



Highly Accelerated Thermal Shock Reliability Report

DI1

January 30, 2023



Customer Information

Date January 30, 2023
 Customer Yossi Mor
 Company Nono Dimension
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HATS Test Parameters

Number of Coupons 10
 Cycles Requested 500
 Total Cycle Time (minutes) 10.40
 High Temperature (C) + 70
 Low Temperature (C) + 0
 Failure Criterion (%) 10

Coupon Design

Design Name HATS_8740
 Design Date June 16, 2021
 Coupon Width (inches) 2
 Coupon Height (inches) 1
 Layers 8
 Soldermask Expansion (mils) 3
 Minimum Clearance (mils) 8
 Plane Layers 27
 Ground Plane Relief (mils) 14

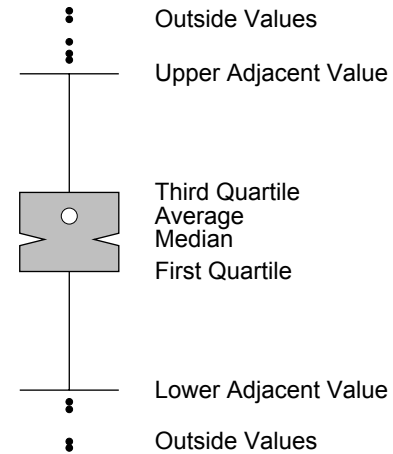
Net Number	Via Type	Hole Size (mils)	Land Size (mils)	Track Width (mils)	Grid Size (mils)	Interconnect Sequence	Vias per Net
1	Through	8.0	20.0	10	40	1-8	182
2	Through	8.0	20.0	10	40	1-5-3-6-4-8	182
3	Through	8.0	18.0	10	40	1-8	182
4	Through	8.0	18.0	10	40	1-5-3-6-4-8	182

Coupon Information

Coupon Number	Designation	Group Number	Thickness (mils)	Reflow Count	Reflow Cycle (C)
1	3.1	1	65	-	-
2	3.2	1	65	-	-
3	3.3	1	65	-	-
4	13.1	1	65	-	-
5	13.3	1	65	-	-
6	13.4	1	65	-	-
7	15.1	1	65	-	-
8	15.2	1	65	-	-
9	15.3	1	65	-	-
10	15.4	1	65	-	-

Notched Box Plot

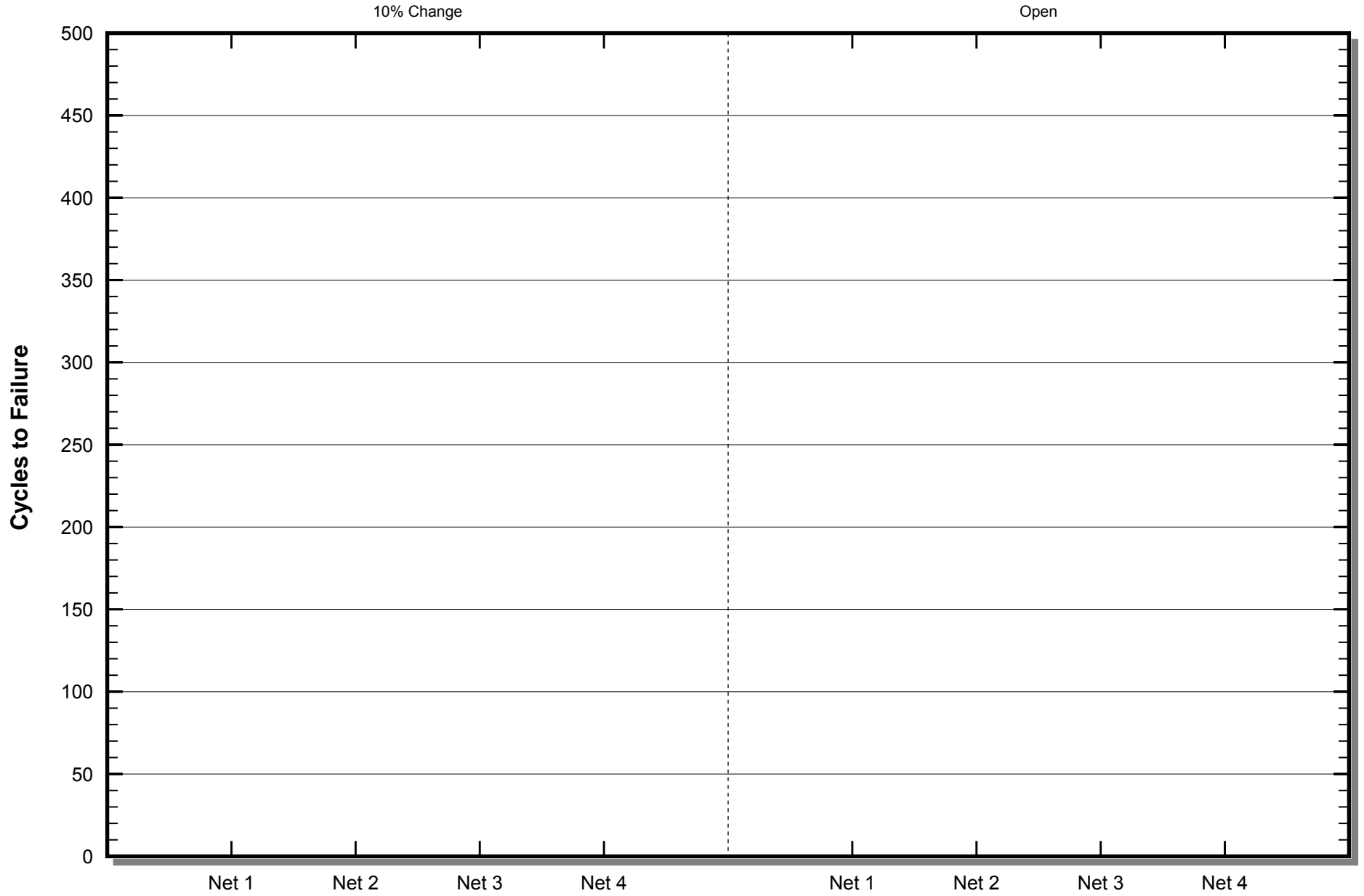
Notched box plots are used to display the distribution of the data. The notch is centered at the median, and the box extends from the first quartile (25th percentile) to the third quartile (75th percentile), encompassing 50 percent of the population. A line extends from the first quartile to the lower adjacent value. This range encompasses 25 percent of the population except when there are outside values, which are plotted as individual points and reduce the population accordingly. Similarly, a line extends from the third quartile to the upper adjacent value and encompasses 25 percent of the population less any outside values at the upper bound. In some cases, the average is indicated by an open circle and is typically near the median.



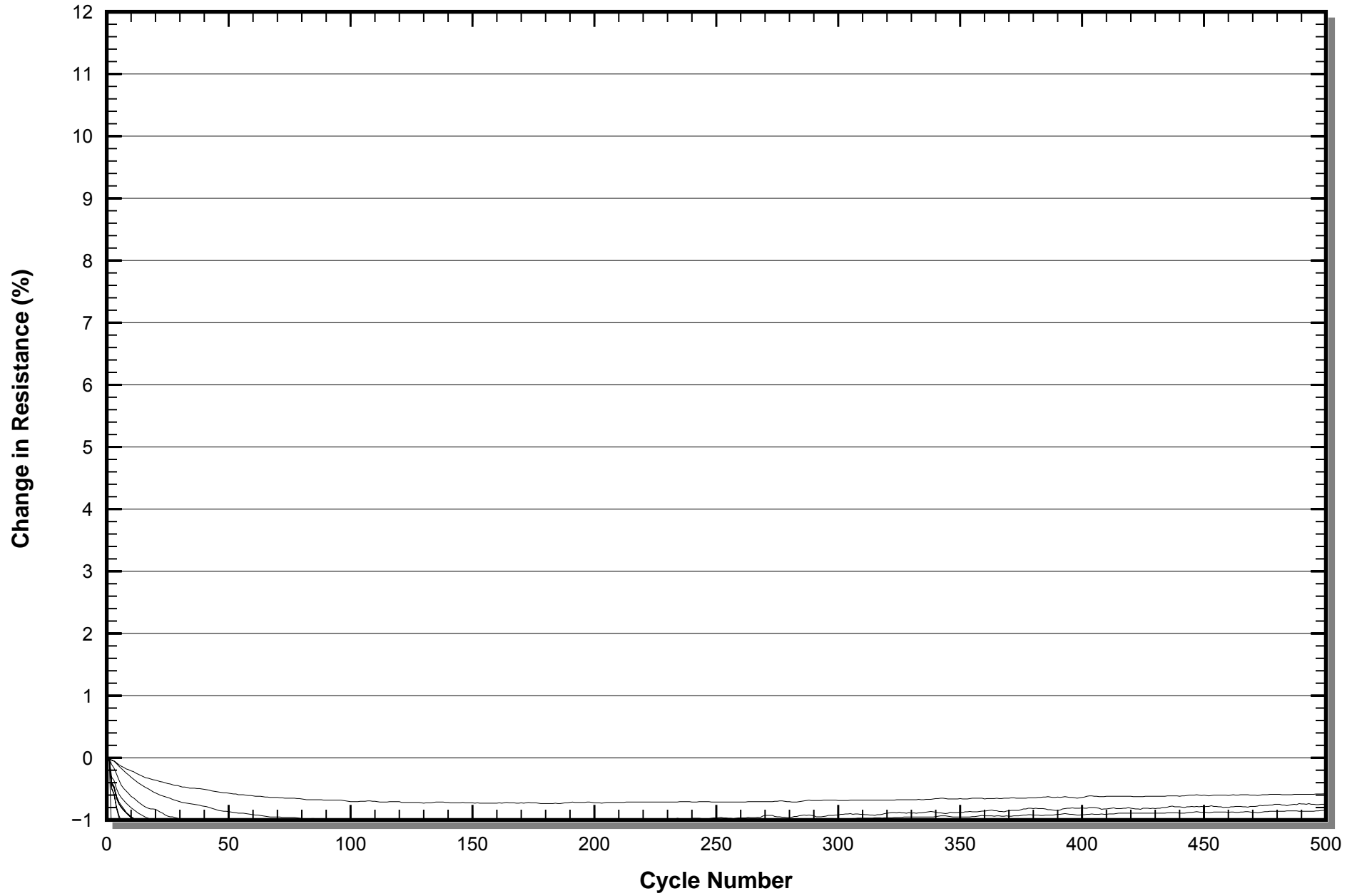
Reliability

Statistics	Cycles to 10% Change				Cycles to Open Circuit (20 ohms)			
	Net 1	Net 2	Net 3	Net 4	Net 1	Net 2	Net 3	Net 4
Count	10	10	10	10	10	10	10	10
Number Passed	10	10	10	10	10	10	10	10
Number Suspended	0	0	0	0	0	0	0	0
Number Failed	0	0	0	0	0	0	0	0
Minimum	-	-	-	-	-	-	-	-
First Quartile	-	-	-	-	-	-	-	-
Median	-	-	-	-	-	-	-	-
Third Quartile	-	-	-	-	-	-	-	-
Maximum	-	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	-	-
Range	-	-	-	-	-	-	-	-

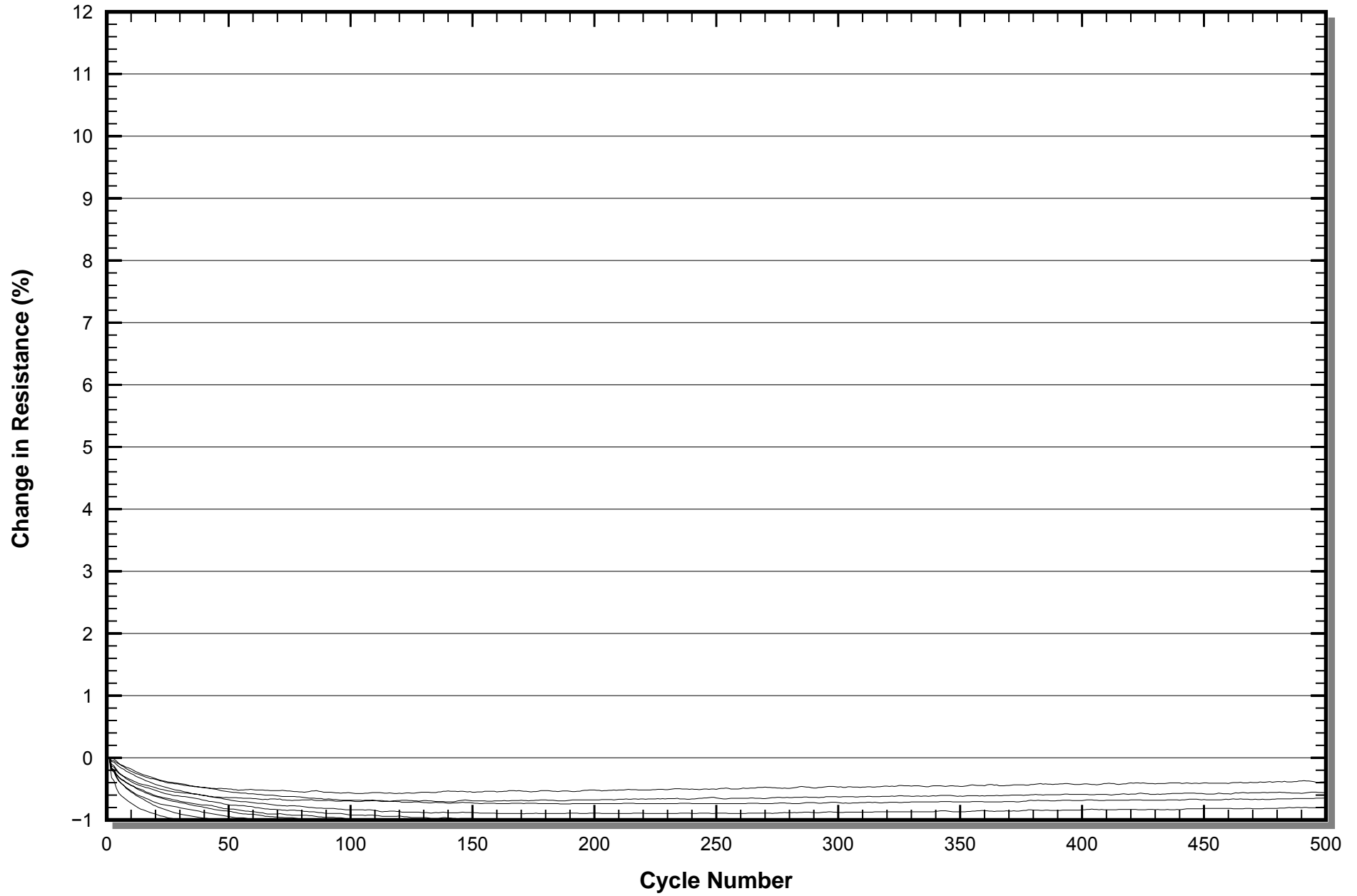
Reliability



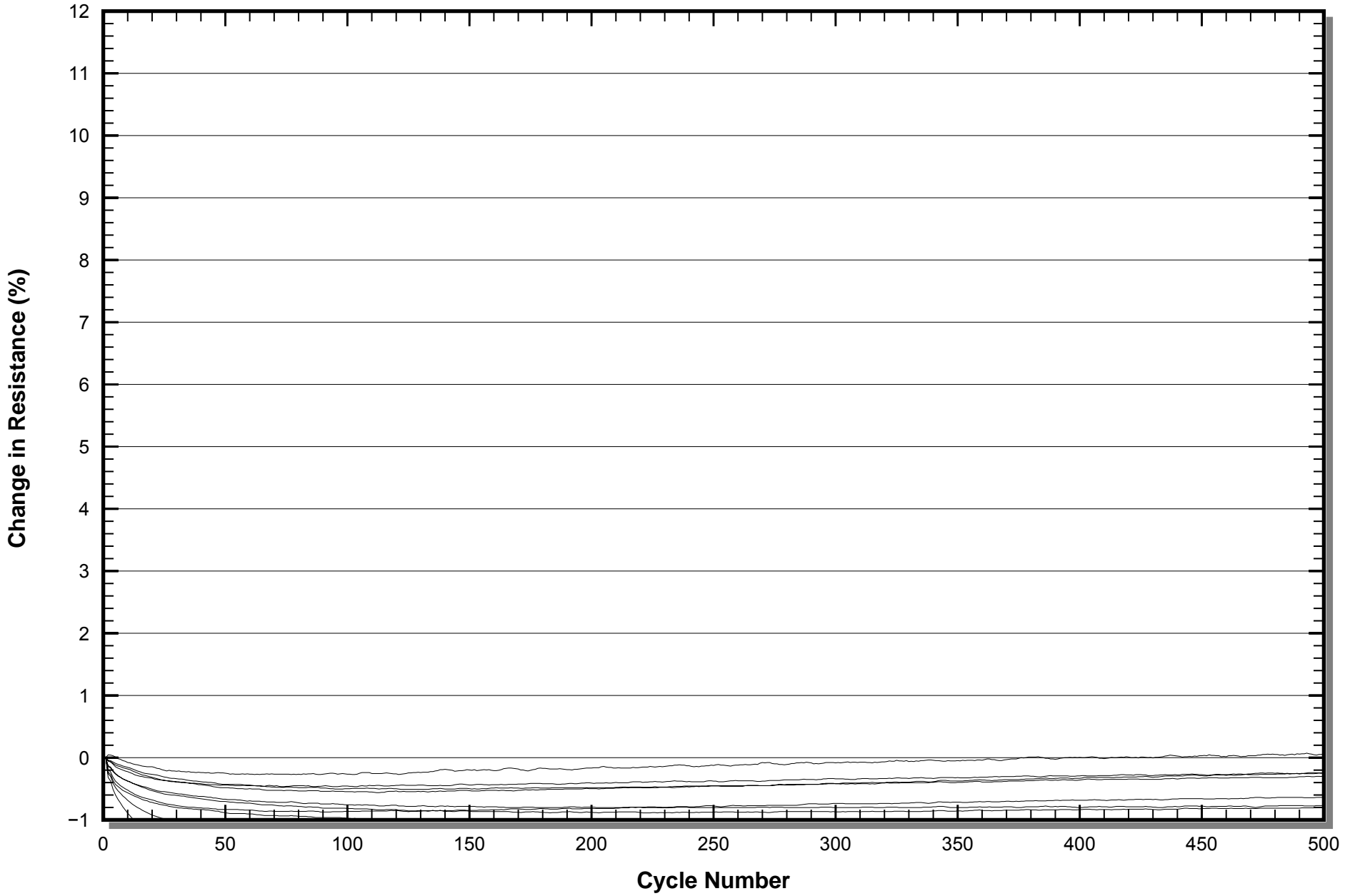
Net 1 Resistance by Cycle



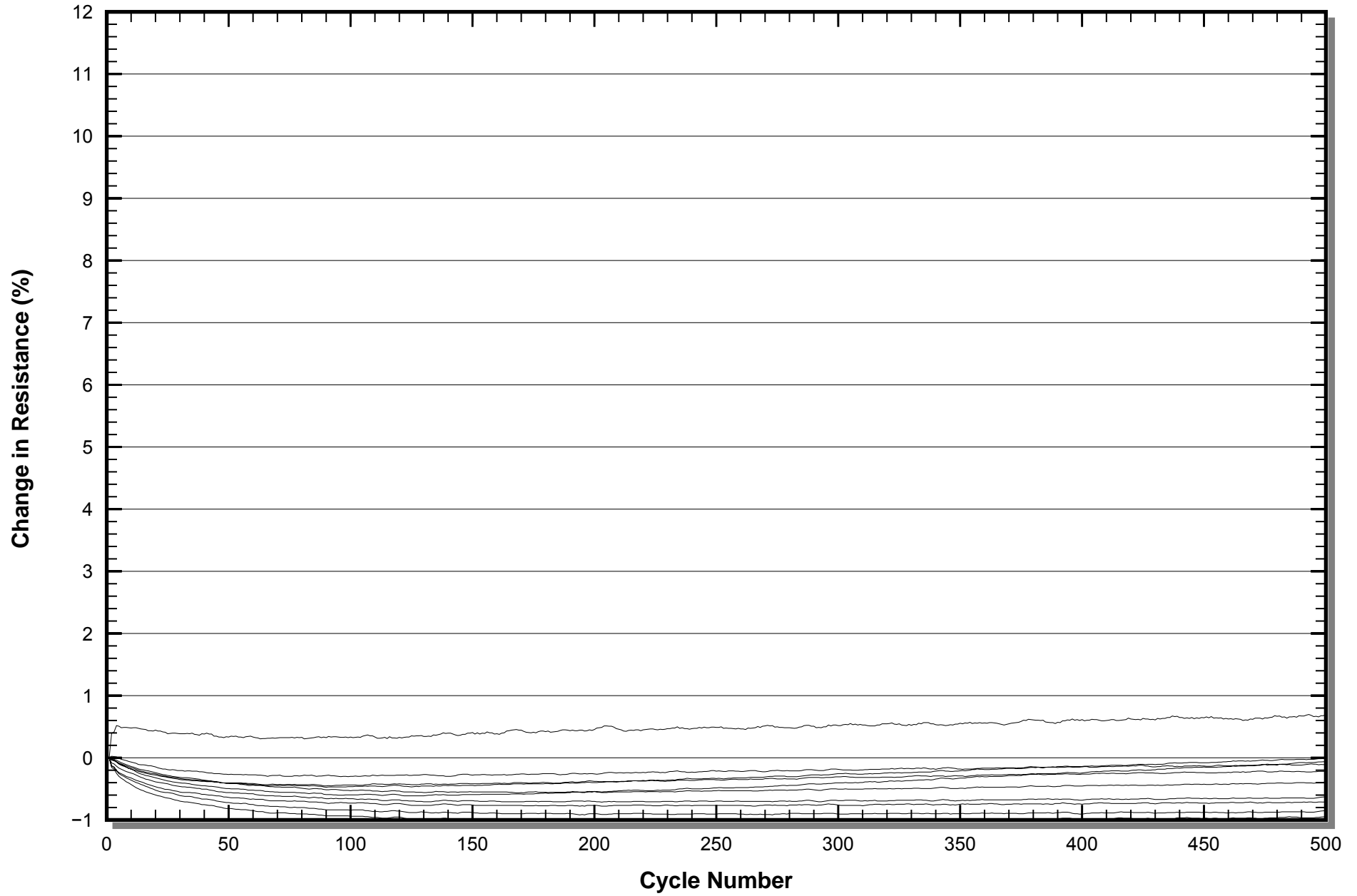
Net 2 Resistance by Cycle



Net 3 Resistance by Cycle



Net 4 Resistance by Cycle



Reliability by Coupon

Coupon Number	Assembly Simulation Resistance Change (%)				Reference Resistance at 70C (ohms)				Cycles to 10% Change				Cycles to Open Circuit (20 ohms)				Percent Change at 500 Cycles			
	Net 1	Net 2	Net 3	Net 4	Net 1	Net 2	Net 3	Net 4	Net 1	Net 2	Net 3	Net 4	Net 1	Net 2	Net 3	Net 4	Net 1	Net 2	Net 3	Net 4
1	-	-	-	-	3.475	3.862	3.844	4.135	>500	>500	>500	>500	>500	>500	>500	>500	-0.7	-0.4	0.1	0.7
2	-	-	-	-	3.487	3.837	3.821	4.087	>500	>500	>500	>500	>500	>500	>500	>500	-1.2	-0.6	-0.2	-0.1
3	-	-	-	-	3.696	3.893	3.916	4.112	>500	>500	>500	>500	>500	>500	>500	>500	-3.5	-1.0	-0.6	-0.2
4	-	-	-	-	3.231	3.663	3.729	4.009	>500	>500	>500	>500	>500	>500	>500	>500	-0.6	-0.6	-0.3	0.0
5	-	-	-	-	3.273	3.633	3.695	3.921	>500	>500	>500	>500	>500	>500	>500	>500	-1.5	-1.1	-0.8	-0.1
6	-	-	-	-	3.255	3.683	3.734	4.003	>500	>500	>500	>500	>500	>500	>500	>500	-0.8	-0.8	-0.2	-0.4
7	-	-	-	-	2.736	3.016	3.117	3.251	>500	>500	>500	>500	>500	>500	>500	>500	-1.7	-1.0	-0.8	-0.6
8	-	-	-	-	2.767	3.005	3.121	3.223	>500	>500	>500	>500	>500	>500	>500	>500	-2.4	-1.2	-1.5	-0.8
9	-	-	-	-	2.785	3.002	3.140	3.211	>500	>500	>500	>500	>500	>500	>500	>500	-2.9	-1.2	-1.8	-0.9
10	-	-	-	-	2.757	3.029	3.118	3.264	>500	>500	>500	>500	>500	>500	>500	>500	-1.9	-1.0	-1.0	-0.7