MEZALOK* Stacking Connector System

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics MEZALOK Stacking Connector System to determine its conformance to the requirements of Product Specification 108-2411, Revision D.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the MEZALOK Stacking Connector System. Testing was performed at the Harrisburg Electrical Components Test Laboratory between 04Aug10 and 21Dec10. Additional testing was performed between 01Jun10 and 25May11, between 01Mar11 and 25May11, on 14Dec12, and between 15Oct15 and 12Feb16. The test file numbers for this testing are EA20100659T, EA20100547T, EA20110223T, EA20120811T, and EA20150522T. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory.

1.3. Conclusion

Specimens listed in paragraph 1.4 conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2411, Revision D.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for testing:

A. Test Report EA20100659T

Test Group	Quantity	Part Number	Description
1	4	2102060-1	Pin housing assembly, 114 position, Mezzanine (2 specimens mounted to each PCB)
	4	2102061-3	Socket housing assembly, 114 position, Mezzanine (2 specimens mounted to each PCB)
2,3	6 each	2102060-1	Pin housing assembly, 114 position, Mezzanine (2 specimens mounted to each PCB)
	6 each	2102060-3	Socket housing assembly, 114 position, Mezzanine (2 specimens mounted to each PCB)
4,5	3 each	2102060-1	Pin housing assembly, 114 position, Mezzanine
	3 each	2102061-3	Socket housing assembly, 114 position, Mezzanine
1	2	60-1042630-1	Test PCB
	2	60-1042631-1	Test PCB
2,3	3 each	60-1042630-1	Test PCB
	3 each	60-1042631-1	Test PCB

Figure 1 (cont)

B. Test Report EA20100547T

Test Group	Test Set	Qty	Part Number	Description
1	5	6	2012060-2	Pin assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each OSP PCB) (Note 2), HM15 lubrication
		6	2012061-4	Socket assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each OSP PCB) (Note 2)
	6	6	2102060-2	Pin assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each ENEPIG PCB) (Note 1), HM15 lubrication
		6	2102061-4	Socket assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each ENEPIG PCB) (Note 1)
3	2	6	2102060-2	Pin assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each ENEPIG PCB) (Note 1), no lubrication
		6	2102061-4	Socket assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each ENEPIG PCB) (Note 1)
	4	6	2102060-2	Pin assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each OSP PCB) (Note 2), no lubrication
		6	2102061-4	Socket assembly, 114 position, 12 mm, Pb free solder ball (2 specimens mounted to each OSP PCB) (Note 2)

Figure 1 (cont)

NOTE
1- *PCB part number 60-1042630-2, Rev. A and 60-1042631-2, Rev. A.*

2- *PCB part number 60-1042630-5, Rev. A and 60-1042631-5, Rev. A.*

C. Test Report EA20110223T

Test Group	Test Set	Qty	Part Number	Description
1	1	6	2102060-1	Pin assembly, 114 position, Sn/Pb solder ball (2 specimens mounted to each PCB) (Note 1), no lubrication
		6	2102061-9	Socket assembly, 114 position, 18 mm, Sn/Pb solder ball (2 specimens mounted to each PCB) (Note 2)
	2	6	2102060-1	Pin assembly, 114 position, Sn/Pb solder ball (2 specimens mounted to each PCB) (Note 1), HM15 lubrication
		6	2102061-9	Socket assembly, 114 position, 18 mm, Sn/Pb solder ball (2 specimens mounted to each PCB) (Note 2)

Figure 1 (cont)

NOTE
1- *PCB part number 60-1042630-1, Rev. A.*

2- *PCB part number 60-1042631-1, Rev. A.*

D. Test Report EA20120811T

Test Group	Qty	Part Number	Description
1	4	2102060-1	Pin assembly, 114-position, tin lead solder ball, 50 µin gold, HM15 lube
	4	1-2102061-3	Socket assembly, 114-position, tin lead solder ball, 50 µin gold

Figure 1 (cont)

E. Test Report EA20150522T

Test Group	Test Set	Qty	Part Number	Description
1	6	3	2102429-4	Pin assembly, 320 position, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 1)
		3	1-2102430-2	Socket assembly, 320 position, 18 mm, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 1)
3	9	4	2102429-4	Pin assembly, 320 position, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 2)
		4	1-2102430-2	Socket assembly, 320 position, 18 mm, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 2)
	10	4	2102429-4	Pin assembly, 320 position, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 1)
		4	1-2102430-2	Socket assembly, 320 position, 18 mm, SAC405 solder ball, 30 µin gold, no lubrication, standard process (Note 1)

Figure 1 (end)

NOTE

1- *PCB part number 60-1824222-1, Rev. A and 60-1824227-1, Rev. A, in .093" thickness.*

2- *PCB part number 60-1824222-1, Rev. A and 60-1824227-1, Rev. A, in .062" thickness.*

1.5. Qualification Test Sequence

A. Test Report EA20100659T

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Initial examination of product	1	1	1	1	1
Low Level Contact Resistance (LLCR)	3,9	2,5	2,5		
Contact resistance, rated current	4,10	3,6	3,6		
Insulation resistance				2,6	
Withstanding voltage				3,7	
Resistance to soldering heat					2
Random vibration	6				
Mechanical shock	7				
Durability	5				
Mating force	2				
Unmating force	11				
Thermal shock			4 (**c**)	4 (**d**)	
Humidity/temperature cycling				5	
Temperature life		4 (**e**)			
Salt spray	8				
Final examination of product	12	7	7	8	3

Figure 2 (cont)

NOTE

a *See Paragraph 1.4.A.*

b *Numbers indicate sequence in which tests are performed.*

c *2000 cycles.*

d *5 cycles.*

e *Precondition specimens with 10 durability cycles.*

B. Test Report EA20100547T and EA20150522T

Test or Examination	Test Group (a)	
	1	3
	Test Sequence (b)	
Initial examination of product	1	1
Low Level Contact Resistance (LLCR)	3,9	2,5
Contact resistance, rated current	4,10	3,6
Random vibration	6	
Mechanical shock	7	
Durability	5	
Mating force	2	
Unmating force	11	
Thermal shock		4 (c)
Salt spray	8	
Final examination of product	12	7

Figure 2 (cont)

NOTE

a *See Paragraph 1.4.B (EA20100547T) and Paragraph 1.4.E (EA20150522T).*

b *Numbers indicate sequence in which tests are performed.*

c *2000 cycles.*

C. Test Report EA20110223T

Test or Examination	Test Group (a)
	1
	Test Sequence (b)
Initial examination of product	1
Low Level Contact Resistance (LLCR)	3,9
Contact resistance, rated current	4,10
Random vibration	6
Mechanical shock	7
Durability	5
Mating force	2
Unmating force	11
Salt spray	8
Final examination of product	12

Figure 2 (cont)

NOTE

a *See Paragraph 1.4.C.*

b *Numbers indicate sequence in which tests are performed.*

D. Test Report EA20120811T

Test or Examination	Test Group (a)
	1
	Test Sequence (b)
Mating force	1,4
Unmating force	2,5
Durability	3

Figure 2 (cont)

NOTE
a *See Paragraph 1.4.D.*

b *Numbers indicate sequence in which tests are performed.*

1.6. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

A. Temperature: 15 to 35°C

B. Relative Humidity: 20 to 80%

2. SUMMARY OF TESTING

2.1. Initial Examination of Product – All Test Groups (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. LLCR- Test Groups 1, 2 and 3 (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

A. Test Report EA20100659T

All LLCR measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and had a change in resistance (ΔR) of less than 15 milliohms after testing.

NOTE
Final measurements were not taken on specimens 13 and 14 from test group 1. These specimens were released to the requestor for failure analysis after discontinuities occurred after mechanical shock testing. After analyzing the specimens, the requestor attributed the failure method to the solder pads pulling off the test boards. Since it was not the test specimen that failed, testing was continued on test group 1 with the remaining 4 specimens.

Reading	Specimen ID					
	11	12	13	14	15	16
	Test Group 1 – Initial (Milliohms)					
Minimum	18.94	19.00	18.79	18.55	18.87	18.67
Maximum	19.99	20.42	19.93	20.10	20.00	19.66
Average	19.52	19.63	19.45	19.50	19.51	19.25
Std. Dev.	0.30	0.30	0.29	0.33	0.30	0.26

Reading	Specimen ID					
	11	12	13	14	15	16
	Test Group 1 – ΔR (Milliohms)					
Minimum	-0.46	-0.73	See ***NOTE*** (above)		-0.51	-0.79
Maximum	0.68	1.00			1.01	0.82
Average	0.08	0.02			0.18	0.07
Std. Dev.	0.19	0.24			0.25	0.20

Reading	Specimen ID					
	21	22	23	24	25	26
	Test Group 2 – Initial (Milliohms)					
Minimum	19.02	19.05	19.02	18.70	18.66	18.77
Maximum	20.24	20.26	20.60	19.90	19.99	19.81
Average	19.70	19.72	19.60	19.34	19.42	19.40
Std. Dev.	0.31	0.32	0.32	0.32	0.31	0.30

Reading	Specimen ID					
	21	22	23	24	25	26
	Test Group 2 – ΔR (Milliohms)					
Minimum	-0.22	-0.29	-0.16	-0.17	-0.26	-0.11
Maximum	0.05	0.14	0.12	0.05	0.08	0.05
Average	-0.10	-0.10	-0.03	-0.05	-0.06	-0.03
Std. Dev.	0.05	0.05	0.06	0.03	0.06	0.03

Figure 4 (cont)

Reading	Specimen ID					
	31	32	33	34	35	36
	Test Group 3 – Initial (Milliohms)					
Minimum	18.61	18.71	18.99	18.83	19.04	18.60
Maximum	19.65	19.93	20.02	19.96	20.57	19.70
Average	19.17	19.36	19.53	19.48	19.67	19.27
Std. Dev.	0.28	0.32	0.29	0.29	0.32	0.28

Reading	Specimen ID					
	31	32	33	34	35	36
	Test Group 3 – ΔR (Milliohms)					
Minimum	-0.15	-0.23	-0.02	-0.12	-0.14	-0.13
Maximum	0.25	0.76	0.72	0.01	1.15	0.12
Average	0.03	0.01	0.06	0.01	0.01	0.03
Std. Dev.	0.07	0.09	0.08	0.04	0.12	0.04

Figure 4 (cont)

B. Test Report EA20100547T

All LLCR measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID					
	501X	502Y	503X	504Y	505	5050
	Test Group 1, Test Set 5 (OSP PCB) – Initial (Milliohms)					
Minimum	18.49	18.65	18.44	18.44	18.60	18.62
Maximum	19.64	19.63	19.58	19.62	19.93	19.84
Average	19.15	19.34	19.12	19.13	19.35	19.33
Std. Dev.	0.36	0.33	0.36	0.36	0.41	0.40

Reading	Specimen ID					
	501X	502Y	503X	504Y	505	5050
	Test Group 1, Test Set 5 (OSP PCB) – ΔR (Milliohms)					
Minimum	-0.50	-0.50	0.03	-0.19	-0.12	-0.45
Maximum	0.33	0.42	0.35	0.40	0.30	0.31
Average	0.16	0.21	0.17	0.16	0.12	0.11
Std. Dev.	0.10	0.13	0.06	0.13	0.09	0.13

Figure 4 (cont)

Reading	Specimen ID					
	601X	602Y	603X	604Y	605X	606Y
	Test Group 1, Test Set 6 (ENEPIG PCB) – Initial (Milliohms)					
Minimum	18.66	18.79	18.58	18.40	18.53	18.64
Maximum	20.21	20.04	19.77	19.81	19.91	19.96
Average	19.47	19.51	19.28	19.25	19.34	19.37
Std. Dev.	0.41	0.30	0.38	0.40	0.41	0.37

Reading	Specimen ID					
	601X	602Y	603X	604Y	605X	606Y
	Test Group 1, Test Set 6 (ENEPIG PCB) – ΔR (Milliohms)					
Minimum	-0.23	-0.21	-2.66	-0.37	-0.55	-0.47
Maximum	0.30	0.26	0.25	0.19	0.30	0.23
Average	0.13	0.03	-0.11	0.01	0.05	0.02
Std. Dev.	0.10	0.09	0.37	0.11	0.15	0.14

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 3, Test Set 2 (ENEPIG PCB) – Initial (Milliohms)					
Minimum	19.06	19.05	19.03	19.10	18.91	18.85
Maximum	20.44	20.51	20.40	20.45	20.26	20.32
Average	19.83	19.91	19.86	19.94	19.69	19.73
Std. Dev.	0.37	0.37	0.38	0.33	0.34	0.37

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 3, Test Set 2 (ENEPIG PCB) – ΔR (Milliohms)					
Minimum	-0.12	-0.10	-0.16	-0.16	-0.15	-0.16
Maximum	0.54	0.97	0.98	0.53	0.76	0.98
Average	0.12	0.18	0.15	0.07	0.13	0.16
Std. Dev.	0.14	0.20	0.21	0.15	0.18	0.21

Figure 4 (cont)

Reading	Specimen ID					
	401X	402Y	403X	404Y	405X	406Y
	Test Group 3, Test Set 4 (OSP PCB) – Initial (Milliohms)					
Minimum	18.73	18.86	18.87	18.81	19.04	18.98
Maximum	20.14	20.17	20.37	20.21	20.35	20.29
Average	19.59	19.66	19.70	19.61	19.76	19.79
Std. Dev.	0.36	0.35	0.34	0.37	0.36	0.33

Reading	Specimen ID					
	401X	402Y	403X	404Y	405X	406Y
	Test Group 3, Test Set 4 (OSP PCB) – ΔR (Milliohms)					
Minimum	-0.17	-0.36	-0.16	-0.11	-0.19	-0.16
Maximum	1.63	0.88	0.61	0.76	0.60	0.94
Average	0.13	0.11	0.14	0.13	0.11	0.20
Std. Dev.	0.23	0.21	0.13	0.16	0.14	0.22

Figure 4 (cont)

C. Test Report EA20110223T

All LLCR measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 1, Test Set 2 – Initial (Milliohms)					
Minimum	22.62	22.50	23.09	22.61	22.52	22.82
Maximum	23.80	23.56	24.04	23.64	23.77	23.76
Average	23.11	23.08	23.56	23.17	23.24	23.30
Std. Dev.	0.25	0.26	0.25	0.26	0.30	0.24

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 1, Test Set 2 – ΔR (Milliohms)					
Minimum	-0.22	-0.22	-0.39	-0.27	-0.21	-0.38
Maximum	0.39	0.67	0.12	0.07	0.22	0.31
Average	-0.10	-0.08	-0.23	-0.17	-0.11	-0.10
Std. Dev.	0.10	0.11	0.11	0.06	0.06	0.12

Figure 4 (cont)

D. Test Report EA20150522T

All LLCR measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID		
	601	602	603
	Test Group 1, Test Set 6 – Initial (Milliohms)		
Minimum	23.26	23.57	23.75
Maximum	25.61	27.92	27.03
Average	23.91	24.73	25.11
Std. Dev.	0.37	0.51	0.62
N	320	320	320

Reading	Specimen ID		
	601	602	603
	Test Group 1, Test Set 6 – ΔR (Milliohms)		
Minimum	-1.58	-0.92	-1.00
Maximum	0.49	3.75	2.27
Average	0.07	0.56	0.79
Std. Dev.	0.18	0.67	0.58
N	320	320	320

Reading	Specimen ID			
	901	902	903	904
	Test Group 3, Test Set 9 – Initial (Milliohms)			
Minimum	23.42	23.60	23.42	23.70
Maximum	26.03	26.90	25.70	27.83
Average	24.24	24.94	24.19	25.22
Std. Dev.	0.39	0.59	0.38	0.54
N	320	320	320	320

Reading	Specimen ID			
	901	902	903	904
	Test Group 3, Test Set 9 – ΔR (Milliohms)			
Minimum	-1.29	-2.78	-1.11	-2.02
Maximum	2.71	2.71	2.59	2.29
Average	0.25	-0.28	0.16	-0.28
Std. Dev.	0.41	0.84	0.46	0.54
N	320	320	320	320

Figure 4 (cont)

Reading	Specimen ID			
	1001	1002	1003	1004
	Test Group 3, Test Set 10 – Initial (Milliohms)			
Minimum	23.36	23.93	23.08	23.21
Maximum	25.58	27.09	25.24	25.59
Average	24.15	24.95	23.71	24.03
Std. Dev.	0.35	0.47	0.36	0.38
N	320	320	320	320

Reading	Specimen ID			
	1001	1002	1003	1004
	Test Group 3, Test Set 10 – ΔR (Milliohms)			
Minimum	-0.83	-2.37	-1.01	-0.53
Maximum	2.26	1.92	2.64	5.29
Average	0.14	-0.81	0.13	1.08
Std. Dev.	0.33	0.68	0.40	0.89
N	320	320	320	320

Figure 4 (end)

2.3. Contact Resistance, Rated Current – Test Groups 1, 2 and 3 (Test Reports EA20100659T, EA20100547T, EA20100659T, and EA20150522T)

A. Test Report EA20100659T

All contact resistance measurements taken at 1.5 amperes were less than 30 milliohms initially, and had a change in resistance (ΔR) of less than 15 milliohms after testing.

NOTE
Final measurements were not taken on specimens 13 and 14 from test group 1. These specimens were released to the requestor for failure analysis after discontinuities occurred after mechanical shock testing. After analyzing the specimens, the requestor attributed the failure method to the solder pads pulling off the test boards. Since it was not the test specimen that failed, testing was continued on test group 1 with the remaining 4 specimens.

Reading	Specimen ID					
	11	12	13	14	15	16
	Test Group 1 – Initial (Milliohms)					
Minimum	18.92	18.91	18.58	18.80	18.96	18.73
Maximum	19.07	19.26	18.98	19.01	19.13	18.87
Average	19.00	19.12	18.73	18.92	19.01	18.81
Std. Dev.	0.05	0.13	0.14	0.09	0.06	0.04

Reading	Specimen ID					
	11	12	13	14	15	16
	Test Group 1 – ΔR (Milliohms)					
Minimum	0.17	0.19	See ***NOTE*** (above)		0.32	0.25
Maximum	0.72	0.62			0.79	0.42
Average	0.34	0.32			0.49	0.32
Std. Dev.	0.18	0.15			0.18	0.06

Reading	Specimen ID					
	21	22	23	24	25	26
	Test Group 2 – Initial (Milliohms)					
Minimum	18.16	18.38	18.58	18.52	18.46	18.67
Maximum	18.51	18.79	19.17	18.82	19.18	18.84
Average	18.30	18.64	18.88	18.68	18.83	18.75
Std. Dev.	0.14	0.14	0.20	0.10	0.25	0.06

Figure 5 (cont)

Reading	Specimen ID					
	21	22	23	24	25	26
	Test Group 2 – ΔR (Milliohms)					
Minimum	0.89	0.68	0.35	0.35	0.28	0.30
Maximum	1.15	0.99	0.68	0.39	0.36	0.37
Average	1.04	0.79	0.47	0.38	0.32	0.34
Std. Dev.	0.09	0.10	0.14	0.01	0.02	0.02

Reading	Specimen ID					
	31	32	33	34	35	36
	Test Group 3 – Initial (Milliohms)					
Minimum	14.17	16.14	17.25	17.20	17.32	17.09
Maximum	15.75	16.96	17.62	17.41	17.60	17.45
Average	15.26	16.58	17.36	17.34	17.47	17.31
Std. Dev.	0.51	0.31	0.13	0.07	0.09	0.13

Reading	Specimen ID					
	31	32	33	34	35	36
	Test Group 3 – ΔR (Milliohms)					
Minimum	3.19	2.15	1.89	1.78	1.79	1.77
Maximum	4.81	3.04	2.03	1.99	2.01	1.86
Average	3.64	2.48	1.97	1.85	1.90	1.81
Std. Dev.	0.54	0.38	0.05	0.07	0.08	0.03

Figure 5 (cont)

B. Test Report EA20100547T

All contact resistance measurements taken at 1.5 amperes were less than 30 milliohms initially, and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID					
	501X	502Y	503X	504Y	505X	506Y
	Test Group 1, Test Set 5 (OSP PCB) – Initial (Milliohms)					
Minimum	18.88	18.94	18.81	18.88	18.98	18.87
Maximum	19.07	19.23	19.01	19.06	19.18	19.13
Average	18.98	19.06	18.94	18.98	19.10	19.03
Std. Dev.	0.07	0.08	0.06	0.06	0.07	0.09

Reading	Specimen ID					
	501X	502Y	503X	504Y	505X	506Y
	Test Group 1, Test Set 5 (OSP PCB) – ΔR (Milliohms)					
Minimum	-0.37	-0.25	0.19	0.18	0.01	-0.26
Maximum	0.24	0.25	0.32	0.31	0.24	0.21
Average	0.13	0.12	0.25	0.26	0.11	0.12
Std. Dev.	0.18	0.14	0.04	0.04	0.07	0.14

Reading	Specimen ID					
	601X	602Y	603X	604Y	605X	606Y
	Test Group 1, Test Set 6 (ENEPIG PCB) – Initial (Milliohms)					
Minimum	18.91	19.00	18.94	18.66	18.67	18.77
Maximum	19.18	19.25	19.11	19.02	18.98	19.02
Average	19.08	19.14	19.03	18.88	18.84	18.92
Std. Dev.	0.07	0.08	0.05	0.11	0.10	0.08

Reading	Specimen ID					
	601X	602Y	603X	604Y	605X	606Y
	Test Group 1, Test Set 6 (ENEPIG PCB) – ΔR (Milliohms)					
Minimum	-0.21	-2.87	-0.14	-0.22	-0.60	18.66
Maximum	0.11	0.10	0.10	0.05	0.02	19.12
Average	-0.07	-0.44	0.01	-0.09	-0.26	18.99
Std. Dev.	0.10	0.88	0.07	0.09	0.19	0.14

Figure 5 (cont)

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 3, Test Set 2 (ENEPIG PCB) – Initial (Milliohms)					
Minimum	19.14	19.09	19.12	19.32	19.01	19.10
Maximum	19.48	19.72	19.60	19.67	19.33	19.43
Average	19.33	19.40	19.38	19.58	19.20	19.33
Std. Dev.	0.12	0.20	0.17	0.14	0.12	0.11

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 3, Test Set 2 (ENEPIG PCB) – ΔR (Milliohms)ms					
Minimum	0.30	0.22	0.06	0.15	0.11	0.12
Maximum	0.65	0.55	0.51	0.64	0.47	0.39
Average	0.48	0.36	0.26	0.32	0.32	0.24
Std. Dev.	0.14	0.10	0.14	0.16	0.16	0.08

Reading	Specimen ID					
	401X	402Y	403X	404Y	405X	406Y
	Test Group 3, Test Set 4 (OSP PCB) – Initial (Milliohms)					
Minimum	18.81	18.84	19.04	19.07	19.24	19.19
Maximum	19.09	19.02	19.44	19.31	16.96	19.67
Average	18.93	18.95	19.22	19.20	19.39	19.45
Std. Dev.	0.11	0.07	0.13	0.08	0.16	0.17

Reading	Specimen ID					
	401X	402Y	403X	404Y	405X	406Y
	Test Group 3, Test Set 4 (OSP PCB) – ΔR (Milliohms)					
Minimum	0.38	0.49	0.19	0.14	0.11	0.16
Maximum	0.56	0.85	0.49	0.42	0.43	0.30
Average	0.47	0.61	0.36	0.32	0.23	0.23
Std. Dev.	0.08	0.14	0.13	0.10	0.12	0.06

Figure 5 (cont)

C. Test Report EA20110223T

All contact resistance measurements taken at 1.5 amperes were less than 30 milliohms initially, and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 1, Test Set 2 – Initial (Milliohms)					
Minimum	22.67	22.68	23.03	22.70	22.68	22.98
Maximum	23.06	22.88	23.34	23.02	23.13	23.12
Average	22.87	22.78	23.20	22.86	22.87	23.04
Std. Dev.	0.15	0.06	0.09	0.12	0.13	0.05

Reading	Specimen ID					
	201X	202Y	203X	204Y	205X	206Y
	Test Group 1, Test Set 2 – ΔR (Milliohms)					
Minimum	-0.41	-0.892	-0.11	-0.64	-0.41	22.98
Maximum	-0.05	0.00	0.03	0.02	-0.17	23.12
Average	-0.16	-0.18	-0.03	-0.18	-0.28	23.04
Std. Dev.	0.12	0.26	0.05	0.22	0.08	0.05

Figure 5 (cont)

D. Test Report EA20150522T

All contact resistance measurements taken at 1.5 amperes were less than 30 milliohms initially, and had a change in resistance (ΔR) of less than 15 milliohms after testing.

Reading	Specimen ID		
	601	602	603
	Test Group 1, Test Set 6 – Initial (Milliohms)		
Minimum	24.49	25.15	25.20
Maximum	25.66	26.47	25.79
Average	25.08	25.77	25.60
Std. Dev.	0.41	0.51	0.23
N	320	320	320

Reading	Specimen ID		
	601	602	603
	Test Group 1, Test Set 6 – ΔR (Milliohms)		
Minimum	-0.96	-0.41	-0.09
Maximum	0.21	1.76	0.88
Average	-0.41	0.99	0.37
Std. Dev.	0.35	0.71	0.34
N	320	320	320

Figure 5 (cont)

Reading	Specimen ID			
	901	902	903	904
	Test Group 3, Test Set 9 – Initial (Milliohms)			
Minimum	24.89	25.67	24.29	25.70
Maximum	26.08	26.80	27.68	27.02
Average	25.56	26.35	25.35	26.19
Std. Dev.	0.52	0.41	1.23	0.53
N	320	320	320	320

Reading	Specimen ID			
	901	902	903	904
	Test Group 3, Test Set 9 – ΔR (Milliohms)			
Minimum	-0.59	-2.67	-2.14	-0.87
Maximum	0.69	0.64	1.30	1.00
Average	-0.19	-0.33	-0.48	0.19
Std. Dev.	0.43	1.11	1.13	0.57
N	320	320	320	320

Figure 4 (cont)

Reading	Specimen ID			
	1001	1002	1003	1004
	Test Group 3, Test Set 10 – Initial (Milliohms)			
Minimum	24.26	24.81	23.68	24.82
Maximum	25.04	26.56	25.05	26.91
Average	24.72	25.83	24.34	25.66
Std. Dev.	0.28	0.61	0.55	0.69
N	320	320	320	320

Reading	Specimen ID			
	1001	1002	1003	1004
	Test Group 3, Test Set 10 – ΔR (Milliohms)			
Minimum	-0.59	-3.83	-0.90	-3.23
Maximum	0.37	1.10	0.92	0.89
Average	-0.30	-0.45	-0.02	-0.89
Std. Dev.	0.33	1.77	0.62	1.28
N	320	320	320	320

Figure 5 (end)

2.4. Insulation Resistance – Test Group 4 (Test Report EA20100659T)

All insulation resistance measurements were greater than 1000 megohms.

2.5. Dielectric Withstanding Voltage - Test Group 4 (Test Report EA20100659T)

No dielectric breakdown or flashover occurred.

2.6. Resistance to Soldering Heat – Test Group 5 (Test Report EA20100659T)

No obvious visual damage, melting, blistering or other anomalies were observed on the specimens.

2.7. Random Vibration – Test Group 1 (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks or loose parts on the specimens were visible.

2.8. Mechanical Shock – Test Group 1 (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

No discontinuities were detected during vibration testing. Following mechanical shock testing, no cracks, breaks or loose parts on the specimens were visible.

2.9. Durability - (Test Reports EA20100659T, EA20100547T, EA20110223T, EA20120811T, and EA20150522T)

No physical damage occurred as a result of mating and unmating the specimens 500 times

2.10. Mating Force – Test Group 1 (Test Reports EA20100659T, EA20100547T, EA20110223T, EA20120811T, and EA20150522T)

All mating force measurements were less than 136 g times the number of contacts.

2.11. Unmating Force – Test Group 1 (Test Reports EA20100659T, EA20100547T, EA20110223T, EA20120811T, and EA20150522T)

All unmating force measurements were greater than 13 g times the number of contacts.

2.12. Thermal Shock – Test Groups 3 and 4 (Test Reports EA20100659T, EA20100547T, and EA20150522T)

No evidence of physical damage was visible as a result of exposure to 2000 cycles of thermal shock.

2.13. Humidity/Temperature Cycling – Test Group 4 (Test Report EA20100659T)

No evidence of physical damage was visible as a result of exposure to humidity/temperature cycling.

2.14. Temperature Life – Test Group 2 (Test Reports EA20100659T, EA20100547T and EA20110223T)

No evidence of physical damage was visible as a result of temperature life exposure.

2.15. Salt Spray – Test Group 1 (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

No evidence of physical damage was visible as a result of salt spray exposure.

2.16. Final Examination of Product – All Test Groups (Test Reports EA20100659T, EA20100547T, EA20110223T, and EA20150522T)

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.