



ATMEL CORPORATION

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ATF1500/1500A/1500B CPLD RELIABILITY DATA\*

- 150°C RETENTION BAKE (PLASTIC)
- 200°C RETENTION BAKE
- 125°C DYNAMIC OPERATING LIFE TEST (PLASTIC)
- 15 PSIG PRESSURE POT
- EXTENDED TEMPERATURE CYCLING
- EXTENDED THERMAL SHOCK
- 131°C/85% RELATIVE HUMIDITY HAST TEST

JULY 2003

2325 Orchard Parkway San Jose CA. 95131

ATF1500/1500A/1500B

200°C RETENTION BAKE

<u>LOT</u> <u>NUMBER</u>	<u>DATE</u> <u>CODE</u>	<u>SAMPLE</u> <u>SIZE</u>	<u>HOURS TO FAILURES</u>		
			<u>168</u>	<u>500</u>	<u>1000</u>
5C0694	5C9545	49	0	0	0
6C1980-A	6C9703	50	0	0	0

FAILURE RATETOTAL DEVICE HOURS

57,400 DEVICE HOURS

BEST ESTIMATE $\lambda = 1.2\%$  PER 1000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda = 0.004\%$  PER 1,000 HOURS (41 FITS)CONFIDENCE ESTIMATE
 $\lambda$  60 = 0.005% PER 1000 HOURS  
60% CONFIDENCE (54 FITS)  
 $\lambda$  90 = 0.013% PER 1000 HOURS  
90% CONFIDENCE (136 FITS)

ATF1500/1500A/1500B

PLASTIC PACKAGE

125°C DYNAMIC OPERATING LIFE TEST

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>SAMPLE SIZE</u>	<u>TOTAL CKT-HRS (K)</u>	<u>NUMBER OF FAILURES</u>			
				<u>48</u>	<u>168</u>	<u>500</u>	<u>1000</u>
5B0686	5B9533	124	124.0	0	0	0	0
5C0694	5C9547	115	115.0	0	0	0	0
5C0695	5C9552	80	80.0	0	0	0	0
6C1778	6C9704	120	120.0	0	0	0	0
6C1980J	6C9649	119	119.0	0	0	0	0
8D1581A-1	8D9908	300	300.0	0	0	0	0
7D1986-2	7D9822	99	99.0	0	0	0	0
8B0446-1	8B9841	100	100.0	0	0	0	0
9B0425-1	9B9929	150	150.0	0	0	0	0
9C2142	9C9942	199	199.0	0	0	0	0

FAILURE RATETOTAL DEVICE HOURS

1,306,000 DEVICE HOURS

BEST ESTIMATE $\lambda = 0.05\%$  PER 1000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF 0.5eV $\lambda = 0.002\%$  PER 1,000 HOURS (18 FITS)CONFIDENCE ESTIMATE
 $\lambda$  60 = 0.003% PER 1000 HOURS  
60% CONFIDENCE (27 FITS)  
 $\lambda$  90 = 0.006% PER 1000 HOURS  
90% CONFIDENCE (60 FITS)

ATF1500/1500A/1500B

PLASTIC PACKAGE

PRESSURE POT TEST

<u>DATE</u> <u>CODE</u>	<u>PKG</u> <u>TYPE</u>	<u>SAMPLE</u> <u>SIZE</u>	<u>NUMBER OF FAILURES</u> <u>AT INDICATED HOURS</u>			
			(24)	(48)	(72)	(96)
5C9552	44 PLCC	89	0	0	0	0
9C9942	44 PLCC	50	0	0	0	0
2G0229	84 PLCC	50	0	0	0	0

ATF1500/1500A/1500B

PLASTIC PACKAGE

EXTENDED TEMPERATURE CYCLING

-65°C to +150°C PLCC/TSOP/SOIC/PDIP  
-55°C to +125°C CBGA

<u>DATE</u> <u>CODE</u>	<u>PKG</u> <u>TYPE</u>	<u>SAMPLE</u> <u>SIZE</u>	<u>NUMBER</u> <u>OF CYCLES</u>	<u>NUMBER</u> <u>OF FAILURES</u>
5C9523	44 PLCC	45	1000	0
7D9734	44 PLCC	50	1000	0
8B9841	44 PLCC	50	1000	0

ATF1500/1500A/1500B

PLASTIC PACKAGE

EXTENDED THERMAL SHOCK

-55°C TO +125°C

<u>DATE CODE</u>	<u>PACKAGE TYPE</u>	<u>SAMPLE SIZE</u>	<u>NUMBER OF CYCLES</u>	<u>NUMBER OF FAILURES</u>
5C0695	44 PLCC	45	1000	0

ATF1500/1500A/1500B

PLASTIC PACKAGE

150°C RETENTION BAKE

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>SAMPLE SIZE</u>	<u>HOURS TO FAILURES</u>		
			<u>168</u>	<u>500</u>	<u>1000</u>
6C1980	6C9703	50	0	0	0
8D1581A-1	8D9908	300	0	0	0
7D1986-2	7D9822	50	0	0	0
9C2142	9C9942	50	0	0	0

FAILURE RATETOTAL DEVICE HOURS

450,000 DEVICE HOURS

BEST ESTIMATE $\lambda$  = 0.2% PER 1000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda$  = 0.003% PER 1,000 HOURS (28 FITS)CONFIDENCE ESTIMATE $\lambda$  60 = 0.004% PER 1000 HOURS  
60% CONFIDENCE (38 FITS) $\lambda$  90 = 0.009% PER 1000 HOURS  
90% CONFIDENCE (94 FITS)

ATF1500/1500A/1500B

PLASTIC PACKAGE

131°C/85% RELATIVE HUMIDITY HAST TEST

<u>DATE CODE</u>	<u>PACKAGE TYPE</u>	<u>SAMPLE SIZE</u>	<u>NUMBER OF HOURS</u>	<u>NUMBER OF FAILURES</u>
7D9822	44 PLCC	50	100	0
8D9841	44 PLCC	50	100	0