The Reliability Data Program

Expanded Version



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 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. <u>The Reliability Program</u>: 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 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<u>Non-Hermetic Packages</u>: 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<u>Hermetic Packages</u>: 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<u>Process Monitor</u>: 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<u>Assembly Package Monitor</u>: 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. <u>Reliability Families</u>: 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.



	T	ABLE 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 resis- tance 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 reli- ability 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



			1
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 condi- tions 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



		TA	BLE 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 XC4036XL XC4044XL XC4052XL XC4062XL XC4085XL	XC7272/A XC7236 XC73108 XC73144 XC7336 XC7354 XC7372	XC9536 XC9572 XC95108 XC95216 XC95288

4. <u>Failure Acceleration Rates</u>: 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.

 $A = \exp Ea/k (1/Tj2 - 1/Tj1)$

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 Tj1fr2 = Failure rate at specified in-stress junction temperature Tj2A = 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 or 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		



Plasti	ic Encapsu	ılant Data (Ty	ypical)	
		6300HS	7320C	7304
Volume Resistivity (Ohm.cm)	150°C	1 x 10 ¹³	1 x 10 ¹³	1 x 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
lonic Impurities 160°C x 23 hrs Extraction	Na+ (ppm) CI - (ppm)	<1 5	<1 5	<1
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	α _{1(1/°C)}	1.7 x 10 -5	1.3 x 10 ⁻⁵	1.4 x 10 ⁻⁵
5 hours)	α 2 (1/°C)	6.8 x 10 -5	5.2 x 10 -5	5.8 x 10 ⁻⁵
Glass Transition - Tg Range (°C)		155 ~ 170°C	130 ~ 155°C	153 ~ 165°C



XILINX Typical Vapor Phase Reflow



April 1,1998 P13

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>	Wors <u>Latch-</u>	st <u>Up</u>		Latch-Up Test Condition
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 to <-250mA Gnd -1.7V	0	300mA Vcc +2.5V <-300mA Gnd -1.5V	25°C
XC4XXXXL	Vcc +3.4V** <-250mA Gnd -1.4V		Vcc +3.4V** <-550mA Gnd -1.55V	25°C
** The new 5V to when input is 1	lerant I/O's used in the XL de forced to maximum of 7V and	evice d with	are guaranteed not to sust the forcing power supply b	ain permanent damage being current limited to 200 mA.

Latch-Up Data Per EIA/JEDEC-78

<u>Device</u>	Wor <u>Latch-</u>	st ∙Up		Latch-Up Test Condition
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
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	E	SD Data	
	Human Body Model Worst Case ESD Mil-Std-883D	Machine Model Worst Case ESD EIAJ	Charge Device Model Worst Case ESD
<u>Device</u>	Method 3015	Method 20	
XC17XXXD	<u>+</u> 6000V	+500V to +900V	<u>+</u> 2000V (1)
XC17XXE	<u>+</u> 4000V to <u>+</u> 4500V	+325V	
XC3XXX/A	<u>+</u> 4000V to <u>+</u> 7000V	+325V to +600V	<u>+</u> 2000V (2)
XC31XX/A	<u>+</u> 1750V to <u>+</u> 5000V	+800V to +700V	<u>+</u> 1000V (3)
XC4XXX/A	<u>+</u> 1000V to <u>+</u> 8000V	+800V to +900V	<u>+</u> 2000V (4)
XC4XXXE	<u>+</u> 3000V to <u>+</u> 8000V		<u>+</u> 2000V (5)
XC4XXXEX	<u>+</u> 3000V to <u>+</u> 7000V		<u>+</u> 2000V (6)
XC4XXXL	<u>+</u> 2000V to <u>+</u> 6000V		<u>+</u> 1000V (7)
(1) Measured on	XC1765D, (2) Measured or	n XC3090, (3) Measured on ≯	KC3190/A, (4) Measured on XC4005
(5) Measured on	XC4005E, (6) Measured or	XC4010E, (7)Measured on	XC4028XL (<u>+</u> 1000V, Equipment
limitation)			« vii kiv [®] -

ESD Data Charge Device Model Human Body Model Machine Model Worst Case ESD Worst Case ESD Worst Case ESD Mil-Std-883D EIAJ Device Method 3015 Method 20 XC5XXX +3000V to +6000V +2000V (8) XC6XXX <u>+2000V to +8000V</u> XC7XXX +2000V to +4000V +2000V (9) XC95XX +2000V to +7000V <u>+</u>2000V (10) XC4300 +2000V to +3500V (8) Measured on XC5210, (9) Measured on XC7336, (10) Measured on XC95108

The FPGA Products



I Qu	Reliability T High Tempe alification &	esting Sumn rature Life Monitor Co	nary Test ombined	
Assumed	Technology: Device Type: Package Type: Actual Temperature Actual Voltage: Activation Energy:	Si Gate CMOS XC3000/A, XC3100 Various 145C +8C/-0C 5.7V +/-0.25 0.90 ev for LCA)/A, XC4000, XC400	00E Microcircuit Grouj
	XC3000/A	XC3100/A	XC4000	XC4000E
Period:	Apr	il 1, 1996 to April 1, 1	1998	
Period: Combined Started Lot:	Apr 15	ril 1, 1996 to April 1, 1 15	1998 16	47
Period: Combined Started Lot: Combined Completed Lots:	Apr 15 15	il 1, 1996 to April 1, 1 15 15	1998 16 16	47 47
Period: Combined Started Lot: Combined Completed Lots: Failures:	Apr 15 15 0	ril 1, 1996 to April 1, 1 15 15 4	1998 16 16 1	47 47 6
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test:	Apr 15 15 0 1,107	il 1, 1996 to April 1, 1 15 15 4 1,101	1998 16 16 1 786	47 47 6 2,913
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C:	Apr 15 15 0 1,107 1,051,176	ril 1, 1996 to April 1, 1 15 15 4 1,101 1,032,569	1998 16 16 1 786 660,306	47 47 6 2,913 3,248,821
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean :	Apr 15 15 0 1,107 1,051,176 950	il 1, 1996 to April 1, 1 15 15 4 1,101 1,032,569 938	1998 16 16 1 786 660,306 840 2 215 20 1	47 47 6 2,913 3,248,821 1,115
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C: Fauiyalent device hours @ Tj=70C;	Apr 15 15 0 1,107 1,051,176 950 3,685,998 246 957 (12)	ril 1, 1996 to April 1, 1 15 15 4 1,101 1,032,569 938 3,620,752	1998 16 16 1 786 660,306 840 2,315,394 155 072 101	47 47 6 2,913 3,248,821 1,115 11,392,144 7(2,092,201
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Fauivalent device hours @ Tj=70C:	Apr 15 15 0 1,107 1,051,176 950 3,685,998 246,867,612 2,445 + 10	il 1, 1996 to April 1, 1 15 15 4 1,101 1,032,569 938 3,620,752 242,497,777	1998 16 16 1 786 660,306 840 2,315,394 155,072,191 1 53E + 10	47 47 6 2,913 3,248,821 1,115 11,392,144 762,982,301 7,54E+10
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Equivalent device hours @ Tj=25C: Equivalent device hours @ Tj=25C:	Apr 15 15 0 1,107 1,051,176 950 3,685,998 246,867,612 2.44E+10 0	ril 1, 1996 to April 1, 1 15 15 4 1,101 1,032,569 938 3,620,752 242,497,777 2.40E+10	1998 16 16 1 786 660,306 840 2,315,394 155,072,191 1.53E+10 6	47 47 6 2,913 3,248,821 1,115 11,392,144 762,982,301 7.54E+10 8

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Q	Reliability High Temp ualification	Testing Sun erature Li & Monitor (nmary fe Test Combined		
Technology:Si Gate CMOSDevice Type:XC4000EX, XC4000XL, XC5000, XC6000 Microcircuit GroupPackage Type:VariousActual Temperature:145C +8C/-0CActual Voltage:3.3V +/-0.3**, 5.7V +/-0.25Assumed Activation Energy:0.90 ev for LCA					
X	C4000EX	XC4000XL **	XC5000	XC6000	
Period: April 1, 1996 to April 1, 1998					
Period:	A	pril 1, 1996 to April	l 1, 1998		
Period: Combined Started Lot:	A2	pril 1, 1996 to April 12	l 1, 1998 12	3	
Period: Combined Started Lot: Combined Completed Lots:	2 2 2	pril 1, 1996 to Apri 12 12	l 1, 1998 12 12	3 3	
Period: Combined Started Lot: Combined Completed Lots: Failures:	A 2 2 0	pril 1, 1996 to April 12 12 6	1 1, 1998 12 12 0	3 3 0	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test:	A 2 2 0 89	pril 1, 1996 to April 12 12 6 628	1 1, 1998 12 12 0 859	3 3 0 276	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C:	A 2 2 0 89 114,721 1 280	pril 1, 1996 to April 12 12 6 628 765.948	1 1, 1998 12 12 0 859 781,693	3 3 0 276 569,393	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean :	A 2 2 0 89 114,721 1,289 402 275	pril 1, 1996 to April 12 12 6 628 765.948 1,220 2 (25 222	1 1, 1998 12 12 0 859 781,693 910	3 3 0 276 569,393 2,064	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C:	A 2 2 0 89 114,721 1,289 402,275 26 942 110	pril 1, 1996 to April 12 12 6 6 628 765.948 1,220 2,685,833	1 1, 1998 12 12 0 859 781,693 910 2,741,043	3 3 0 276 569,393 2,064 1,996,603	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C:	A 2 2 0 89 114,721 1,289 402,275 26,942,110 2,66E+09	pril 1, 1996 to April 12 12 6 628 765.948 1,220 2,685,833 179,882,107 1 795 + 10	1 1, 1998 1 1, 1998 12 0 859 781,693 910 2,741,043 183,579,805	3 3 0 276 569,393 2,064 1,996,603 133,721,366	
Period: Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours @ 145C: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Equivalent device hours @ Tj=25C:	A 2 2 0 89 114,721 1,289 402,275 26,942,110 2.66E+09 0	pril 1, 1996 to April 12 12 6 628 765.948 1,220 2,685,833 179,882,107 1.78E+10 33	11, 1998 12 12 0 859 781,693 910 2,741,043 183,579,805 1.81E+10	3 3 0 276 569,393 2,064 1,996,603 133,721,366 1.32E+10	

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Technology:Si Gate CMOSDevice Type:XC3000/A Microcircuit GroupPackage Type:PLCC- 84, PGA-84, 175Actual Temperature:145C +8C/-0CActual Voltage:5.7V +/-0.25Assumed Activation Energy:0.90 ev

XC3020/A XC3030/A

XC3042/A

XC3064/A XC3090/A

XC3000/A

XILINX®

Period:	April 1, 1996 to April 1, 1998							
Combined Started Lot:	3	1	8	1	2	15		
Combined Completed Lots:	3	1	8	1	2	15		
Failures:	0	0	0	0	0	0		
Device on test:	225	129	448	129	176	1.107		
Actual device hours:	166,164	129,000	479,659	134,160	142,193	1.051.176		
Mean :	739	1,000	1,071	1,040	808	<u> </u>		
Equivalent device hours @ Tj=125C:	582,662	452,345	1,681,947	470,438	498,606	3.685.998		
Equivalent device hours @ Tj=70C:	39,023,446	30,295,519	112,647,427	31,507,339	33,393,881	246.867.612		
Equivalent device hours @ Tj=25C:	3.86E+09	2.99E+09	1.11E+10	3.11E+09	3.30E+09	2.44E+10		
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:								

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
Failure Analysis:			F/A 96043(4)-NDF				
							XILINX≞

Re Higl Qualif	liability To n Temper ication &	esting Sum ature Lif Monitor (mary e Test Combined	
Actua Assumed Act	Technology: Device Type: Package Type: I Temperature: Actual Voltage: ivation Energy:	Si Gate CMOS XC4000 Microc PLCC-84, PGA 145C +8C/-0C 5.7V +/-0.25 0.90 ev	tircuit Group -156, 199	
X	C 4004	XC4005	XC4010	XC4000
Period:	Apri	l 1, 1996 to April	1, 1998	
Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Equivalent device hours @ Tj=25C: Failure Rate in FITS @ Tj=25C: Failure Rate in FITS @ Tj=25C:	2 2 0 90 136,035 1,512 477,013 31,947,68 3.16E+09 0 0	10 10 0 452 417,842 924 1,465,183 1 98,129,768 9.70E+09 0 0	4 4 1 244 106,429 436 373,198 24,994,742 2.47E+09 40 0.41 F/A96075(1)-NDF	16 16 1 786 660,306 840 2,315,394 155,072,191 1.53E+10 6 0.07
				—≸. XILINX [®] —

Technology:Si Gate CMOSDevice Type:XC4000E Microcircuit GroupPackage Type:PLCC-84, PGA- 156, 191, 223. 299, CB-228Actual Temperature:145C +8C/-0CActual Voltage:5.7V +/-0.25Assumed Activation Energy:0.90 ev

	XC4003E	XC4005E	XC4006E	XC4010E
Period	<u>An</u>	ril 1 1006 to April 1 1	008	
i chou.	Ар	in 1, 1990 to April 1, 1	1990	
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

• **EXILINX**®

Technology:Si Gate CMOSDevice Type:XC4000E Microcircuit GroupPackage Type:PLCC-84, PGA- 156, 191, 223. 299, CB-228Actual Temperature:145C +8C/-0CActual Voltage:5.7V +/-0.25Assumed Activation Energy:0.90 ev

XC4013E

XC4020E

XC4025E X0

XC4000E

• **EXILINX**®

Period:	April 1	, 1996 to April 1, 19	998	
Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours: Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Equivalent device hours @ Tj=25C: Failure Rate in FITS @ Tj=70C: Failure Rate in FITS @ Tj=25C:	12 12 3 873 1,002,530 1,148 3,515,419 235,443,149 2.33E+10 13 0.13	1 1 0 35 37,100 1,060 130,093 8,712,897 8.61E+08 0 0	3 3 1 199 167,984 844 589,044 39,450,871 3.90E+09 25 0.26	47 47 6 2,913 3,248,821 1,115 11,392,144 762,982,301 7.54E+10 8 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

=**{{`**XILINX[®]

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:	Ар	April 1, 1996 to April 1, 1998			
Combined Started Lot: Combined Completed Lots: Failures: Device on test: Actual device hours : Mean : Equivalent device hours @ Tj=125C: Equivalent device hours @ Tj=70C: Equivalent device hours @ Tj=25C: Failure Rate in FITS @ Tj=70C: Failure Rate in FITS @ Tj=25C:	1 1 0 76 156,028 2,053 547,120 36,643,017 3.62E+09 0 0	2 2 90 97,707 1,086 342,614 22,946,389 2.27E+09 87 88.2	3 3 0 207 274,583 1,326 962,838 64,485,538 64,485,538 6.37E+09 0 0	1 1 0 76 77,824 1,024 272,894 18,276,887 1.81E+09 0 0	
Failure Analysis:		F/A97113(1)-FANC F/A97137(1)-FANC		≪ vii iniv_®	
				∢ ⊾∧iliin∧=	

Reliability Testing Summary High Temperature Operating Life Qualification & Monitor

Si Gate CMOS
XC4000XL Microcircuit Group
PLCC-84, PGA-223, 299, 411, 475, CB-228
145C +8C/-0C
3.3V +/-0.3
0.90 ev

XC4036XL

XC4044XL

XC4062XL

XC4000XL

Period:	A	April 1, 1996 to April 1, 199	8	
Combined Started Lot:	3	1	1	12
Combined Completed Lots:	3	1	1	12
Failures:	1	3	0	6
Device on test:	115	32	32	628
Actual device hours :	80,320	47,070	32,416	765.948
Mean :	698	1,471	1,013	1,220
Equivalent device hours @ Ti=125C:	281,646	165,053	113,668	2,685,833
Equivalent device hours @ Ti=70C:	18,863,070	11,054,342	7,612,865	179,882,107
Equivalent device hours @ Ti=25C:	1.86E+09	1.09E+09	7.53E+08	1.78E+10
Failure Rate in FITS @ Ti=70C:	53	271	0	33
Failure Rate in FITS @ Tj=25C:	0.54	2.75	0	0.34
Failure Analysis:	F/A98007(1)-FANC	F/A97081(1)-VCMD F/A97100(2)-VCMD		
				S XILINX

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
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:					
					XILINX [®]

April 1, 1998 P30

Technology:Si Gate CMOSDevice Type:XC6000 Microcircuit GroupPackage Type:PGA-299Actual Temperature:145C +8C/-0CActual Voltage:5.7V +/-0.25Assumed Activation Energy:0.90 ev

XC6216

XC6000

- **{ `**XILINX[®]

Period:	April 1, 1990	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:

	Jualification & M	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			
Period:	April 1,	1996 to April 1, 1998				
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					
	T D Pac Test Bia	Yechnology: Si Gate CMOS evice Type: XC4000E, XC4000E, XC4000E, XC4000E, XC4000E, XC4000E, XC4000E, XC4000E, XC400E, XC400E, XC400E, XC400E, XC40E, XC4E, XC40E, XC4E, XC4	5 4000EX, XC4000XL, XC5 85%	5000 Microcircuit Group	
	XC400E	XC4000EX	XC4000XL*	XC5000	
Period:		April 1, 1996 to Apri	1 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					
	D Pao Test Bia	Fechnology:Si GatDevice Type:XC30Device Type:PLCCPPGAPPGAt Condition:T = 85as Voltages:5.0V +	e CMOS 00/A Microcircuit G -84, HTFP-176, V -132, TQFP-100, 5C, R.H. = 85% -/25V	Froup QFP-100,	
	XC3020/A	XC3042/A	XC3064/A	XC3090/A	XC3000/A
Period:	l: 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:					≸. XII INX≞

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

=**{{`**XILINX[®]

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:							
						<u> </u>	XILINX [®]

	Reliability T B Qualificat	Festing ias Mo ion & I	Sum isture Monit	mary-Packa e Life cor Combine	ges d	
	Tec Devi Packa Test Co Bias V	hnology: ce Type: ge Type: ondition: Voltages:	Si Gate XC4000 PQFP-20 BGA-22 T = 85C 5.0V +/-	CMOS E Microcircuit Grou 08, 240, PLCC-84, H 5, VQFP-100 , R.H. = 85% .25V	ıp IQFP-208, 240,	
	XC4003E	XC4()05E	XC4013E	XC4025E	XC4000E
Period:		April	1, 1996 to	o April 1, 1998		
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	12	27,725	728,608	43,000	944,333
Failure Analysis Number:				F/A 96090(1)- MST	S.	XII INX®

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

XC4000EX

=**{{`**XILINX[®]

XC4036EX

Period:	April 1, 1996 to Apr	il 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 Bias Mo Qualification &	g Summary-Pao Disture Life Monitor Comb	ckages	
	Technology: Device Type: Package Type: Test Condition: Bias Voltages:	Si Gate CMOS XC4000XL Microcircu HQFP-240, BGA-560 T = 85C, R.H. = 85% 3.3V +/3V	iit Group	
	XC4036XI	L XC4062X	KL XC4000XI	
Period:	Apri	l 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:			£>	XILINX®

-	Reliability Testing Bias Mo Qualification &	g Summary-Packages oisture Life Monitor Combined	
	Technology: Device Type: Package Type: Test Condition: Bias Voltages:	Si Gate CMOS XC5000 Microcircuit Group HQFP-240, PQFP-208 & VQFP-100 T = 85C, R.H. = 85% 5.0V +/25V	
	XC5206	XC5215	XC5000
Period:	Apr	il 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:			\$ ™XILINX®

Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined						
	Technology:Si Gate CMOSDevice Type:XC3000/A, XC3100/A, & XC4000 Microcircuit GroupPackage Type:VariousTest Condition:T=121C; 2 atm. sat. steam					
	XC3000/A	XC3100/A	XC4000			
Period:	d: 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			

= **{ `**XILINX[®]

	Reliability Qualifica	Testing Summa Pressure Pot tion & Monitor	ry-Packages Combined	
] D Pac Test	Fechnology:Si Gate CM0vevice Type:XC4000E, Xvekage Type:Varioust Condition:T=121C; 2 a	OS CC4000EX, XC4000XL, X tm. sat. steam	C5000 Microcircuit Group
	XC4000E	XC4000EX	XC4000XL	XC5000
Period:		April 1, 1996 to Ap	oril 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
				—{{` XILINX [®]

R	eliability Testing Pres Qualification &	g Summary-Packag sure Pot Monitor Combined	es
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC3000/A Microcircuit Group PLCC-84, VQFP-100, & PPGA T = 121C; 2 atm. sat. steam.	132
	XC3042/A	XC3064/A	XC3000/A
Period:	Apr	il 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:			
			{XILINX [®]

Reliability Testing Summary-Packages Pressure Pot Qualification & Monitor Combined

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

XC3190/A

XC3100/A

₌**{`**XILINX[®]

Period:	April 1, 1996 to April 1, 199	98
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 Testin Pres	g Summar ssure Pot	y-Packages					
	Qualification &	Monitor (Combined					
	Technology:Si Gate CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-160, 208, VQFP-100, HQFP-208, 240PLCC-84, BGA-225, & HTFP-208Test Condition:T = 121C; 2 atm. sat. steam					Technology:Si Gate CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-160, 208, VQFP-100, HQFP-208PLCC-84, BGA-225, & HTFP-208Test Condition:T = 121C; 2 atm. sat. steam		08, 240
	XC4003	XC4005	XC4008	XC4010				
Period:	Арі	ril 1, 1996 to Apri	1 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 CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-160, 208, 240, HQFP-208, 240, VQFP-100PLCC-84, BGA-225, & HTFP-208Test Condition:T = 121C; 2 atm. sat. steam					
	XC4013	XC4025	XC4000			
Period:	Apri	l 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 Press Qualification & I	Summary-Packages ure Pot Monitor Combined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC4000E Microcircuit Group HQFP-208, 240, 304, PQFP-208, BGA-2 T = 121C; 2 atm. sat. steam	25
	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:			
			={: XILINX®

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

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	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,	998	
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:			
		& XILIN	NX=

	Reliability Testing Press Qualification &	g Summary-l sure Pot Monitor Cor	Packages nbined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC5000 Microcircu VQFP-100 & HQF T = 121C; 2 atm. sa	uit Group P-240 at. steam	
	XC5206	XC52	215 XC5	5000
Period:	April	1, 1996 to April 1, 1	998	
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:				
				- { ` XILINX [®]

Reliability Testing Summary-Packages Temperature Cycle (Air to Air) Qualification & Monitor Combined						
	Technology:Si Gate CMOSDevice Type:XC3000/A, XC3100/A, XC4000 Microcircuit GroutPackage Type:VariousTest 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:						
			── { XILINX [®] ──			

	Reliability Testing Temperature Qualification &	g Summary-P Cycle (Air to Monitor Con	ackages Air) nbined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC4000E, XC4000X Various T = -65C / +150C (A T = -55C / +125C (A	L, XC4000EX, XC5000 ir to Air) ir to Air) for BGA) Microcircuit Group
	XC4000EX	XC4000XL	XC4000E	XC5000
Period:	Apri	l 1, 1996 to April 1, 19	98	
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:			;	&`` XILINX [®] —

	Reliab Te Qual	ility Testing mperature (lification & 3	g Summary-Pac Cycle (Air to Ai Monitor Combi	kages r) ined	
		Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC3000/A Microcircuit PLCC- 44, 84, VQFP-10 PPGA-132, HTFP-176 & T = -65C/+150C (Air to	Group 0, TQFP-100, & PQFP-160 Air)	
XC	C3030/A	XC3042/A	XC3064/A	XC3090/A	XC3000/A
Period:		April	1, 1996 to April 1, 1998		
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: Device Type: Package Type: Test Condition:	Si Gate CMOS XC3100/A Microcircuit Group PLCC-84, PQFP-160, PPGA-175 T = -65C/+150C (Air toAir)			
	XC3190/A	XC3195/A	XC3100/A		
Period:	Apri	l 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:					
			──{` XILINX [®] ──		

	Qualifi	cation & N	Jonitor Comb	ined		
	Technology:Si Gate CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-160, 208, HT-208, HQFP-208,240PLCC-84, VQFP-100, BG-225, 432Test Condition:T = -65C/+150C (Air to Air)*For BGA, T=-55C/+125C (Air to Air)					
	XC4003	XC4005	XC4008	XC4010	XC4013	
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	

	Qualificati	on & Monif	tor Combine	d	
	Tech Device Packag Test Cor	nology: Si Gate e Type: XC4000 e Type: PQFP-1 ndition: PLCC-8 T = -650 *For BC	CMOS Microcircuit Group 60, 208, HT-208, HQ 64, VQFP-100, BG-22 C/+150C (Air to Air) GA, T=-55C/+125C (A	0FP-208,240 25, 432 Air to Air)	
	XC4010*	XC4013*	XC4025	XC4025*	XC4000
Period:		April 1, 1996 to	o 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
	101 000	90.407	20 790	76.000	1 000 200

Reliability Testing Summary-Packages Temperature Cycle (Air to Air) Qualification & Monitor Combined						
	Technology:Si Gate CMOSDevice Type:XC4000EX Microcircuit GroupPackage Type:HQFP-240, 304, BGA-352Test Condition:T = -65C/+150C (Air to Air)*For BGA, T=-55C/+125C (Air to Air)					
	XC4028EX	XC4036EX	XC4000EX			
Period:	April 1, 1996 to	9 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			
			€_XILINX≞			

Reliability Testing Summary-Packages Temperature Cycle (Air to Air) Qualification & Monitor Combined						
	Technology:Si Gate CMOSDevice Type:XC4000XL Microcircuit GroupPackage Type:HQFP-340, & BGA-432, 560PGA-411, 475, PQFP-160For A-411, 475, PQFP-160Test Condition:T = -65C/+150C (Air to Air)*For BGA, T=-55C/+125C (Air to Air)					
	XC4020XL	XC4036XL	XC4052	2XL		
Period:	April	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			

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	Qualificat	tion & Monito	or Combined	
	To Pack Test (echnology: Si Gate C Device XC4000X Type: HQFP-34 kage Type: PGA-411, Condition: T = -65C/ *For BG	MOS L Microcircuit Group 0, & BGA-432, 560 ,475, PQFP-160 +150C (Air to Air) A, T=-55C/+125C (Air to	Air)
	XC4062XL	XC4062XL*	XC4085XL	XC4000XL
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
	=0.000	77 076	21 708	336 600

]	Reliability Testing Temperature Qualification &	g Summary Cycle (Air Monitor C	-Packages to Air) ombined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC4000E Micro PQFP-160, 208. PLCC-84, HQFI T = -65C/+150C *For BGA, T=-4	circuit Group 240, PGA- 223 & 299, P-208, 240, BG-225 (Air to Air) 55C/+125C (Air to Air)	
	XC4003E	XC4005E	XC4010E	XC4013E
Period:	Apri	il 1, 1996 to April 1	l, 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
				F/A97098(2)-FANC

N	Temperature Qualification &	Cycle (Air to Air) Monitor Combine	ed	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC4000E Microcircuit Gro PQFP-160, 208. 240, PGA- PLCC-84, HQFP-208, 240, T = -65C/+150C (Air to Air *For BGA, T=-55C/+125C	oup 223 & 299, BG-225 r) (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 CMOSDevice Type:XC5000 Microcircuit GroupPackage Type:PLCC-84, HQFP-240, VQFP-100Test Condition:T = -65C/+150C (Air to Air)				
	XC5202	XC5206	XC5210	XC5215	XC5000
Period:		April 1, 1996 to A	pril 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: Device Type: Package Type: Test Condition: Bias Voltage:	Si Gate CN XC3100/A Various T = 130C, 5.0V +/2	/IOS , XC4000E Microcircuit Gi R.H. = 85%, 2ATM 5V	oup	
	XC310)/A	XC4000	XC4000E	
Period:	April	1, 1996 to A	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	
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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

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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 CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-240Test Condition:T = 130C, R.H. = 85%, 2ATMBias Voltage:5.0V +/25V				
	XC4013	XC400	0		
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			

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Reliability Testing Summary-Packages Hast Qualification & Monitor Combined				
	Technology: Device Type: Package Type: Test Condition: Bias Voltage:	Si Gate Cl XC4000E HQFP-240 T = 130C, 5.0V +/2	MOS Microcircuit Group) R.H. = 85%, 2ATM 25V	
	XC402	5E	XC4000E	
Period:	Apri	l 1, 1996 to 2	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:	3	25	325	
Total Device Hours:	7,1	50	7,150	
	F/A97114(1)-FA	NC		
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Reliability Testing Summary High Temperature Life Test Qualification & Monitor Combined						
Technology:Si Gate CMOSDevice Type:XC1700D, XC1700E, CV1700L, XC7000, XC9500Package Type:VariousActual Temperature:145C (125C & 150C for XC7000 & XC9500)Actual Voltage:5.7V +/-0.25, 3.3V+/-0.3VAssumed Activation Energy:0.58 ev for Eprom & Flash						
	XC1700D	XC17000E	XC1700/L	XC7000	XC9500	
Period:		April 1, 1996 to A	pril 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	

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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, 199	6 to April 1, 1998			
Combined Started Lot:	2	7	1	1	11	
Combined Completed Lots:	$\overline{2}$	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:						
				{	XILINX®	

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

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Period:	April 1, 1996 to April 1, 199	8
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

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Period:						
Combined Started Lot:	5	1	6			
Combined Completed Lots:	5	- 1	6			
Failures:	0	Ō	Õ			
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						
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As	Teo Dev Packa Actual Tem Actual sumed Activatior	chnology: Si (ice Type: XC age Type: PL(perature: 125 Voltage: 5.0 h Energy: 0.9(Gate CMOS 7000 Microcirc CC-44,68, WC4 C * & 145, 150 V +/-0.25* & 5.7) ev	uit Group 4, 68 & PQFP-: C** +8C/-0C 7V +/-0.25**	160	
	XC73144	XC7336	XC7336	XC7354	XC7354	XC7000
	*	1107000	**	**	110,00	@ 145 C
Period:		April 1, 19	996 to April 1, 1	998		
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:						
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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, 199	96 to April 1, 199	98		
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		
					<u> </u>	
April 1, 1998 P73					{ _/	

Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined				
	Technology: Device Type: Package Type: Test Condition: Bias Voltages:	Si Gate CMOS XC1700D, XC1700E, XC Various T=85C, R.H.=85% 5.0V +/25V	C9500 Microcircuit Group	
	XC1700D	XC1700E	XC9500	
Period:	Apri	il 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	

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Reliability Testing Summary-Packages Bias Moisture Life Qualification & Monitor Combined					
		Technology: Device Type: Package Type: Test Condition: Bias Voltages:	Si Gate CMOS XC1700D Microcircui PD8, SOIC-8, VO-8 T = 85C, R.H. = 85% 5.0V +/25V	t Group	
	XC1718D	XC1736D	XC1765D	XC17256D	XC1700D
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
				{	

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

XC1700E

EXILINX®

XC1765E

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

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

=**{{`**XILINX[®]

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: Device Type: Package Type: Test Condition:	Si Gate CMOS XC1700D, XC7000, X Various T=121C; 2 atm. sat. st	C9500 Microcircuit Group eam	
	XC1700D	XC7000	XC9500	
Period:	Apri	l 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	
	15 200	2 1 1 2	4,224	

= **{ `**XILINX[®]

	Reliability T Qualificati Tech Devic Packag Test Co	Sesting Summary Pressure Pot on & Monitor ConAnology:Si Gate CMOS Si Gate CMOS Ce Type:XC1700D Micro ge Type:PD-8 & SOIC-8 SOIC-8 ondition:	-Packages Ombined circuit Group	
	XC1718D	XC1736D	XC1765D	XC1700D
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:				—{XILINX ®

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

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:		
		XILINX [®]

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

Period:	April 1, 1996 to	9 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:			
			-{XILINX [®]

Reliability Testing Summary-Packages Temperature Cycle (Air to Air) Qualification & Monitor Combined						
	Technology:Si Gate CMOSDevice Type:XC1700D, XC7000 & XC9500 Microcircuit GroupPackage Type:VariousTest Condition: $T = -65C / +150C$ (Air to Air) $T = -55C / +125C$ (Air to Air) for BGA					
	XC1700D	XC7000	XC9500			
Period:	Apri	l 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:						
			EXILINX			

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, 199	6 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: Device Type: Package Type: Test Condition:	Si Gate CMOS XC7000 Microcir PLCC-44, 68, PQ T = -65C/+150C (cuit Group FP-160 (Air to Air)			
	XC7336	XC7354	XC73108	XC7000		
Period:	Apr	il 1, 1996 to April 1,	1998			
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:	J	F/A97112(2)- FANC		_≸` XII INX®		

Reliability Testing Summary-Packages Temperature Cycle (Air to Air) Qualification & Monitor Combined					
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC9500 Microcircuit PQFP-160, HQFP-203 T = -65C/+150C (Air	Group 8, PLCC-84 to Air)		
	XC95108	XC95216	XC9572	XC9500	
Period:	Арг	il 1, 1996 to April 1, 199	8		
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

=**{{`**XILINX[®]

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
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						
	Technolog Device Typ Package Typ Test Conditio	gy: Si Gat be: XC17 be: PD-8, bn: 150C,	e CMOS 00D Microc DD-8 250C*	ircuit Group		
	XC1736D	XC	1765D	XC17128D	XC1700D	
Period:	A	April 1, 1996	ó 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 14	13,000	159,000	1,687,250	
Failure Analysis Number:		F/A9606.	8(2)-VIM		€ XILINX [®]	

Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined Technology: Si Gate CMOS Device Type: XC1700E Microcircuit Group Package Type: PD-8					
	Test Cond	lition: 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		
			{`` XILINX®		

Reliability Testing Summary-Packages Data Retention Qualification & Monitor Combined					
Technology:Si Gate CMOSDevice Type:XC1700/L Microcircuit GroupPackage Type:PD-8Test Condition:150C					
	XC1701L	XC1700/L			
Period:	April 1, 1996 to Apr	ril 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			
Annel 1 1008 D00			_{XILINX ®		

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:				
				- 🗶 XILINX 🖳

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
Period:	April 1, 1996 to April 1, 1998				
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:	Failure Analysis Number: F/A97111(1)-FANC				
A					—{`` XILINX®

]	Reliability Testin Eras Qualification &	g Summary-Pa e Cycling Monitor Com	nckages bined	
	Technology Device Type Package Type Test Condition Voltage	 7: Si Gate CMOS e: XC9500 Microcircuit e: PLCC- 84 a: 55C e: Vcc=5.0V, Vpp=12.0- 	Group 12.5V	
	XC9536	XC95108	XC9500	
Period:	Ap	ril 1, 1996 to April 1, 199	8	
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	
			{`` XILII	VX®

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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

∙**€**XILINX[®]

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 @ Ti=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

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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

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

Period:	April 1, 1996 to April 1, 1	998
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:		
		XILINX®

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

April 1, 1996 to April 1, 1	998
1	1
1	1
0	0
78	78
1,124	1,124
87,672	87,672
	S. XILINX®
	April 1, 1996 to April 1, 1 1 0 78 1,124 87,672

Si Gate CMOS
XC4300 Microcircuit Group
PQFP-208
T = 85C, R.H. = 85%
5.0V +/25V

XC4310

Period:	April 1, 1996 to April 1, 1	998
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:		
		XILINX [®]

	Reliability Testing Press Qualification &	g Summary-Packages sure Pot Monitor Combined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC0300, XC4300 Microcircuit Group Various T = 121C; 2 atm. sat. steam	
	XC	3300	XC4300
Period:	Apri	l 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:	2.	5,568	13,104

=**{**XILINX[®]

	Reliability Testing Press Qualification &	g Summary-Packages sure Pot Monitor Combined	
	Technology: Device Type: Package Type: Test Condition:	Si Gate CMOS XC3300 Microcircuit Group TQFP-176 T = 121C; 2 atm. sat. steam	
	XC3342	XC3390	XC3300
Period:	Apri	l 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
			{XILINX ®

	Reliability Testing Sum Pressure P Qualification & Monit	mary-Packages Pot tor Combined
	Technology:Si GateDevice Type:XC4300Package Type:PQFP-2Test Condition:T = 1210	CMOS 0 Microcircuit Group 208 C; 2 atm. sat. steam
	XC4310	XC4300
Period:	April 1, 1996 t	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

= **{ `**XILINX[®]

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 T Tempera Qualificati	esting Summan ture Cycle (Ai on & Monitor	ry-Packages r to Air) Combined	
	Tec Devi Packa Test Co	hnology: Si Gate CMO ice Type: XC4300 Micr ge Type: PQFP-100,16 ondition: T = -65C/+150	S ocircuit Group 0,208, PPGA-175 0C (Air to Air)	
	XC4303	XC4305	XC4310	XC4300
Period:		April 1, 1996 to Apr	il 1, 1998	
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
				€` XILINX [®]

Package Qualification & Monitor Program

pe: XC pe: PD ial: Silv nd: Sur ailures	1736D, XC176 8 7er Epoxy nitomo 6300H Device On Test 90	5D Microcircuit Gi & Shenitsu KMC Mean Test Hrs/Cycles 755	roup C-1805 Total Device Hrs				
ailures 0	Device On Test 90	Mean Test Hrs/Cycles 755	Total Device Hrs				
0	90	755	67.050				
		100	07,950				
0	90	96	8,640				
0	8						
0	6						
0	12						
0	8						
	0 0 0	0 6 0 12 0 8	0 6 0 12 0 8				
Reliability Testing Summary Package Qualification / Monitor SOIC Device Type: XC1718D, XC1736D, XC1765D Package Type: SOIC-8 Die Attach Material: Silver Epoxy Molding Compound: EME6300H							
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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: A	pril 1st, 1996 to April	1st, 1998			_ \$ ‴ XII INX®		

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: A	pril 1st, 1996 to April	1st, 1998			=≸. XII INX®		

	Reliability Package Qu	Testing alification PLCC	s Summary on / Monit	7 or	
	Device Type Package Type Die Attach Material Molding Compound	: XC2018, XC4005E XC95108 : PLCC- 84 : Silver Ep : Sumitome	XC3020/A, XC C, XC4010/E,X , XC9572 4 oxy o 6300H	C3042, XC3195/A C5202, XC5210,	A, XC4005, XC7336, XC7354
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		
1 1998 P110	: April 1st, 1996 to April 1st,	1998			{` XILINX [®]

	Reliability Package Qu Device Types Package Types Die Attach Materals Molding Compounds	Testin alificat PQFP XC302 XC319 XC400 PQFP- Silver I Sumito	g Summan ion / Moni 0/A, XC95108 0/A, XC4003, 1 8, XC4010, XC 100, 160, 208 Epoxy mo 6300H, El	Y itor 3, XC4020XL,XC XC4005, XC4303 C4013, XC4013E & 240 ME-7304LC & 1	C3090/A,XC4310, 3,XC4305, XC3342, , XC5206, XC3064/A E7N36
Reliability Test	Combined No. Lots F	ailures	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, 1	1998			-≸ ‴XII INX®

Reliability Testing Summary Package Qualification / Monitor TQFPDevice Type:XC3042/A, XC3390A Package Type:TQFP-100 & 176Die 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: A	pril 1st, 1996 to April 1	st, 1998				

	Reliability 7 Package Qua	Festing lificatio VQFP	Summar on / Monit	y tor	
Reliability Test	Device Type Package Type Die Attach Material Molding Compound Combined No Lots F	: XC304 XC400 : VQFP- : Silver l : EME-7	2L, XC3142// 3, XC4003E 44, 64, & 100 Epoxy /320 Device On Test	A, XC5206, 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 Period: A	1 pril 1st, 1996 to April 1st, 19	0 98	3		≪ ⊻ii iniv®

	, XC5215, C4062XL, XC95216				
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 Period: .	4 April 1st, 1996 to April 1st, 1	0 998	20		\$ ‴XII INX [®] ──

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: Ap	oril 1st, 1996 to April 1s	st, 1998				

Reliability Testing Summary Package Qualification / Monitor HTFP							
	Device T Package T Die Attach Mate Molding Compo	ype: XC30 ype: HT-1 erial: Silver und: 73200	90A, XC4010 76, HT-208 Epoxy CR				
Reliability	Combined		Device	Mean Test	Total		
Test	No.Lots	Failures	On Test	Hrs/Cycles	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 Period: An	1 oril 1st, 1996 to April 1s	0 t, 1998	3				

	Reliability T Package Qual Device Type: Package Type: Die Attach Material: Test Condition:	esting ificati BGA XC73 XC40 BGA- Silver -55C/	g Summar on / Moni 108, XC4010/1 36XL,XC4062 225, 352, 432 Epoxy +125C for T/C	y tor E, XC4013/D/E, XL, XC4085XL & BGA-560	XC4025, XC4036EX, , XC4028EX
Reliability Test	Combined No.Lots Fa	ilures	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: A	pril 1st, 1996 to April 1st, 199	8			

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

	C	ombined		Mean Hr	s/Cycles	Total
Code	Test	Sample	Failures	Per D	evice	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 Seal	24	0			
D3	Thermal Shock	150	1	FA97064-FANC	15	2,250
	Temperature Cycle				100	15.000
	Seal					
	Visual Examination					
	End-Point Elect.					
	Parametrics			FA05124 ISI S		
D4	Mechanical Shock	167	1	FA95124-16L6		
	Vibration, Var. Freq.					
	Constant Accel.					
	Seal					
	Visual Examination					
	End-Point Elec. Para	•	0			
D5	Salt Atmosphere	153	0			
	Seal					
	Visual Examination	30	0			
D6	Internal Water-Vapor Conte	ent 38	0			
D7	Adhesion of lead finish	27	0			
	Period: April 1st, 199	96 to April 1st, 1	998			

Code B2 Resis B3 Solde B5 Bond D1 Physi D2 Lead D3 Therr D4 Mech	C Test stance to Solvents erability I Strength sical Dimension	ombined Sample 192 162	Failures 0	Mean Hrs/Cycles Per Device	Total Device Hours
B2 Resis B3 Solde B5 Bond D1 Physi D2 Lead D3 Therr	stance to Solvents erability I Strength sical Dimension	192 162	0		
B3 Solde B5 Bond D1 Physi D2 Lead D3 Therr	erability 1 Strength sical Dimension	162	U		
B5 Bond D1 Physi D2 Lead D3 Therr	l Strength sical Dimension	102	0		
D1 Physi D2 Lead D3 Therr	ical Dimension	212	Ŭ Û		
D2 Lead D3 Therr D4 Mech		90	Ŏ		
D3 Ther D4 Mech	l Integrity Seal	18	ů 0		
D4 Mech	mal Shock Temperature Cycle Seal	90	0	15 100	1,350 9,000
D4 Mech	Visual Examination End-Point Elect. Parametrics				
	hanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination	90	0		
	End-Point Elec. Para.				
D5 Salt A	Atmosphere Seal	90	0		
	Visual Examination				
D6 Inter	rnal Water-Vapor Conten	it 18	0		
D7 Adhe		18	0		

Reliability Testing Summary CQFP Package Qualification / Monitor CQFP-100					
Code	(Test	Combined Sample	Failures	Mean Hrs/Cycles Per Device	Total Device Hou
Coue	Itst	Sample	1 anul CS	Ter Device	Device 1100
B2	Resistance to Solvents	27	0		
B3	Solderability	18	0		
B5	Bond Strength	10 24	0		
D1	Physical Dimension	24 45	0		
D2	Lead Integrity	45 Q	0		
	Seal	,	0		
D3	Thermal Shock	45	0 0	15	675
	Temperature Cycle	-10	v	100	4 500
	Seal Visual Examination			100	7,500
	End-Point Elect. Parametrics				
D4	Mechanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination	60	4 ^{FA9}	7052-CMGL	
	End-Point Elec. Para.				
D5	Salt Atmosphere Seal Visual Examination	45	0		
D6	Internal Water-Vapor Conte	nt 11	Λ		
D7	Adhesion of lead finish	11	U A		
D8	Lead Torque	13	0		
	Period: April 1st. 199	 6 to April 1st. 19	98		C 1 1 1 1 1 1 1 1 1 1
1000 D100					₹⊾XILINX

Combined Mean Hrs/Cycles Total						
Code	Test	Sample	Failures	Per Device	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.	(0)	0			
D5	Salt Atmosphere	60	0			
	Seal					
	Visual Examination	1(Δ			
D6	Internal Water-Vapor Conten	t 10	U			
D7	Adhesion of lead finish	12	U			
D8	Lead Torque	20	U			

Code Test Combined Sample B2 Resistance to Solvents 4 B3 Solderability 44 B5 Bond Strength 45 D1 Physical Dimension 40 D2 Lead Integrity 90 Seal 0 5 D3 Thermal Shock 25 Temperature Cycle Seal Visual Examination 25 Vibration, Var. Freq. Constant Accel. Seal 25 Vibration, Var. Freq. Constant Accel. Seal 30 Seal 40 Seal 5 Of Internal Water-Vapor Content 6	e Failures	Combined Sample	Test	Code
B2 Resistance to Solvents 4 B3 Solderability 44 B5 Bond Strength 45 D1 Physical Dimension 40 D2 Lead Integrity 90 Seal 90 Seal 25 Temperature Cycle Seal Visual Examination 25 Seal 30 Visual Examination 5 Seal 30 Seal 5 Visual Examination 5 Seal 5 </th <th>0 0 0 0 0 0</th> <th>4</th> <th></th> <th></th>	0 0 0 0 0 0	4		
B3 Solderability 44 B5 Bond Strength 45 D1 Physical Dimension 40 D2 Lead Integrity 90 Seal D3 Thermal Shock 25 Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics D4 Mechanical Shock 25 Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination End-Point Elec. Para. D5 Mathematical Shore 30 Seal Visual Examination End-Point Elec. Para. D5 Mathematical Shore 30 Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination End-Point Elec. Para. D5 Mathematical Shore 50 Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination End-Point Elec. Para. D6 Internal Water-Vapor Content 6	0 0 0 0 0	4	Resistance to Solvents	B2
B5 Bond Strength 45 D1 Physical Dimension 40 D2 Lead Integrity 90 Seal 25 Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics 25 Vibration, Var. Freq. Constant Accel. Seal 25 Visual Examination End-Point Elect. Parametrics 25 Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elect. Seal Vibration, Var. Freq. Constant Accel. Seal Seal Visual Examination 5 Salt Atmosphere 30 Seal Visual Examination Visual Examination 5	0 0 0 0	44	Solderability	B3
D1 Physical Dimension 40 D2 Lead Integrity 90 Seal 90 D3 Thermal Shock 25 Temperature Cycle Seal Seal 25 Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics 25 Vibration, Var. Freq. Constant Accel. Seal Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination D6 Internal Water-Vapor Content 6	0 0 0	45	Bond Strength	B5
D2 Lead Integrity 90 Seal D3 Thermal Shock 25 Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics D4 Mechanical Shock 25 Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination End-Point Elec. Para.	0 0 0	40	Physical Dimension	D1
D3 Thermal Shock 25 Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics D4 Mechanical Shock 25 Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination End-Point Elec. Para. D5 Internal Water-Vapor Content 6	0 0	90	Lead Integrity Seal	D2
D4 Mechanical Shock 25 Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para. D5 Salt Atmosphere 30 Seal Visual Examination D6 Internal Water-Vapor Content 6	0	25	Thermal Shock Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics	D3
D5 Salt Atmosphere 30 Seal Visual Examination D6 Internal Water-Vapor Content 6		25	Mechanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para.	D4
D6 Internal Water-Vapor Content 6	0	30	Salt Atmosphere Seal Visual Examination	D5
	0	6	Internal Water-Vapor Content	D6
D7 Adhesion of lead finish 30	0	30	Adhesion of lead finish	D7

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Reliability Testing Summary WC68 Package Qualification (EPLD)

Code	Test	Combined Sample	Failures
D2	Soldovobility	22	0
ДЈ D1	Soluerability Physical Dimonsion	22	0
D1 D2	Lead Integrity Seal (No Leads)	45	0
D3	Thermal Shock Temperature Cycle Seal Visual Examination End-Point Elect. Parametrics	26	0
D4	Mechanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para.	25	0
D8	Lead Torque	5	0
	Period: April 1st, 1996 to April 1st, 1998		\$~XII INX≞

	Reliability Testing Summary WC84 Package Qualification (EPLD)				
Code	Test	Combined Sample	Failures		
B2	Resistance to Solvents	4	0		
B3	Solderability	60	0		
B 5	Bond Strength	30	0		
D1	Physical Dimension	68	0		
D2	Lead Integrity Seal (No Leads)	167	0		
D3	Thermal Shock Temperature Cycle Seal Visual Examination End-Point Elect. Parametric	130	0		
D4	Mechanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para.	105	1		
D5	Salt Atmosphere Seal Visual Examination	47	0		
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		—{ XILINX [®] —		

Reliability Testing Summary PG84 Package Qualification (EPLD)

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

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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 Seal (No Leads)	45	0
D3	Thermal Shock Temperature Cycle Seal Visual Examination End-Point Elect. Parametric	25	0
D4	Mechanical Shock Vibration, Var. Freq. Constant Accel. Seal Visual Examination End-Point Elec. Para.	24	0
D5	Salt Atmosphere Seal Visual Examination	15	0
D6	Internal Water-Vapor Content	3	0
D7	Adhesion of lead finish	15	0
	Period: April 1st, 1996 to April 1st, 1	998	

Reliability Testing Summary-Packages EIAJ Temperature Soldering Heat Test

I	Technology: Device Type: Package Type: Foundry/Assembly: Preconditionning Test Condition: Test Duration: Solder Heat Temp.: Test Duration:	Si-Gate CMOS XC1700 Microcircuit PD8 & PLCC20 TSMC / Anam & AA T = 85C, R.H. = 85% 240 hours 350 +/- 10 degrees C 3 + 0.5/-0 seconds	t Group PI XC1765	XC1700
	AC1750A	AC1/128D	AC1/05	AC1700
Period:	Apri	il 1, 1996 to April 1, 199	98	
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 : Soldera	bility test applied to all leads			

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Reliability Testing Summary-Packages EIAJ Temperature Soldering Heat Test					
	Technology: Si-Gate CMOS Device Type: XC3000/A & XC3 Package Type: PLCC-68, 84 & Pl Foundry/Assembly: Seiko/Anam Preconditionning Test Condition: T = 85C, R.H. = 8 Test Duration: 240 hours Solder Heat Temp.: 350 +/- 10 degrees Test Duration: 3 + 0.5/-0 seconds			C3100/A Microci z PPGA-132 = 85% ees C ds	rcuit Group
	XC3020/A	XC3030/	XC3042/A	XC3142/A	XC3000/A/XC3100/A
Period	:	Apr	il 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 : Solder	Note : Solderability test applied to all leads				
					——{XILINX ®—

Reliability Testing Summary-Packages EIAJ Temperature Soldering Test Technology: Si-Gate CMOS Device Type: XC1700 Microcircuit Group Package Type: PD8C & PLCC-20 TSMC (Arom & AA PL					
	Preconditionning Test Condition: Test Duration:	Steam Age 1 hour min.			
	Solder Heat Temp.: 230 +/- 5 degrees C Test Duration: 3 +/- 1 seconds				
	XC 1736A	XC1765D	XC17128D	XC1700	
Period:	Apri	l 1, 1996 to April 1, 1	998		
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:					
Noto - Soldova	bility test applied to the number of l	aada I TDD 10, 22 laa	de accont on 0		
note : Soldera	ionity test applied to the number of h	vaus L 1 F D 10, 22 lee	ius accept oli v	= \$. XILINX®	

Reliability Testing Summary-Packages EIAJ Temperature Soldering Test							
	Technology:Si-Gate CMOSDevice Type:XC3000/A Microcircuit GroupPackage Type:PLCC-68, 84 & PPGA-132 & PQFP-120Foundry/Assembly:Seiko/AnamPreconditionning Test Condition:Steam AgeTest Duration:1 hour min.Solder Heat Temp.:230 +/- 5 degrees CTest Duration:3 +/-1 secondsRate:1 +/- 0.1 in.sec						
	XC3020/A	XC3090/A	XC3142/A	XC3000/A/XC3100/A			
Period:	Period: April 1, 1996 to April 1, 1998						
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 : Soldera	Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0						
				── { XILINX [®] ─			

	Reliability Testing EIAJ Temperat	g Summary-Packages ture Soldering Test					
Technology:Si-Gate CMOSDevice Type:XC4000 Microcircuit GroupPackage Type:PQFP-208 & MQFP-208Foundry/Assembly:Seiko / AnamPreconditionning Test Condition:Steam AgeTest Duration:1 hour min.Solder Heat Temp.:230 +/- 5 degrees CTest Duration:3 +/- 1 secondRate: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 : Solderat	Note : Solderability test applied to the number of leads LTPD 10, 22 leads accept on 0						
			—€XILINX [®]				

	Reliabili Low Ter I Solder	ity Testing mperature Technology: Device Type: Package Type: Steam Age: Flux: r Heat Temp.:	g Summary-Packages e Soldering Heat Test Si-Gate CMOS Various Microcircuits PQFP-100, 120, 160 ,208, MQFP-208, & PPGA-175 2 hours RMA 215 +/- 5 degrees C			
	PQ100	PQ120	PQ160	PQ208	MQ208	PP175
Period:	April 1, 1996 to April 1, 1998					
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 : Solderabili	ty test applied to	the number of l	eads LTPD 10,	22 leads accept	on 0	

Reliability Testing Summary-Packages Low Temperature Soldering Heat Test						
	Technology: Device Type: Package Type: Steam Age: Flux: Solder Heat Temp.:	Si-Gate CMOS Various Microcircuits PD-8, & PLCC-20, 84 2 hours RMA 215 +/- 5 degrees C				
	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:						
Noto - Soldorability	test applied to the number of l	lands I TDD 10, 22 lands account	on 0			
Trote . Soluci ability	test applied to the number of	aug 1/11 D 10, 22 itaus accept				