Actel
1st Quarter 2000
Reliability Report

Table of Contents

	Page
Reliability Test Matrix	2
• Test Methods and Conditions	
Failure Rates	
• Failure Rates (FITs) Based For Current Process Data	3-4
• Mean Time Between Failure (MTBF) For Current Process Data	5
Process and Package Data	
• 0.25µm FPGA- SX32A	6
◦ Reliability Data	
• RTSX 0.6µm FPGA-RTSX16, RTSX32	7
◦ Reliability Data	
• 0.35µm FPGA-SX 16P, SX16, SX32	8
◦ Reliability Data	
• 0.45µm FPGA-MX 04, MX16, MX36	11-12
◦ Reliability Data	
• 0.6µm FPGA - 1225XL, 1240XL, 1280XL, A1415, A1425, 14100BP, 32140DX, 32200DX	13-22
◦ Reliability Data	
◦ Failure Analysis Results	
• 0.8µm FPGA - 1280XL, A1415, A1425, A1440, A1460, A14100, A32100DX	23-29
◦ Reliability Data	
◦ Failure Analysis Results	
• 1.0µm FPGA - A1010, A1020, A1225, A1240, A1280	30-49
◦ Reliability Data	
◦ Failure Analysis Results	
Package Data	
• Plastic Leaded Chip Carrier (PLCC)	50-60

- Reliability Data
- Failure Analysis Results

- Plastic Quad Flat Pack (QFP) 61-69
  - Standard PQFP, TQ, VQFP, RQFP, TEPQFP Reliability Data
  - Standard PQFP, TQ, VQFP, RQFP, TEPQFP Failure Analysis Results

Reliability Test Matrix

Test Description	Conditions	Frequency
High Temperature Operating Life	Ta=125^{o}C, 1000 Hours, Dynamic with Programmed Lifetest Patterns Vdd = 5.5 volts Mil-Std 883C, Method 1005	Qualification On-Going Reliability Monitor
Temperature Humidity Bias	85^{o}C, 85% Relative Humidity Biased - Alternate Pins, 1000 Hours Vdd=5.5 volts static JEDEC Std 22-B Method A101	Qualification
HAST - Highly Accelerated Temperature and Humidity Stress Test	130^{o}C, 85% Relative Humidity Biased - Alternate Pins, 100 Hours Vdd=5.5 volts static JEDEC Std 22-A110	Qualification On-Going Reliability Monitor
Pressure Pot	121 ^{o}C, 2.0 atm.., Unbiased, 168 Hours JEDEC Std 22-B Method A102-A	Qualification On-Going Reliability Monitor

Temperature Cycle	Condition B: -55 °C to 125°C, 1000 Cycles Condition C: -65 °C to 150°C, 1000 Cycles Mil-Std 883C Method 1010	Qualification On-Going Reliability Monitor
Thermal Shock	-65 °C to 150°C, 100 Cycles Min. Mil-Std 883C Method1011	Qualification

FIT Rates By Process

1.0µm CMOS FPGA ---------- 9.34FITS

6 Failures, Device Hours @ 55°C = 5.8519 x 10^8 hours

0.8µm CMOS FPGA ----------14.77 FITS

1 Failure, Device Hours @ 55°C = 1.36796x10^8 hours

0.6µm CMOS FPGA ---------- 4.85FITS

0 Failure, Device Hours @ 55°C = 1.896x10^8 hours

.45µm CMOS FPGA----------16.36FITS

0 Failure, Device Hours @ 55°C =5.6228x10^7 hours

.35µm CMOS FPGA----------22.51FITS

0 Failure, Device Hours @ 55°C =4.0872x10^7 hours

RTSX .6µm CMOS FPGA----------36.18FITS

0 Failure, Device Hours @ 55°C =2.5428x10^7 hours

.25µm CMOS FPGA----------112.33FITS

0 Failure, Device Hours @ 55°C =8.19x10^6 hours

Note: Calculations are based on reliability data generated for each process technology. The following assumptions were made in these FIT rate calculations:

Tj = 55 °C, Ea = 0.7 eV, 60% Confidence

MEAN TIME BETWEEN FAILURE (MTBF) By Process

1.0µm CMOS FPGA ---------- 6.426E+08Hours
6 Failures, Device Hours @ 55°C = 5.9119 x10^8 hours
0.8µm CMOS FPGA ---------- 6.77E+07Hours
1 Failure, Device Hours @ 55°C = 1.304x10^8 hours
0.6µm CMOS FPGA ----------2.061E+08 Hours
0 Failure, Device Hours @ 55°C = 1.896x10^8 hours
.45µm CMOS FPGA----------6.28E+07 Hours
0 Failure, Device Hours @ 55°C =5.7788x10^7 hours
.35µm CMOS FPGA----------4.437E+07 Hours
0 Failure, Device Hours @ 55°C =4.0872x10^7 hours
RTSX.6µm CMOS FPGA---------- ----------2.7639E+07 Hours
0 Failure, Device Hours @ 55°C =2.5428x10^7 hours
.25µm CMOS FPGA----------8.90E+07 Hours
0 Failure, Device Hours @ 55°C =8.19x10^6 hours

Note: Calculations are based on reliability data generated for each process technology. The following assumptions were made in these MTBF calculations:
Tj = 55 °C, Ea = 0.7 eV, 60% Confidence

ACTEL .25um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN #**	**PACKAGE**	**UNITS**	**168**	**500**	**1000**	**2000**
SX32A	T25J002 (DC – 9943) P05 (DC – 9940) P04 (DC – 9941)	PQ208	130	0	0	-	-
SX32A	T25J002 (DC – 9943) P05 (DC – 9940) P04 (DC – 9941)	PQ208	80	-	-	0	-

HTOL SUMMARY:

TOTAL UNITS:	130
TOTAL RUNS:	3
TOTAL DEVICE HOURS	8.19E+06
TOTAL FAILURES:	0

ACTEL RTSX .6µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN #**	**PACKAGE**	**UNITS**	**168**	**500**	**1000**	**2000**
RTSX16	P02, P03, P04	PQ208	81	0	0	0	-
RTSX16	P05	CQ256	77	0	0	0	-
RTSX16	P04 (9931)	CQ256	46	0	0	0	0
RTSX32	T6JP01A (9949)	CQ208B	76	0	0	0	

HTOL SUMMARY:

TOTAL UNITS:	280
TOTAL RUNS:	6
TOTAL DEVICE HOURS	2.5428E+07
TOTAL FAILURES:	0

ACTEL .35um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN #**	**PACKAGE**	**UNITS**	**168**	**500**	**1000**	**2000**
SX16	2XZR402521	PQ208	38	0	0	0	-
SX16P	2ACT141821	PQ208	45	0	0	0	-
SX32	2XZT091468	PQ208	43	0	0	0	0
SX16	2ACT110031	PQ208	74	0	0	0	0
SX32	2ACT500021	CQ208	45	0	0	0	-
SX16	2ACT100081 (DC 9920)	PQ208	81	0	0	0	0

HTOL SUMMARY:

TOTAL UNITS:	245
TOTAL RUNS:	6
TOTAL DEVICE HOURS	4.0872E+07
TOTAL FAILURES:	0

BIASED HUMIDITY (HAST)

				NUMBER OF FAILURES (HOURS)	
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**
A54SX32	2ACU211641 (DC 9941, 9942, 9943)	BG329	81	-	0
A54SX16	2ACU241341 (DC 9947) 2ACU420072 (DC 0002) 2ACU222448 (DC 0004)	208PQFP	84	-	0

UNBIASED HUMIDITY (HAST)

PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**
A54SX16	2ACU241341 (DC 9947) 2ACU420072 (DC 0002) 2ACU222448 (DC 0004)	208PQFP	84	-	0

TEMPERATURE CYCLE:

PRODUCT	RUN#	PACKAGE	#UNITS	200	500	1000
A54SX16	2ACU241341 (DC 9947) 2ACU420072 (DC 0002) 2ACU222448 (DC 0004)	208PQFP	93	0	0	0

ACTEL 0.45um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN #**	**PACKAGE**	**UNITS**	**168**	**500**	**1000**	**2000**
MX04	2XZR24206.5	PL84	29	0	0	0	0
MX04	2ACR23038.3	PL84	30	0	0	0	0
MX16	2XZR25104.1	PQ160	26	0	0	0	0
MX04	2ACR23038.3	PL84	45	0	0	0	0
MX36	2Act10221	PQ208	27	0	0	0	0
MX04	2Act 160021	PL84	77	0	0	0	0
MX36	2ACT363611	CQ256	77	0	0	0	
MX04	2ACU040091 (DC9919)	PL84	88	0	0	0	0

HTOL SUMMARY:

TOTAL UNITS:	399
TOTAL RUNS:	8
TOTAL DEVICE HOURS:	5.6228E+07
TOTAL FAILURES:	0

ACTEL 0.45um FPGA RELIABILITY SUMMARY

BIASED HUMIDITY (HAST)

				NUMBER OF FAILURES (HOURS)
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**100**
42MX36	2ACT180141 (DC 9842); 2ACT230231 (DC 9841, 9842)	BG272	76	0

ACTEL 0.6um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
1225XL	ACP02187.1	100 PQFP	26	0	0	0	-
1225XL	ACQ10102 ACQ07959 ACQ09061	100 PQFP	56	0	0	0	-
1240XL	ACP01117.1 ACN51939.1	144 PQFP	52	0	0	0	-
1240XL	ACP57584.1	84PLCC	100	0	0	0	-
1240XL	MIX	PQ144	56	0	0	0	-
1280XL	ACP212072 ACP19329.1	160 PQFP	76	0	0	0	-
1280XL	MIX	84PLCC	100	0	0	0	
3265DX	ACP163684	160 PQFP	78	0	0	0	
A1415	ACP17300	100PQFP	100	0	0	0	

A1425	ACP122761	100PQFP	100	0	0	0

HIGH TEMPERATURE OPERATING LIFE (Cont.)

				NUMBER OF FAILURES (HOURS)			
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
A1425	ACP12285 ACP34166 ACP27991	100PQFP	88	0	0	0	
1460BP	25430540 25430550	208PQFP	52	0	0	0	
14100BP	26026670	208RQFP	27	0	0	0	
32140DX	ACP33277.1 ACP55730.1 ACP54023.1	208PQFP	75	0	0	0	
32140DX	ACP56255.1 ACP56254.1	208PQFP	52	0	0	0	
32140DX	ACP540231 ACP56254.1	160PQFP	26	0	0	0	
32140DX	25464510	160PQFP	26	0	0	0	
32200DX	26207340	208PQFP	29	0	0	0	

ACTEL 0.6um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (Cont.)

				NUMBER OF FAILURES (HOURS)			
PRODUCT	RUN#	PACKAGE	#UNITS	168	500	1000	2000
32140DX	ACP562551	PQ208	28	0	-	0	0
1415A	ACP17300	PQ100	101	0	-	0	0
32300DX	ACQ09069.1	RQ240	26	0	-	2*	0
A1425A(150C)	UCJ01,02,03	PG133	130	-	0	-	-
A32100DX(150C)	ACR50293.1	CQ84	80	-	0		
-	-						
32140DX	G10854	PQ208C	26	0	0	0	-
1280XL	ACR53214	PQ160	129	0	-		
A1240XL	ACR50594.1	PQ144C	228	0			
A1240XL	ACR50594.1	PQ144C	143	0			
A1240XL	ACR50594.1	PQ144C	227	0			
A1280XL	ACT10293.1	CQ172B	80	0	0	0	
A32200DX	ACT166851	CQ256	77	0	0	0	
A1280XL	ACU166851 (9943)	PG176	77	0	0	0	

* Failures attributed to electric overstress and not related to Die fabrication.

HTOL SUMMARY:

ACTEL 0.6um FPGA RELIABILITY SUMMARY

TOTAL UNITS:	2391
TOTAL RUNS:	43
TOTAL DEVICE HOURS:	1.896E+08
TOTAL FAILURES:	0

BIASED HUMIDITY (HAST)

				NUMBER OF FAILURES (HOURS)	
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**
1225XL	ACP02187.1	100 PQFP	17	-	0
1240XL	ACP01117.1 ACN51939.1	144 PQFP	31	-	0
1280XL	ACP19329.1 ACP212072	160 PQFP	76	-	0
1280XL	ACP33235.1 ACP32219.3	160 PQFP	76	-	0
1280XL	ACQ01769 ACQ03811 ACQ03814	160 PQFP	40	-	0
1280XL	ACQ05561 ACQ05564 ACQ05562	160 PQFP	39	-	0
3265DX	ACP163684	160 PQFP	40	-	0

1415	ACP17300	100QFP	50	-	0
A1425	ACP122761	100PQFP	50	-	0

BIASED HUMIDITY (HAST)

				NUMBER OF FAILURES (HOURS)	
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**
32140DX	ACP54023.1	160PQFP	26	-	0
32140DX	ACP33277.1 ACP55730.1 ACP54023.1	208PQFP	76	-	0
32200DX	26207340	208PQFP	26	-	0
14100BP	26330340	208RQFP	26	0	0
32200DX	ACQ03818.1	208PQFP	30	-	0
1280XL	26084380	160PQFP	58	-	0
32140DX	55558.1	PQ208C	25		0

ACTEL 0.6um FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-55 C TO 125 C

PRODUCT	RUN#	PACKAGE	#UNITS	200	500	1000
1225XL	MIX	84PLCC	39	0	0	0
32140DX	ACQ07975 ACQ06716	208TEPQFP	31	0	0	0
32140DX	ACQ05572 ACQ09703	160TEPQFP	16	0	0	0
1225XL	ACP02187.1	100 PQFP	18	-	0	0
1240XL	ACP01117.1 ACN51939.1	144 PQFP	30	-	0	0
1280XL	ACP19329.1	160 PQFP	38	0	0	0
	ACP212072	160 PQFP	38	0	0	0
3265DX	ACP163684	160 PQFP	45	0	0	0

1440A	51940.1	100 VQFP	45	0	0	0

TEMPERATURE CYCLE: (CONT.)

-55 °C TO 150 °C:

PRODUCT	RUN#	PACKAGE	#UNITS	200	500	1000
A1415	ACP212001	100 VQFP	50	0	0	0
A1415	ACP17300	PQ100	50	0	0	0
A14100	26026670	208RQFP	26	0	0	0
1460BP	25430540 25430550	208PQFP	52	0	0	0
14100BP	26026670 26330340	208RQFP	45	0	0	0
32140DX	ACP54023.1	160PQFP	26	0	0	0
32140DX	ACP33277.1 ACP55730.1 ACP54023.1	208PQFP	76	0	0	0
32200DX	26207340	208PQFP	26	0	0	0

ACTEL 0.6um FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE: (CONT.)

-65 °C TO 150 °C:

				NUMBER OF FAILURES (CYCLES)		
PRODUCT	RUN#	PACKAGE	#UNITS	200	500	1000
32140DX	2623860	208PQFP	40	0	0	0
32140DX	26145020	208PQFP	40	0	0	0
1460BP	26247840	208PQFP	40	0	-	-
1460BP	26232850	208PQFP	40	0	-	-
32410DX	26272490	208PQFP	38	0	-	-
32410DX	26026660	208PQFP	52	0	0	0
32200DX	26207340	208PQFP	48	0	0	0
32410DX	26073180	208PQFP	39	0	0	0
32410DX	26090100	208PQFP	26	0	0	0
1460BP	26465100	208PQFP	59	0	0	0
32300DX	ACQ09705.1	204RQFP	25	0	0	0
32140DX	266026660	208PQFP	35	0	0	0

ACTEL 0.6um FPGA RELIABILITY SUMMARY

32140DX	266026660A	208PQFP	78	0	0

ACTEL 0.6um FPGA RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE):

				NUMBER OF FAILURES (HOURS)		
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**48**	**96**	**168**
14100BP	26330340	208RQFP	26	0	0	0

ACTEL 0.8um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURE (HOURS)		
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**
1280XL	24464430 24442620 24381610	160 PQFP	78	1	0	0
1425	JK08,09,10	133 PGA	140	0	0	0
1425	JK08,09,10	84 PLCC	135	0	0	0
1425A	UCJ01,2,3	133 PGA	130	0	0	0
1425A	ACN32804 ACN30805 ACN33807	133 PGA	130	0	0	0
A1425	UCJ013	100PQFP	100	0	0	0
1440A	JN05	100 VQFP	79	0	0	0
1440A	51940.1	100 VQFP	79	0	0	0
1460A	JL-01	208 PQFP	80	0	0	0
1460A	JL-01	207 PGA	80	0	0	0
1460A	JL-03	208 PQFP	62	0	0	0
1460A	JL-06B	207 PGA	65	0	0	0
1460A	PC435091 PC435092 PC435093	207 PGA 207 PGA 207 PGA	80	0	0	0

ACTEL 0.8um FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURE (HOURS)		
PRODUCT	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**
14100A	24239130	208 RQFP	51	0	0	0
	UCLO1	208 RQFP	25	0	0	0
14100A	25290820	313PBGA	45	0	0	0
A1460A(150C)	UCKT01	207CPGA	81	0	-	-
A32100DX		84CQ	80			
A14100A	UCL049	256CQ	15	-	-	0
A 1460A(150C, 184Hrs)	UCK056	PG207B	80	0	-	-
1280 XL (150C, 184Hrs)	ACT 10293.1	CQ172	80	0	-	-
RT14100A	UCL055	CQ256E	18	-	-	0

HTOL SUMMARY:

TOTAL UNITS:	1648
TOTAL RUNS:	28
TOTAL DEVICE HOURS:	1.304E+08
TOTAL FAILURES:	1

FAILURE ANALYSIS:

PROD	RUN#	HOURS	CAUSE
1280XL	24442620	168	One polyamide failure due to die saw defect in assembly

ACTEL 0.8um FPGA RELIABILITY SUMMARY

85C / 85% TEMPERATURE HUMIDITY BIAS:

				NUMBER OF FAILURES (HOURS)		
PROD	RUN#	PACKAGE	#UNITS	168	500	1000
14100A	25290820	313PBGA	45	0	0	0

ACTEL 0.8um FPGA RELIABILITY SUMMARY

BIASED HUMIDITY (HAST):

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (HOURS) 50	100
1280XL	24464430 24381610 24442620	160 PQFP	46	-	0
1425	JK8,9,10	84-PLCC	81	-	0
1425A	ACN32804 ACN30805 ACN33807	100 PQFP	80	-	0
1425A	UCJ01,2,3	100 PQFP	80	-	0
1440A	JN05	100 VQFP	45	-	0
1440A	51940.1	100 VQFP	45	-	0 -
1460A	JL04A	208 PQFP	80	-	0
1460A	WB24279010	208 PQFP	47	-	0
14100A	24239130	208 RQFP	14	-	0
	UCLO1	208 RQFP	31	-	0

TEMPERATURE CYCLE:

ACTEL 0.8um FPGA RELIABILITY SUMMARY

-65 °C TO 155 °C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 200	500	1000
1280XL	25026540	176 TQFP	17	-	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	-
1280XL	25312500 25312480	160 PQFP 160 PQFP	75	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	75	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	74	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	0
1280XL	25504560 26010580	160 PQFP	36	0	0	0
1425	JK8,9,10	133 PGA	81	0	0	0
1425	JK8,9,10	84 PLCC	83	0	0	0
1425A	UCJ01,2,3	100 PQFP	80	0	0	0
1425A	ACN32804 ACN30805 ACN33807	100 PQFP	80	0	0	0

TEMPERATURE CYCLE: (cont.)

ACTEL 0.8um FPGA RELIABILITY SUMMARY

-65 °C TO 155 °C

				NUMBER OF FAILURES (CYCLES)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**200**	**500**	**1000**
1440A	JN-02	160 PQFP	80	0	0	0
1440A	JN-05	100 VQFP	80	0	0	1
1440A	51940.1	100 VQFP	45	0	0	0
1460A	JL-01	208 PQFP	80	0	0	0
1460A	JL-01	207 PGA	80	0	0	0
1460A	PC435091	207 PGA	80	0	0	0
1460A	PC435092	207 PGA				
1460A	PC435093	207 PGA				
1460A	25364430	208QFP	45	0	0	0
1460A	2610001	208QFP	80	0	0	0
14100A	24239130	208 RQFP	14	-	-	0
	UCLO1	208 RQFP	31	-	-	0
14100A	25371980 25364960	208 RQFP	19	0	-	-
14100A	25290820	313PBGA	78	0	0	0
14100A	MIX	208RQC	24	0	--	

ACTEL 0.8um FPGA RELIABILITY SUMMARY

FAILURE ANALYSIS (TEMPERATURE CYCLE):

PROD	RUN#	CYCLES	CAUSE
1440A	JN-05	1000	No defects were observed after decapsulation

PRESSURE POT (UNBIASED AUTOCLAVE):

				NUMBER OF FAILURES (HOURS)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**48**	**96**	**168**
1280XL	25312480 12531250	176TQ	45	0	0	0
14100A	25290820	313PBGA	45	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE

				NUMBER OF FAILURES(HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
1010A	JG03	68 PLCC	59	0	0	0	0
1010A	JG03	68 PLCC	117	0	0	0	0
1010A	TI24	68 PLCC	74	0	0	0	0
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	107	0	0	0	-
1010A	E01-1	68 PLCC	69	0	0	0	-
1010A	E02-1	68 PLCC	70	0	0	0	-
1010B	TI2072857 TI2072858	68 PLCC	400	1	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

	TI2072860						
1010B	U1G-01	68 PLCC	79	0	0	0	-
1010B	U1G-02	68 PLCC	57	0	0	-	-
1010B	U9G01P	100 PQFP	76	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)			
PROD	RUN#	PACKAGE	#UNITS	168	500	1000	2000
1020A	JF01	84 JLCC	25	0	0	0	0
1020A	JF01	84 PLCC	15	0	0	0	0
1020A	JF02	84 JLCC	44	0	0	0	0
1020A	JF02	84 JLCC	41	0	0	0	0
1020A	JF04	84 PLCC	77	0	0	0	-
1020A	JF04	84 PLCC	20	0	0	-	-
1020A	JF14	84 PLCC	58	0	0	-	-
1020A	JF14	84 PLCC	100	0	1	-	-
1020A	JF37	84 PLCC	14	1	-	-	-
1020A	JF37	84 PLCC	20	0	-	-	-
1020A	JF39	84 PLCC	32	0	-	-	-
1020A	JF39	84 PLCC	29	0	-	-	-
1020A	JF42	84 PLCC	49	0	0	-	-
1020A	JF42	84 PLCC	30	0	1	-	-
1020A	JF66	84 PLCC	33	0	0	0	-
1020A	JF66	84 PLCC	39	0	0	0	-
1020A	JF67	84 PLCC	49	0	0	0	-
1020A	JF67	84 PLCC	45	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
1020A	TI S#1	84 PLCC	79	0	0	0	-
1020A	E-14	84 PLCC	45	0	0	0	0
1020A	E-15	84 PLCC	44	0	0	0	0
1020A	E-17	84 PLCC	45	0	0	0	0
1020A	JF-207	100 PQFP	129	0	0	0	-
1020A	D1J1815 D2B2704	84 PGA	51	0	0	0	-
1020A	E-01	84 PLCC	45	0	0	0	-
1020A	E-02	84 PLCC	45	0	0	0	-
1020A	E-03	84 PLCC	45	0	0	0	-
1020A	ADK29X	84 PLCC	45	0	0	0	0
1020A	ADA72X	84 PLCC	45	0	0	0	0
1020A	ADC21X	84 PLCC	45	0	0	0	0
1020A 1020A 1020A 1020A 1020A	TI1130 TI1139 TI1210 TI1800 TI1803	84 PLCC	223	0	0	0	-
1020A	TI1130 TI1139 TI1210 TI1800 TI1803	84 PLCC	34	0	0	-	-
1020A	UP-04	84 PLCC	40	0	0	0	-
	UP-05	84 PLCC	40	0	0	0	-
1010B	TI5276893	84PLCC	100	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**
1020B	JJ-14	84 PLCC	45	0	0	0
1020B	JJ-15	84 PLCC	45	0	0	0
1020B	JJ-17	84 PLCC	45	0	0	0
1020B	JJ-13	84 PGA	30	0	0	0
1020B	JJ-13	84 PGA	80	0	0	-
1020B	JJ-16	84 PLCC	80	0	0	0
1020B	U1P-01	84 PLCC	40	0	0	0
1020B	U1P-02	84 PLCC	40	0	0	0
1020B	JJ-24	84 PLCC	87	0	0	0
1020B	EBFJ001	84 PLCC	40	0	0	0
1020B	EBFI004	84 PLCC	40	0	0	0
1020B	U1P41HM	100 PQFP	80	0	0	0
1020B	U1P25	80 VQFP	45	0	0	-
1020B	U1P83	80 VQFP	43	0	0	0
	U1P25	80 VQFP	39	0	0	0
1020B	U1P05	100 PQFP	129	0	0	0
1020B	U1P209B	84 PLCC	40	0	0	0
1020B	U9P01	100 PQFP	133	0	1*	0
	U9P021A	100 PQFP				
1020B	U9P-004	84 PLCC	47	0	0	0

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)			
PROD	RUN#	PACKAGE	#UNITS	168	500	1000	2000
1020B	U9P046	84 PLCC	100	0	0	0	-
1020B	6085878	84 PLCC	100	0	0	0	-
1020B	U9P128	84 PLCC	100	0	0	0	-
1020B	UP121	CQ84	24	0	0	0	-
1225	UJ-01	100 PGA	80	0	0	0	-
1225	UJ-01	100 PQFP	127	0	0	0	-
A1225	TI9028537	84PLCC	100	0	0	0	-
1225A	U1J-02	100 PQFP	80	0	0	0	-
A1225A	MIX	PQ100	32	0	0	0	-
1240	TI3257	132 PGA	7	0	0	-	-
1240	TI3257	144 PQFP	129	0	0	0	-
1240	TI1045571	132 PGA	38	0	0	0	0
1240	TI1053933	132 PGA	55	0	0	0	0
1240	TI1053932	132 PGA	36	0	0	0	0
1240	TI1220494	132 PGA	90	0	0	0	-
1240	UI-01	132 PGA	50	0	0	0	-
1240	UI-03	84 PLCC	80	0	0	0	-
1240	MIX	PQ144	36	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)			
				168	500	1000	
1240A	E-02,03	144 PQFP	100	0	0	0	-
1240A	E-04	84 PLCC	30	0	0	0	0
1240A	U1I-26	144 PQFP	80	0	0	0	-
1280	JH05	176 PGA	15	0	0	0	0
1280	JH06	176 PGA	15	0	0	0	0
1280	JH03(K)	176 PGA	25	0	0	0	0
1280	JH03(SB)	176 PGA	25	0	0	0	0
1280	TI1143649	176 PGA	44	0	1*	0	-
1280	TI1143650	176 PGA	44	0	0	0	-
1280	TI1136307	176 PGA	42	0	0	0	-
1280	UH-01	176 PGA	26	0	0	0	-
1280	UH-02	176 PGA	26	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

HIGH TEMPERATURE OPERATING LIFE (cont.)

				NUMBER OF FAILURE (HOURS)			
PROD	RUN#	PACKAGE	#UNITS	168	500	1000	2000
1280	UH-05	176 PGA	40	0	0	0	-
1280	UH-04	160 PQFP	79	0	0	0	-
1280	UH-10,14	176 PGA	75	0	0	0	-
1280	ADC18X	160 PQFP	130	0	0	0	-
1280A	EBFJ002	160 PQFP	30	0	-	-	-
1280A	EBFJ003	160 PQFP	30	0	-	-	-
1280A	EBFJ004	160 PQFP	20	0	-	-	-
1280A	U1H-01	160 PQFP	27	0	0	0	0
1280A	U1H-02	160 PQFP	27	0	0	0	0
1280A	U1H-35	176 PGA	132	0	-	-	-
1280A	U1H-18	160 PQFP	80	0	0	0	-
1280A	EWAJ03,4	160 PQFP	134	0	0	0	-
1280A	U1H25,29	84 PLCC	79	0	0	0	-
1280A	U1H235/6	160 PQFP	80	0	0	0	-
A1020B	103501	84PLCC	124	0	0	0	-

A1020A	UP121	CQ84E	24	0	0	0
A1280A	U1H486	CQ172B	81	0	0	0

HIGH TEMPERATURE OPERATING LIFE (cont.)

LOTS ACCELERATED AT 150C (GROUPC)

				NUMBER OF FAILURE (HOURS)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**184**	**500**	**1000**
A1280A	U1H83	CQ172	45	-	0	-
A1280A	U1H363	CQ172	58	0	-	-
A1280A	U1H442	PG176B	81	0	-	-
A1020A	U1RT01	CQ84B	80	-	0	-
A1280A	UIH439	CQ172	18	0	-	-
A1280A	U1H439	CQ172	310	0		
A1020(125C)	U1RT02	CQ84E	699 (240HRS)	0		
A1280A	**U1H551/ 9934**	**PG176**	**77**	**0**		

HTOL SUMMARY:

TOTAL UNITS:	8355
TOTAL RUNS:	134
TOTAL DEVICE HOURS*	5.9119E+08

ACTEL 1µm FPGA RELIABILITY SUMMARY

TOTAL FAILURES: 6

RECALCULATED FROM Q2,97

FAILURE ANALYSIS:

PROD	RUN#	HOURS	CAUSE
1010A	TI29	500	FUNCTIONAL AT VCC>4.5V. ALL NETS SLOW. DAMAGED ISOLATION TRASISTOR OXIDE. NOT ANTIFUSE RELATED. UNIT WAS MARGINAL AT T0.
1010B	TI2072857	144	IDDH FAILURE AT 144 HRS. GATE POLY TO DRAIN

FAILURE ANALYSIS(cont.):

1020A	JF14	417	OPEN METAL I TO METAL II VIA.
1020A	JF37	300	GROSS FUNCTIONAL FAILURE DUE TO SHORTED GATE OXIDE IN THE LOGIC MODULE. UNIT WAS GOOD AT 112 HRS.
1020A	JF42	650	FAILED FUSE SHORTS. CAUSE IS SHORTED ANTIFUSE. UNIT WAS GOOD AT 168 HRS. BLANK PATTERN AT 6V IS MUCH STRONGER STRESS THAN NORMAL APPLICATION.

1280	TI1143649	500	TRISTATE LKG PIN 28. NO CAUSE DETERMINED DUE TO BOND WIRE DAMAGE DURING DECAPSULATION .
1020B*	U9P01	500	FUNTIONAL FAIILURE. DISCOUNTED NO DEFECTS WERE OBSERVED AFTER DECAPSULATION. .

ACTEL 1µm FPGA RELIABILITY SUMMARY

85C/85%TEMPERATURE HUMIDITY BIAS:

				NUMBER OF FAILURES (HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
1010A	E01-1	68 PLCC	79	0	0	-	-
1010A	E02-2	68 PLCC		0	0	-	-
1010A	E03-1	68 PLCC		0	0	-	-
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	80	0	0	0	-
1010B	2072857 2072858 2072860	68 PLCC	201	0	0	0	-
1020A	E-01	84 PLCC	64	0	0	0	-
	E-02	84 PLCC					
	E-03	84 PLCC					
1020A	ADK29	84 PLCC	27	0	0	0	-
	ADC21X	84 PLCC	27	0	0	0	-
	ADA72X	84 PLCC	27	0	0	0	-
1020A	E14	84 PLCC	24	0	0	0	-
	E15	84 PLCC	29	0	0	0	-
	E17	84 PLCC	32	0	0	0	-
1020A	UP-06	100 PQFP	77	0	0	0	-
1020B	JJ-14	84 PLCC	27	0	0	0	-
	JJ-15	84 PLCC	27	0	0	0	-
	JJ-17	84 PLCC	27	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

BIASED HUMIDITY (HAST):

				NUMBER OF FAILURES(HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**	**200**	**240**
1020A	TI1130 TI1139 TI1210	84 PLCC	77	0	0	0	0
1020A	U1P05	100 PQFP	45	0	0	-	-
1020A	U1P41HM	100 PQFP	81	0	0	-	-
1020A	U1P-209B	84-PLCC	15	0	0	-	-
1020B	EBFJ001	84-PLCC	44	0	0	-	-
	EBFI004	84-PLCC	36	0	0	-	-
1020B	U9P01	84-PLCC	29	0	0	-	-
	U9P021A	84-PLCC	50	0	0	-	-
1020B	U9P039	84PLCC	50	0	0	-	-
1020B	U9P046	84PLCC	50	0	0	-	-
1020B	6085878	84PLCC	50	0	0	-	-
1225A	TI6182116 TI6198610	84PLCC	52	0	0	-	-
A1020B	103501	84PLCC	61	-	0		

ACTEL 1µm FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE:

0°C - 125°C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 100	500	1000	2000
1010A	TI15	68 PLCC	125	0	0	0	-
1010A	TI24	68 PLCC	176	0	0	0	-
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0

TEMPERATURE CYCLE:

-40 °C - 125 °C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(CYCLES) 100	500	1000	2000
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0

ACTEL 1µm FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-55 °C - 125 °C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(CYCLES) 100	500	1000
1020B	U9P186 U9P200	68 PLCC	30	0	0	0
1020B	U9G042	PQ100	25	0	0	0

ACTEL 1µm FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-65 °C TO 150 °C

				NUMBER OF FAILURES(CYCLES)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**200**	**500**	**1000**	**2000**
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	201	0	0	0	-
1010B	U1G-01,02	68 PLCC	40	0	0	0	-
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0
1020A	JF-71	100 PQFP	129	0	0	0	-
1020A	E01 E02 E03	84-PLCC	85	0	0	0	-
1020A	S-1702A,B,C	84-PLCC	144	0	0	0	-
1020B	JJ14-17	84-PLCC	81	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

TEMPERATURE CYCLE (cont.):
-65 °C TO 150 °C

				NUMBER OF FAILURES(CYCLES)			
PROD	RUN#	PACKAGE	#UNITS	200	500	1000	2000
1020B	U1P-01,02	84-PLCC	40	0	0	0	-
1020B	EBFJ001	84-PLCC	80	0	0	0	-
1020B	U1P41HM	100 PQFP	80	0	0	0	-
1020B	EWAI003	84-PLCC	80	0	0	0	-
1020B	U1P-209B	84-PLCC	15	0	0	0	-
1020B	U1P05	100 PQFP	80	0	0	0	-
1020B	U9P021A	84-PLCC	55	0	0	0	-
	U9P01		23	0	0	0	-
1020B	U9P039	84-PLCC	50	0	0	0	-
1020B	U9P046	84-PLCC	50	0	0	0	-
1020B	6085878	84-PLCC	50	0	0	0	-
A1225A	TI9039849 TI6182117	84-PLCC	16	0	0	0	-
A1240A	TI0094901 TI0081338 TI0113145	PQ144	36	0	0	0	-
A1020B	103501	84PLCC	62	0	-	0	
A1240A	TI6163513 TI6163521 TI6163522	84-PLCC	40	0	0	0	-

ACTEL 1µm FPGA RELIABILITY SUMMARY

THERMAL SHOCK:

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(CYCLES) 100	200	500	1000
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	77	0	0	0	0
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	45	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	77	0	0	0	0

ACTEL 1µm FPGA RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE):

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(HOURS) 96	168	240	336
1010A	TI15	68 PLCC	77	0	0	0	0
1010A	TI24	68 PLCC	129	0	0	0	0
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	77	0	0	0	0
1010A	E01-1	68 PLCC	30	0	0	0	0
1010A	E02-1	68 PLCC	30	0	0	0	0
1010A	E03-1	68 PLCC	30	0	0	-	2
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	45	0	0	0	-
1010B	U1G-01	68 PLCC	40	0	0	-	-
1020A	TI1800 TI1859 TI2156	84 PLCC	77	0	0	0	-
1020A	E-01	84-PLCC	26	0	0	0	0
	E-02	84-PLCC	28	0	0	0	0
	E-03	84-PLCC	26	0	0	0	0

ACTEL 1µm FPGA RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE) (cont.).:

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(HOURS) 96	168	240	336
1020A	ADK29	84-PLCC	27	0	0	-	-
	ADC21X	84-PLCC	27	0	0	-	-
	ADA72X	84-PLCC	27	0	0	-	-
1020A	JF-207	100 PQFP	80	0	0	-	-
1020A	S-1702A	84-PLCC	25	0	0	0	0
	S-1702B		26	0	0	0	0
	S-1702C		25	0	0	0	0
1020B	JJ14-17	84-PLCC	81	0	0	-	-
1020B	U1P-01	84-PLCC	40	0	0	-	-
1020B	U09039	84-PLCC	50	0	0	-	-
A1240A	TI6133120 TI9089916 TI9052514	PQ144	45	0	0	-	-

FAILURE ANALYSIS (AUTOCLAVE):

PROD	RUN#	HOURS	CAUSE
1010A	E03-1	336	CONTINUITY DUE TO CORRODED PADS
1010A	E03-1	336	CONTINUITY DUE TO CORRODED PADS

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE HUMIDITY BIAS: (85/85)

				NUMBER OF FAILURES (HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**168**	**500**	**1000**	**2000**
1010A	E01-1	68 PLCC	79	0	0		
1010A	E02-2	68 PLCC		0	0		
1010A	E03-1	68 PLCC		0	0		
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	80	0	0	0	-
1010B	2072857 2072858 2072860	68 PLCC	201	0	0	0	- -
1020A	E-01 E-02 E-03	84 PLCC 84 PLCC 84 PLCC	64	0	0	0	
1020A	ADK29	84 PLCC	27	0	0	0	
	ADC21X	84 PLCC	27	0	0	0	
	ADA72X	84 PLCC	27	0	0	0	
1020A	E14	84 PLCC	24	0	0	0	
	E15	84 PLCC	29	0	0	0	
	E17	84 PLCC	32	0	0	0	

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE HUMIDITY BIAS: (cont.)-85/85

				NUMBER OF FAILURES (HOURS)			
PROD	RUN#	PACKAGE	#UNITS	168	500	1000	2000
1020B	JJ-14	84 PLCC	27	0	0	0	
1020B	JJ-15	84 PLCC	27	0	0	0	-
1020B	JJ-17	84 PLCC	27	0	0	0	-

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

BIASED HUMIDITY (HAST):

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES(HOURS) 50	100
1020A	TI1130 TI1139 TI1210	84 PLCC	77	0	0
1020A	U1P-209B	84-PLCC	15	0	0
1020B	EBFJ001	84-PLCC	44	0	0
1020B	EBFI004	84-PLCC	36	0	0
1020B	U9P01	84-PLCC	29	0	0
1020B	U9P021A	84-PLCC	50	0	0
1020B	U9P039	84-PLCC	50	0	0
1020B	U9P046	84-PLCC	50	0	0
1020B	6085878	84-PLCC	50	0	0
1425	JK8,9,10	84-PLCC	81	-	0
1020B	U9P046	84 PLCC	50	-	0
1020B	6085878	84 PLCC	50	-	0
1240A	TI 0094895/6 TI 00113137 TI 0013142	84 PLCC	48	-	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE CYCLE:

0°C - 125°C

				NUMBER OF FAILURES (CYCLES)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**100**	**500**	**1000**	**2000**
1010A	TI15	68 PLCC	125	0	0	0	-
1010A	TI24	68 PLCC	176	0	0	0	-
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-40 °C - 125 °C

				NUMBER OF FAILURES(CYCLES)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**100**	**500**	**1000**	**2000**
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-55 °C - 125 °C

				NUMBER OF FAILURES(CYCLES)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**200**	**500**	**1000**
1020B	U9P186 U9P200	84PLCC	30	0	0	0
1225XL	ACQ-MIX	84PLCC	39	0	0	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-65°C - 150°C

				NUMBER OF FAILURES(CYCLES)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**200**	**500**	**1000**	**2000**
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	129	0	0	0	0
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	201	0	0	0	
1010B	U1G-01,02	68 PLCC	40	0	0	0	
1020A	TI1800 TI1859 TI2156	84 PLCC	129	0	0	0	0
1020A	E01 E02 E03	84-PLCC	85	0	0	0	
1020A	S-1702A,B,C	84-PLCC	144	0	0	0	
1020B	JJ14-17	84-PLCC	81	0	0	0	
1020B	U1P-01,02	84-PLCC	40	0	0	0	
1020B	EBFJ001	84-PLCC	80	0	0	0	
1020B	EWAI003	84-PLCC	80	0	0	0	
1020B	U1P-209B	84-PLCC	15	0	0	0	
1020B	U9P021A	84-PLCC	55	0	0	0	

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

TEMPERATURE CYCLE (CONT.):

-65°C - 150°C

				NUMBER OF FAILURES(CYCLES)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**200**	**500**	**1000**
1020B	U9P01	84-PLCC	23	0	0	0
1020B	U9P039	84PLCC	50	0	0	0
1020B	U9P046	84PLCC	50	0	0	0
1020B	6085878	84PLCC	50	0	0	0
1425	JK8,9,10	84 PLCC	83	0	0	0
1240A	TI 0113140/1 TI 0094898/9 TI 0094889	84PLCC	56	0	0	0
A1240A	TI6163513 TI6163521 TI6163522	84PLCC	40	0	0	0
A1225A	TI9039849 TI6182117	84PLCC	16	0	0	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

THERMAL SHOCK:

				NUMBER OF FAILURES(CYCLES)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**100**	**200**	**500**	**1000**
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	77	0	0	0	0
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	45	0	0	0	0
1020A	TI1800 TI1859 TI2156	84 PLCC	77	0	0	0	0

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE):

				NUMBER OF FAILURES(HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**96**	**168**	**240**	**336**
1010A	TI15	68 PLCC	77	0	0	0	0
1010A	TI24	68 PLCC	129	0	0	0	0
1010A	TI1104 TI1243 TI1263 TI1297	68 PLCC	77	0	0	0	0
1010A	E01-1	68 PLCC	30	0	0	0	0
1010A	E02-1	68 PLCC	30	0	0	0	0
1010A	E03-1	68 PLCC	30	0	0	-	2
1010B	TI2072857 TI2072858 TI2072860	68 PLCC	45	0	0	0	
1010B	U1G-01	68 PLCC	40	0	0	-	-
1020A	TI1800 TI1859 TI2156	84 PLCC	77	0	0	0	-
1020A	E-01 E-02 E-03	84-PLCC 84-PLCC 84-PLCC	26 28 26	0 0 0	0 0 0	0 0 0	0 0 0
1020A	ADK29 ADC21X ADA72X	84-PLCC 84-PLCC 84-PLCC	27 27 27	0 0 0	0 0 0	- - -	

ACTEL PLASTIC LEADED CHIP CARRIES (PLCC) RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE) (cont.):

				NUMBER OF FAILURES(HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**96**	**168**	**240**	**336**
1020A	S-1702A	84-PLCC	25	0	0	0	0
	S-1702B		26	0	0	0	0
	S-1702C		25	0	0	0	0
1020B	JJ14-17	84-PLCC	81	0	0	-	
1020B	U1P-01	84-PLCC	40	0	0	-	
1020B	U9P039	84-PLCC	50	0	0	-	

FAILURE ANALYSIS (AUTOCLAVE):

PROD	**RUN#**	**HOURS**	**CAUSE**
1010A	E03-1	336	CONTINUITY DUE TO CORRODED PADS
1010A	E03-1	336	CONTINUITY DUE TO CORRODED PADS

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

BIASED HUMIDITY (HAST):

				NUMBER OF FAILURES (HOURS)			
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**	**200**	**400**
1020A	U1P05	100 PQFP	45	0	0		
1020A	U1P41HM	100 PQFP	81	0	0		
1280XL	24464430 24381610 24442620	160PQFP	46	-	0		
1425A	ACN32804 ACN30805 ACN33807	100 PQFP	80	-	0		
1425A	UCJ01,2,3	100 PQFP	80	-	0		
1440A	JN05	100 VQFP	45	-	0		
1440A	51940.1	100 VQFP	45	-	0		
1460A	JL04A	208 PQFP	80	-	0		
1460A	WB24279010	208 PQFP	47	-	0		
14100A	24239130	208 RQFP	14	-	0		
	UCLO1	208 RQFP	31	-	0		
1225XL	ACP02187.1	100 PQFP	17	-	0		
1240XL	ACP01117.1 ACN51939.1 ACP212072.2	144 PQFP	31	-	0		
1280XL	ACP19329.1	160 PQFP	76	-	0		

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

BIASED HUMIDITY (HAST): (cont.)

				NUMBER OF FAILURES (HOURS)			
PROD	RUN#	PACKAGE	#UNITS	50	100	200	400
1280XL	ACP33235.1 ACP32219.3	160 PQFP	76	-	0		
3265DX	ACP163684	160 PQFP	40	-	0		
1415	ACP17300	100QFP	50	-	0		
A1425	ACP122761	100PQFP	50	-	0		
1280XL	ACQ01769 ACQ03811 ACQ03814	160 PQFP	40	-	0		
1280XL	ACQ05561 ACQ05564 ACQ05562	160 PQFP	39	-	0		
1460BP	25430540 25430550	208PQFP	52	-	0		
14100BP	26330340	208RQFP	26	-	0		
32140DX	ACP33277.1 ACP55730.1 ACP54023.1	208TEPQFP	76	-	0		
32200DX	26207340	208TEPQFP	26	-	0		

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

BIASED HUMIDITY (HAST-contd)

				NUMBER OF FAILURES (HOURS)	
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**50**	**100**
32200DX	26207340	208PQFP	24	0	0
14100BP	26330340	208RQFP	26	0	0
32200DX	ACQ03818.1	208PQFP	30	-	0
1280XL	26084380	160PQFP	58	-	0

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

TEMPERATURE CYCLE:

-55°C To 125°C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 200	500	1000
32104DX	ACQ07975 ACQ06716	208 TQFP	31	0	0	0
32140DX	ACQ05572 ACQ09703	160TQFP	16	0	0	0
1460A	26410001	208 PQFP	80	0	0	0
1010B	U9G042	100PQFP	25	-	0	0

TEMPERATURE CYCLE (-65°C To 150°C)

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 200	500	1000
1020A	JF-71	100 PQFP	129	0	0	0
1020B	U1P41HM	100 PQFP	80	0	0	0
1020B	U1P05	100 PQFP	80	0	0	0
1280XL	25026540	176 TQFP	17	-	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	-
1280XL	25312500 25312480	160 PQFP 160 PQFP	75	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	75	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	74	0	0	0
1280XL	25312500 25312480	160 PQFP 160 PQFP	76	0	0	0
1425A	UCJ01,2,3	100 PQFP	80	0	0	0
1425A	ACN32804 ACN30805 ACN33807	100 PQFP	80	0	0	0

TEMPERATURE CYCLE: (cont.)

-65°C To 150°C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 200	500	1000
1440A	JN-02	160 PQFP	80	0	0	0
1440A	JN-05	100 VQFP	80	0	0	1
1440A	51940.1	100 VQFP	45	0	0	0
1460A	JL-01	208 PQFP	80	0	0	0
1460A	25364430	208QFP	45	0	0	0
14100A	24239130	208 RQFP	14	-	-	0
	UCLO1	208 RQFP	31	-	-	0
14100A	25371980	208 RQFP	19	0		
	25364960	208 RQFP				
14100A	26026670	208RQFP	26	0	0	0
1225XL	ACP02187.1	100 PQFP	18	-	0	0
1240XL	ACP01117.1	144 PQFP	30	-	0	0
	ACN51939.1					
1280XL	ACP19329.1	160 PQFP	38	0	0	0
	ACP212072.2	160 PQFP	38	0	0	0
1280XL	ACP33235.1	160 PQFP	76	0	0	0
	ACP32219.3					

TEMPERATURE CYCLE: (cont.)

-65°C To 150°C

PROD	RUN#	PACKAGE	#UNITS	NUMBER OF FAILURES (CYCLES) 200	500	1000
3265DX	ACP163684	160 PQFP	45	0	0	0
1440A	51940.1	100 VQFP	45	0	0	0
1415A	ACP212001	100 VQFP	50	0	0	0
1415A	ACP17300	PQ100	50	0	0	0
1460BP	25430540 25430550	208PQFP	52	0	0	0
14100BP	26330340	208RQFP	26	0	0	0
32200DX	26207340	208TEPQFP	26	0	0	0
32140DX	ACP33277.1 ACP55730.1 ACP54023.1	208TEPQFP	76	0	0	0

TEMPERATURE CYCLE: (CONT.)

-65 °C TO 150 °C):

PROD	RUN#	PACKAGE	#UNITS	200	500	1000
32140DX	26231860	208PQFP	40	0	0	0
32140DX	26145020	208PQFP	40	0	0	0
1460BP	26232850	208PQFP	40	0	-	-
32410DX	26272490	208 PQFP	38	0	-	-
32410DX	26026660	208 PQFP	52	0	0	0
32200DX	26207340	208 PQFP	48	0	0	0
32410DX	26073180	208 PQFP	39	0	0	0
32410DX	26090100	208 PQFP	26	0	0	0
1460BP	26465100	208PQFP	59	0	0	0
32300DX	ACQ09705.1	204RQFP	25	0	0	0
32140DX	266026660	208PQFP	35	0	0	0
32140DX	266026660A	208PQFP	78	0	0	-

FAILURE ANALYSIS: (TEMP CYCLE)

PROD	RUN#	CYCLES	CAUSE
1440A	JN-05	1000	No obvious defects were observed after decapsulation

ACTEL PLASTIC QUAD FLAT PACKS(QFP)RELIABILITY SUMMARY

PRESSURE POT (UNBIASED AUTOCLAVE):

				NUMBER OF FAILURES (HOURS)		
PROD	**RUN#**	**PACKAGE**	**#UNITS**	**48**	**96**	**168**
1020A	JF-207	100 PQFP	80	0	0	-
1280XL	25312480.1 25312500 25312480.2	176TQ	45	0	0	0
14100BP	26330340	208RQFP	26	0	0	0