

The Reliability Data Program

Expanded Version



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1. This reliability report is published by Xilinx to provide insight to our customers concerning the reliability of Xilinx products. Reliability is defined as product performance to specification over time in response to varied (specified) environmental stress. The science of reliability engineering is devoted to improving this product performance through measurement, failure analysis, feedback, and corrective action. The ultimate goal of any reliability program is to achieve continuous improvement in the robustness of the product being evaluated.

As part of this program, finished product reliability is measured periodically to ensure that the product performance meets or exceeds internal and external reliability specifications. Reliability programs are executed in response to internal programs as well as to individual customer requirements. All testing is performed or supervised by experienced Xilinx employees using facilities which are approved and audited by Xilinx for compliance to the requirements of DSCC-VAC and MIL-STD-883 requirements.

2. **The Reliability Program:** The Xilinx reliability qualification of new devices, wafer processes, and packages is designed to ensure that these devices and/or processes satisfy the internal and external customer requirements before transfer into production. The reliability requirements for this transfer are spelled out below.

2.1 **New Process/Design Qualification:** For new process qualification, the qualifications are to run and pass two wafer lots of high temperature life test. This test accelerates failure mechanisms which are thermally excited by high temperature, such as ionic drift, oxide breakdown, silicon material defects, and assembly related mechanisms. Two lots are run, one to 1,000-hours at 145 degrees C and 5.7 V. or 3.3 V. bias. The second lot is run to 256-hours at 145 degrees C and 5.7V or 3.3 V bias. The sample size is based on a LTPD = 3.

In addition to the temperature life test, two wafer lots must be run and pass the Bias Moisture life. This evaluates the effectiveness of chip passivation and device packaging. High humidities in the presence of electrical bias promote electro-chemical corrosion, electro-thermal migration, and other chemical reactions involving the presence of water. The required bias moisture life time at Xilinx is 1,000-hours minimum at 85 degrees C temperature, 85% relative humidity and 5.0V or 3.3 V. bias. The sample size is based on a LTPD = 3.

One wafer lot must be run and pass the Temperature cycle test. This evaluates the resistance of the die, package combination. The required number of cycles is 500 cycles at -65 degrees C/+150 degrees C. The sample size is based on a LTPD = 3

2.2 Initial Qualification: For a new die type from a previously qualified process, the requirements are to run one wafer lot of high temperature life test (asa monitor). Lot will be run to 256-hours at 145 degrees C and 5.7 V. or 3.3V. bias; the sample size is based on a LTPD = 3.

2.3 Process Changes: For major process changes (major changes are identified as outlined per MIL-PRF-38535 Appendix A and MIL-STD-883) that occur to a qualified device, the above requirements (Refer to Section 2.2) are to be again fulfilled.

2.4 New Package Qualification:

2.4.1 Non-Hermetic Packages: The non-hermetic package qualification requires one lot to be run for each of the following tests:

Unbiased Pressure Pot - Pressure pot test is performed to identify the effects of high humidity and heat conditions on the die surface. Steam stressing accelerates moisture penetration through the plastic package material to the surface of the die, resulting in corrosion of metal. The required pressure pot test time is 96-hours at a temperature of 121 degrees C and a pressure of to 2 atmosphere. The sample size is based on a LTPD = 3 .

Temperature Cycling (Liquid to Liquid) - Temperature Cycling applies thermally-induced stress to the devices to accelerate material fatigue and to precipitate failures associated with thermal expansion mismatch and microcracks. The required total cycles are 500 cycles done per method 1011, Condition C (-65 C/ +150 C) of MIL-STD-883 (no bias). The minimum sample size is based on a LTPD = 3. (This test is optional)

Temperature Cycling (Air to Air) - Temperature Cycling applies thermally-induced stress to the devices to accelerate material fatigue and to precipitate failures associated with thermal expansion mismatch and microcracks for a longer period of test. The required total cycles is 500 cycles done per method 1010, Condition C (-65 C/+150 C) of MIL-STD-883. The minimum sample size is based on a LTPD = 3.

Resistance to Solvents - This test evaluates the integrity of the package marking. At the present time this test is done outside the company at a qualified test laboratory. Test done per method 2015 of MIL-STD-883. The minimum sample size is 3 units and the allowable maximum reject units is 0.

Solderability - This test is performed to evaluate the integrity of the leads. At the present time this test is done outside the company per a qualified test laboratory. Test done per method 2003 of MIL-STD-883. The minimum sample size is 3 units (25 leads) and the allowable maximum reject units is 0.

Lead Fatigue - This test is performed to evaluate the integrity of the leads. At the present time test is done outside the company at a qualified test laboratory. Test done per method 2004 of MIL-STD-883. The minimum sample size is 3 units (25 leads) and the allowable maximum reject units is 0.

2.4.2 Hermetic Packages: The hermetic package qualification requires a full group D test per MIL-STD-883, Method 5005.

2.5 **Reliability Monitor**: In addition to qualifying all new products and processes before going into production, Xilinx also runs periodic reliability monitors on existing production processes. The details of this monitor program are spelled out in Table I.

2.5.1 Process Monitor: Xilinx fabrication processes are grouped into 12 families according to similarities in process and reliability characteristics and by fabrication facility. One or more products within these fabrication process families are selected as monitor vehicles. Process Monitor is run once a month with rotation of all 12 product families. Lot is tested with static burn-in (Refer to Table I for conditions and time).

2.5.2 Assembly Package Monitor: Package types are grouped into families according to the package characteristics and assembly location. Two major categories, Plastic and Ceramic packages, are identified and each Package Family encompasses one or more lead counts.

Assembly Plastic Package Families are monitored once per quarter using a standard set of reliability tests listed in Table I. Monitor is run on separate packages from the Plastic Package families with rotation of all packages in the families.

- 3. Reliability Families:** Xilinx products are manufactured in several worldwide locations. A limited number of process technologies are used for all product lines, resulting in manufacturing efficiency and significant experience with a particular process in different device applications. This strategy accelerates Xilinx's progress on the learning curve and results in process and products which are thoroughly characterized, inherently more reliable, and of the highest quality.

There are 12 different product families at Xilinx with various package combination: EPROM XC1700D, XC1700/L/E, XC7000 (EPLD), Flash XC9500, and LCA (Logic Cell Array); XC3000/A, XC3100/A, XC4300, XC4000E, XC4000EX, XC400XL, XC5000, XC6000. Each product family has one or more products. These products are listed in Table II.

TABLE I

STRESS	PURPOSE OF TEST	TYPICAL TEST PARAMETERS	SAMPLE FREQUENCY/ STRESS FAMILY
High Temperature Operating Life (HTOL)	Determine major changes in device process, infant mortality levels	145 C Vcc = 5.7V or 3.3V for 256-hours, continuous bias applied. SS = 45 + 2 spares Accept 0	Monthly/Fab Process Family Assembly Package Family
Extended Static Life Test	Determine device process durability to electrical and thermal stresses for long period of time	145 C Vcc = 5.7V or 3.3V for 2,000-hours, continuous basis applied. SS = 45 + 2 spares Accept = 0	Quarterly/Fab Process Family
Temperature Humidity (85/85)	Evaluate moisture resistance of die in plastic package	85 C @ 85% R.H. Vcc = 5.0V or 3.3V for 1,000-hrs, continuous bias applied. SS = LTPD 3	Quarterly/Fab Process Family Assembly Package Family
Moisture Test	Test moisture resistance and integrity of plastic package	121 C @ 2 Atm. for 96-hours. SS = 45 Accept = 0	Quarterly/Assembly Package Family
Thermal Shock (optional)	Evaluate resistance of the package to cracking and resistance of the bonding wires and leadframe separation	Cond. C, Method 1011 of MIL-STD-883, -65 C to +150 C for 500 Cycles Liquid to Liquid. SS = 45 Accept = 0	Quarterly/Fab Process Family Assembly Package Family
Temperature Cycling	Detect mechanical reliability problems and thin film leakage caused by temperature change	Cond. C Method 1010 of MIL-STD-883, -65 C +150 C for 500 Cycles Air to Air. SS = 45 Accept = 0	Quarterly/Fab Process Family Assembly Package Family

**TABLE I
Continued**

STRESS	PURPOSE OF TEST	TYPICAL TEST PARAMETERS	SAMPLE FREQUENCY/ STRESS FAMILY
Salt Atmosphere (Hermetics only)	Evaluate resistance to corrosion of the package finish and marking	Cond. A, Method MIL-STD-883, Method 1009, 24-hours. SS = 15 Accept = 0	Quarterly/Fab Process Family Assembly Package Family
Solderability	Evaluate the solderability of the leads under conditions of low soldering temperature following exposure to the aging effects of water vapor	MIL-STD-883, Method 2003. SS = 3 (25 Leads) Accept = 0	Quarterly/Fab Process Family Assembly Package Family
Mark Permanency	Evaluate the integrity of the package marking during exposure to a variety of solvents	MIL-STD-883, Method 2015. SS = 3 Accept = 0	Quarterly/Fab Process Family Assembly Package Family
Lead Fatigue	Evaluate the resistance of the completed assembly to vibrations during storage, shipping, and operations	MIL-STD-883, Method 2004. SS = 3 (25 Leads) Accept = 0	Quarterly/Fab Process Family Assembly Package Family
Physical Dimension	Verify that the external physical dimensions of the device are in accordance with the applicable procurement document	MIL-STD-883, Method 2015. SS = 15	Quarterly/Fab Process Family Assembly Package Family

TABLE II

EPROM XC1700D	EPROM XC1700/L/E	LCA XC3000/A	LCA XC3100/A	LCA XC4000/E	LCA XC4300 (Hardwire)
XC1718D XC1736D XC1765D XC17128D XC17256D	XC1701 XC1765E XC17256E	XC3020/A XC3030/A XC3042/A XC3064/A XC3090/A	XC3120/A XC3130/A XC3142/A XC3164/A XC3190/A XC3195/A	XC4003/E XC4005/E XC4006/E XC4008/E XC4010/E XC4013/E XC4020/E XC4025/E	XC4303 XC4305 XC4310
LCA XC5000	LCA XC6000	LCA XC4000/EX	LCA XC4000XL	EPLD XC7000	FLASH XC9500
XC5202 XC5204 XC5206 XC5210 XC5215	XC6216	XC4028EX XC4036EX	XC4005XL XC4010XL XC4013XL XC4020XL XC4028XL XC4036XL XC4044XL XC4052XL XC4062XL XC4085XL	XC7272/A XC7236 XC73108 XC73144 XC7336 XC7354 XC7372	XC9536 XC9572 XC95108 XC95216 XC95288

4. **Failure Acceleration Rates:** Since Xilinx uses accelerated stress tests in determining product failure rates, it is important to understand how the accelerated conditions are translated to standard operating conditions. Xilinx uses temperature acceleration techniques in which the thermal activation energy (Ea) is assigned for all failures mechanisms. FIT rates can be calculated from these data using the procedure for FIT rate calculation outlined below.

$$A = \exp \left(\frac{E_a}{k} \left(\frac{1}{T_{j2}} - \frac{1}{T_{j1}} \right) \right)$$

Ea = Thermal activation energy (electron Volts)

A = Acceleration factor (0.9 Ev expressed in electron volts)

K = Boltzman's constant {8.617164 x 10 exp (-5 ev/deg K)}

Tj1 = In-use junction temperature in degrees Kelvin (Tin °K = T in °C + 273.16)

Tj2 = In stress junction temperature in degrees Kelvin (Tin °K = T in °C + 273.16)

The in-use failure rate is the computed by dividing the in-stress failure rate by the acceleration factor

$$fr1 = fr2/A$$

fr1 = Failure rate at specified in-use junction temperature Tj1

fr2 = Failure rate at specified in-stress junction temperature Tj2

A = Acceleration factor

Notes: FIT = Failure Unit

1 FIT = 1 Failure / Billion device hours (1 x 10E09 failures)

1 FIT = 1 Failure / 10E+09 Device hours

5. **Failure Analysis:** At Xilinx analysis is performed on all Qualification stress test failures, with the appropriate failure mechanism identified. For Failure analysis Xilinx uses the Failure Analysis Lab. in house Failure Analysis Lab. and outside subcontractors that are in constant contact with Design and product Engineering personnel. Each failure analysis is analyzed and categorized in accordance with the failure mechanism.

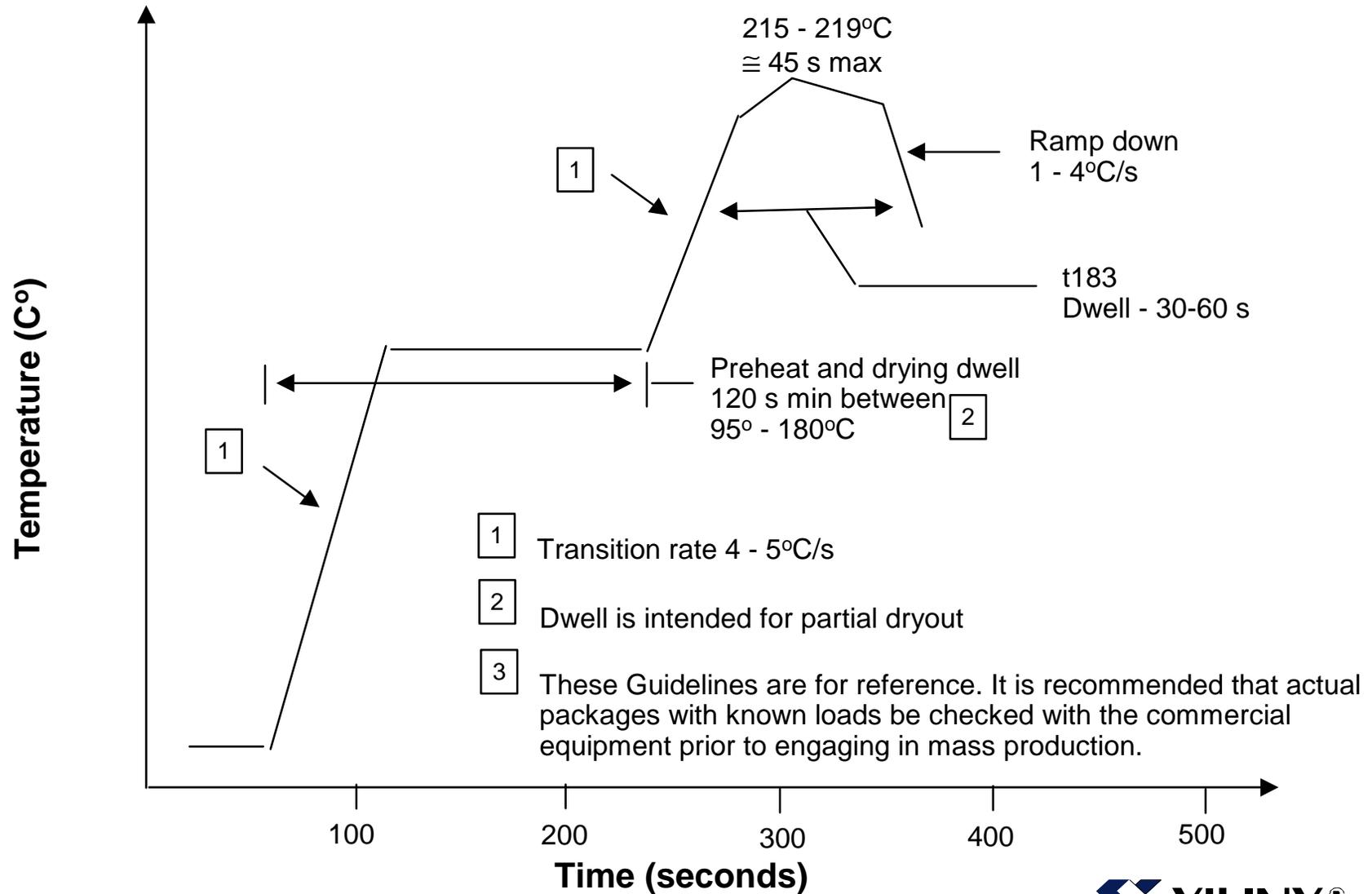
TABLE III

F/A ACRONYM	DESCRIPTION	F/A ACRONYM	DESCRIPTION
FANC	Failure Analysis not completed	ISLS	Insufficient solder on Lid seal
MST	Moisture in package	VCMD	Via contact to metal defect
NDF	No defect found	SL	Lifted ball bond
ORG	Oxide rupture on agate		
PALM	Bad contact and \ precipitates in aluminum		
PFMP	Particle found in Metal 1 to Poly - causing short		
PFGS	Particle shorting polysilicon polysilicon gate to substrate		
RAND	Random defect		
VIM	Void in metal		
LML	Lead misalignment leakage		
CMGL	Ceramic material glass leakage		

Plastic Encapsulant Data (Typical)

		6300HS	7320C	7304
Volume Resistivity (Ohm.cm)	150°C	1×10^{13}	1×10^{13}	1×10^{13}
Water Absorption Boil 48 hrs (wt%)		0.30/24 hrs	0.22/ 24 hrs	0.25/ 24 hrs
Spiral Flow	(cm)	80	180	125
Ionic Impurities 160°C x 23 hrs Extraction	Na+ (ppm)	<1	<1	<1
	Cl - (ppm)	5	5	5
Flexural Strength (kgf/mm) ²		12.0 @ 25°C	17 @ 25°C	17 @ 25°C
Flexural Modulus (kgf/mm) ²		1200 @ 25°C	1750 @ 25°C	1800 @ 25°C
Thermal Expansion(Cured @ 175°C for 5 hours)	α_1 (1/°C)	1.7×10^{-5}	1.3×10^{-5}	1.4×10^{-5}
	α_2 (1/°C)	6.8×10^{-5}	5.2×10^{-5}	5.8×10^{-5}
Glass Transition - Tg Range (°C)		155 ~ 170°C	130 ~ 155°C	153 ~ 165°C

XILINX Typical Vapor Phase Reflow



Product Moisture Classification

Package (Lead Count)	Products	Moisture Level / Floor life (1)
PD-8	XC1700D	Level 1 / Unlimited
SO-8	XC1700D	Level 1 / Unlimited
VO-8	XC1700D	Level 1 / Unlimited
PLCC (20, 44, 68)	ALL	Level 1 / Unlimited
PLCC 84	ALL	30% Level 1 / Unlimited 70% Level 3 / 168 hours
PQFP (100, 160, 208, 240)	ALL	Level 3 / 168 hours
TQFP (44, 100, 144, 176)	ALL	Level 3 / 168 hours
HQFP (160, 208, 240, 304)	ALL	Level 3 / 168 hours
VQFP (44, 100)	ALL	Level 3 / 168 hours
HTQFP (144, 176, 208)	ALL	Level 3 / 168 hours
PPGA (132, 175)	ALL	Level 1 / Unlimited
MQFP (208, 240)	ALL	Level 1 / Unlimited
BGA (225, 256)	ALL	Level 3 / 168 hours
SBGA (352, 432, 560)	ALL	Level 3 / 168 hours
SBGA (560)	XC4085XL	Level 3 / 168 hours

Note (1): Classification for Plastic Integrated Circuit Surface Mount Devices, per J-STD-020



Latch-Up Data Per EIA/JEDEC-78

<u>Device</u>	<u>Worst Latch-Up</u>		<u>Latch-Up Test Condition</u>
XC17XXD	300mA Vcc +2.9V <-300mA Gnd -2.0V	460mA Vcc +9.0V <-460mA Gnd -2.0V	25°C
XC17XXL	>300mA Vcc +4.1V <-300mA Gnd -1.7V	to >560mA Vcc +3.9V <-560mA Gnd -2.5V	25°C
XC3XXX/A	220mA Vcc +1.8V <-300mA Gnd -1.8V	to 300mA Vcc +2.4V <-300mA Gnd -1.4V	25°C
XC31XX/A	300mA Vcc +1.5V <-300mA Gnd -1.3V		25°C
XC4XXX/A	300mA Vcc +2.6V <-300mA Gnd -1.4V		25°C
XC4XXXE	250mA Vcc +1.5V <-250mA Gnd -1.7V	to 300mA Vcc +2.5V <-300mA Gnd -1.5V	25°C
XC4XXXL	Vcc +3.4V** <-250mA Gnd -1.4V	Vcc +3.4V** <-550mA Gnd -1.55V	25°C

** The new 5V tolerant I/O's used in the XL device are guaranteed not to sustain permanent damage when input is forced to maximum of 7V and with the forcing power supply being current limited to 200 mA.



Latch-Up Data

Per EIA/JEDEC-78

<u>Device</u>	<u>Worst Latch-Up</u>		<u>Latch-Up Test Condition</u>
XC4XXEX	250mA Vcc +1.8V <-250mA Gnd -1.6V	to	300mA Vcc +2.5V <-300mA Gnd -1.5V 25°C
XC5200	250mA Vcc +2.40V <-250mA Gnd -1.40V	to	350mA Vcc +2.35V <-400mA Gnd -2.20V 25°C
XC7XX/A	150mA Vcc +2V <-150mA Gnd -5.25V	to	200mA Vcc +5.25V <-200mA Gnd -5.25V 125°C
XC7XXX	200mA Vcc +2.0V <-200mA Gnd - 2.0V	to	300mA Vcc +2.0V <-300mA Gnd - 2.0V 25°C
XC95XX	250mA Vcc +1.3 <-250mA Gnd -2.0V	to	510mA Vcc +1.0V <-510mA Gnd -1.75V 25°C
XC6000	>210mA Vcc +1.5V <-210mA Gnd -1.4V		25°C
XC4300	>200mA Vcc +1.0V <200mA Gnd -1.75V		25°C



ESD Data

<u>Device</u>	Human Body Model	Machine Model	Charge Device Model
	Worst Case ESD	Worst Case ESD	Worst Case ESD
	Mil-Std-883D <u>Method 3015</u>	EIAJ <u>Method 20</u>	
XC17XXXD	±6000V	+500V to +900V	±2000V (1)
XC17XXE	±4000V to ±4500V	+325V	
XC3XXX/A	±4000V to ±7000V	+325V to +600V	±2000V (2)
XC31XX/A	±1750V to ±5000V	+800V to +700V	±1000V (3)
XC4XXX/A	±1000V to ±8000V	+800V to +900V	±2000V (4)
XC4XXE	±3000V to ±8000V		±2000V (5)
XC4XXEX	±3000V to ±7000V		±2000V (6)
XC4XXXL	±2000V to ±6000V		±1000V (7)

(1) Measured on XC1765D, (2) Measured on XC3090, (3) Measured on XC3190/A, (4) Measured on XC4005
 (5) Measured on XC4005E, (6) Measured on XC4010E, (7) Measured on XC4028XL (±1000V, Equipment
 limitation)



ESD Data

<u>Device</u>	Human Body Model Worst Case ESD Mil-Std-883D <u>Method 3015</u>	Machine Model Worst Case ESD EIAJ <u>Method 20</u>	Charge Device Model Worst Case ESD
XC5XXX	$\pm 3000\text{V}$ to $\pm 6000\text{V}$		$\pm 2000\text{V}$ (8)
XC6XXX	$\pm 2000\text{V}$ to $\pm 8000\text{V}$		
XC7XXX	$\pm 2000\text{V}$ to $\pm 4000\text{V}$		$\pm 2000\text{V}$ (9)
XC95XX	$\pm 2000\text{V}$ to $\pm 7000\text{V}$		$\pm 2000\text{V}$ (10)
XC4300	$\pm 2000\text{V}$ to $\pm 3500\text{V}$		

(8) Measured on XC5210, (9) Measured on XC7336, (10) Measured on XC95108

The FPGA Products

Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3000/A, XC3100/A, XC4000, XC4000E Microcircuit Group
Package Type: Various
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev for LCA

	XC3000/A	XC3100/A	XC4000	XC4000E
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	15	15	16	47
Combined Completed Lots:	15	15	16	47
Failures:	0	4	1	6
Device on test:	1,107	1,101	786	2,913
Actual device hours @ 145C:	1,051,176	1,032,569	660,306	3,248,821
Mean :	950	938	840	1,115
Equivalent device hours @ Tj=125C:	3,685,998	3,620,752	2,315,394	11,392,144
Equivalent device hours @ Tj=70C:	246,867,612	242,497,777	155,072,191	762,982,301
Equivalent device hours @ Tj=25C:	2.44E+10	2.40E+10	1.53E+10	7.54E+10
Failure Rate in Fit @ Tj=70C:	0	21	6	8
Failure Rate in Fit @ Tj=25C:	0	0.21	0.07	0.08



Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000EX, XC4000XL, XC5000, XC6000 Microcircuit Group
Package Type: Various
Actual Temperature: 145C +8C/-0C
Actual Voltage: 3.3V +/-0.3**, 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev for LCA

XC4000EX	XC4000XL **	XC5000	XC6000
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	12	12	3
Combined Completed Lots:	2	12	12	3
Failures:	0	6	0	0
Device on test:	89	628	859	276
Actual device hours @ 145C:	114,721	765,948	781,693	569,393
Mean :	1,289	1,220	910	2,064
Equivalent device hours @ Tj=125C:	402,275	2,685,833	2,741,043	1,996,603
Equivalent device hours @ Tj=70C:	26,942,110	179,882,107	183,579,805	133,721,366
Equivalent device hours @ Tj=25C:	2.66E+09	1.78E+10	1.81E+10	1.32E+10
Failure Rate in Fit @ Tj=70C:	0	33	0	0
Failure Rate in Fit @ Tj=25C:	0	0.34	0	0



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-175, PQFP-100,160
 Actual Temperature: 145C +8C/-0C
 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: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	4	1	2	4	3	15
Combined Completed Lots:	1	4	1	2	4	3	15
Failures:	0	0	4	0	0	0	4
Device on test:	129	263	129	173	270	137	1,101
Actual device hours:	132,225	274,864	131,967	188,714	157,227	147,572	1,032,569
Mean :	1,025	1,045	1,023	1,091	582	1,077	938
Equivalent device hours @ Tj=125C:	463,653	963,824	462,748	661,735	551,324	517,468	3,620,752
Equivalent device hours @ Tj=70C:	31,052,907	64,551,530	30,992,315	44,319,291	36,924,601	34,657,134	242,497,777
Equivalent device hours @ Tj=25C:	3.07E+09	6.38E+09	3.06E+09	4.38E+09	3.65E+09	3.43E+09	2.40E+10
Failure Rate in FITS @ Tj=70C:	0	0	129	0	0	0	21
Failure Rate in FITS @ Tj=25C:	0	0		0	0	0	0.21

F/A 96043(4)-NDF

Failure Analysis:



Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PLCC-84, PGA-156, 199
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

	XC4004	XC4005	XC4010	XC4000
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	10	4	16
Combined Completed Lots:	2	10	4	16
Failures:	0	0	1	1
Device on test:	90	452	244	786
Actual device hours:	136,035	417,842	106,429	660,306
Mean :	1,512	924	436	840
Equivalent device hours @ Tj=125C:	477,013	1,465,183	373,198	2,315,394
Equivalent device hours @ Tj=70C:	31,947,681	98,129,768	24,994,742	155,072,191
Equivalent device hours @ Tj=25C:	3.16E+09	9.70E+09	2.47E+09	1.53E+10
Failure Rate in FITS @ Tj=70C:	0	0	40	6
Failure Rate in FITS @ Tj=25C:	0	0	0.41	0.07

Failure Analysis:

F/A96075(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, CB-228
 Actual Temperature: 145C +8C/-0C
 Actual Voltage: 5.7V +/-0.25
 Assumed Activation Energy: 0.90 ev

XC4003E

XC4005E

XC4006E

XC4010E

Period:

April 1, 1996 to April 1, 1998

	XC4003E	XC4005E	XC4006E	XC4010E
Combined Started Lot:	5	16	3	7
Combined Completed Lots:	5	16	3	7
Failures:	0	1	0	1
Device on test:	253	1,019	135	431
Actual device hours:	306,560	1,163,914	145,080	425,653
Mean :	1,212	1,142	1,075	1,067
Equivalent device hours @ Tj=125C:	1,074,967	4,081,319	508,730	1,492,572
Equivalent device hours @ Tj=70C:	71,995,304	273,344,017	34,071,890	99,964,173
Equivalent device hours @ Tj=25C:	7.12E+09	2.70E+10	3.37E+09	9.88E+09
Failure Rate in FITS @ Tj=70C:	0	4	0	10
Failure Rate in FITS @ Tj=25C:	0	0.04	0	0.1

Failure Analysis:

F/A96032(1)-PALM

F/A96064(1)-Lost



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, CB-228
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

XC4013E XC4020E XC4025E XC4000E

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	12	1	3	47
Combined Completed Lots:	12	1	3	47
Failures:	3	0	1	6
Device on test:	873	35	199	2,913
Actual device hours:	1,002,530	37,100	167,984	3,248,821
Mean :	1,148	1,060	844	1,115
Equivalent device hours @ Tj=125C:	3,515,419	130,093	589,044	11,392,144
Equivalent device hours @ Tj=70C:	235,443,149	8,712,897	39,450,871	762,982,301
Equivalent device hours @ Tj=25C:	2.33E+10	8.61E+08	3.90E+09	7.54E+10
Failure Rate in FITS @ Tj=70C:	13	0	25	8
Failure Rate in FITS @ Tj=25C:	0.13	0	0.26	0.08

Failure Analysis: F/A97050(2)-FANC
F/A97094(1)-INC

F/A96072(1)-NDF



Reliability Testing Summary High Temperature Operating Life Qualification & Monitor

Technology: Si Gate CMOS
Device Type: XC4000EX Microcircuit Group
Package Type: PGA-411
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

XC4036EX

XC4000EX

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	89	89
Actual device hours :	114,721	114,721
Mean :	1,289	1,289
Equivalent device hours @ Tj=125C:	402,275	402,275
Equivalent device hours @ Tj=70C:	26,942,110	26,942,110
Equivalent device hours @ Tj=25C:	2.66E+09	2.66E+09
Failure Rate in FITS @ Tj=70C:	0	0
Failure Rate in FITS @ Tj=25C:	0	0

Failure Analysis:



Reliability Testing Summary

High Temperature Operating Life Qualification & Monitor

Technology: Si Gate CMOS
Device Type: XC4000XL Microcircuit Group
Package Type: PLCC-84, PGA-223, 299, 411, 475 , CB-228
Actual Temperature: 145C +8C/-0C
Actual Voltage: 3.3V +/-0.3
Assumed Activation Energy: 0.90 ev

XC4002XL

XC4005XL

XC4013XL

XC4020XL

Period:

April 1, 1996 to April 1, 1998

Combined Started Lot:	1	2	3	1
Combined Completed Lots:	1	2	3	1
Failures:	0	2	0	0
Device on test:	76	90	207	76
Actual device hours :	156,028	97,707	274,583	77,824
Mean :	2,053	1,086	1,326	1,024
Equivalent device hours @ Tj=125C:	547,120	342,614	962,838	272,894
Equivalent device hours @ Tj=70C:	36,643,017	22,946,389	64,485,538	18,276,887
Equivalent device hours @ Tj=25C:	3.62E+09	2.27E+09	6.37E+09	1.81E+09
Failure Rate in FITS @ Tj=70C:	0	87	0	0
Failure Rate in FITS @ Tj=25C:	0	88.2	0	0

Failure Analysis:

F/A97113(1)-FANC
 F/A97137(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, PGA-299
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

	XC5202	XC5206	XC5210	XC5215	XC5000
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	3	5	2	12
Combined Completed Lots:	2	3	5	2	12
Failures:	0	0	0	0	0
Device on test:	90	220	426	123	859
Actual device hours:	68,445	223,445	364,415	125,388	781,693
Mean :	761	1,016	855	1,019	910
Equivalent device hours @ Tj=125C:	240,006	783,520	1,277,838	439,679	2,741,043
Equivalent device hours @ Tj=70C:	16,074,239	52,475,831	85,582,491	29,447,244	183,579,805
Equivalent device hours @ Tj=25C:	1.59E+09	5.19E+09	8.46E+09	2.91E+09	1.81E+10
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 Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC6000 Microcircuit Group
Package Type: PGA-299
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev

XC6216

XC6000

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	3	3
Combined Completed Lots:	3	3
Failures:	0	0
Device on test:	276	276
Actual device hours:	569,393	569,393
Mean :	2,063	2,063
Equivalent device hours @ Tj=125C:	1,996,603	1,996,603
Equivalent device hours @ Tj=70C:	133,721,366	133,721,366
Equivalent device hours @ Tj=25C:	1.32E+10	1.32E+10
Failure Rate in FITS @ Tj=70C:	0	0
Failure Rate in FITS @ Tj=25C:	0	0

Failure Analysis:



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

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

	XC3000/A	XC3100/A	XC4000
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Period:	April 1, 1996 to April 1, 1998		
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Combined Started Lot:	8	1	14
Combined Completed Lots:	8	1	14
Failures:	0	0	0
Device on test:	391	44	782
Mean Test Hour s/Device:	845	1,009	1,101
Total Device Hours:	330,267	44,396	861,321



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000E, XC4000EX, XC4000XL, XC5000 Microcircuit Group
Package Type: Various
Test Condition: T=85C, R.H.=85%
Bias Voltages: 5.0V +/- .25V
 * 3.3V +/-0.3

	XC400E	XC4000EX	XC4000XL*	XC5000
Period:	April 1, 1996 to April 1, 1998			
Combined Started Lot:	15	1	4	3
Combined Completed Lots:	15	1	4	3
Failures:	1	0	0	0
Device on test:	924	60	128	165
Mean Test Hour s/Device:	1,022	1,000	1,004	1,024
Total Device Hours:	944,333	60,000	128,537	169,020



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

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

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

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	4	2	1	8
Combined Completed Lots:	1	4	2	1	8
Failures:	0	0		0	0 0
Device on test:	45	180	90	76	391
Mean Test Hour s/Device:	507	905	760	1,002	845
Total Device Hours:	22,815	162,900	68,400	76,152	330,267
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: PPGA-175
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC3190/A

XC3100/A

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	44	44
Mean Test Hour s/Device:	1,009	1,009
Total Device Hours:	44,396	44,396
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
 PQFP- 208 & VQFP-100
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC4003 XC4005 XC4008 XC4010 XC4013 XC4025 XC4000



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	1	1	5	4	1	14
Combined Completed Lots:	2	1	1	5	4	1	14
Failures:	0	0	0	0	0	0	0
Device on test:	120	76	45	269	199	73	782
Mean Test Hour s/Device:	1,019	1,085	1,000	944	1,431	1,000	1,101
Total Device Hours:	122,250	82,460	45,000	253,813	284,798	73,000	861,321
Failure Analysis Number:							



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, HQFP-208, 240,
 BGA-225, VQFP-100
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

	XC4003E	XC4005E	XC4013E	XC4025E	XC4000E
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Period:	April 1, 1996 to April 1, 1998				
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Combined Started Lot:	1	2	11	1	15
Combined Completed Lots:	1	2	11	1	15
Failures:	0	0	1	0	1
Device on test:	45	123	713	43	924
Mean Test Hour s/Device:	1,000	1,038	1,022	1,000	1,022
Total Device Hours:	45,000	127,725	728,608	43,000	944,333

Failure Analysis Number:

F/A 96090(1)- MST



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000EX Microcircuit Group
Package Type: HQFP- 240,
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC4036EX

XC4000EX



Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	60	60
Mean Test Hour s/Device:	1,000	1,000
Total Device Hours:	60,000	60,000
Failure Analysis Number:		



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000XL Microcircuit Group
Package Type: HQFP-240, BGA-560
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 3.3V +/- .3V

XC4036XL

XC4062XL

XC4000XL



Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	2	2	4
Combined Completed Lots:	2	2	4
Failures:	0	0	0
Device on test:	60	68	128
Mean Test Hour s/Device:	1,001	1,007	1,004
Total Device Hours:	60,031	68,506	128,537
Failure Analysis Number:			



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC5000 Microcircuit Group
Package Type: HQFP-240, PQFP-208 & VQFP-100
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

	XC5206	XC5215	XC5000
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	2	1	3
Combined Completed Lots:	2	1	3
Failures:	0	0	0
Device on test:	120	45	165
Mean Test Hour s/Device:	1,017	1,043	1,024
Total Device Hours:	122,085	46,935	169,020
Failure Analysis Number:			



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3000/A, XC3100/A, & XC4000 Microcircuit Group
Package Type: Various
Test Condition: T=121C; 2 atm. sat. steam

XC3000/A

XC3100/A

XC4000



Period:

April 1, 1996 to April 1, 1998

Combined Started Lot:	4	2	15
Combined Completed Lots:	4	2	15
Failures:	0	0	0
Device on test:	180	121	963
Mean Test Hour s/Device:	96	96	122
Total Device Hours:	17,280	11,616	117,725



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E, XC4000EX, XC4000XL, XC5000 Microcircuit Group
 Package Type: Various
 Test Condition: T=121C; 2 atm. sat. steam

	XC4000E	XC4000EX	XC4000XL	XC5000
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	8	5	3	2
Combined Completed Lots:	8	5	3	2
Failures:	0	1	0	0
Device on test:	419	171	77	122
Mean Test Hour s/Device:	112	108	168	122
Total Device Hours:	46,704	18,480	12,936	14,880



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

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

XC3042/A

XC3064/A

XC3000/A



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	3	1	4
Combined Completed Lots:	3	1	4
Failures:	0	0	0
Device on test:	135	45	180
Mean Test Hour s/Device:	96	96	96
Total Device Hours:	12,960	4,320	17,280
Failure Analysis Number:			



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3100/A Microcircuit Group
Package Type: PQFP-160, PPGA-175
Test Condition: T = 121C; 2 atm. sat. steam.

XC3190/A

XC3100/A



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	121	121
Mean Test Hour s/Device:	96	96
Total Device Hours:	11,616	11,616
Failure Analysis Number:		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PQFP-160, 208, VQFP-100, HQFP-208, 240
 PLCC-84, BGA-225, & HTFP-208
Test Condition: T = 121C; 2 atm. sat. steam

	XC4003	XC4005	XC4008	XC4010
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2	1	5
Combined Completed Lots:	2	2	1	5
Failures:	0	0	0	0
Device on test:	123	126	45	351
Mean Test Hour s/Device:	157	95	96	119
Total Device Hours:	19,296	11,981	4,320	41,904
Failure Analysis Number:				



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PQFP-160, 208, 240, HQFP-208, 240, VQFP-100
 PLCC-84, BGA-225, & HTFP-208
Test Condition: T = 121C; 2 atm. sat. steam

XC4013

XC4025

XC4000



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	4	1	15
Combined Completed Lots:	4	1	15
Failures:	0	0	0
Device on test:	274	44	963
Mean Test Hour s/Device:	116	192	122
Total Device Hours:	31,776	8,448	117,725
Failure Analysis Number:			



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000E Microcircuit Group
 Package Type: HQFP-208, 240, 304, PQFP-208, BGA-225
 Test Condition: T = 121C; 2 atm. sat. steam

XC4013E

XC4025E

XC4000E



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	6	2	8
Combined Completed Lots:	6	2	8
Failures:	0	0	0
Device on test:	298	121	419
Mean Test Hour s/Device:	118	96	112
Total Device Hours:	35,088	11,616	46,704
Failure Analysis Number:			



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC4000EX Microcircuit Group
 Package Type: HQFP-208, 240, 304, BGA-352, 432
 Test Condition: T = 121C; 2 atm. sat. steam

XC4028EX

XC4036EX

XC4000EX



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	3	5
Combined Completed Lots:	2	3	5
Failures:	1	0	1
Device on test:	76	95	171
Mean Test Hour s/Device:	126	94	108
Total Device Hours:	9,600	8,880	18,480
Failure Analysis Number:	F/A98003(1)-FANC		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000XL Microcircuit Group
Package Type: HQFP-240, 304, BGA-432
Test Condition: T = 121C; 2 atm. sat. steam

XC4062XL

XC4000XL



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	3	3
Combined Completed Lots:	3	3
Failures:	0	0
Device on test:	77	77
Mean Test Hour s/Device:	168	168
Total Device Hours:	12,936	12,936
Failure Analysis Number:		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC5000 Microcircuit Group
Package Type: VQFP-100 & HQFP-240
Test Condition: T = 121C; 2 atm. sat. steam

	XC5206	XC5215	XC5000
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	0
Device on test:	78	44	122
Mean Test Hour s/Device:	96	168	122
Total Device Hours:	7,488	7,392	14,880
Failure Analysis Number:			



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

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

	XC3000/A	XC3100/A	XC4000
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	7	3	17
Combined Completed Lots:	7	3	17
Failures:	0	0	0
Device on test:	310	225	1,166
Mean Test Cycles/Device:	750	1,017	858
Total Device Cycles:	232,363	228,820	1,000,388
Failure Analysis Number:			



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

Technology: Si Gate CMOS
Device Type: XC4000E, XC4000XL, XC4000EX, XC5000 Microcircuit Group
Package Type: Various
Test Condition: T = -65C / +150C (Air to Air)
 T = -55C / +125C (Air to Air) for BGA

	XC4000EX	XC4000XL	XC4000E	XC5000
Period:	April 1, 1996 to April 1, 1998			
Combined Started Lot:	4	13	20	6
Combined Completed Lots:	4	13	20	6
Failures:	0	0	2	0
Device on test:	150	359	1,230	476
Mean Test Cycles/Device:	1,052	938	837	824
Total Device Cycles:	157,724	336,609	1,029,414	391,994
Failure Analysis Number:				



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

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

	XC3030/A	XC3042/A	XC3064/A	XC3090/A	XC3000/A
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Period:	April 1, 1996 to April 1, 1998				
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Combined Started Lot:	1	3	1	2	7
Combined Completed Lots:	1	3	1	2	7
Failures:	0	0	0	0	0
Device on test:	15	135	42	118	310
Mean Test Cycles/Device:	1,028	722	1,047	640	750
Total Device Cycles:	15,420	97,470	43,974	75,499	232,363
Failure Analysis Number:					



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

Technology: Si Gate CMOS
Device Type: XC3100/A Microcircuit Group
Package Type: PLCC-84, PQFP-160, PPGA-175
Test Condition: T = -65C/+150C (Air to Air)

XC3190/A

XC3195/A

XC3100/A



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	1	3
Combined Completed Lots:	2	1	3
Failures:	0	0	0
Device on test:	157	68	225
Mean Test Cycles/Device:	1,024	1,000	1,017
Total Device Cycles:	160,820	68,000	228,820
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: PQFP-160, 208, HT-208, HQFP-208,240
 PLCC-84, VQFP-100, BG-225, 432
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

	XC4003	XC4005	XC4008	XC4010	XC4013
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2	1	5	2
Combined Completed Lots:	2	2	1	5	2
Failures:	0	0	0	0	0
Device on test:	123	122	45	369	154
Mean Test Cycle/Device:	1,482	898	514	666	788
Total Device Cycles:	182,319	109,607	23,130	245,760	121,396



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

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PQFP-160, 208, HT-208, HQFP-208,240
Test Condition: PLCC-84, VQFP-100, BG-225, 432
 T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

	XC4010*	XC4013*	XC4025	XC4025*	XC4000
Period:	April 1, 1996 to April 1, 1998				
Combined Started Lot:	2	1	1	1	17
Combined Completed Lots:	2	1	1	1	17
Failures:	0	0	0	0	0
Device on test:	121	78	78	76	1,166
Mean Test cycles/Device:	1,007	1,032	510	1,000	858
Total Device Cycles:	121,900	80,496	39,780	76,000	1,000,388



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

Technology: Si Gate CMOS
Device Type: XC4000EX Microcircuit Group
Package Type: HQFP-240, 304, BGA-352
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

XC4028EX

XC4036EX

XC4000EX



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	3	4
Combined Completed Lots:	1	3	4
Failures:	0	0	0
Device on test:	45	105	150
Mean Test cycles/Device:	1,160	1,005	1,052
Total Device Cycles:	52,200	105,524	157,724



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

Technology: Si Gate CMOS
Device Type: XC4000XL Microcircuit Group
Package Type: HQFP-340, & BGA-432, 560
 PGA-411, 475, PQFP-160
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

XC4020XL **XC4036XL** **XC4052XL**



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	4	1
Combined Completed Lots:	1	4	1
Failures:	0	0	0
Device on test:	45	144	32
Mean Test Cycles/Device:	200	947	1,012
Total Device cycles:	9,000	136,352	32,384



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

Technology: Si Gate CMOS
Device: XC4000XL Microcircuit Group
Type: HQFP-340, & BGA-432, 560
Package Type: PGA-411,475, PQFP-160
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

	XC4062XL	XC4062XL*	XC4085XL	XC4000XL
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	3	3	1	13
Combined Completed Lots:	3	3	1	13
Failures:	0	0	0	0
Device on test:	57	60	21	359
Mean Test Cycles/Device:	1,053	1,285	1,038	938
Total Device Cycles:	59,999	77,076	21,798	336,609



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, 240, PGA- 223 & 299,
 PLCC-84, HQFP-208, 240, BG-225
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

	XC4003E	XC4005E	XC4010E	XC4013E
Period:	April 1, 1996 to April 1, 1998			
Combined Started Lot:	1	1	1	14
Combined Completed Lots:	1	1	1	14
Failures:	0	0	0	2
Device on test:	45	45	129	880
Mean Test Cycles/Device:	1,098	1,016	592	864
Total Device Cycles:	49,410	45,720	76,368	760,573

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, 240, PGA- 223 & 299,
 PLCC-84, HQFP-208, 240, BG-225
Test Condition: T = -65C/+150C (Air to Air)
 *For BGA, T=-55C/+125C (Air to Air)

XC4013E*

XC4025E

XC4000E

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	2	20
Combined Completed Lots:	1	2	20
Failures:	0	0	2
Device on test:	45	86	1,230
Mean Test Cycles/Device:	1,002	608	837
Total Device Cycles:	45,090	52,253	1,029,414



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, HQFP-240, VQFP-100
Test Condition: T = -65C/+150C (Air to Air)

	XC5202	XC5206	XC5210	XC5215	XC5000
Period:	April 1, 1996 to April 1, 1998				
Combined Started Lot:	1	2	2	1	6
Combined Completed Lots:	1	2	2	1	6
Failures:	0	0	0	0	0
Device on test:	49	123	260	44	476
Mean Test Cycles/Device:	1,118	763	767	1,002	824
Total Device Cycles:	54,782	93,834	199,290	44,088	391,994
Failure Analysis Number:					



Reliability Testing Summary-Packages Hast Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3100/A, XC4000E Microcircuit Group
Package Type: Various
Test Condition: T = 130C, R.H. = 85%, 2ATM
Bias Voltage: 5.0V +/- .25V

	XC3100/A	XC4000	XC4000E
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	1
Device on test:	22	12	22
Mean Test Hours/Device:	200	100	325
Total Device Hours:	4,400	1,200	7,150



Reliability Testing Summary-Packages Hast Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3100/A Microcircuit Group
Package Type: PLCC-84
Test Condition: T = 130C, R.H. = 85%, 2ATM
Bias Voltage: 5.0V +/- .25V

XC3195/A

XC3100/A



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	22	22
Mean Test Hours/Device:	200	200
Total Device Hours:	4,400	4,400



Reliability Testing Summary-Packages Hast Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000 Microcircuit Group
Package Type: PQFP-240
Test Condition: T = 130C, R.H. = 85%, 2ATM
Bias Voltage: 5.0V +/- .25V

XC4013

XC4000



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	12	12
Mean Test Hours/Device:	100	100
Total Device Hours:	1,200	1,200



Reliability Testing Summary-Packages Hast Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4000E Microcircuit Group
Package Type: HQFP-240
Test Condition: T = 130C, R.H. = 85%, 2ATM
Bias Voltage: 5.0V +/- .25V

XC4025E

XC4000E



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	1	1
Device on test:	22	22
Mean Test Hours/Device:	325	325
Total Device Hours:	7,150	7,150

F/A97114(1)-FANC



The CPLD & EPROM Products

Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700D, XC1700E, CV1700L, XC7000, XC9500
Package Type: Various
Actual Temperature: 145C (125C & 150C for XC7000 & XC9500)
Actual Voltage: 5.7V +/-0.25, 3.3V +/-0.3V
Assumed Activation Energy: 0.58 ev for Eprom & Flash

	XC1700D	XC17000E	XC1700/L	XC7000	XC9500
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	11	6	1	5	12
Combined Completed Lots:	11	6	1	5	12
Failures:	0	0	0	0	3
Device on test:	997	540	76	443	844
Actual device hours @ 145C:	1,133,783	595,213	80,332	343,648	967,325
Mean :	1,137	1,102	1,057	76	1,146
Equivalent device hours @ Tj=125C:	2,544,923	1,336,033	180,316	1,205,018	2,171,286
Equivalent device hours @ Tj=70C:	38,227,116	20,068,458	2,708,508	80,705,383	32,614,746
Equivalent device hours @ Tj=25C:	7.38E+08	3.87E+08	5.23E+07	7.98E+09	6.30E+08
Failure Rate in Fit @ Tj=70C:	0	0	0	0	92
Failure Rate in Fit @ Tj=25C:	0	0	0	0	4.76



Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700D Microcircuit Group
Package Type: PD8, DD8
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.58 ev

XC1736D XC1765D XC17128D XC17256D XC1700D

Period: April 1, 1996 to April 1, 1998

	XC1736D	XC1765D	XC17128D	XC17256D	XC1700D
Combined Started Lot:	2	7	1	1	11
Combined Completed Lots:	2	7	1	1	11
Failures:	0	0	0	0	0
Device on test:	214	629	107	47	997
Actual device hours:	216,782	686,287	218,494	12,220	1,133,783
Mean :	1,013	1,091	2,042	260	1,137
Equivalent device hours @ Tj=125C:	486,595	1,540,460	490,438	27,429	2,544,923
Equivalent device hours @ Tj=70C:	7,309,115	23,139,148	7,366,838	412,015	38,227,116
Equivalent device hours @ Tj=25C:	1.41E+08	4.47E+08	1.42E+08	7.95E+06	7.38E+08
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 Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700/L Microcircuit Group
Package Type: PD8
Actual Temperature: 145C +8C/-0C
Actual Voltage: 3.3V +/-0.3V
Assumed Activation Energy: 0.58 ev

XC1701L

XC1700/L

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	76	76
Actual device hours:	80,332	80,332
Mean :	1,057	1,057
Equivalent device hours @ Tj=125C:	180,316	180,316
Equivalent device hours @ Tj=70C:	2,708,508	2,708,508
Equivalent device hours @ Tj=25C:	5.23E+07	5.23E+07
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: XC1700E Microcircuit Group
Package Type: PD8
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.58 ev

XC1765E

XC17256E

XC1700E

Period:

April 1, 1996 to April 1, 1998

Combined Started Lot:	5	1	6
Combined Completed Lots:	5	1	6
Failures:	0	0	0
Device on test:	464	76	540
Actual device hours:	442,529	152,684	595,213
Mean :	954	2,009	1,102
Equivalent device hours @ Tj=125C:	993,314	342,719	1,336,033
Equivalent device hours @ Tj=70C:	14,920,498	5,147,960	20,068,458
Equivalent device hours @ Tj=25C:	2.88E+08	9.94E+07	3.87E+08
Failure Rate in FITS @ Tj=70C:	0	0	0
Failure Rate in FITS @ Tj=25C:	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-44,68, WC44, 68 & PQFP-160
 Actual Temperature: 125C * & 145, 150C** +8C/-0C
 Actual Voltage: 5.0V +/-0.25* & 5.7V +/-0.25**
 Assumed Activation Energy: 0.90 ev

XC73144	XC7336	XC7336	XC7354	XC7354	XC7000
*		**	**		@ 145 C

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1	1	1	1	5
Combined Completed Lots:	1	1	1	1	1	5
Failures:	0	0	0	0	0	0
Device on test:	108	45	107	107	76	443
Actual device hours :	34,884	11,610	65,912	114,062	80,332	343,648
Mean :	323	258	616	1,066	1,276	76
Equivalent device hours @ Tj=125C:	34,884	40,711	310,468	537,270	818,958	1,205,018
Equivalent device hours @ Tj=70C:	2,336,336	2,726,597	20,793,391	35,983,367	54,849,214	80,705,383
Equivalent device hours @ Tj=25C:	2.31E+08	2.70E+08	2.06E+09	3.56E+09	5.42E+09	7.98E+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-44 & 84 & HQFP-208
Actual Temperature: 145C & 150C* +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.58 ev

XC95108	XC95108	XC95216	XC9536	XC9536	XC9500
	*				* @145C

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	4	3	1	1	2	12
Combined Completed Lots:	4	3	1	1	2	12
Failures:	2	0	0	1	0	3
Device on test:	354	236	78	54	122	844
Actual device hours :	443,218	200,843	81,276	120,366	65,771	967,325
Mean :	1,252	851	1,042	2,229	539	1,146
Equivalent device hours @ Tj=125C:	994,860	545,257	182,435	270,177	147,632	2,171,286
Equivalent device hours @ Tj=70C:	14,943,729	8,190,268	2,740,337	4,058,312	2,217,563	32,614,746
Equivalent device hours @ Tj=25C:	2.88E+08	1.58E+08	5.29E+07	7.83E+07	4.28E+07	6.30E+08
Failure Rate in FITS @ Tj=70C:	134	0	0	246	0	92
Failure Rate in FITS @ Tj=25C:	6.93	0	0	12.8	0	4.76

Failure Analysis: F/A98014(2)-ASL

F/A97124(1)-FANC



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700D, XC1700E, XC9500 Microcircuit Group
Package Type: Various
Test Condition: T=85C, R.H.=85%
Bias Voltages: 5.0V +/- .25V

	XC1700D	XC1700E	XC9500
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Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	5	2	2
Combined Completed Lots:	5	2	2
Failures:	0	0	0
Device on test:	225	153	90
Mean Test Hour s/Device:	1,012	946	935
Total Device Hours:	227,655	144,738	84,150



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

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

	XC1718D	XC1736D	XC1765D	XC17256D	XC1700D
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Period:	April 1, 1996 to April 1, 1998				
Combined Started Lot:	1	1	2	1	5
Combined Completed Lots:	1	1	2	1	5
Failures:	0	0	0	0	0
Device on test:	45	45	90	45	225
Mean Test Hour s/Device:	1,003	1,000	1,028	1,002	1,012
Total Device Hours:	45,135	45,000	92,520	45,090	227,655



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700E Microcircuit Group
Package Type: PD8
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC1765E

XC1700E

Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	153	153
Mean Test Hour s/Device:	946	946
Total Device Hours:	144,738	144,738



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

XC95108

XC95000

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	90	90
Mean Test Hour s/Device:	935	935
Total Device Hours:	84,150	84,150
Failure Analysis Number:		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700D, XC7000, XC9500 Microcircuit Group
Package Type: Various
Test Condition: T=121C; 2 atm. sat. steam

XC1700D

XC7000

XC9500



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	4	1	1
Combined Completed Lots:	4	1	1
Failures:	0	0	0
Device on test:	180	22	44
Mean Test Hour s/Device:	96	96	96
Total Device Hours:	17,280	2,112	4,224



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD-8 & SOIC-8
 Test Condition: T = 121C; 2 atm. sat. steam

	XC1718D	XC1736D	XC1765D	XC1700D
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Period:	April 1, 1996 to April 1, 1998			
Combined Started Lot:	1	2	1	4
Combined Completed Lots:	1	2	1	4
Failures:	0	0	0	0
Device on test:	45	90	45	180
Mean Test Hour s/Device:	96	96	96	96
Total Device Hours:	4,320	8,640	4,320	17,280
Failure Analysis Number:				



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC7300 Microcircuit Group
Package Type: PLCC-44
Test Condition: T = 121C; 2 atm. sat. steam

XC7354

XC7300



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	22	22
Mean Test Hour s/Device:	96	96
Total Device Hours:	2,112	2,112
Failure Analysis Number:		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: HQFP-208
Test Condition: T = 121C; 2 atm. sat. steam

XC95216

XC9500



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	44	44
Mean Test Hour s/Device:	96	96
Total Device Hours:	4,224	4,224
Failure Analysis Number:		



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

Technology: Si Gate CMOS
Device Type: XC1700D , XC7000 & XC9500 Microcircuit Group
Package Type: Various
Test Condition: T = -65C / +150C (Air to Air)
 T = -55C / +125C (Air to Air) for BGA

XC1700D

XC7000

XC9500

Period:

April 1, 1996 to April 1, 1998

Combined Started Lot:	6	4	5
Combined Completed Lots:	6	4	5
Failures:	0	2	0
Device on test:	270	222	328
Mean Test Cycles/Device:	767	790	617
Total Device Cycles:	207,090	175,332	202,468
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, SOIC-8, VO-8
Test Condition: T = -65C/+150C (Air to Air)

XC1718D XC1736D XC1765 D XC17256D XC1700D

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	2	2	1	6
Combined Completed Lots:	1	2	2	1	6
Failures:	0	0	0	0	0
Device on test:	45	90	90	45	270
Mean Test Cycles/Device:	500	780	760	1,024	767
Total Device Cycles:	22,500	70,155	68,355	46,080	207,090
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: PLCC-44, 68, PQFP-160
Test Condition: T = -65C/+150C (Air to Air)

XC7336

XC7354

XC73108

XC7000

Period:

April 1, 1996 to April 1, 1998

	XC7336	XC7354	XC73108	XC7000
Combined Started Lot:	1	2	1	4
Combined Completed Lots:	1	2	1	4
Failures:	0	2	0	2
Device on test:	76	101	45	222
Mean Test Cycles/Device:	500	895	1,043	790
Total Device Cycles:	38,000	90,397	46,935	175,332
Failure Analysis Number:	F/A97112(2)- FANC			



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

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PQFP-160, HQFP-208, PLCC-84
Test Condition: T = -65C/+150C (Air to Air)

	XC95108	XC95216	XC9572	XC9500
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Period:	April 1, 1996 to April 1, 1998			
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Combined Started Lot:	3	1	1	5
Combined Completed Lots:	3	1	1	5
Failures:	0	0	0	0
Device on test:	229	45	54	328
Mean Test Cycles/Device:	537	537	1,025	617
Total Device Cycles:	122,953	24,165	55,350	202,468
Failure Analysis Number:				



Reliability Testing Summary-Packages Hast Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PQFP-160
Test Condition: T = 130C, R.H. = 85%, 2ATM
Bias Voltage: 5.0V +/- .25V

XC95108

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1
Combined Completed Lots:	1
Failures:	0
Device on test:	15
Mean Test Hours/Device:	500
Total Device Hours:	7,500



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D, XC1700E, XC1700/L, XC7300,
 XC9500 Microcircuit Group
 Package Type: Various
 Test Condition: 150C, 250C

	XC1700D	XC1700E	XC1700/L	XC7300	XC9500
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	8	2	1	1	5
Combined Completed Lots:	8	2	1	1	5
Failures:	0	0	0	0	1
Device on test:	1,170	152	22	23	381
Mean Test Hours/Device:	1,442	2,006	2,006	1,477	1,481
Total Device Hours:	1,687,250	304,912	44,132	33,971	564,366
Failure Analysis Number:					



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
 Device Type: XC1700D Microcircuit Group
 Package Type: PD-8, DD-8
 Test Condition: 150C, 250C*

	XC1736D	XC1765D	XC17128D	XC1700D
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Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	5	*1	1	8
Combined Completed Lots:	1	5	1	1	8
Failures:	0	0	2	0	0
Device on test:	143	725	143	159	1,170
Mean Test Hours/Device:	2,133	1,489	1,000	1,000	1,442
Total Device Hours:	305,019	1,080,231	143,000	159,000	1,687,250
Failure Analysis Number:	F/A96063(2)-VIM				



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700E Microcircuit Group
Package Type: PD-8
Test Condition: 150C

XC1765E

XC17256E

XC1700E

Period:

April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	0
Device on test:	76	76	152
Mean Test Hours/Device:	2,006	2,006	2,006
Total Device Hours:	152,456	152,456	304,912



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC1700/L Microcircuit Group
Package Type: PD-8
Test Condition: 150C

XC1701L

XC1700/L

Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	22	22
Mean Test Hours/Device:	2,006	2,006
Total Device Hours:	44,132	44,132



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC7300 Microcircuit Group
Package Type: PLCC-68
Test Condition: 150C

XC7354

XC7300

Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	23	23
Mean Test Hours/Device:	1,477	1,477
Total Device Hours:	33,971	33,971
Failure Analysis Number:		



Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PLCC-44, 84, PQFP-160
Test Condition: 150C

	XC9536	XC95108	XC95216	XC9572	XC9500
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Period:	April 1, 1996 to April 1, 1998				
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Combined Started Lot:	1	2	1	1	5
Combined Completed Lots:	1	2	1	1	5
Failures:	0	0	0	1	1
Device on test:	24	203	130	105	462
Mean Test Hours/Device:	1,002	1,921	1,031	1,022	1,419
Total Device Hours:	24,048	390,064	134,030	107,310	655,452

Failure Analysis Number:

F/A97111(1)-FANC



Reliability Testing Summary-Packages

Erase Cycling

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC9500 Microcircuit Group
Package Type: PLCC- 84
Test Condition: 55C
Voltage: Vcc=5.0V, Vpp=12.0-12.5V

XC9536

XC95108

XC9500

	XC9536	XC95108	XC9500
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	0
Device on test:	29	80	109
Mean Test Cycles/Device:	10,000	10,939	10,689
Total Device Cycles:	290,000	875,120	1,165,120



The HARDWIRE Products

Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XHA000, XC3300 Microcircuit Group
Package Type: Various
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev for LCA

XHA312

XC3300

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	129	54
Actual device hours @ 145C:	129,050	55,188
Mean :	1,000	1,022
Equivalent device hours @ Tj=125C:	452,520	193,519
Equivalent device hours @ Tj=70C:	30,307,261	12,960,846
Equivalent device hours @ Tj=25C:	3.00E+09	1.28E+09
Failure Rate in Fit @ Tj=70C:	0	0
Failure Rate in Fit @ Tj=25C:	0	0



Reliability Testing Summary

High Temperature Life Test

Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XHA000 Microcircuit Group
Package Type: PG- 299
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev for LCA

XHA312

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1
Combined Completed Lots:	1
Failures:	0
Device on test:	129
Actual device hours @ 145C:	129,050
Mean :	1,000
Equivalent device hours @ Tj=125C:	452,520
Equivalent device hours @ Tj=70C:	30,307,261
Equivalent device hours @ Tj=25C:	3.00E+09
Failure Rate in Fit @ Tj=70C:	0
Failure Rate in Fit @ Tj=25C:	0



Reliability Testing Summary

High Temperature Life Test Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3300 Microcircuit Group
Package Type: PQFP-100
Actual Temperature: 145C +8C/-0C
Actual Voltage: 5.7V +/-0.25
Assumed Activation Energy: 0.90 ev for LCA

XC3342

XC3300

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	54	54
Actual device hours @ 145C:	55,188	55,188
Mean :	1,022	1,022
Equivalent device hours @ Tj=125C:	193,519	193,519
Equivalent device hours @ Tj=70C:	12,960,846	12,960,846
Equivalent device hours @ Tj=25C:	1.28E+09	1.28E+09
Failure Rate in Fit @ Tj=70C:	0	0
Failure Rate in Fit @ Tj=25C:	0	0



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3300, XC4300 Microcircuit Group
Package Type: Various
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC3300

XC4300



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	2
Combined Completed Lots:	1	2
Failures:	0	0
Device on test:	78	149
Mean Test Hour s/Device:	1,124	1,006
Total Device Hours:	87,672	149,973
Failure Analysis Number:		



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3300 Microcircuit Group
Package Type: TQFP-176
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC3390

XC3300

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	78	78
Mean Test Hour s/Device:	1,124	1,124
Total Device Hours:	87,672	87,672
Failure Analysis Number:		



Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4300 Microcircuit Group
Package Type: PQFP-208
Test Condition: T = 85C, R.H. = 85%
Bias Voltages: 5.0V +/- .25V

XC4310

XC4300



Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	2	2
Combined Completed Lots:	2	2
Failures:	0	0
Device on test:	149	149
Mean Test Hour s/Device:	1,006	1,006
Total Device Hours:	149,973	149,973
Failure Analysis Number:		



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC0300, XC4300 Microcircuit Group
Package Type: Various
Test Condition: T = 121C; 2 atm. sat. steam

XC3300

XC4300

Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	2	1
Combined Completed Lots:	2	1
Failures:	0	0
Device on test:	154	78
Mean Test Cycles/Device:	166	168
Total Device Cycles:	25,568	13,104



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC3300 Microcircuit Group
Package Type: TQFP-176
Test Condition: T = 121C; 2 atm. sat. steam

XC3342

XC3390

XC3300

	XC3342	XC3390	XC3300
Period:	April 1, 1996 to April 1, 1998		
Combined Started Lot:	1	1	2
Combined Completed Lots:	1	1	2
Failures:	0	0	0
Device on test:	76	78	154
Mean Test Cycles/Device:	164	168	166
Total Device Cycles:	12,464	13,104	25,568



Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

Technology: Si Gate CMOS
Device Type: XC4300 Microcircuit Group
Package Type: PQFP-208
Test Condition: T = 121C; 2 atm. sat. steam

XC4310

XC4300

Period:	April 1, 1996 to April 1, 1998	
Combined Started Lot:	1	1
Combined Completed Lots:	1	1
Failures:	0	0
Device on test:	78	78
Mean Test Cycles/Device:	168	168
Total Device Cycles:	13,104	13,104



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

Technology: Si Gate CMOS
Device Type: XC4300 Microcircuit Group
Package Type: Various
Test Condition: T = -65C/+150C (Air to Air)

XC4300

Period: April 1, 1996 to April 1, 1998

Combined Started Lot:	5
Combined Completed Lots:	5
Failures:	0
Device on test:	389
Mean Test Cycles/Device:	1,016
Total Device Cycles:	395,178



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

Technology: Si Gate CMOS
Device Type: XC4300 Microcircuit Group
Package Type: PQFP-100,160,208, PPGA-175
Test Condition: T = -65C/+150C (Air to Air)

	XC4303	XC4305	XC4310	XC4300
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Period:	April 1, 1996 to April 1, 1998
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Combined Started Lot:	1	1	3	5
Combined Completed Lots:	1	1	3	5
Failures:	0	0	0	0
Device on test:	76	76	237	389
Mean Test Cycles/Device:	1,005	1,005	1,022	1,016
Total Device Cycles:	76,380	76,380	242,418	395,178



Package Qualification & Monitor Program



Reliability Testing Summary

Package Qualification / Monitor

PD-8

Device Type: XC1736D, XC1765D Microcircuit Group
Package Type: PD8
Die Attach Material: 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	2	0	90	755	67,950
Pressure Pot	2	0	90	96	8,640
Solderability	2	0	8		
Resistance to Solvents	2	0	6		
Lead Fatigue	2	0	12		
Physical Dimension	2	0	8		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary

Package Qualification / Monitor

SOIC

Device Type: XC1718D, XC1736D, XC1765D
Package Type: SOIC-8
Die Attach Material: Silver Epoxy
Molding Compound: EME6300H

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	3	0	135	689	93,060
Pressure Pot	2	0	90	96	8,640
Solderability	3	0	9		
Lead Fatigue	3	0	14		
Physical Dimension	3	0	15		
Resistance to Solvents	3	0	9		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor TSOP

Device Type: XC1736D, XC17256D
Package Type: VO8
Die Attach Material: Silver Epoxy
Molding Compound: KMC 184-4

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	1	0	45	1,024	46,080
Solderability	1	0	3		
Physical Dimension	1	0	5		
Reistance to Solvents	1	0	3		
Lead Fatigue	1	0	5		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary

Package Qualification / Monitor

PLCC

Device Type: XC2018, XC3020/A, XC3042, XC3195/A, XC4005,
XC4005E, XC4010/E, XC5202, XC5210, XC7336, XC7354
XC95108, XC9572

Package Type: PLCC- 84

Die Attach Material: Silver Epoxy

Molding Compound: Sumitomo 6300H

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	17	2*	1,157	779	901,749
Pressure Pot	3	0	145	96	13,920
Hast	2	0	44	150	6,600
Solderability	4	0	17	*F/A97112(2)-FANC	
Resistance to Solvents	2	0	6		
Lead Fatigue	3	0	9		
Physical Dimension	2	0	10		
Die Shear	1	0	5		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary

Package Qualification / Monitor

PQFP

Device Type: XC3020/A, XC95108, XC4020XL, XC3090/A, XC4310, XC3190/A, XC4003, XC4005, XC4303, XC4305, XC3342, XC4008, XC4010, XC4013, XC4013E, XC5206, XC3064/A

Package Type: PQFP- 100, 160, 208 & 240

Die Attach Material: Silver Epoxy

Molding Compound: Sumitomo 6300H, EME-7304LC & E7N36

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	27	0	1,852	795	1,570,795
Pressure Pot	12	0	789	121	95,240
Hast	2	0	27	322	8,700
Adhesion to Lead Finish	2	0	6		
Solderability	11	0	33		
Resistance to Solvents	9	0	27		
Bond Pull	5	0	25		
Lead Fatigue	11	0	35		
Physical Dimension	10	0	50		
Die shear	3	0	13		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor TQFP

Device Type: XC3042/A, XC3390A
Package Type: TQFP-100 & 176
Die Attach Material: Silver Epoxy
Molding Compound: EME-7320, E7N32

Reliability Test	Combined No. Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	1	0	78	1,153	89,934
Pressure Pot	1	0	78	168	13,104
Solderability	2	0	6		
Resistance to Solvents	2	0	6		
Lead Fatigue	2	0	6		
Physical Dimension	3	0	15		
Die shear	1	0	5		
Bond Pull	1	0	5		
Adhesion to Lead finish	1	0	3		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor VQFP

Device Type: XC3042L, XC3142/A, XC5206,
XC4003, XC4003E

Package Type: VQFP-44, 64, & 100

Die Attach Material: 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	246	1,130	278,088
Pressure Pot	3	0	201	133	26,784
Resistance to Solvents	3	0	9		
Lead Fatigue	4	0	12		
Bond Strength	1	0	5		
Physical Dimension	5	0	25		
Solderability	3	0	9		
Die shear	1	0	5		
Adhesion to Lead finish	1	0	3		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary

Package Qualification / Monitor

HQFP

Device Type: XC4005, XC4025, XC4013E, XC4025E, XC5215,
 XC4028EX, XC4036EX, XC4036XL, XC4062XL, XC95216
Package Type: HQFP-208, 240 & 304
Die Attach Material: Silver Epoxy
Molding Compound: Sumitomo 7304L

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	18	0	639	922	589,124
Pressure Pot	14	0	590	124	73,296
Hast	2	1*	22	325	7,150
Resistance to Solvents	4	0	12	*FA97114(1)-FANC	
Lead Fatigue	6	0	18		
Physical Dimension	7	0	35		
Solderability	5	0	15		
Die shear	2	0	10		
Bond Pull	4	0	20		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor PPGA

Device Type: XC3042/A, XC3064/A, XC3190/A, XC4310,
Package Type: PPGA-132, & 175
Die Attach Material: Silver Epoxy
Sealant Material: R4785

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	3	0	171	898	153,4778
Pressure Pot	3	0	135	96	12,960
Solderability	4	0	12		
Resistance to Solvents	3	0	9		
Lead Fatigue	4	0	12		
Physical Dimension	5	0	25		
Bond Strength	1	0	5		
Die shear	1	0	5		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor HTFP

Device Type: XC3090A, XC4010
Package Type: HT-176, HT-208
Die Attach Material: Silver Epoxy
Molding Compound: 7320CR

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/S	1	0	76	500	38,000
T/C	2	0	121	590	71,362
Pressure Pot	1	0	76	96	7,296
Resistance to Solvents	1	0	3		
Physical Dimension	1	0	5		
Lead Integrity	1	0	3		
Solderability	1	0	3		
Adhesion to lead finish	1	0	3		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary Package Qualification / Monitor BGA

Device Type: XC73108, XC4010/E, XC4013/D/E, XC4025, XC4036EX,
XC4036XL, XC4062XL, XC4085XL, XC4028EX

Package Type: BGA-225, 352, 432 & BGA-560

Die Attach Material: Silver Epoxy

Test Condition: -55C/+125C for T/C

Reliability Test	Combined No.Lots	Failures	Device On Test	Mean Test Hrs/Cycles	Total Device Hrs
T/C	9	0	425	1,065	452,762
Pressure Pot	7	0	329	127	41,664
Resistance to Solvents	2	0	6		
Physical Dimension	7	0	35		
Ball Shear	4	0	17		
Bond Pull	3	0	12		
Die shear	2	0	10		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary
PGA Package Qualification / Monitor
PGA-84, -120, -132, -156, -175, -191, -223, -299, -411, -475, -559

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	303	0		
B3	Solderability	236	0		
B5	Bond Strength	309	0		
D1	Physical Dimension	140	0		
D2	Lead Integrity	24	0		
D3	Seal				
D3	Thermal Shock	150	1	FA97064-FANC	2,250
	Temperature Cycle				15,000
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	167	1	FA95124-ISLS	
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	153	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	38	0		
D7	Adhesion of lead finish	27	0		

Period: April 1st, 1996 to April 1st, 1998



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	192	0		
B3	Solderability	162	0		
B5	Bond Strength	212	0		
D1	Physical Dimension	90	0		
D2	Lead Integrity Seal	18	0		
D3	Thermal Shock	90	0	15	1,350
	Temperature Cycle			100	9,000
	Seal				
	Visual Examination End-Point Elect. Parametrics				
D4	Mechanical Shock	90	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	18	0		
D7	Adhesion of lead finish	18	0		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary

CQFP Package Qualification / Monitor

CQFP-100

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	27	0		
B3	Solderability	18	0		
B5	Bond Strength	24	0		
D1	Physical Dimension	45	0		
D2	Lead Integrity	9	0		
	Seal		0		
D3	Thermal Shock	45	0	15	675
	Temperature Cycle			100	4,500
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	60	4		FA97052-CMGL
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	45	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	11	0		
D7	Adhesion of lead finish	9	0		
D8	Lead Torque	13	0		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary DD8 Package Qualification / Monitor

Code	Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hours
B2	Resistance to Solvents	18	0		
B3	Solderability	22	0		
B5	Bond Strength	24	0		
D1	Physical Dimension	60	0		
D2	Lead Integrity	24	0		
	Seal				
D3	Thermal Shock	60	0	15	1,125
	Temperature Cycle			100	75,000
	Seal				
	Visual Examination				
	End-Point Elect.				
	Parametrics				
D4	Mechanical Shock	60	0		
	Vibration, Var. Freq.				
	Constant Accel.				
	Seal				
	Visual Examination				
	End-Point Elec. Para.				
D5	Salt Atmosphere	60	0		
	Seal				
	Visual Examination				
D6	Internal Water-Vapor Content	16	0		
D7	Adhesion of lead finish	12	0		
D8	Lead Torque	20	0		

Period: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary WC44 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B2	Resistance to Solvents	4	0
B3	Solderability	44	0
B5	Bond Strength	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: April 1st, 1996 to April 1st, 1998



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: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary WC84 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B2	Resistance to Solvents	4	0
B3	Solderability	60	0
B5	Bond Strength	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.		
	Parametric		
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: April 1st, 1996 to April 1st, 1998



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.		
	Parametric		
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: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary PG144 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
B3	Solderability	22	0
B5	Bond Strength	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.		
	Parametric		
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: April 1st, 1996 to April 1st, 1998



Reliability Testing Summary-Packages EIAJ Temperature Soldering Heat Test

Technology:	Si-Gate CMOS
Device Type:	XC1700 Microcircuit Group
Package Type:	PD8 & PLCC20
Foundry/Assembly:	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:

April 1, 1996 to April 1, 1998

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
Preconditioning 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: April 1, 1996 to April 1, 1998

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: TSMC / Anam & AAPI
Preconditioning 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
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Period:	April 1, 1996 to April 1, 1998
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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:	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
Preconditioning 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
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Period:	April 1, 1996 to April 1, 1998
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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
Preconditioning 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:

April 1, 1996 to April 1, 1998

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:	April 1, 1996 to April 1, 1998
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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

	PD8	PC20	PC84
Period:	April 1, 1996 to April 1, 1998		
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

