

# N4000-12

## Application Bulletin- CAF Testing

# CAF Test Results for N4000-12

July 6, 2004

### Scope

This bulletin describes the testing process; test vehicles and test results for the Electromigration Resistance Test (CAF) performed on N4000-12 coupons. Coupons manufactured according to a Sun Microsystems design for Nelco.

### Requirements

CAF resistance test performed per IPC-TM-650 specification 2.6.25 (Exception of 85°C applied instead of specified 65°C).

### Method

Sample size: 25 coupons of each A1, A2, A3, A4 and B1, B2, B3, B4.

Wire the CAF coupons per Sun Microsystem Test Vehicle #1, CAF TV1 6/15/00.

Place the terminated coupons in the chamber. Rout wires through to the outside of the chamber.

Close the chamber and allow the coupons to stabilize for 96 hours @ 85°C ± 1°C and 85% ± 1 RH. No voltage.

After a 96-hour stabilization period the initial insulation resistance measurements shall be made using 100V DC. Record resistance measurements (IR<sub>initial</sub>).

Connect the samples to a power supply with a 1MΩ current limiting resistor in-circuit, and supply 100V DC for the duration of the test.

Every 125 hours disconnect the power supply and repeat resistance measurements while still in chamber. Record as (IR<sub>final</sub>)

Reconnect power supply and repeat until a minimum of 500 hours of test is completed.

A passing coupon shall be determined according to the following formula.

$$Pass = \log IR_{initial} - \log IR_{final} \geq 1$$

## Results

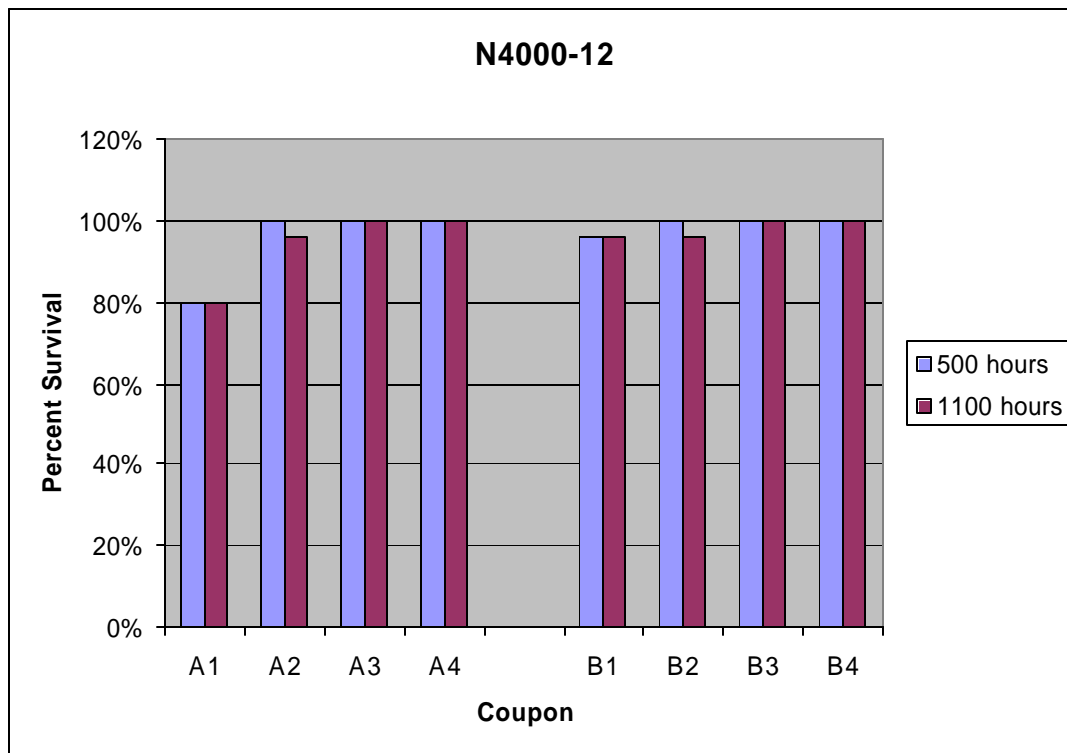
Weibull analysis indicate an 86% survival rate at 500 hours for the A1 section of the coupon. A2 through A4 passed 100% to 1104 hours.

B1 had one failure at 384 hours. B2 – B4 had no failures to 1104 hours.

Due to the extremely low failure rate only the A1 coupon was statistically analyzed.

The following chart and graph is a count of the number of coupons that survived vs. the number of coupons tested.

<i>Section</i>	<i>% Surviving 500 hours</i>	<i>% Surviving 1104 hours</i>
A1	80%	80%
A2	100%	96%
A3	100%	100%
A4	100%	100%
B1	96%	96%
B2	100%	96%
B3	100%	100%
B4	100%	100%



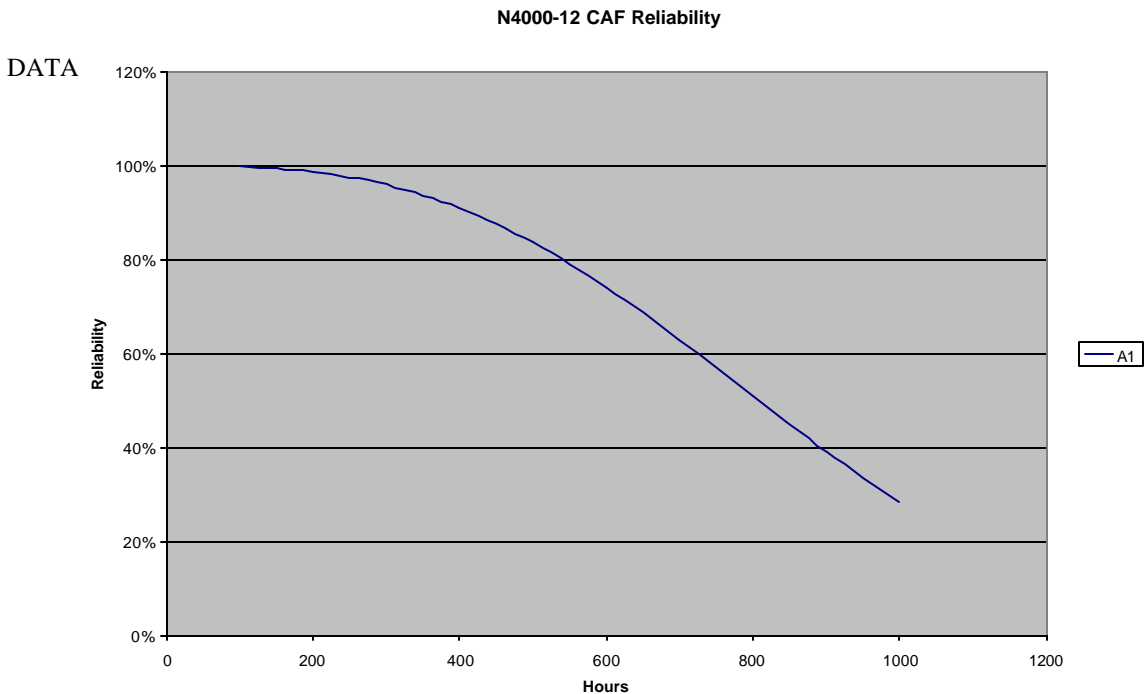
## Statistics for A1 section

Beta (or Shape Parameter)= 2.270948845  
 Alpha (or Characteristic Life)= 1134.316242

A1 HOURS	CDF	A1 RELIABILITY
100	0.004016789	100%
200	0.019238226	98%
300	0.047612455	95%
400	0.089495312	91%
500	0.144119442	86%
600	0.209782979	79%
700	0.284045714	72%
800	0.363967425	64%
900	0.446378359	55%
1000	0.528155851	47%

Reliability	Hours
0.01	2,222
0.1	1,638
0.5	965
0.9	421
0.99	150

## Weibull Plot for A1 COUPON Section:



Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04 ~+24 hr recovery
Hours	Ambient	96	240	384	456	600	744	888	1104	
	100 Vdc									
<b>ID</b>	<b>N4000-12 sample coupon # 1</b>									
<b>A1</b>	4.E+11	1.E+11	9.E+10	6.E+10	3.E+10	1.E+10	4.E+10	2.E+10	1.E+10	2.E+11
<b>A2</b>	4.E+11	5.E+10	1.E+11	1.E+11	5.E+10	4.E+10	4.E+10	2.E+10	3.E+10	1.E+12
<b>A3</b>	4.E+11	6.E+10	1.E+11	1.E+11	5.E+10	3.E+10	8.E+10	1.E+10	3.E+10	1.E+12
<b>A4</b>	4.E+11	4.E+10	2.E+11	1.E+11	7.E+10	8.E+10	8.E+10	4.E+10	4.E+10	5.E+11
<b>B1</b>	1.E+11	4.E+10	7.E+10	6.E+10	7.E+10	6.E+10	7.E+10	6.E+10	3.E+10	3.E+11
<b>B2</b>	1.E+11	6.E+10	1.E+11	7.E+10	6.E+10	3.E+10	4.E+10	4.E+10	3.E+10	3.E+11
<b>B3</b>	1.E+11	5.E+10	1.E+11	9.E+10	8.E+10	4.E+10	5.E+10	3.E+10	3.E+10	3.E+11
<b>B4</b>	3.E+11	4.E+10	1.E+11	1.E+11	7.E+10	8.E+10	3.E+10	6.E+10	2.E+10	5.E+11
<b>ID</b>	<b>N4000-12 sample coupon # 2</b>									
<b>A1</b>	8.E+11	9.E+08	4.E+10	5.E+10	6.E+10	3.E+10	5.E+10	3.E+10	3.E+10	2.E+11
<b>A2</b>	8.E+11	3.E+09	1.E+11	7.E+10	9.E+10	6.E+10	6.E+10	4.E+10	2.E+10	2.E+11
<b>A3</b>	8.E+11	2.E+10	1.E+11	1.E+11	1.E+11	6.E+10	6.E+10	4.E+10	4.E+10	4.E+11
<b>A4</b>	7.E+11	5.E+10	9.E+10	1.E+11	6.E+10	3.E+11	9.E+10	4.E+10	3.E+10	1.E+12
<b>B1</b>	8.E+11	2.E+11	1.E+11	8.E+10	7.E+10	7.E+10	7.E+10	3.E+10	7.E+10	3.E+11
<b>B2</b>	8.E+11	1.E+11	5.E+10	8.E+10	1.E+11	8.E+10	4.E+10	4.E+10	5.E+10	2.E+11
<b>B3</b>	2.E+12	2.E+11	1.E+11	1.E+11	1.E+11	7.E+10	6.E+10	4.E+10	4.E+10	1.E+11
<b>B4</b>	1.E+12	7.E+10	1.E+11	1.E+11	8.E+10	5.E+10	6.E+10	3.E+10	3.E+10	1.E+12
<b>ID</b>	<b>N4000-12 sample coupon # 3</b>									
<b>A1</b>	8.E+11	3.E+10	6.E+10	2.E+11	1.E+11	9.E+10	5.E+10	6.E+10	4.E+10	3.E+11
<b>A2</b>	7.E+11	7.E+08	2.E+10	4.E+10	3.E+10	4.E+10	1.E+11	5.E+10	4.E+10	1.E+11
<b>A3</b>	1.E+12	3.E+09	8.E+10	5.E+10	7.E+10	8.E+10	7.E+10	2.E+10	6.E+10	5.E+11
<b>A4</b>	1.E+12	6.E+09	1.E+11	8.E+10	8.E+10	5.E+10	1.E+11	1.E+11	2.E+10	2.E+11
<b>B1</b>	4.E+12	6.E+09	6.E+10	8.E+10	8.E+10	6.E+10	3.E+10	4.E+10	5.E+10	7.E+11
<b>B2</b>	4.E+12	1.E+10	3.E+10	5.E+10	1.E+11	5.E+10	3.E+10	1.E+11	1.E+10	1.E+11
<b>B3</b>	5.E+12	1.E+11	1.E+11	8.E+10	1.E+11	7.E+10	5.E+10	4.E+10	2.E+10	1.E+11
<b>B4</b>	4.E+12	1.E+11	1.E+11	7.E+10	1.E+11	6.E+10	7.E+10	4.E+10	2.E+10	1.E+11
<b>ID</b>	<b>N4000-12 sample coupon # 4</b>									
<b>A1</b>	7.E+11	2.E+10	1.E+11	1.E+11	1.E+11	5.E+10	6.E+10	5.E+10	4.E+10	2.E+11
<b>A2</b>	7.E+11	1.E+09	1.E+11	1.E+11	8.E+10	8.E+10	6.E+10	6.E+10	3.E+10	2.E+11
<b>A3</b>	8.E+11	6.E+10	2.E+11	1.E+11	2.E+11	8.E+10	7.E+10	5.E+10	4.E+10	3.E+11
<b>A4</b>	8.E+11	5.E+10	2.E+11	1.E+11	2.E+11	9.E+10	8.E+10	7.E+10	8.E+10	2.E+11
<b>B1</b>	1.E+12	2.E+10	1.E+11	7.E+10	1.E+11	5.E+10	6.E+10	5.E+10	3.E+10	5.E+11
<b>B2</b>	8.E+11	1.E+10	7.E+10	6.E+10	1.E+11	6.E+10	6.E+10	5.E+10	3.E+10	2.E+11
<b>B3</b>	8.E+11	2.E+10	1.E+11	1.E+11	2.E+11	5.E+10	8.E+10	5.E+10	5.E+10	3.E+11
<b>B4</b>	8.E+11	2.E+10	1.E+11	1.E+11	2.E+11	7.E+10	9.E+10	7.E+10	4.E+10	3.E+11

Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04
Hours	Ambient	96	240	384	456	600	744	888	1104	~+24 hr recovery
		100 Vdc								
<b>ID</b>	<b>N4000-12 sample coupon # 5</b>									
<b>A1</b>	8.E+11	2.E+10	8.E+10	5.E+10	6.E+10	6.E+10	6.E+10	3.E+10	3.E+10	5.E+11
<b>A2</b>	8.E+11	4.E+10	1.E+11	6.E+10	8.E+10	5.E+10	4.E+10	2.E+10	4.E+10	2.E+11
<b>A3</b>	7.E+11	1.E+10	1.E+11	8.E+10	9.E+10	4.E+10	6.E+10	4.E+10	4.E+10	3.E+11
<b>A4</b>	6.E+11	1.E+11	8.E+10	5.E+10	1.E+11	4.E+10	3.E+10	3.E+10	3.E+10	2.E+11
<b>B1</b>	8.E+11	3.E+10	7.E+10	4.E+10	5.E+10	4.E+10	4.E+10	3.E+10	8.E+10	2.E+11
<b>B2</b>	7.E+11	2.E+10	7.E+10	4.E+10	4.E+10	3.E+10	4.E+10	3.E+10	5.E+10	2.E+11
<b>B3</b>	8.E+11	2.E+09	1.E+11	9.E+10	7.E+10	9.E+10	5.E+10	3.E+10	1.E+11	4.E+11
<b>B4</b>	7.E+11	2.E+10	1.E+11	8.E+10	6.E+10	5.E+10	5.E+10	3.E+10	1.E+11	2.E+11
<b>ID</b>	<b>N4000-12 sample coupon # 6</b>									
<b>A1</b>	7.E+11	8.E+09	1.E+11	8.E+10	1.E+11	8.E+10	1.E+11	6.E+10	3.E+10	4.E+11
<b>A2</b>	8.E+11	6.E+10	1.E+11	1.E+11	1.E+11	7.E+10	1.E+11	6.E+10	4.E+10	3.E+11
<b>A3</b>	9.E+11	2.E+10	1.E+11	2.E+11	2.E+11	1.E+11	8.E+10	6.E+10	8.E+10	2.E+11
<b>A4</b>	8.E+11	5.E+10	2.E+11	1.E+11	1.E+11	1.E+11	1.E+11	6.E+10	4.E+10	2.E+11
<b>B1</b>	1.E+12	2.E+10	1.E+11	1.E+11	1.E+11	5.E+10	6.E+10	6.E+10	4.E+10	2.E+11
<b>B2</b>	7.E+11	2.E+10	7.E+10	6.E+10	1.E+11	1.E+11	5.E+10	5.E+10	4.E+10	2.E+11
<b>B3</b>	8.E+11	3.E+10	1.E+11	7.E+10	1.E+11	5.E+10	6.E+10	5.E+10	4.E+10	4.E+12
<b>B4</b>	7.E+11	2.E+10	2.E+11	7.E+10	1.E+11	8.E+10	7.E+10	5.E+10	3.E+10	1.E+12
<b>ID</b>	<b>N4000-12 sample coupon # 7</b>									
<b>A1</b>	8.E+11	7.E+09	4.E+10	5.E+10	4.E+10	5.E+10	4.E+10	2.E+10	3.E+10	4.E+11
<b>A2</b>	7.E+11	4.E+08	1.E+11	1.E+11	8.E+10	1.E+11	7.E+10	4.E+10	3.E+10	4.E+11
<b>A3</b>	7.E+11	2.E+11	2.E+11	1.E+11	1.E+11	7.E+10	1.E+11	7.E+10	6.E+10	5.E+11
<b>A4</b>	7.E+11	2.E+11	3.E+11	1.E+11	6.E+10	2.E+11	7.E+10	6.E+10	5.E+10	4.E+11
<b>B1</b>	1.E+12	4.E+09	5.E+10	1.E+08	5.E+10	4.E+10	5.E+10	3.E+10	4.E+10	1.E+11
<b>B2</b>	1.E+12	6.E+09	9.E+10	9.E+10	1.E+11	3.E+10	5.E+10	3.E+10	5.E+10	2.E+11
<b>B3</b>	8.E+11	7.E+09	5.E+10	5.E+10	6.E+10	5.E+10	6.E+10	5.E+10	4.E+10	4.E+11
<b>B4</b>	7.E+11	3.E+09	1.E+11	1.E+11	1.E+11	7.E+10	6.E+10	5.E+10	4.E+10	1.E+11
<b>ID</b>	<b>N4000-12 sample coupon # 8</b>									
<b>A1</b>	8.E+11	6.E+09	7.E+10	6.E+10	1.E+11	5.E+10	2.E+10	2.E+10	3.E+10	3.E+11
<b>A2</b>	7.E+11	7.E+10	3.E+11	8.E+10	1.E+11	7.E+10	6.E+10	4.E+10	4.E+10	2.E+11
<b>A3</b>	8.E+11	2.E+10	1.E+11	1.E+11	1.E+11	5.E+10	6.E+10	5.E+10	4.E+10	2.E+11
<b>A4</b>	7.E+11	8.E+09	6.E+11	1.E+11	1.E+11	1.E+11	6.E+10	6.E+10	5.E+10	3.E+11
<b>B1</b>	1.E+12	1.E+11	1.E+11	8.E+10	1.E+11	2.E+10	6.E+10	3.E+10	4.E+10	9.E+10
<b>B2</b>	4.E+11	1.E+11	1.E+11	1.E+11	1.E+11	6.E+10	5.E+10	5.E+10	4.E+10	3.E+11
<b>B3</b>	7.E+11	1.E+11	2.E+11	8.E+10	9.E+10	8.E+10	6.E+10	3.E+10	4.E+10	2.E+11
<b>B4</b>	7.E+11	7.E+10	3.E+11	8.E+10	1.E+11	7.E+10	5.E+10	4.E+10	4.E+10	4.E+11

Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04
Hours	Ambient	96	240	384	456	600	744	888	1104	~+24 hr recovery
		100 Vdc								
<b>ID</b>	<b>N4000-12 sample coupon #9</b>									
<b>A1</b>	8.E+11	3.E+07	1.E+10	6.E+10	3.E+10	4.E+09	1.E+09	1.E+09	<b>8.E+08</b>	5.E+10
<b>A2</b>	7.E+11	2.E+10	2.E+11	1.E+11	9.E+10	6.E+10	2.E+11	5.E+10	3.E+10	2.E+11
<b>A3</b>	1.E+12	1.E+11	1.E+11	8.E+10	1.E+11	5.E+10	8.E+10	4.E+10	3.E+10	1.E+11
<b>A4</b>	4.E+11	2.E+09	1.E+11	8.E+10	7.E+10	5.E+10	6.E+10	4.E+10	4.E+10	4.E+11
<b>B1</b>	1.E+12	2.E+10	2.E+11	9.E+10	1.E+11	6.E+10	7.E+10	6.E+10	4.E+10	2.E+11
<b>B2</b>	1.E+12	8.E+10	1.E+11	1.E+11	1.E+11	1.E+11	7.E+10	5.E+10	7.E+10	1.E+12
<b>B3</b>	8.E+11	5.E+10	1.E+11	9.E+10	1.E+11	1.E+11	7.E+10	6.E+10	5.E+10	4.E+11
<b>B4</b>	5.E+11	2.E+10	1.E+11	6.E+10	8.E+10	5.E+10	7.E+10	4.E+10	4.E+10	5.E+11
<b>ID</b>	<b>N4000-12 sample coupon #10</b>									
<b>A1</b>	7.E+11	2.E+09	2.E+10	2.E+10	6.E+08	2.E+10	9.E+09	3.E+09	1.E+09	1.E+12
<b>A2</b>	1.E+12	3.E+09	7.E+10	4.E+10	5.E+10	3.E+10	2.E+10	2.E+10	2.E+10	1.E+12
<b>A3</b>	8.E+11	1.E+10	1.E+11	7.E+10	9.E+10	5.E+10	6.E+10	4.E+10	4.E+10	3.E+11
<b>A4</b>	3.E+12	3.E+09	8.E+10	4.E+10	4.E+10	4.E+10	4.E+10	3.E+10	2.E+10	2.E+11
<b>B1</b>	1.E+11	1.E+10	8.E+10	3.E+10	5.E+10	3.E+10	3.E+10	2.E+10	2.E+10	7.E+11
<b>B2</b>	1.E+11	2.E+10	5.E+10	3.E+10	4.E+10	3.E+10	3.E+10	2.E+10	2.E+10	2.E+11
<b>B3</b>	4.E+11	4.E+10	9.E+10	4.E+10	7.E+10	5.E+10	4.E+10	2.E+10	2.E+10	2.E+11
<b>B4</b>	3.E+11	1.E+10	5.E+10	4.E+10	6.E+10	3.E+10	3.E+10	2.E+10	2.E+10	2.E+11
<b>ID</b>	<b>N4000-12 sample coupon #11</b>									
<b>A1</b>	1.E+12	1.E+10	8.E+10	6.E+10	6.E+10	5.E+10	3.E+10	3.E+10	2.E+10	2.E+11
<b>A2</b>	7.E+11	5.E+10	1.E+11	5.E+10	5.E+10	4.E+10	5.E+10	2.E+10	2.E+10	6.E+11
<b>A3</b>	1.E+12	4.E+10	1.E+11	5.E+10	5.E+10	4.E+10	4.E+10	3.E+10	2.E+10	4.E+11
<b>A4</b>	1.E+12	1.E+11	1.E+11	6.E+10	7.E+10	1.E+11	6.E+10	5.E+10	3.E+10	2.E+11
<b>B1</b>	1.E+11	2.E+09	5.E+10	4.E+10	4.E+10	4.E+10	4.E+10	2.E+10	2.E+10	3.E+11
<b>B2</b>	5.E+11	1.E+11	3.E+10	3.E+10	2.E+10	2.E+10	2.E+10	1.E+10	2.E+10	3.E+11
<b>B3</b>	6.E+11	2.E+10	6.E+10	3.E+10	4.E+10	4.E+10	4.E+10	3.E+10	2.E+10	1.E+12
<b>B4</b>	8.E+11	2.E+11	2.E+10	3.E+10	4.E+10	4.E+10	3.E+10	3.E+10	5.E+10	6.E+11
<b>ID</b>	<b>N4000-12 sample coupon #12</b>									
<b>A1</b>	7.E+11	1.E+09	3.E+11	9.E+10	1.E+11	1.E+11	1.E+11	3.E+10	1.E+10	4.E+11
<b>A2</b>	7.E+11	1.E+09	2.E+11	9.E+10	1.E+11	6.E+10	3.E+10	4.E+10	2.E+10	6.E+11
<b>A3</b>	9.E+11	1.E+11	2.E+11	1.E+11	1.E+11	9.E+10	2.E+11	8.E+10	3.E+10	3.E+11
<b>A4</b>	4.E+11	1.E+11	1.E+11	1.E+11	2.E+11	1.E+11	7.E+10	5.E+10	4.E+10	5.E+11
<b>B1</b>	4.E+11	6.E+10	7.E+10	2.E+11	8.E+10	2.E+11	6.E+10	3.E+10	3.E+10	2.E+11
<b>B2</b>	2.E+11	5.E+10	1.E+11	2.E+11	1.E+11	8.E+10	4.E+10	3.E+10	3.E+10	1.E+11
<b>B3</b>	1.E+12	8.E+10	2.E+11	9.E+10	6.E+10	8.E+10	7.E+10	6.E+10	4.E+10	2.E+11
<b>B4</b>	9.E+11	2.E+11	1.E+11	1.E+11	8.E+10	6.E+10	6.E+10	6.E+10	3.E+10	2.E+11

Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04 ~+24 hr recovery
Hours	Ambient	96	240	384	456	600	744	888	1104	
		100 Vdc								
<b>ID</b>			<b>N4000-12 sample coupon #13</b>							
<b>A1</b>	2.E+12	8.E+10	1.E+11	5.E+10	4.E+10	4.E+10	2.E+10	3.E+10	2.E+10	2.E+11
<b>A2</b>	2.E+11	7.E+09	1.E+11	9.E+10	8.E+10	6.E+10	4.E+10	4.E+10	3.E+10	4.E+11
<b>A3</b>	4.E+11	2.E+10	5.E+10	5.E+10	1.E+11	4.E+10	4.E+10	3.E+10	3.E+10	3.E+11
<b>A4</b>	4.E+11	7.E+10	2.E+11	1.E+11	1.E+11	8.E+10	1.E+11	4.E+10	3.E+10	3.E+11
<b>B1</b>	6.E+11	3.E+08	7.E+10	1.E+11	8.E+10	6.E+10	2.E+11	4.E+10	2.E+10	1.E+11
<b>B2</b>	1.E+12	7.E+09	1.E+11	1.E+11	8.E+10	4.E+10	1.E+11	4.E+10	4.E+10	3.E+11
<b>B3</b>	6.E+11	1.E+09	9.E+10	8.E+10	7.E+10	6.E+10	2.E+11	5.E+10	3.E+10	7.E+11
<b>B4</b>	6.E+11	2.E+10	1.E+11	7.E+10	9.E+10	1.E+11	1.E+11	4.E+10	3.E+10	1.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 14</b>							
<b>A1</b>	3.E+11	2.E+10	1.E+11	6.E+10	7.E+10	7.E+10	2.E+10	4.E+10	2.E+10	1.E+12
<b>A2</b>	2.E+12	3.E+10	1.E+11	6.E+10	2.E+11	6.E+10	3.E+10	3.E+10	2.E+10	3.E+11
<b>A3</b>	2.E+11	8.E+10	8.E+10	5.E+10	2.E+11	4.E+10	3.E+10	3.E+10	2.E+10	4.E+11
<b>A4</b>	1.E+11	3.E+10	1.E+11	6.E+10	1.E+11	1.E+11	4.E+10	5.E+10	3.E+10	2.E+11
<b>B1</b>	6.E+11	1.E+08	8.E+10	6.E+10	1.E+11	9.E+10	4.E+10	4.E+10	1.E+09	3.E+11
<b>B2</b>	3.E+12	3.E+10	9.E+10	5.E+10	6.E+10	8.E+10	4.E+10	6.E+10	2.E+10	4.E+11
<b>B3</b>	6.E+11	5.E+09	5.E+10	5.E+10	4.E+10	3.E+10	2.E+10	3.E+10	2.E+10	6.E+11
<b>B4</b>	3.E+12	1.E+11	1.E+11	6.E+10	7.E+10	8.E+10	4.E+10	3.E+10	3.E+10	3.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 15</b>							
<b>A1</b>	4.E+11	2.E+10	1.E+11	7.E+10	8.E+10	7.E+10	5.E+10	3.E+10	2.E+10	4.E+11
<b>A2</b>	8.E+11	1.E+10	9.E+10	8.E+10	7.E+10	5.E+10	3.E+10	3.E+10	2.E+10	5.E+11
<b>A3</b>	2.E+11	5.E+10	6.E+10	7.E+10	8.E+10	5.E+10	4.E+10	3.E+10	2.E+10	4.E+11
<b>A4</b>	3.E+11	2.E+10	1.E+11	6.E+10	8.E+10	5.E+10	3.E+10	3.E+10	2.E+10	4.E+11
<b>B1</b>	6.E+11	2.E+09	5.E+10	4.E+10	6.E+10	5.E+10	4.E+10	5.E+10	2.E+10	5.E+11
<b>B2</b>	6.E+11	2.E+11	1.E+11	8.E+10	9.E+10	6.E+10	4.E+10	4.E+10	3.E+10	4.E+11
<b>B3</b>	6.E+11	2.E+10	1.E+11	7.E+10	6.E+10	5.E+10	5.E+10	4.E+10	3.E+10	7.E+11
<b>B4</b>	6.E+11	3.E+10	1.E+11	8.E+10	6.E+10	1.E+11	4.E+10	5.E+10	3.E+10	1.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 16</b>							
<b>A1</b>	6.E+11	2.E+10	5.E+10	3.E+10	4.E+10	2.E+08	2.E+10	1.E+10	1.E+10	4.E+10
<b>A2</b>	1.E+12	3.E+10	5.E+10	4.E+10	4.E+10	2.E+10	2.E+10	2.E+10	2.E+10	2.E+11
<b>A3</b>	4.E+10	2.E+10	9.E+10	5.E+10	5.E+10	2.E+10	3.E+10	3.E+10	3.E+10	4.E+11
<b>A4</b>	1.E+11	1.E+11	6.E+10	4.E+10	5.E+10	3.E+10	3.E+10	2.E+10	2.E+10	3.E+11
<b>B1</b>	1.E+11	7.E+10	5.E+10	4.E+10	4.E+10	2.E+10	2.E+10	2.E+10	2.E+10	7.E+10
<b>B2</b>	2.E+12	1.E+11	4.E+10	3.E+10	4.E+10	4.E+10	4.E+10	2.E+10	2.E+10	2.E+11
<b>B3</b>	9.E+11	4.E+10	5.E+10	4.E+10	4.E+10	3.E+10	2.E+10	2.E+10	1.E+10	3.E+11
<b>B4</b>	1.E+12	7.E+10	4.E+10	3.E+10	4.E+10	3.E+10	3.E+10	2.E+10	2.E+10	1.E+11

Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04 ~+24 hr recovery
Hours	Ambient	96	240	384	456	600	744	888	1104	
		100 Vdc								
<b>ID</b>			<b>N4000-12 sample coupon #17</b>							
A1	3.E+11	3.E+10	9.E+10	6.E+10	4.E+10	3.E+10	2.E+10	2.E+10	2.E+10	2.E+11
A2	4.E+11	1.E+11	1.E+11	6.E+10	5.E+10	4.E+10	2.E+10	3.E+10	1.E+10	2.E+11
A3	2.E+11	1.E+09	1.E+11	7.E+10	6.E+10	4.E+10	2.E+10	3.E+10	2.E+10	3.E+10
A4	7.E+11	2.E+11	9.E+10	9.E+10	7.E+10	8.E+10	4.E+10	3.E+10	3.E+10	3.E+11
B1	5.E+11	2.E+10	2.E+09	2.E+10	1.E+10	2.E+10	2.E+10	2.E+10	5.E+10	2.E+11
B2	3.E+11	4.E+10	8.E+10	6.E+10	4.E+10	4.E+10	3.E+10	3.E+10	4.E+10	4.E+11
B3	3.E+11	3.E+10	9.E+10	6.E+10	7.E+10	4.E+10	2.E+10	3.E+10	6.E+10	2.E+11
B4	3.E+11	1.E+11	1.E+11	8.E+10	7.E+10	7.E+10	5.E+10	5.E+10	8.E+10	2.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 18</b>							
A1	5.E+11	2.E+10	2.E+11	9.E+10	6.E+10	5.E+10	5.E+10	3.E+10	1.E+10	2.E+11
A2	6.E+11	1.E+10	8.E+10	8.E+10	6.E+10	4.E+10	5.E+10	3.E+10	2.E+10	3.E+11
A3	1.E+12	4.E+10	1.E+11	1.E+11	9.E+10	5.E+10	5.E+10	3.E+10	3.E+10	3.E+11
A4	1.E+12	2.E+10	1.E+11	1.E+11	1.E+11	1.E+11	5.E+10	4.E+10	3.E+10	4.E+11
B1	4.E+11	2.E+09	2.E+10	5.E+10	4.E+10	4.E+10	4.E+10	4.E+10	3.E+10	2.E+11
B2	1.E+12	2.E+10	6.E+10	4.E+10	4.E+10	5.E+10	5.E+10	4.E+10	3.E+10	2.E+11
B3	1.E+11	2.E+09	4.E+10	6.E+10	5.E+10	6.E+10	5.E+10	5.E+10	4.E+10	7.E+11
B4	3.E+12	5.E+10	9.E+10	8.E+10	5.E+10	4.E+10	5.E+10	4.E+10	3.E+10	5.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 19</b>							
A1	2.E+11	1.E+09	2.E+10	3.E+10	4.E+10	5.E+10	2.E+10	3.E+10	3.E+10	6.E+10
A2	2.E+11	2.E+10	5.E+10	6.E+10	7.E+10	7.E+10	4.E+10	4.E+10	3.E+10	1.E+11
A3	2.E+11	5.E+10	6.E+10	6.E+10	7.E+10	5.E+10	4.E+10	2.E+10	3.E+10	1.E+11
A4	5.E+11	4.E+10	5.E+10	1.E+11	2.E+11	1.E+11	6.E+10	3.E+10	4.E+10	3.E+11
B1	2.E+11	2.E+10	4.E+10	1.E+11	8.E+10	5.E+10	9.E+10	4.E+10	2.E+10	8.E+10
B2	2.E+11	7.E+09	7.E+10	6.E+10	5.E+10	4.E+10	1.E+11	3.E+10	3.E+10	5.E+10
B3	1.E+11	3.E+10	1.E+11	7.E+10	4.E+10	5.E+10	1.E+11	6.E+10	4.E+10	3.E+11
B4	2.E+11	2.E+10	2.E+11	9.E+10	8.E+10	8.E+10	1.E+11	5.E+10	6.E+10	2.E+11
<b>ID</b>			<b>N4000-12 sample coupon # 20</b>							
A1	4.E+11	5.E+10	1.E+11	3.E+06	1.E+11	9.E+09	3.E+10	3.E+07	1.E+10	4.E+10
A2	1.E+11	8.E+10	1.E+11	9.E+10	7.E+10	4.E+10	3.E+10	4.E+10	2.E+10	1.E+11
A3	1.E+11	1.E+11	3.E+11	1.E+11	1.E+11	1.E+11	5.E+10	1.E+11	3.E+10	1.E+11
A4	1.E+11	2.E+11	2.E+11	2.E+11	1.E+11	1.E+11	6.E+10	5.E+10	4.E+10	2.E+11
B1	1.E+11	5.E+09	5.E+10	4.E+10	7.E+10	4.E+10	4.E+10	3.E+10	3.E+10	3.E+11
B2	2.E+11	1.E+11	7.E+10	6.E+10	8.E+10	5.E+10	4.E+10	4.E+10	5.E+10	1.E+11
B3	1.E+11	1.E+11	1.E+11	7.E+10	1.E+11	7.E+10	4.E+10	5.E+10	4.E+10	3.E+11
B4	1.E+11	2.E+11	2.E+11	1.E+11	1.E+11	8.E+10	5.E+10	4.E+10	4.E+10	2.E+11



Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04
Hours	Ambient	96	240	384	456	600	744	888	1104	~+24 hr recovery
	100 Vdc									
<b>ID</b>	<b>N4000-12 sample coupon # 21</b>									
A1	8.E+11	2.E+10	4.E+10	4.E+10	3.E+10	2.E+10	2.E+10	2.E+10	1.E+10	2.E+10
A2	9.E+11	2.E+10	4.E+10	7.E+10	5.E+10	4.E+10	4.E+10	3.E+10	1.E+10	2.E+10
A3	1.E+12	2.E+10	5.E+10	5.E+10	4.E+10	4.E+10	3.E+10	2.E+10	1.E+10	6.E+10
A4	8.E+11	6.E+10	1.E+11	1.E+11	1.E+11	6.E+10	3.E+10	3.E+10	1.E+10	1.E+11
B1	7.E+11	4.E+09	3.E+10	4.E+10	3.E+10	3.E+10	2.E+10	2.E+10	2.E+10	3.E+10
B2	1.E+12	3.E+10	7.E+10	6.E+10	5.E+10	3.E+10	1.E+10	2.E+10	2.E+10	4.E+10
B3	1.E+12	2.E+10	8.E+10	5.E+10	6.E+10	5.E+10	2.E+10	2.E+10	2.E+10	2.E+11
B4	8.E+11	1.E+11	8.E+10	6.E+10	8.E+10	7.E+10	3.E+10	3.E+10	3.E+10	1.E+11
<b>ID</b>	<b>N4000-12 sample coupon # 22</b>									
A1	6.E+11	2.E+10	5.E+10	1.E+09	3.E+08	5.E+10	3.E+10	4.E+10	2.E+10	2.E+10
A2	5.E+11	7.E+10	2.E+11	1.E+11	8.E+10	5.E+10	6.E+10	4.E+10	3.E+10	1.E+11
A3	2.E+11	4.E+10	2.E+11	1.E+11	8.E+10	7.E+10	5.E+10	4.E+10	3.E+10	8.E+10
A4	6.E+11	2.E+10	1.E+11	1.E+11	2.E+11	1.E+11	5.E+10	4.E+10	5.E+10	2.E+11
B1	7.E+11	4.E+10	2.E+11	1.E+11	1.E+11	7.E+10	6.E+10	4.E+10	3.E+10	6.E+10
B2	3.E+11	5.E+10	2.E+11	1.E+11	1.E+11	7.E+10	6.E+10	5.E+10	4.E+10	9.E+10
B3	4.E+11	6.E+10	1.E+11	1.E+11	1.E+11	1.E+11	5.E+10	5.E+10	4.E+10	5.E+10
B4	3.E+11	1.E+11	1.E+11	1.E+11	1.E+11	9.E+10	4.E+10	1.E+11	4.E+10	8.E+10
<b>ID</b>	<b>N4000-12 sample coupon # 23</b>									
A1	6.E+11	6.E+10	6.E+10	4.E+10	2.E+06	7.E+06	1.E+06	1.E+06	1.E+08	2.E+09
A2	1.E+12	1.E+11	1.E+11	8.E+10	7.E+10	3.E+10	4.E+10	2.E+10	2.E+10	2.E+10
A3	8.E+11	7.E+10	1.E+11	1.E+11	1.E+11	7.E+10	5.E+10	3.E+10	2.E+10	3.E+10
A4	1.E+12	8.E+10	1.E+11	1.E+11	1.E+11	1.E+11	1.E+11	7.E+10	3.E+10	2.E+10
B1	6.E+11	2.E+10	8.E+10	8.E+10	6.E+10	6.E+10	4.E+10	3.E+10	3.E+10	3.E+10
B2	1.E+12	2.E+11	1.E+11	9.E+10	7.E+10	6.E+10	5.E+10	3.E+10	3.E+10	3.E+09
B3	7.E+11	6.E+10	1.E+11	1.E+11	1.E+11	9.E+10	5.E+10	3.E+10	5.E+10	2.E+10
B4	8.E+11	3.E+10	2.E+11	1.E+11	9.E+10	8.E+10	5.E+10	4.E+10	5.E+10	3.E+10
<b>ID</b>	<b>N4000-12 sample coupon # 24</b>									
A1	8.E+11	4.E+09	8.E+10	5.E+10	5.E+10	1.E+10	2.E+10	1.E+11	1.E+10	3.E+10
A2	5.E+11	3.E+10	1.E+11	6.E+10	6.E+10	3.E+10	3.E+10	2.E+10	1.E+10	5.E+10
A3	1.E+12	4.E+10	6.E+10	4.E+10	5.E+10	3.E+10	3.E+10	2.E+10	1.E+10	1.E+10
A4	1.E+12	4.E+10	1.E+11	9.E+10	7.E+10	8.E+10	4.E+10	3.E+10	2.E+10	4.E+10
B1	1.E+12	7.E+10	9.E+10	6.E+10	7.E+10	6.E+10	3.E+10	3.E+10	3.E+10	2.E+10
B2	7.E+11	5.E+10	4.E+10	4.E+10	4.E+10	3.E+10	3.E+10	2.E+10	1.E+10	3.E+10
B3	1.E+12	1.E+11	5.E+10	5.E+10	4.E+10	4.E+10	3.E+10	2.E+10	4.E+10	6.E+10
B4	9.E+11	1.E+11	1.E+11	8.E+10	6.E+10	5.E+10	2.E+10	3.E+10	3.E+10	5.E+10

Date	05.08.04	05.12.04	05.18.04	05.24.04	05.27.04	06.02.04	06.08.04	06.14.04	06.23.04	06.25.04	
Hours	Ambient	96	240	384	456	600	744	888	1104	~+24 hr recovery	
		100 Vdc									
<b>ID</b>			<b>N4000-12 sample coupon #25</b>								
<b>A1</b>	4.E+11	4.E+10	2.E+10	4.E+08	3.E+09	2.E+09	5.E+09	5.E+09	1.E+10	2.E+10	
<b>A2</b>	4.E+11	3.E+10	2.E+10	3.E+10	3.E+10	4.E+10	3.E+10	3.E+10	1.E+11	3.E+10	
<b>A3</b>	1.E+12	3.E+10	1.E+11	7.E+09	8.E+09	2.E+10	3.E+10	4.E+10	2.E+10	3.E+10	
<b>A4</b>	4.E+11	4.E+10	1.E+11	1.E+11	1.E+11	8.E+10	7.E+10	4.E+10	2.E+10	6.E+10	
<b>B1</b>	6.E+11	1.E+11	7.E+11	5.E+11	6.E+11	1.E+12	8.E+11	7.E+11	3.E+11	5.E+10	
<b>B2</b>	8.E+11	1.E+10	1.E+12	5.E+11	2.E+11	2.E+11	6.E+11	8.E+11	3.E+11	1.E+11	
<b>B3</b>	1.E+12	1.E+11	6.E+11	3.E+11	7.E+11	4.E+11	2.E+11	5.E+11	2.E+11	5.E+10	
<b>B4</b>	2.E+12	1.E+11	1.E+11	1.E+11	9.E+10	8.E+10	6.E+10	3.E+10	2.E+10	8.E+10	