COMPREHENSIVE TEST REPORT

IT3 SERIES

APPROVED	TY.ARAI
CHECKED	TM.MATSUO
PREPARED	MN.NAGATA

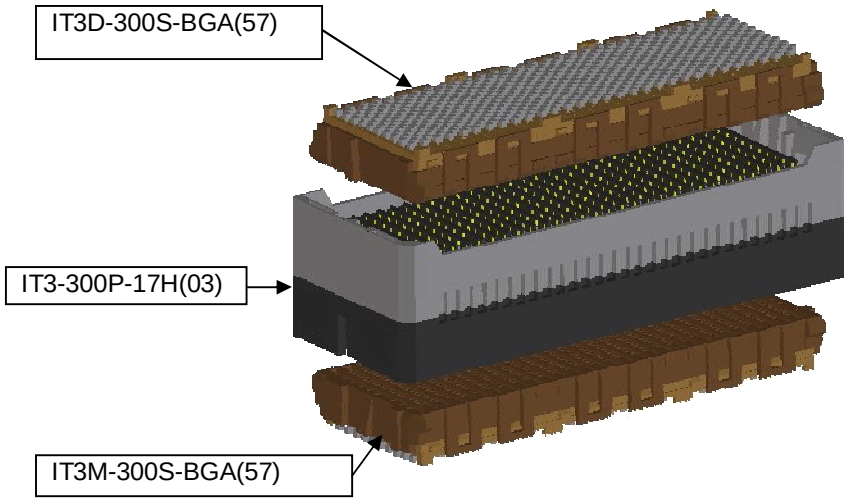
HIROSE ELECTRIC CO.,LTD.

[1] Objectives

To perform Telcordia GR1217 and EIA-TS1000 Qualification testing on IT3 board-to-board Connectors system

[2] Test Samples

Socket : IT3M-300S-BGA(57) , IT3D-300S-BGA(57)
Interposer : IT3-300P-17H(03)



[3] Test period:

From: 2007- Dec -06

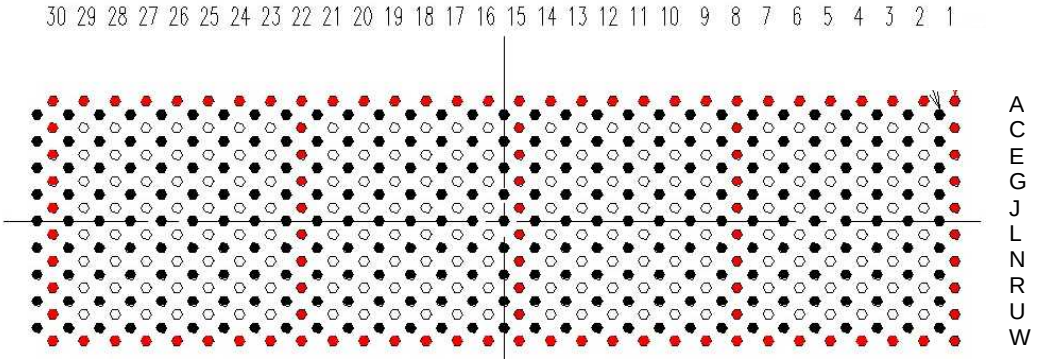
To: 2008- Feb- 06

[4] Sample ID#

The test samples were coded in the following manner:

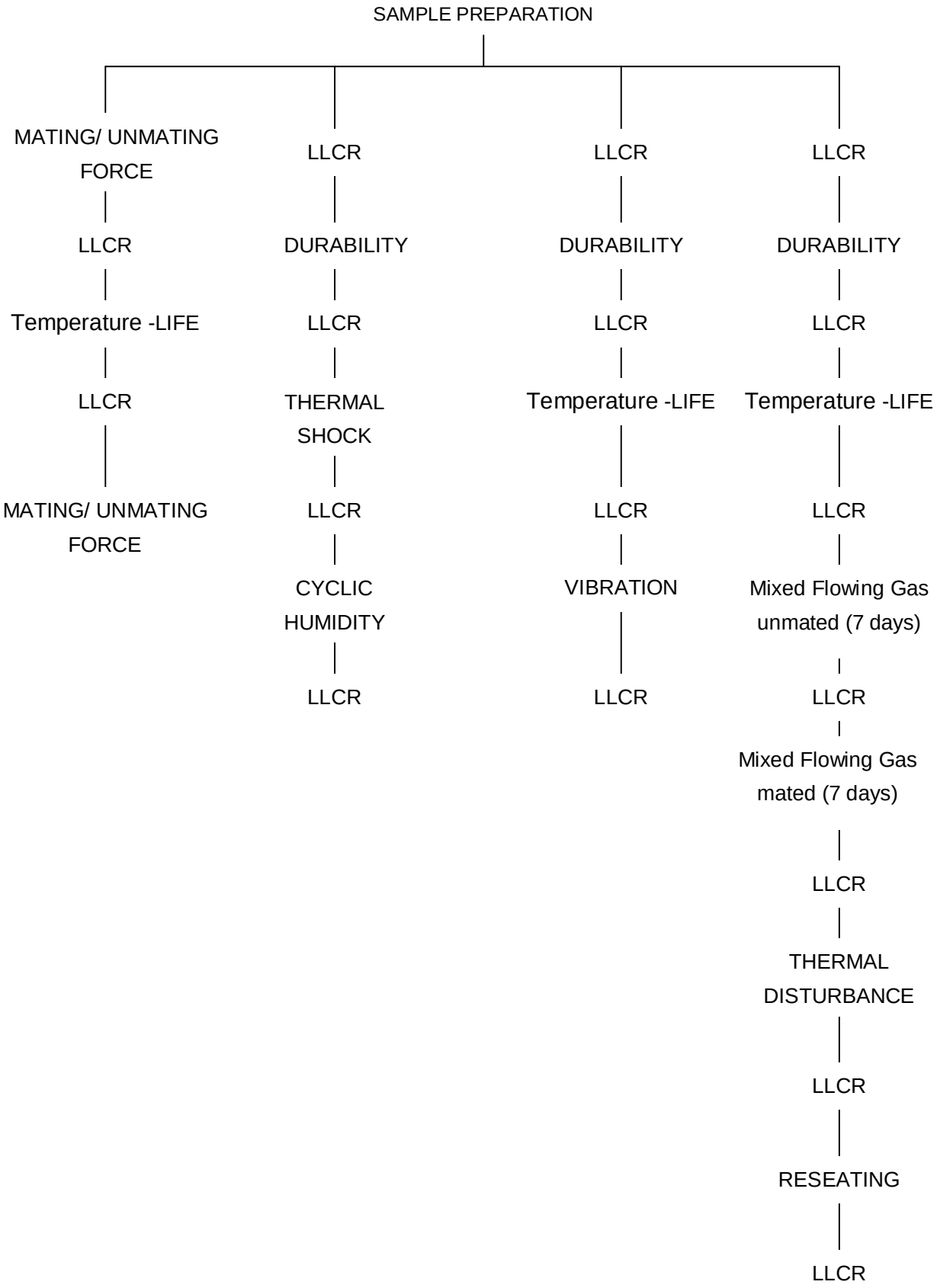
Group 1 : 1-1 , 1-2 , 1-3 , 1-4 , 1-5
Group 2 : 2-1 , 2-2 , 2-3 , 2-4 , 2-5
Group 3 : 3-1 , 3-2 , 3-3 , 3-4 , 3-5
Group 4 : 4-1 , 4-2 , 4-3 , 4-4 , 4-5

[5] Measurement point



● Signal (measurement point) , ● Ground

TEST PLAN FLOW DIAGRAM



DATA SUMARY

TEST	REQUIREMENT	RESULT
GROUP 1		
Mating Force	135N Max.	116.7 N Max
Unmating Force	15N Min.	91.9 N Min
LLCR	50.0 m ohm Max	29.6 m ohm Max
Temperature Life	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+3.7 m ohm Max. Chg.
Mating Force	135N Max.	85.8 N Max
Unmating Force	15N Min.	42.3 N Min
GROUP 2		
LLCR	50.0 m ohm Max	25.5 m ohm Max
Durability	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+3.4 m ohm Max. Chg.
Thermal Shock	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+2.1 m ohm Max. Chg.
Cyclic Humidity	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+4.6 m ohm Max. Chg.
Reseating	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+9.0 m ohm Max. Chg.
GROUP 3		
LLCR	50.0 m ohm Max	34.8 m ohm Max
Durability	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+16.9 m ohm Max. Chg.
Temperature Life	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+14.5 m ohm Max. Chg.
Random Vibration	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+18.2 m ohm Max. Chg.

DATA SUMARY - continued

TEST	REQUIREMENT	RESULT
GROUP 4		
LLCR	50.0 m ohm Max	28.0 m ohm Max
Durability	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+5.4 m ohm Max. Chg.
Temperature Life	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+7.2 m ohm Max. Chg.
Mixed Flowing Gas (7 days)	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+18.8 m ohm Max. Chg.
Mixed Flowing Gas (7 days)	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+18.6 m ohm Max. Chg.
Thermal Disturbance	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+18.1 m ohm Max. Chg.
Reseating	No Damage	Passed
LLCR	+20.0 m ohm Max. Chg.	+18.6 m ohm Max. Chg.

Test Result

Group 1

MATING AND UNMATING FORCE

PURPOSE:

To determine the mechanical forces required to mate/unmate the connectors.

PROCEDURE:

1. The test was performed in accordance with Paragraph 6.1.4 of Specification GR-1217-Core and EIS 364, Test Procedure 13.
2. The test samples were fixtured to the base plate of the test stand and applicable force gauge.
3. The fixturing was accomplished in a manner to prevent “bowing” of the test samples during the performance of the test.
4. The fixturing was accomplished to assure axial alignment and allow self centering movement to exist.
5. The test rate was 1.0 inch/minute maximum.

REQUIREMENT:

1. The force required to mate the test samples shall not exceed 135 Newtons.
2. The force required to unmate the test samples shall exceed 15 Newtons.

RESULTS:

1. The following is a summary of the data observed :

Sample ID#	MATING FORCE (Newton)	UNMATING FORCE (Newton)
1– 1	108.3	107.0
1– 2	91.0	91.9
1– 3	104.3	111.4
1– 4	107.3	110.1
1– 5	116.7	113.2

LOW LEVEL CIRCUIT RESITANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films, which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.
2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.
3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude established the stability of the interface being evaluated.

- -

PROCEDURE:

1. The test was performed in accordance with Paragraph 6.2.1 of Specification GR-1217-CORE and EIA 364, Test Procedure 23 with the following conditions:
2. Test Conditions:
   a) Test Current : 100 milliamps maximum
   b) Open Circuit Voltage : 20 millivolts
   c) No. of Positions tested : 100 per sample
3. The voltage probes were placed on the common buss of the daughter card test board and the applicable PTH's on the backplane.
4. The points of application are shown in Figure #2.

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REQUIREMENT:

Low level circuit resistance shall not exceed 50.0 milliohms.

- -

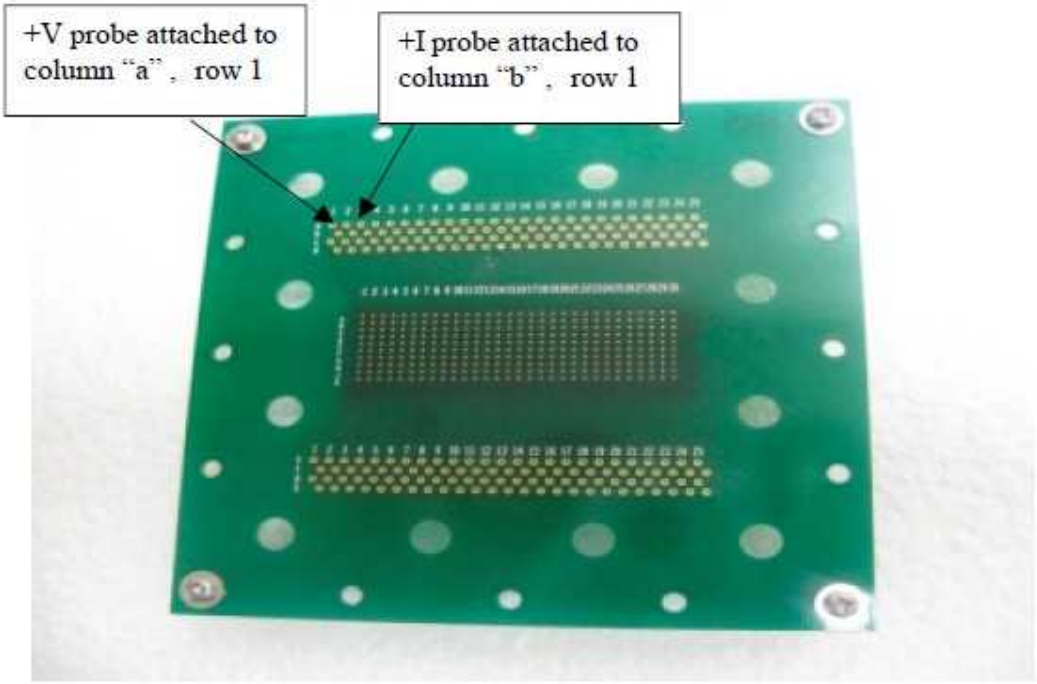
RESULTS:

1. The following is a summary of the data observed:

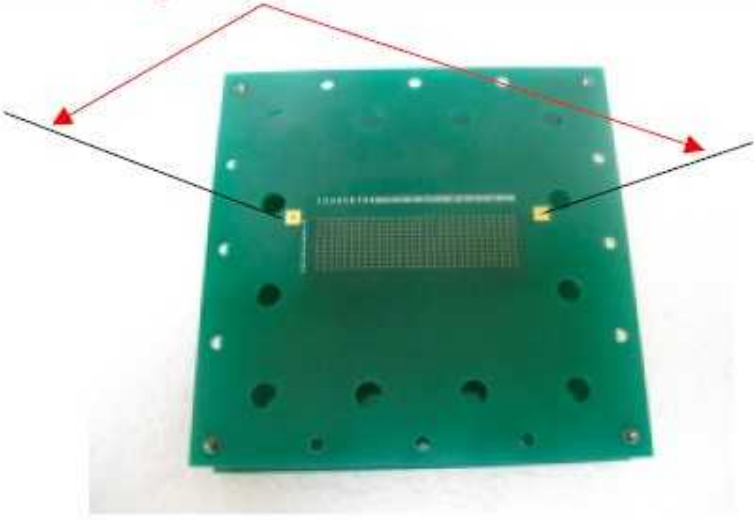
	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)		
Sample ID#	Avg.	Max.	Min.
1 – 1	19.8	28.6	17.5
1 – 2	19.4	22.7	17.1
1 – 3	20.7	29.6	18.4
1 – 4	19.8	23.8	17.8
1 – 5	20.0	27.8	17.8

FIGURE #2

TYPICAL LLCR SET-UP



The –V and –I probes are attached to either side of the common buss.



TEMPERATURE LIFE

PUROSE:

To evaluate the impact on electrical stability of the contact system when exposed to a thermal environment. Said environment may generate temperature dependent failure mechanisms such as:

a) Reduced normal (contact) force due to stress relaxation as a result of a thermal environment.

b) Dry oxidation of base metals and/or under plates, which have reached the contacting surfaces by impurity, diffusion or pore corrosion.

c) Dry oxidation and/or film formation of particulates which may have been deposited on the contacting surfaces from the surrounding atmosphere.

- -

PROCEDURE:

1. The test was performed in accordance with Paragraph 6.3.2 of Specification GR-1217-CORE and EIA 364, Test Procedure 17, Test Condition 4.
2. Test Condition:
   a) Temperature : 85°c ± 2°C
   b) Duration : 500 Hours
   c) Mated Condition : Mated
   d) Mounting Condition: Mounted
3. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.
4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

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REQUIREMENTS:

1. There shall be no evidence of physical damage or deterioration of the test samples so exposed.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.
3. The mating and unmating forces shall not exceed 135 Newtons.
4. The unmating forces shall exceed 15 Newtons.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
1 – 1	+0.1	+3.4
1 – 2	-1.2	+1.8
1 – 3	-0.2	+2.8
1 – 4	+0.3	+3.3
1 – 5	+0.2	+3.7

	MATING FORCE	UNMATING FORCE
Sample ID#	(Newton)	(Newton)
1– 1	72.9	39.3
1– 2	85.8	36.5
1– 3	75.3	42.3
1– 4	83.5	41.6
1– 5	81.5	41.3

Test Result

Group 2

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films, which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.
2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.
3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23 with the following conditions:
2. Test Conditions:
   a) Test Current : 100 milliamps maximum
   b) Open Circuit Voltage : 20 millivolts
   c) No. of Positions tested : 100 per test sample
3. The voltage probes were placed on the common buss of the daughter card test board and the applicable PTH's on the backplane.
4. The points of application are shown in Figure #2.

- -

REQUIREMENT:

Low level circuit resistance shall not exceed 50.0 milliohms.

- -

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)		
Sample ID#	Avg.	Max.	Min.
2 – 1	19.1	23.7	17.2
2 – 2	19.8	23.7	17.8
2 – 3	18.8	25.5	16.9
2 – 4	20.2	24.7	17.7
2 – 5	19.4	23.8	17.1

DURABILITY

PURPOSE:

1. This is a preconditioning sequence, which is used to induce the type of wear on the contacting surfaces, which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.
2. This type of preconditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses, which in turn, may result in an unstable electrical condition to exist.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.
2. Test Conditions:
   a) No. of Cycles : 25
3. The test was performed manually in accordance with instructions provided by the test sponsor.
4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested.
2. The following is a summary of the data observed :

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
2 – 1	+0.1	+2.5
2 – 2	-0.6	+1.2
2 – 3	-0.1	+3.4
2 – 4	-0.8	+2.1
2 – 5	-0.4	+1.2

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and the shock of alternate exposure to these extremes, simulating the worst probable conditions of storage, transportation and application.

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PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 32, with the following conditions:
2. Test Conditions:
   a) Number of Cycles : 10 Cycles
   b) Hot Extreme : +85 +3°C/ -0°C
   c) Cold Extreme : -55 +0°C/ -3°C
   d) Time at Temperature : 30 Minutes
   e) Mating Conditions : Mated
   f) Mounting Conditions : Mounted
   g) Transfer Time : Instantaneous
3. The total number of cycles was performed continuously.
4. All subsequent variable testing was performed in accordance with the procedures as previously indicated.
5. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

- -

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested.
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
2 – 1	-0.1	+1.5
2 – 2	-0.6	+1.5
2 – 3	-0.3	+2.1
2 – 4	-0.6	+1.4
2 – 5	-0.1	+2.0

HUMIDITY (THERMAL CYCLING)

PURPOSE:

To evaluate the impact on electrical stability of the contact system when exposed to any environment which may generate thermal/moisture type failure mechanisms such as:

a) Fretting corrosion due to wear resulting from micro motion, induced by thermal cycling. Humidity accelerates the oxidation process.

b) Oxidation of wear debris or from particulates from the surrounding atmosphere, which may have become entrapped between the contacting surfaces.

c) Failure mechanisms resulting from a wet oxidation process.

- -

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, TS1000.01 and Test Procedure 31 with the following conditions:
2. Test Conditions:
   a) Relative Humidity : 80% @ 25°C, 50% @ 65°C
   b) Temperature Conditions : 25°C to 65°C
   c) Number of Cycles : 24
   d) Mating Conditions : Mated
   e) Mounting Conditions : Mounted
   f) Cycle Duration : 3 Hours
3, Following the post cyclic humidity variable measurements, the samples were subjected to a 3-cycle reseat test.
4. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.
5. All subsequent variable testing was performed in accordance with the procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence of physical deterioration of the test samples as tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE

	After Cyclic Humidity		After Reseating	
	Avg.	Max.	Avg.	Max.
Sample ID#	Change	Change	Change	Change
2 – 1	+0.9	+4.6	+0.4	+2.9
2 – 2	-1.1	+2.3	-0.2	+3.4
2 – 3	-0.7	+1.2	-0.1	+2.5
2 – 4	-1.6	+1.3	+0.0	+9.0
2 – 5	-0.9	+0.9	-0.1	+2.8

Test Result

Group 3

LOW LEVEL CURCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films, which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.
2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.
3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23 with the following conditions:
2. Test Conditions:
   a) Test Current : 100 milliamps maximum
   b) Open Circuit Voltage : 20 millivolts
   c) No. of Positions Tested : 100 per test sample
3. The voltage probes were placed on the common buss of the daughter card test board and the applicable PTH’s on the backplane.
4. The points of application are shown in Figure #2.

- -

REQUIREMENT:

Low level circuit resistance shall not exceed 50.0 milliohms.

- -

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)		
Sample ID#	Avg.	Max.	Min.
3 – 1	21.9	32.0	19.1
3 – 2	22.2	34.8	19.1
3 – 3	21.7	32.9	18.6
3 – 4	21.4	26.8	18.8
3 – 5	20.9	27.5	18.4

DURABILITY

PURPOSE:

1. This is a preconditioning sequence, which is used to induce the type of wear on the contacting surfaces, which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.
2. This type of preconditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses, which in turn, may result in an unstable electrical condition to exist.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.
2. Test Conditions:
   a) No. of Cycles : 25
3. The test was performed manually in accordance with instructions provided by the test sponsor.
4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
Sample ID#	Avg. Change	Max. Change
3 – 1	+0.0	+16.9
3 – 2	-1.0	+14.1
3 – 3	-0.6	+8.2
3 – 4	+0.3	+7.4
3 – 5	+0.5	+4.7

TEMPERATURE LIFE

PURPOSE:

To evaluate the impact on electrical stability of the contact system when exposed to a thermal environment. Said environment may generate temperature dependent failure mechanisms such as:

a) Dry oxidation of the contacting surfaces when non-noble finish systems are utilized.

b) Dry oxidation due to smearing of base metal and/or underplate on the contact surfaces or exposure of same due to wear.

c) Dry oxidation and/or film formation of particulates, which may have been deposited on the contacting, surfaces from the surrounding atmosphere.

- -

PROCEDURE:

1. The test samples were placed in the test chamber after it had reached equilibrium at the specified temperature level. The test exposure was performed in accordance with EIA 364, test Procedure 17, with the following conditions:

2. Test Condition:

   a) Temperature : 115°C ± 2°C

   b) Duration : 24 Hours

   c) Mated Condition : Mated

   d) Mounting Condition : Mounted

3. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
Sample ID#	Avg. Change	Max. Change
3 – 1	+0.2	+8.1
3 – 2	+0.6	+9.7
3 – 3	+1.3	+8.8
3 – 4	+1.7	+14.5
3 – 5	+0.7	+4.6

VIBRATION, RANDOM

PURPOSE:

1. To determine if the contact system is susceptible to fretting corrosion.
2. To determine if the electrical stability of the system has degraded when exposed to a vibratory environment.
3. To determine if electrical discontinuities at the level specified exist.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, TS 1000.01 and EIA 364, Test Procedure 28, Test Condition VII, Letter D.
2. Test Conditions:
   a) Power Spectral Density : 0.02 g^2 / Hz
   b) G 'RMS' : 3.13
   c) Frequency : 20 to 500 Hz
   d) Duration : 15 mins per axis (3 axis total)
3. Discontinuity monitoring was performed on the following 5 position sets per sample : A1, L15, A30 , W30 , W1
4. All subsequent variable testing was performed in accordance with procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence pf physical damage to the test samples as tested.
2. There shall be no contact interruption greater than 1.0 microsecond.
3. The low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. There was no interruption greater than 1.0 microsecond.
3. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
3 – 1	+2.2	+14.9
3 – 2	+0.5	+8.6
3 – 3	+1.6	+18.2
3 – 4	+1.7	+14.0
3 – 5	+2.9	+17.8

Test Result

Group 4

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films, which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.
2. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the contact systems as they progress through the applicable test sequences.
3. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 23 with the following conditions:
2. Test Conditions:
   a) Test Current : 100 milliamps maximum
   b) Open Circuit Voltage : 20 millivolts
   c) No. of Positions Tested : 100 per test sample
3. The voltage probes were placed on the common buss of the daughter card test board and the applicable PTH's on the backplane.
4. The points of application are shown in Figure #2.

- -

REQUIREMENT:

Low level circuit resistance shall not exceed 50.0 milliohms.

- -

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)		
Sample ID#	Avg.	Max.	Min.
4 – 1	20.8	24.1	18.8
4 – 2	20.5	24.0	18.4
4 – 3	20.6	23.5	18.4
4 – 4	21.5	28.0	18.5
4 – 5	21.3	27.6	18.7

DURABILITY

PURPOSE:

1. This is a preconditioning sequence, which is used to induce the type of wear on the contacting surfaces, which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.
2. This type of preconditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses, which in turn, may result in an unstable electrical condition to exist.

- -

PROCEDURE:

1. The test was performed in accordance with EIA 364, Test Procedure 09.
2. Test Conditions:
   a) No. of Cycles : 25
3. The test was performed manually in accordance with instructions provided by the test sponsor.
4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

- -

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
4 – 1	-0.2	+1.6
4 – 2	-0.2	+3.3
4 – 3	+0.4	+3.2
4 – 4	-0.5	+4.3
4 – 5	-0.7	+5.4

TEMPERATURE LIFE

PURPOSE:

To evaluate the impact on electrical stability of the contact system when exposed to a thermal environment. Said environment may generate temperature dependent failure mechanisms such as:

a) Dry oxidation of the contacting surfaces when non-noble finish systems are utilized.

b) Dry oxidation due to smearing of base metal and/or underplate on the contact surfaces or exposure of same due to wear.

c) Dry oxidation and/or film formation of particulates which may have been deposited on the contacting surfaces from the surrounding atmosphere.

- -

PROCEDURE:

1. The test samples were placed in the test chamber after it had reached equilibrium at the specified temperature level. The test exposure was performed in accordance with EIA 364, Test Procedure 17, with the following conditions:

2. Test Conditions:

   a) Temperature : 115°C ± 2°C

   b) Duration : 24 hours

   c) Mated Condition : Mated

   d) Mounted Condition : Mounted

3. Prior to performing variable measurements, the test samples were allowed to recover to room ambient conditions.

4. All subsequent variable testing was performed in accordance with the procedures previously indicated.

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REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. The change in low level circuit resistance shall not exceed +20.0 Milliohms.

- -

RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed:

	CHANGE IN LOW LEVEL CIRCUIT RESISTANCE (Milliohms)	
	Avg.	Max.
Sample ID#	Change	Change
4 – 1	+0.2	+3.0
4 – 2	+0.4	+3.3
4 – 3	+0.7	+7.2
4 – 4	+0.0	+6.8
4 – 5	+0.2	+6.5

MIXED FLOWING GAS

PURPOSE:

1. To determine the impact on electrical stability of contact interfaces when the test samples are exposed to a mixed flowing gas environment. Said environment is based on field data simulating typical, severe, non-benign environments. Said exposure is indicative of expected behavior in the field.
2. Mixed flowing gas tests (MFG) are environmental test procedures whose primary purpose is to evaluate product performance under simulated storage or operating (field) conditions. For parts involving plated contact surfaces, such tests are also used to measure the effect of plating degradation (due to the environment) on the electrical and durability properties of contact or connector system. The specific test conditions are usually chosen so as to stimulate, in the test laboratory, the effects of certain representative field environments or environmental severity levels on standard metallic surfaces.

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PROCEDURE:

1. The test environment was performed in accordance with EIA 364, TS1000.01 and EIA 364, Test Procedure 65 with the following conditions.
2. Environmental Conditions:

a)	Temperature	:	30°C ± 1°C
b)	Relative Humidity	:	70% ± 2%
c)	$C1_2$	:	10 ± 3 ppb
d)	NO_2	:	200 ± 50 ppb
e)	H_2S	:	10 ± 5 ppb
f)	SO_2	:	100 ± 20 ppb
g)	Exposure Time	:	20 Days Total
h)	Mating Conditions	:	Day 1-10 All samples exposed unmated
		:	Day 11-20 All samples exposed mated
i)	Mounting Conditions	:	Mounted

3. The test chamber was allowed to stabilize at the specified conditions indicated.
4. After stabilization, the test samples and control coupons were placed in the chamber such that they were no closer than 2.0” from each other and/or the chamber walls.

PROCEDURE: - continued

5. The test samples were handled in a manner so as not to disturb the contact interface.
6. After placement of the test samples in the chamber, it was allowed to re-stabilize and adjust as required to maintain the specified concentrations and conditions.
7. The test chamber was monitored periodically during the exposure period to assure the environmental conditions as specified were maintained.
8. During the exposure, resistance measurements were taken at specific intervals and in the following sequence:
   a) Place the test samples in the test chamber.
   b) At each designated measurement period, remove the test units from the test chamber. The test samples were exposed to room ambient for two hours prior to making measurements.
   c) Measure and record low level circuit resistance measurements.
   d) Upon completion of the measurements, place the test units back into the test chamber until the next measurement interval or until completion of the test duration.
9. Testing was performed in the following sequence:
   a) MFG, 7 Days (Unmated)
   b) LLCR
   c) MFG, 7 Days (Mated)
   d) LLCR
   e) Thermal Disturbance (10 cycles)
   f) LLCR
   g) Reseat, 3X (Unmate/Mate)
   h) LLCR
10. Thermal Disturbance was performed in accordance with EIA 364, Test Procedure 32 and the following conditions:
    a) Number of Cycles : 10 Cycles
    b) Hot Extreme : +85 +3°C/-0°C
    c) Cold Extreme : +15 +0°c/-3°C
    d) Time at temperature : 10 Minutes
    e) Ramp Time Hot to Cold : 15 Minutes
    f) Ramp Time Cold to Hot : 15 Minutes
11. All subsequent variable testing was performed in accordance with the procedures previously indicated.

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REQUIREMENTS:

1. There shall be no evidence of damage or corrosion to the test samples as exposed which will cause mechanical or electrical malfunction of the said samples.
2. The change in low level circuit resistance shall not exceed +20.0 milliohms.

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RESULTS:

1. There was no evidence of physical damage to the test samples as tested
2. The following is a summary of the data observed :

CHANGE IN
LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

	Unmated 7 days		Mated 7 days	
Sample ID#	Avg. Change	Max. Change	Avg. Change	Max. Change
4 – 1	+3.2	+18.7	+6.4	+17.4
4 – 2	+5.5	+17.7	+10.0	+18.4
4 – 3	+6.0	+18.8	+11.1	+18.6
4 – 4	+4.7	+16.4	+8.3	+16.9
4 – 5	+5.9	+17.3	+6.4	+17.2

	After Thermal Disturbance		After Reseating	
Sample ID#	Avg. Change	Max. Change	Avg. Change	Max. Change
4 – 1	+7.7	+18.5	+10.2	+18.3
4 – 2	+8.3	+18.1	+7.1	+17.3
4 – 3	+6.2	+17.2	+11.6	+18.6
4 – 4	+5.6	+15.4	+9.0	+17.8
4 – 5	+3.9	+16.3	+8.2	+18.0