis Number:	F/A-95029(1)-VIM					



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E Microcircuit Group
 Package Type: PQFP-208, 240, PLCC-84
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC4005E

XC4013E

XC4000E

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	3	2	5
Combined Completed Lots:	3	2	5
Failures:	0	0	0
Device on test:	230	150	380
Mean Test Hour s/Device:	1,033	1,011	1,024
Total Device Hours:	237,492	151,590	389,082
Failure Analysis Number:			



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC5000 Microcircuit Group
 Package Type: PLCC-84
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC5210

XC5000

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	4	4
Combined Completed Lots:	4	4
Failures:	0	0
Device on test:	411	411
Mean Test Hour s/Device:	1,020	1,020
Total Device Hours:	419,386	419,386
Failure Analysis Number:		



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC7000 Microcircuit Group
 Package Type: PLCC-44. BGA-225, PQFP-44
 Test Condition: T = 85C, R.H. = 85%
 Bias Voltages: 5.0V +/- .25V

XC7236A

XC73108

XC7336

XC7000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1	1	3
Combined Completed Lots:	1	1	1	3
Failures:	0	0	0	0
Device on test:	81	44	77	202
Mean Test Hour s/Device:	1,001	1,020	1,010	1,009
Total Device Hours:	81,081	44,880	77,770	203,731
Failure Analysis Number:				



Reliability Testing Summary-Packages

Bias Moisture Life

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PLCC-84
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC95106

XC9500

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	90	90
Mean Test Hour s/Device:	1,019	1,019
Total Device Hours:	91,710	91,710
Failure Analysis Number:		



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D, XC2000, XC3000/A, XC3100/A,
 XC4000, XC7000, XC9500
 Package Type: Various
 Test Condition: T=121C; 2 atm. sat. steam

XC1700D XC2000 XC3000/A XC3100/A XC4000 XC7000 XC9500



Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	10	3	14	4	19	3	1
Combined Completed Lots:	10	3	14	4	19	3	1
Failures:	0	0	0	0	0	0	0
Device on test:	543	135	692	180	1,223	166	129
Mean Test Hour s/Device:	109	96	96	96	104	122	96
Total Device Hours:	59,424	12,960	66,432	17,280	127,776	20,256	12,384



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD8, PLCC-20, VOIC-8, SOIC-8
 Test Condition: T = 121C; 2 atm. sat. steam

	XC1718D	XC17256D	XC1736D	XC1765D	XC1700D
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Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	3	1	3	3	10
Combined Completed Lots:	3	1	3	3	10
Failures:	0	0	0	0	0
Device on test:	135	76	197	135	543
Mean Test Hour s/Device:	96	96	133	96	109
Total Device Hours:	12,960	7,296	26,208	12,960	59,424
Failure Analysis Number:					



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC2000 Microcircuit Group
Package Type: PLCC- 84
Test Condition: T = 121C; 2 atm. sat. steam.

XC2018

XC2000

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	3	3
Combined Completed Lots:	3	3
Failures:	0	0
Device on test:	135	135
Mean Test Hour s/Device:	96	96
Total Device Hours:	12,960	12,960
Failure Analysis Number:		



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3000/A Microcircuit Group
 Package Type: PLCC-84, VQFP-64, PQFP-100, 160, TQFP-100, 144
 & PGA-132, 175
 Test Condition: T = 121C; 2 atm. sat. steam.

XC3020/A XC3030/A XC3042/A XC3064/A XC3090/A XC3000/A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	4	6	1	14
Combined Completed Lots:	2	1	4	6	1	14
Failures:	0	0	0	0	0	0
Device on test:	90	45	211	301	45	692
Mean Test Hour s/Device:	96	96	96	96	96	96
Total Device Hours:	8,640	4,320	20,256	28,896	4,320	66,432
Failure Analysis Number:						



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3100/A Microcircuit Group
 Package Type: PLCC-84, PQFP-100 & 208, VQFP-100
 Test Condition: T = 121C; 2 atm. sat. steam.

XC3142/A

XC3190/A

XC3195/A

XC3100/A

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	1	4
Combined Completed Lots:	2	1	1	4
Failures:	0	0	0	0
Device on test:	90	45	45	180
Mean Test Hour s/Device:	96	96	96	96
Total Device Hours:	8,640	4,320	4,320	17,280
Failure Analysis Number:				



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: PQFP-208, & MQFP-240, CG-225
 PLCC-84, BGA-225, HQ-304, HT-208
 Test Condition: T = 121C; 2 atm. sat. steam

	XC4003	XC4005	XC4010	XC4013	XC4025	XC4000
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	Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	1	6	7	3	2	19
Combined Completed Lots:	1	6	7	3	2	19
Failures:	0	0	0	0	0	0
Device on test:	45	424	457	199	98	1,223
Mean Test Hour s/Device:	96	96	119	96	96	104
Total Device Hours:	4,320	40,704	54,240	19,104	9,408	127,776
Failure Analysis Number:						



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC7000 Microcircuit Group
 Package Type: BGA-225, PQFP-44
 Test Condition: T = 121C; 2 atm. sat. steam

XC73108

XC7336

X7000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	3
Combined Completed Lots:	2	1	3
Failures:	0	0	0
Device on test:	90	76	166
Mean Test Hour s/Device:	144	96	122
Total Device Hours:	12,960	7,296	20,256
Failure Analysis Number:			



Reliability Testing Summary-Packages

Pressure Pot

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PQFP-160
Test Condition: T = 121C; 2 atm. sat. steam

XC95108

X9500

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	129	129
Mean Test Hour s/Device:	96	96
Total Device Hours:	12,384	12,384
Failure Analysis Number:		



Reliability Testing Summary-Packages

Temperature Cycle(Air to Air)

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D, XC2000, XC3000/A, XC3100/A & XC4000
 Package Type: Various
 Test Condition: T = -65C / +150C (Air to Air)

	XC1700D	XC2000	XC3000/A	XC3100/A	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996				
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Combined Started Lot:	14	3	14	4	27
Combined Completed Lots:	14	3	14	4	27
Failures:	0	0	0	0	0
Device on test:	847	135	692	180	1,748
Mean Test Cycles/Device:	515	555	530	516	639
Total Device Cycles:	436,356	74,925	366,941	92,835	1,117,646
Failure Analysis Number:					



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000E, XC5000, XC7000 & XC9500
Package Type: Various
Test Condition: T = -65C / +150C (Air to Air)

XC4000E

XC5000

XC7000

XC9500

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	11	6	5	1
Combined Completed Lots:	11	6	5	1
Failures:	0	0	0	0
Device on test:	947	650	356	77
Mean Test Cycles/Device:	612	626	632	537
Total Device Cycles:	579,188	406,661	224,816	41,349
Failure Analysis Number:				



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700D Microcircuit Group
Package Type: PD-8, DD-8, PLCC-20, VOIC-8, & SOIC-8
Test Condition: T = -65C/+150C (Air to Air)

XC17128D XC1718D XC1736D XC1765D/L XC17256D XC1700D

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	3	4	4	2	14
Combined Completed Lots:	1	3	4	4	2	14
Failures:	0	0	0	0	0	0
Device on test:	76	135	273	211	152	847
Mean Test Cycles/Device:	500	504	512	527	522	515
Total Device Cycles:	38,000	68,040	139,837	111,211	79,268	436,356
Failure Analysis Number:						



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC2000 Microcircuit Group
Package Type: PLCC- 84
Test Condition: T = -65C/+150C (Air to Air)

XC2018

XC2000

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	3	3
Combined Completed Lots:	3	3
Failures:	0	0
Device on test:	135	135
Mean Test Cycles/Device:	555	555
Total Device Cycles:	74,925	74,925
Failure Analysis Number:		



Technology: Si Gate CMOS
Device Type: XC3000/A Microcircuit Group
Package Type: PLCC-44, 84, VQFP-64, PQFP-100, 160, TQFP-100, 144, & PPGA-132, HTFP-176
Test Condition: T = -65C/+150C (Air to Air)

Period: Oct 1, 1994 to Oct 1, 1996

Reliability Testing Summary-Packages

Temperature Cycle(Air to Air)

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3100/A Microcircuit Group
 Package Type: PQFP-100, 208, VQFP-100, & PLCC-84
 Test Condition: T = -65C/+150C (Air toAir)

XC3142/A

XC3190/A

XC3195/A

XC3100/A

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	2	1	1	4
Combined Completed Lots:	2	1	1	4
Failures:	0	0	0	0
Device on test:	90	45	45	180
Mean Test Cycles/Device:	513	500	538	516
Total Device Cycles:	46,125	22,500	24,210	92,835
Failure Analysis Number:				



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: MQFP-208, 240. PQFP-160,208, HT-208
 PGA-191, PLCC-84, HQ-304, & BGA-225
 Test Condition: T = -65C/+150C (Air to Air)
 *For BGA-225, T=-55/+125C

XC4005

XC4010

XC4010*

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	8	11	1
Combined Completed Lots:	8	11	1
Failures:	0	0	0
Device on test:	575	667	77
Mean Test cycles/Device:	580	612	1000
Total Device Cycles:	333,677	407,872	77,000
Failure Analysis Number:			



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: MQFP-208, 240. PQFP-160, 208, HT-208
PGA-191, PLCC-84, HQ-304, & BGA-225
Test Condition: T = -65C/+150C (Air to Air)
*For BGA-225, T=-55/+125C

XC4013	XC4013*	XC4025	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996
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Combined Started Lot:	3	2	2	27
Combined Completed Lots:	3	2	2	27
Failures:	0	0	0	0
Device on test:	196	118	115	1,748
Mean Test Cycles/Device:	552	823	814	639
Total Device Cycles:	108,272	97,165	93,660	1,117,646
Failure Analysis Number:				



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000E Microcircuit Group
Package Type: PQFP-160, 208. PGA-156 & 299, PLCC-84
Test Condition: T = -65C/+150C (Air to Air)

	XC4005E	XC4010E	XC4013E	XC4025E	XC4000E
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Period:	Oct 1, 1994 to Oct 1, 1996				
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Combined Started Lot:	2	2	6	1	11
Combined Completed Lots:	2	2	6	1	11
Failures:	0	0	0	0	0
Device on test:	208	206	460	73	947
Mean Test Cycles/Device:	519	747	605	747	612
Total Device Cycles:	108,005	153,830	278,152	39,201	579,188
Failure Analysis Number:					



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC5000 Microcircuit Group
Package Type: PLCC-84, PQFP-208, VQFP-100
Test Condition: T = -65C/+150C (Air to Air)

XC5206

XC5210

XC5215

XC5000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	4	1	6
Combined Completed Lots:	1	4	1	6
Failures:	0	0	0	0
Device on test:	78	465	107	650
Mean Test Cycles/Device:	558	666	501	626
Total Device Cycles:	43,524	309,530	53,607	406,661
Failure Analysis Number:				



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC7000 Microcircuit Group
Package Type: WC-44, 84, BGA-225, & PQFP-44
Test Condition: T = -65C/+150C (Air to Air)
* For BGA-225, T = -55C/+125C

XC7236

XC7336

XC73108*

XC7000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	2	2	5
Combined Completed Lots:	1	2	2	5
Failures:	0	0	0	0
Device on test:	81	154	121	356
Mean Test Cycles/Device:	571	516	819	632
Total Device Cycles:	46,251	79,418	99,147	224,816
Failure Analysis Number:				



Reliability Testing Summary-Packages Temperature Cycle(Air to Air) Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PLCC-84
Test Condition: T = -65C/+150C (Air to Air)

XC95108

XC9500

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	77	77
Mean Test Cycles/Device:	537	537
Total Device Cycles:	41,349	41,349
Failure Analysis Number:		



Reliability Testing Summary-Packages

Thermal Shock (Liquid to Liquid)

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC3000/A, XC3100/A, XC4000, XC7000
 Package Type: Various
 Test Condition: T = -65C/+150C (Liquid to Liquid)

XC3000/A

XC3100 /A

XC4000

XC7000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1	3	1
Combined Completed Lots:	1	1	3	1
Failures:	0	0	0	0
Device on test:	45	45	133	45
Mean Test Cycles/Device:	500	500	500	1,008
Total Device Cycles:	22,500	22,500	66,500	45,360
Failure Analysis Number:				



Reliability Testing Summary-Packages

Thermal Shock (Liquid to Liquid)

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3000/A Microcircuit Group
Package Type: TQFP-144
Test Condition: T = -65C/+145C (Liquid to Liquid)

XC3064/A

XC3000/A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	45	45
Mean Test cycles/Device:	500	500
Total Device Cycles:	22,500	22,500
Failure Analysis Number:		



Reliability Testing Summary-Packages

Thermal Shock (Liquid to Liquid)

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3100/A Microcircuit Group
Package Type: PQFP-208
Test Condition: T = -65C/+145C (Liquid to Liquid)

XC3195/A

XC3100 /A

Period: Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	45	45
Mean Test Cycles/Device:	500	500
Total Device Cycles:	22,500	22,500
Failure Analysis Number:		



Reliability Testing Summary-Packages

Thermal Shock (Liquid to Liquid)

Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000 Microcircuit Group
 Package Type: MQFP-240, HT-208 & CG-225
 T = -65C/+145C (Liquid to Liquid)
 Test Condition:

	XC4005	XC4010	XC4013	XC4000
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Period:	Oct 1, 1994 to Oct 1, 1996			
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Combined Started Lot:	1	1	1	3
Combined Completed Lots:	1	1	1	3
Failures:	0	0	0	0
Device on test:	43	76	14	133
Mean Test Cycles/Device:	500	500	500	500
Total Device Cycles:	21,500	38,000	7,000	66,500



Reliability Testing Summary-Packages

Thermal Shock (Liquid to Liquid)

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC7000 Microcircuit Group
Package Type: BGA-225
Test Condition: T = -55C/+125C (Liquid to Liquid)

XC73108

XC7000

Period:

Oct 1, 1994 to Oct 1, 1996

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	45	45
Mean Test Cycles/Device:	1,008	1,008
Total Device Cycles:	45,360	45,360



Reliability Testing Summary

Package Qualification / Monitor

PD-8

Device Type: XC1718, XC1736D, XC1765D, XC17128D
XC17256L

Package Type: PD8

Die Attach Method: Silver Epoxy

Molding Compound: Sumitomo 6300H & Shenitsu KMC-1805

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	8	0	408	614	250,439
Pressure Pot	4	0	180	96	17,280
Salt Atmosphere	2	0	30	24	720
Solderability	4	0	12		
Resistance to Solvents	5	0	15		
Lead Fatigue	4	0	21		
Physical Dimension	4	0	20		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

SOIC

Device Type: XC1718D, & XC1765D
Package Type: SOIC-8
Die Attach Method: Silver Epoxy
Molding Compound: Sumitomo 6300H

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	3	0	135	520	70,245
Pressure Pot	3	0	135	96	12,960
Solderability	2	0	6		
Lead Fatigue	2	0	12		
Physical Dimension	2	0	10		
Reistance to Solvents	2	0	6		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary Package Qualification / Monitor PLCC

Device Type: XC1736D, XC2018, XC3020/A, XC3190, XC4005, XC4010,
XC4005E, XC4010E XC5210 & XC7336
Package Type: PLCC-20, 44, & 84
Die Attach Method: Silver Epoxy
Molding Compound: Sumitomo 6300H

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	22	0	1,712	607	1,039,595
Pressure Pot	12	0	712	111	78,816
Salt Atmosphere	1	0	15	24	360
Solderability	7	0	27		
Resistance to Solvents	8	0	24		
Lead Fatigue	8	0	23		
Physical Dimension	8	0	40		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary Package Qualification / Monitor PQFP

Device Type: XC3020, XC3042/A, XC3064/A, XC95108,
XC3142/A, XC3195/A, XC4003, XC4005,
XC4010, XC4013, XC4013E, XC5215, XC7336

Package Type: PQFP-44, 100, 160, 208 and 240

Die Attach Method: Silver Epoxy

Molding Compound: Sumitomo 6300H & EME-7304LC

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/S	1	0	45	500	22,500
T/C	23	0	1,578	588	927,798
Pressure Pot	14	0	933	96	86,400
Salt Atmosphere	2	0	30	24	720
Solderability	8	0	24		
Resistance to Solvents	10	0	30		
Lead Fatigue	13	0	39		
Physical Dimension	12	0	60		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary Package Qualification / Monitor TQFP

Device Type: XC3042/A & XC3064/A
Package Type: TQFP-100 & 144
Die Attach Method: Silver Epoxy
Molding Compound: EME-7320

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/S	1	0	45	500	22,500
T/C	3	0	135	515	69,570
Pressure Pot	3	0	135	96	12,960
Solderability	3	0	9		
Resistance to Solvents	3	0	9		
Lead Fatigue	3	0	9		
Physical Dimension	3	0	10		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

VQFP

Device Type: XC3030/A, XC3142/A, XC5001 & XC5206
Package Type: VQFP-64, & 100
Die Attach Method: Silver Epoxy
Molding Compound: EME-7320

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	4	0	213	553	117,864
Pressure Pot	4	0	213	96	20,448
Resistance to Solvents	4	0	18		
Lead Fatigue	3	0	9		
Physical Dimension	3	0	15		
Solderability	3	0	9		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

HQFP

Device Type: XC4025
 Package Type: HQFP-304
 Die Attach Method: 84-1LMSR4
 Molding Compound: Sumitomo 7304L

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	1	0	70	1,005	70,350
Pressure Pot	1	0	72	96	6,912
Resistance to Solvents	1	0	3		
Lead Fatigue	1	0	3		
Physical Dimension	1	0	5		
Solderability	1	0	5		
Adhesion to lead finish	1	0	3		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

PPGA

Device Type: XC3042/A, XC3064/A & XC3090/A
 Package Type: PPGA-132, & 175
 Die Attach Method: Silver Epoxy
 Sealant Material: R4785

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	4	0	211	510	107,615
Pressure Pot	5	0	256	96	24,576
Solderability	5	0	15		
Resistance to Solvents	4	0	12		
Lead Fatigue	5	0	15		
Physical Dimension	4	0	20		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

MQFP

Device Type: XC4005, XC4013 & XC4025
 Package Type: MQFP-208, & 240
 Die Attach Method: Silver Epoxy

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/S	1	0	43	500	21,500
T/C	3	0	131	514	68,026
Pressure Pot	2	0	71	96	6,816
Salt Atmosphere	2	0	40	24	960
Solderability	3	0	9		
Resistance to Solvents	3	0	9		
Lead Fatigue	3	0	9		
Physical Dimension	3	0	20		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

Package Qualification / Monitor

BGA

Device Type: XC73108, XC4010, XC4013 & XC4025
Package Type: BGA-225
Die Attach Method: Silver Epoxy
Test Condition: -55C/+125C for T/S & T/C

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/S	1	0	45	1,008	45,360
T/C	6	0	392	891	349,312
Pressure Pot	3	0	166	122	20,256
Resistance to Solvents	1	0	3		
Physical Dimension	3	0	15		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

PGA Package Qualification / Monitor

PGA-84, -120, -132, -156, -175, -191, -223, & -299

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	300	0		
B3	Solderability	225	0		
B5	Bond Strenght	310	0		
D1	Physical Dimension	145	0		
D2	Lead Integrity	27	0		
	Seal				
D3	Thermal Shock	203	0	15	3,045
	Temperature Cycle			100	20,300
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	212	3		
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	180	1		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	35	0		
D7	Adhesion of lead finish	24	0		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

CB Package Qualification / Monitor

CB-100, -164, -196, -228

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	153	0		
B3	Solderability	114	0		
B5	Bond Strenght	156	0		
D1	Physical Dimension	135	0		
D2	Lead Integrity	31	0		
	Seal				
D3	Thermal Shock	175	0	15	2,625
	Temperature Cycle			100	17,500
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	198	0		
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	135	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	31	0		
D7	Adhesion of lead finish	30	0		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary

CQFP Package Qualification / Monitor

CQFP-100, & -164

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	36	0		
B3	Solderability	24	0		
B5	Bond Strenght	32	0		
D1	Physical Dimension	75	0		
D2	Lead Integrity	15	0		
	Seal		0		
D3	Thermal Shock	118	0	15	1,770
	Temperature Cycle			100	11,800
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	85	2		
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	75	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	20	0		
D7	Adhesion of lead finish	27	0		
D8	Lead Torque	25	0		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary DD8 Package Qualification / Monitor

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	66	0		
B3	Solderability	30	0		
B5	Bond Strenght	40	0		
D1	Physical Dimension	90	0		
D2	Lead Integrity	39	0		
	Seal				
D3	Thermal Shock	100	0	15	1,500
	Temperature Cycle			100	10,000
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	100	0		
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	90	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	22	0		
D7	Adhesion of lead finish	18	0		
D8	Lead Torque	30	0		

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary WC44 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B2	Resistance to Solvents	4	0
B3	Solderability	44	0
B5	Bond Strenght	45	0
D1	Physical Dimension	40	0
D2	Lead Integrity	90	0
	Seal		
D3	Thermal Shock	25	0
	Temperature Cycle		
	Seal		
	Visual Examination		
	End-Point Elect.		
	Parametrics		
D4	Mechanical Shock	25	0
	Vibration, Var. Freq.		
	Constant Accel.		
	Seal		
	Visual Examination		
	End-Point Elec. Para.		
D5	Salt Atmosphere	30	0
	Seal		
	Visual Examination		
D6	Internal Water-Vapor Content	6	0
D7	Adhesion of lead finish	30	0
D8	Lead Torque	5	0

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary WC68 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B3	Solderability	22	0
D1	Physical Dimension	25	0
D2	Lead Integrity	45	0
	Seal (No Leads)		
D3	Thermal Shock	26	0
	Temperature Cycle		
	Seal		
	Visual Examination		
	End-Point Elect.		
	Parametrics		
D4	Mechanical Shock	25	0
	Vibration, Var. Freq.		
	Constant Accel.		
	Seal		
	Visual Examination		
	End-Point Elec. Para.		
D8	Lead Torque	5	0

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary WC84 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B2	Resistance to Solvents	4	0
B3	Solderability	60	0
B5	Bond Strenght	30	0
D1	Physical Dimension	68	0
D2	Lead Integrity	167	0
	Seal (No Leads)		
D3	Thermal Shock	130	0
	Temperature Cycle		
	Seal		
	Visual Examination		
	End-Point Elect.		
	Parametrics		
D4	Mechanical Shock	105	1
	Vibration, Var. Freq.		
	Constant Accel.		
	Seal		
	Visual Examination		
	End-Point Elec. Para.		
D5	Salt Atmosphere	47	0
	Seal		
	Visual Examination		
D6	Internal Water-Vapor Content	10	0
D7	Adhesion of lead finish	45	0
D8	Lead Torque	10	0

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary PG84 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B3	Solderability	22	0
D1	Physical Dimension	25	0
D2	Lead Integrity	77	0
	Seal (No Leads)		
D3	Thermal Shock	25	0
	Temperature Cycle		
	Seal		
	Visual Examination		
	End-Point Elect.		
	Parametrics		
D4	Mechanical Shock	25	0
	Vibration, Var. Freq.		
	Constant Accel.		
	Seal		
	Visual Examination		
	End-Point Elec. Para.		
D5	Salt Atmosphere	15	0
	Seal		
	Visual Examination		
D6	Internal Water-Vapor Content	5	0
D7	Adhesion of lead finish	15	0
D8	Lead Torque	6	0

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary PG144 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B3	Solderability	22	0
B5	Bond Strenght	15	0
D1	Physical Dimension	25	0
D2	Lead Integrity	45	0
	Seal (No Leads)		
D3	Thermal Shock	25	0
	Temperature Cycle		
	Seal		
	Visual Examination		
	End-Point Elect.		
	Parametrics		
D4	Mechanical Shock	24	0
	Vibration, Var. Freq.		
	Constant Accel.		
	Seal		
	Visual Examination		
	End-Point Elec. Para.		
D5	Salt Atmosphere	15	0
	Seal		
	Visual Examination		
D6	Internal Water-Vapor Content	3	0
D7	Adhesion of lead finish	15	0

Period: Oct. 1st, 1994 to Oct 1st, 1996



Reliability Testing Summary-Packages

EIAJ Temperature Soldering Heat Test

Technology: Si-Gate CMOS
Device Type: XC1700 Microcircuit Group
Package Type: PD8C & PLCC20
Foundry/Assembly: Nippon Denso & TSMC / Anam & AAPI
Preconditionning Test Condition: T = 85C, R.H. = 85%
Test Duration: 240 hours
Solder Heat Temp.: 350 +/- 10 degrees C
Test Duration: 3 + 0.5/-0 seconds

XC1736A

XC17128D

XC1765

XC1700

Period:

July 1, 1994 to June 30, 1996

Combined Started Lot:	1	1	3	5
Combined Completed Lots:	1	1	3	5
Failures:	0	0	0	0
Device on test:	5	3	13	21
Failure Analysis:				

Note : Solderability test applied to all leads



Reliability Testing Summary-Packages EIAJ Temperature Soldering Heat Test

Technology: Si-Gate CMOS
 Device Type: XC3000/A & XC3100/A Microcircuit Group
 Package Type: PLCC-68, 84 & PPGA-132
 Foundry/Assembly: Seiko/Anam
 Preconditionning Test Condition: T = 85C, R.H. = 85%
 Test Duration: 240 hours
 Solder Heat Temp.: 350 +/- 10 degrees C
 Test Duration: 3 + 0.5/-0 seconds

XC3020/A XC3030/ XC3042/A XC3142/A XC3000/A/XC3100/A

Period: July 1, 1994 to June 30, 1996

Combined Started Lot:	2	1	2	1	6
Combined Completed Lots:	2	1	2	1	6
Failures:	0	0	0	0	0
Device on test:	10	5	10	3	28
Failure Analysis:					

Note : Solderability test applied to all leads



Reliability Testing Summary-Packages

EIAJ Temperature Soldering Test

Technology: Si-Gate CMOS
 Device Type: XC1700 Microcircuit Group
 Package Type: PD8C & PLCC-20
 Foundry/Assembly: Nippon Denso & TSMC / Anam & AAPI
 Preconditionning Test Condition: Steam Age
 Test Duration: 1 hour min.
 Solder Heat Temp.: 230 +/- 5 degrees C
 Test Duration: 3 +/- 1 seconds
 Rate: 1 +/- 0.1 in./sec.

XC 1736A

XC1765D

XC17128D

XC1700

Period:

July 1, 1994 to June 30, 1996

Combined Started Lot:	1	1	1	3
Combined Completed Lots:	1	1	1	3
Failures:	0	0	0	0
Device on test:	3	3	3	9
Failure Analysis:				

Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0



Reliability Testing Summary-Packages

EIAJ Temperature Soldering Test

Technology: Si-Gate CMOS
 Device Type: XC3000/A Microcircuit Group
 Package Type: PLCC-68, 84 & PPGA-132 & PQFP-120
 Foundry/Assembly: Seiko/Anam
 Preconditionning Test Condition: Steam Age
 Test Duration: 1 hour min.
 Solder Heat Temp.: 230 +/- 5 degrees C
 Test Duration: 3 +/-1 seconds
 Rate: 1 +/- 0.1 in.sec

XC3020/A

XC3090/A

XC3142/A

XC3000/A/XC3100/A

Period:

July 1, 1994 to June 30, 1996

Combined Started Lot:	2	1	1	4
Combined Completed Lots:	2	1	1	4
Failures:	0	0	0	0
Device on test:	6	3	3	12
Failure Analysis:				

Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0



Reliability Testing Summary-Packages

EIAJ Temperature Soldering Test

Technology: Si-Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PQFP-208 & MQFP-208
Foundry/Assembly: Seiko / Anam & Indy
Preconditionning Test Condition: Steam Age
Test Duration: 1 hour min.
Solder Heat Temp.: 230 +/- 5 degrees C
Test Duration: 3 +/- 1 second
Rate: 1 +/- 0.1 in./sec.

XC4008

XC4010

XC4000

Period:

July 1, 1994 to June 30, 1996

Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	0
Device on test:	3	3	6
Failure Analysis:			

Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0



Reliability Testing Summary-Packages Low Temperature Soldering Heat Test

Technology: Si-Gate CMOS
 Device Type: Various Microcircuits
 Package Type: PQFP-100, 120, 160 ,208, MQFP-208, & PPGA-175
 Steam Age: 2 hours
 Flux: RMA
 Solder Heat Temp.: 215 +/- 5 degrees C

	PQ100	PQ120	PQ160	PQ208	MQ208	PP175
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Period:	July 1, 1994 to June 30, 1996					
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Combined Started Lot:	2	1	2	1	3	1
Combined Completed Lots:	2	1	2	1	3	1
Failures:	0	0	0	0	0	0
Device on test:	10	3	9	3	5	3
Failure Analysis:						

Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0



Reliability Testing Summary-Packages Low Temperature Soldering Heat Test

Technology: Si-Gate CMOS
 Device Type: Various Microcircuits
 Package Type: PD-8, & PLCC-20, 84
 Steam Age: 2 hours
 Flux: RMA
 Solder Heat Temp.: 215 +/- 5 degrees C

PD8

PC20

PC84

Period:

July 1, 1994 to June 30, 1996

Combined Started Lot:

1

1

1

Combined Completed Lots:

1

1

1

Failures:

0

0

0

Device on test:

3

3

3

Failure Analysis:

Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0

