



AT-27C4096 EPROM RELIABILITY DATA

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

\* This report was generated from AT-27C4096 reliability testing.  
This data is applicable to the following device types due to same  
technology grouping as defined in MIL-M-38535 Appendix A:

AT-27C040

AT-27C010

JULY 2005

2325 Orchard Parkway San Jose CA.95131

AT-27C4096

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>
3D1818A-5	3D9407	77	77.0	0
4D2397	4D9529	160	400.0	0

FAILURE RATETOTAL DEVICE HOURS

477,000 DEVICE HOURS

BEST ESTIMATE $\lambda$  = 0.15% PER 1000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda$  = 0.005% PER 1,000 HOURS (48 FITS)CONFIDENCE ESTIMATE $\lambda$  60 = 0.006% PER 1000 HOURS  
60% CONFIDENCE (64 FITS) $\lambda$  90 = 0.016% PER 1000 HOURS  
90% CONFIDENCE (158 FITS)

AT-27C4096

200°C DATA RETENTION BAKE

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>SAMPLE SIZE</u>	<u>TOTAL CKT-HRS (K)</u>	<u>NUMBER OF FAILURES</u>
3D1818A-5	3D9407	76	76.0	0

FAILURE RATETOTAL DEVICE HOURS

76,000 DEVICE HOURS

BEST ESTIMATE $\lambda = 0.9\%$  PER 1,000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda = 0.003\%$  PER 1,000 HOURS (31 FITS)CONFIDENCE ESTIMATE $\lambda = 60 = 0.004\%$  PER 1,000 HOURS  
60% CONFIDENCE (41 FITS) $\lambda = 90 = 0.01\%$  PER 1,000 HOURS  
90% CONFIDENCE (102 FITS)

AT-27C4096

PLASTIC PACKAGE

125°C DYNAMIC OPERATING LIFE TEST

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>PKG</u>	<u>SAMPLE SIZE</u>	<u>TOTAL CKT-HRS(K)</u>	<u>NUMBER OF FAILURES</u>
5C2674	5C9547	44 PLCC	79	79.0	0
6A2456	6A9627	44 PLCC	80	80.0	0
6A2456-7	6A9627	40 PDIP	76	76.0	0
6A2456-5	6A9627	40 VSOP	44	44.0	0
6B3453	6B9635	40 VSOP	205	250.0	0
6F3914-1	6F9650	44 PLCC	112	112.0	0
6F3914	6F9650	44 PLCC	224	224.0	0
7D3120AC	7D9818	44 PLCC	100	100.0	0
7G4436	7G9737	44 PLCC	250	250.0	0
1B2602	1B0131	44 PLCC	250	250.0	0
2E2335	2E0216	44 PLCC	249	249.0	0
2J2362	2J0301	40 PDIP	250	250.0	0
5F0745-1	5F0514	44 PLCC	100	100.0	0

FAILURE RATETOTAL DEVICE HOURS

2,164,000 DEVICE HOURS

BEST ESTIMATE $\lambda = 0.03\%$  PER 1,000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda = 0.001\%$  PER 1,000 HOURS (11 FITS)CONFIDENCE ESTIMATE $\lambda = 0.001\%$  PER 1,000 HOURS  
60% CONFIDENCE (13 FITS) $\lambda = 0.4\%$  PER 1,000 HOURS  
90% CONFIDENCE (36 FITS)

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PLASTIC PACKAGE

150°C RETENTION BAKE

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>SAMPLE SIZE</u>	<u>HOURS TO FAILURE</u>			
			<u>24</u>	<u>168</u>	<u>500</u>	<u>1,000</u>
5B2470	5B9538	314	0	0	0	0
5C2674	5C9547	88	0	0	0	0
6F2434	6F9633	520	0	0	0	0
6F1678	6F9633	510	0	0	0	0
6F2295	6F9634	964	0	0	0	0
6F2298	6F9635	1070	0	0	0	0
6B2967	6B9635	269	0	0	0	0
6F3914	6F9650	380	0	0	0	0
7H0950	7H9735	200	0	0	0	0
7D3120	7D9818	100	0	0	0	0
7G4436	7G9737	250	0	0	0	0
7G4429	7G9743	100	0	0	0	0
8E4897	8E9913	500	0	0	0	0
1B2602	1B0131	250	0	0	0	0
2E2335	2E0216	500	0	0	0	0
2J2362	2J0301	499	0	0	0	0
3H4964	3H0346	500	0	0	0	0
3J0708	3J0350	50	0	0	0	0
4E7186	4E0421	250	0	0	0	0
5F0745-1	5F0514	50	0	0	0	0

FAILURE RATETOTAL DEVICE HOURS

7,364,000 DEVICE HOURS

BEST ESTIMATE $\lambda = 0.01\%$  PER 1,000 HOURS50°C AMBIENTEXTRAPOLATION TO 50°C VIA ARRHENNIUS  
EQUATION AND ACTIVATION ENERGY OF  
0.5eV $\lambda = 0.0001\%$  PER 1,000 HOURS (1 FITS)CONFIDENCE ESTIMATE $\lambda = 60 = 0.0002\%$  PER 1,000 HOURS  
60% CONFIDENCE (2 FITS) $\lambda = 90 = 0.0005\%$  PER 1,000 HOURS  
90% CONFIDENCE (5 FITS)

AT-27C4096

PLASTIC PACKAGE

PRESSURE POT TEST

<u>DATE CODE</u>	<u>PACKAGE TYPE</u>	<u>SAMPLE SIZE</u>	<u>NUMBER OF FAILURE AT INDICATED HOURS</u>			
			(24)	(48)	(72)	(96)
5C9547	44 PLCC	77	0	0	0	0
6F9631	40 VSOP	45	0	0	0	0
6B9635	40 VSOP	100	0	0	0	0
7H9734	44 PLCC	154	0	0	0	0
7D9818	44 PLCC	50	0	0	0	0
7G9737	44 PLCC	100	0	0	0	0
7G9743	44 PLCC	50	0	0	0	0
8E9913	44 PLCC	100	0	0	0	0
1B0131	44 PLCC	100	0	0	0	0
2E0216	44 PLCC	99	0	0	0	0
3H0346	44 PLCC	100	0	0	0	0
3J0350	40 PDIP	50	0	0	0	0
4E0421	44 PLCC	100	0	0	0	0

Date: May 5, 1994  
Subject: AT27C4096 (18709A Latchup Data)  
From: T. Pearce  
To: G. Korsh, E. Hui, C. Lionbarger  
Copy: M. Wong, H. Nguyen, LY. Lee

Three packaged units of the AT27C4096 (18709A Stepping) from lot 4D1705 were tested for latchup. A curve tracer was used to force current into each pin and observe the latchup trigger current and voltage. A 9 ohm resistor was connected in parallel across the Vcc power supply to allow current to be forced out of the Vcc pin during testing. A separate ammeter was connected in series with the Vcc power supply to verify when latchup occurred.

The results are show in page 2 an indicate that the new AT27C4096 (18709A) is quite immune to latchup under normal operating conditions (Vcc=4.5v to 5.5v room temperature). Inputs can sustain -3.3v with respect to ground and no latchup is observed. No latchup is observed for possitive input voltages up to 18v where destructive junction breakdown occurs. Outputs can sustain 11.0v and -3.3v with respect to ground and no latchup is observed.

## AT27C4096 (18709A) Latchup Trigger Current and Voltages

<u>Pin</u>	<u>Function</u>	<u>-V (v)</u>	<u>-I (mA)</u>	<u>+V (v)</u>	<u>+I (mA)</u>
1	VPP	3.5	>600	>14	
2	CE	5.1	>600	>14	
3	O15	3.3	>600	11.0	>600
4	O14	3.4	>600	11.0	>600
5	O13	3.6	>600	11.0	>600
6	O12	3.7	>600	11.2	>600
7	O11	3.9	>600	11.3	>600
8	O10	3.8	>600	11.7	>600
9	O9	3.8	>600	11.6	>600
10	O8	3.8	>600	12.1	>600
11	GND				
12	O7	3.8	>600	12.6	>600
13	O6	3.9	>600	12.7	>600
14	O5	3.9	>600	13.1	>600
15	O4	3.9	>600	13.2	>600
16	O3	3.8	>600	13.2	>600
17	O2	3.6	>600	13.4	>600
18	O1	3.5	>600	13.9	>600
19	O0	3.3	>600	14.0	>600
20	OE	4.8	>600	>14	
21	AE	4.6	>600	>14	
22	A1	4.5	>600	>14	
23	A2	4.4	>600	>14	
24	A3	4.3	>600	>14	
25	A4	4.2	>600	>14	
26	A5	3.9	>600	>14	
27	A6	3.7	>600	>14	
28	A7	3.6	>600	>14	
29	A8	3.4	>600	>14	
30	GND				
31	A9	3.5	>600	>14	
32	A10	3.6	>600	>14	
33	A11	3.8	>600	>14	
34	A12	4.0	>600	>14	
35	A13	4.2	>600	>14	
36	A14	4.3	>600	>14	
37	A15	4.3	>600	>14	
38	A16	4.3	>600	>14	
39	A17	4.3	>600	>14	
40	VCC				



AT-27C4096

PLASTIC PACKAGE

EXTENDED TEMPERATURE CYCLING

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

<u>DATE CODE</u>	<u>PKG TYPE</u>	<u>SAMPLE SIZE</u>	<u>NUMBER OF CYCLES</u>	<u>NUMBER OF FAILURES</u>
6B9631	40 PDIP	88	1000	0
6B9635	40 VSOP	200	1000	0
6F9631	40 PDIP	100	1000	0
7H9734	44 PLCC	77	1000	0
7D9818	44 PLCC	50	1000	0
7G9737	44 PLCC	100	1000	0
8E9913	44 PLCC	100	1000	0
3G0346	44 PLCC	100	1000	0
3J0350	40 PDIP	50	1000	0
4E0421	40 PLCC	100	1000	0
5F0514	44 PLCC	50	1000	0

AT-27C4096

PLASTIC PACKAGE

EXTENDED THERMAL SHOCK

-55°C TO +125°C

<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>
6B9635	40 VSOP	200	1000	0
7H9734	44 PLCC	77	1000	0

AT-27C4096

PLASTIC PACKAGE

85°C/85% RELATIVE HUMIDITY OPERATING LIFE TEST

<u>LOT NUMBER</u>	<u>DATE CODE</u>	<u>PKG TYPE</u>	<u>SAMPLE SIZE</u>	<u>NUMBER OF FAILURES AT INDICATED HOURS</u>		
				(168)	(500)	(1000)
6A2456	6A9627	44 PLCC	45	0	0	0
7H0950	7H9807	44 PLCC	54	0	0	0