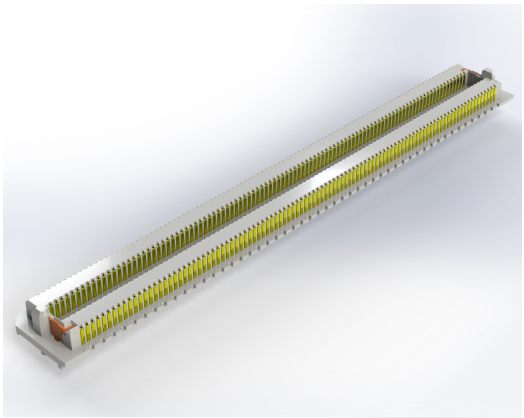
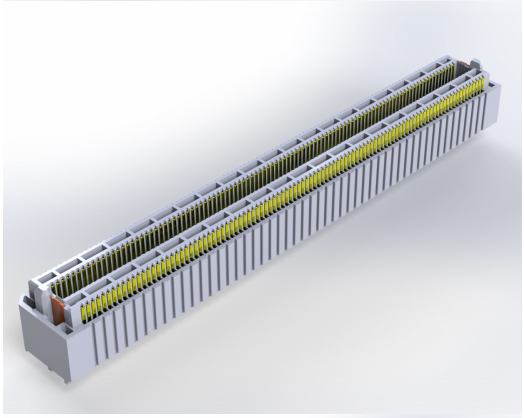
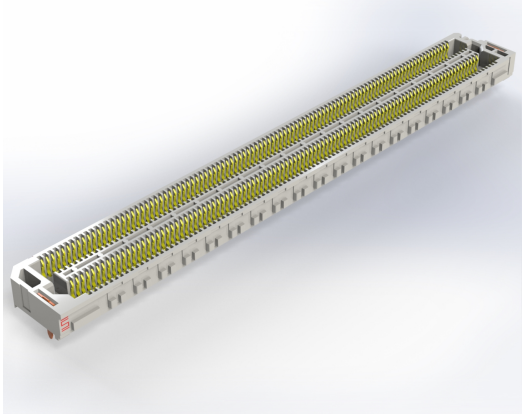
Project Number: Design Qualification Test Report	Tracking Code: CR-976601_Report_Rev_1
Requested by: Emmanuel Davis	Date: 1/24/2025
Part #: ASP-230333-02(WT Male 1.5)/ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)	
Part description: ASP/ASP	Tech: John Crawford, Daniel Haydon
Test Start: 2/26/2024	Test Completed: 3/20/2024







Actual part not depicted

DESIGN QUALIFICATION TEST REPORT

ASP

ASP-230333-02(WT Male 1.5)/ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

* WT=Weld Tab

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
9/10/2024	**1**	**Initial test**	**KH**

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

To perform the following tests: Design Qualification test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used for LLCR and DWV/IR testing were cleaned according to CO-SC-WI-3029.
4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
5) The automated procedure is used with aqueous compatible soldering materials.
6) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead Free
9) Samtec Test PCBs used: PCB-113027-TST-XX, PCB-112864-TST-XX.

FLOWCHARTS

Mating/Unmating/Durability

Group 1 ASP-230333-02 ASP-230332-02 8 Assemblies 5mm Stack Height WT		Group 2 ASP-230336-02 ASP-230332-02 8 Assemblies 10mm Stack Height WT	
Step	**Description**	**Step**	**Description**
1.	Contact Gaps	1.	Contact Gaps
2.	LLCR (2)	2.	LLCR (2)
3.	Mating/Unmating Force (3)	3.	Mating/Unmating Force (3)
4.	Cycles Quantity = 25 Cycles	4.	Cycles Quantity = 25 Cycles
5.	Mating/Unmating Force (3)	5.	Mating/Unmating Force (3)
6.	Contact Gaps	6.	Contact Gaps
7.	LLCR (2) Max Delta = 15 mOhm	7.	LLCR (2) Max Delta = 15 mOhm
8.	Thermal Shock (4)	8.	Thermal Shock (4)
9.	LLCR (2) Max Delta = 15 mOhm	9.	LLCR (2) Max Delta = 15 mOhm
10.	Humidity (1)	10.	Humidity (1)
11.	LLCR (2) Max Delta = 15 mOhm	11.	LLCR (2) Max Delta = 15 mOhm
12.	Mating/Unmating Force (3)	12.	Mating/Unmating Force (3)
13.	Contact Gaps	13.	Contact Gaps

(1) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(3) Mating/Unmating Force = EIA-364-13

(4) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

FLOWCHARTS Continued

IR/DWV

Pin-to-Closest Metallic Hardware

Group 1 ASP-230333-02 ASP-230332-02 2 Assemblies		Group 2 ASP-230333-02 2 Assemblies		Group 3 ASP-230332-02 2 Assemblies		Group 4 ASP-230333-02 ASP-230332-02 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	IR (4)
						2.	DWV at Test Voltage (1)
						3.	Thermal Shock (5)
						4.	IR (4)
						5.	DWV at Test Voltage (1)
						6.	Humidity (3)
						7.	IR (4)
						8.	DWV at Test Voltage (1)

Group 5 ASP-230336-02 ASP-230332-02 2 Assemblies		Group 6 ASP-230336-02 2 Assemblies		Group 7 ASP-230332-02 2 Assemblies		Group 8 ASP-230336-02 ASP-230332-02 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	IR (4)
						2.	DWV at Test Voltage (1)
						3.	Thermal Shock (5)
						4.	IR (4)
						5.	DWV at Test Voltage (1)
						6.	Humidity (3)
						7.	IR (4)
						8.	DWV at Test Voltage (1)

(1) DWV at Test Voltage = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(2) DWV Breakdown = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(3) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

(4) IR = EIA-364-21
Test Condition = 500 Vdc, 2 Minutes Max

(5) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/LLCR

Group 1 ASP-230333-02 ASP-230332-02 8 Assemblies 5mm Stack Height WT		Group 2 ASP-230336-02 ASP-230332-02 8 Assemblies 10mm Stack Height WT	
Step	**Description**	**Step**	**Description**
1.	LLCR (1)	1.	LLCR (1)
2.	Mechanical Shock (2)	2.	Mechanical Shock (2)
3.	Random Vibration (3)	3.	Random Vibration (3)
4.	LLCR (1) Max Delta = 15 mOhm	4.	LLCR (1) Max Delta = 15 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Mechanical Shock = EIA-364-27
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(3) Random Vibration = EIA-364-28
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

Mating/Unmating/Basic

Group 1 ASP-230333-02 ASP-209946-01 Non WT Female - WT 1.5 Male		Group 2 ASP-209948-01 ASP-230332-02 WT Female - Non WT 6.5 Male	
Step	**Description**	**Step**	**Description**
1.	Contact Gaps	1.	Contact Gaps
2.	Mating/Unmating Force (1)	2.	Mating/Unmating Force (1)
3.	Cycles Quantity = 25 Cycles	3.	Cycles Quantity = 25 Cycles
4.	Mating/Unmating Force (1)	4.	Mating/Unmating Force (1)

(1) Mating/Unmating Force = EIA-364-13

FLOWCHARTS Continued

Pull

Group 1
ASP-214802-01

5 Assemblies
Control - 1.5 Male
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Group 2
ASP-209946-01

5 Assemblies
Control - 3.5 Female
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Group 3
ASP-209948-01

5 Assemblies
Control - 6.5 Male
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Group 4
ASP-230333-02

8 Assemblies
Male 1.5 WT
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Group 5
ASP-230332-02

8 Assemblies
Female 3.5 WT
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Group 6
ASP-230336-02

8 Assemblies
Male 6.5 WT
Note: Position fixture between assembly and PCB. Secure fixture to AT-3050-109 base and PCB to AT-1817-209 base. Pull until assembly pulls free of PCB.

Step	Description
1.	Connector Pull

Shear

Group 1
ASP-214802-01

5 Assemblies
Control - 1.5 Male
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

Group 2
ASP-209946-01

5 Assemblies
Control - 3.5 Female
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

Group 3
ASP-209948-01

5 Assemblies
Control - 6.5 Male
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

Group 4
ASP-230333-02

8 Assemblies
Male 1.5 WT
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

Group 5
ASP-230332-02

8 Assemblies
Female 3.5 WT
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

Group 6
ASP-230336-02

8 Assemblies
Male 6.5 WT
Note: Secure assembly to plate perpendicular to base. Position steel fixture above assembly and apply downward force until physical failure.

Step	Description
1.	Connector Shear

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition I: -55°C to +85°C.
3) Test Time: ½ hour dwell at each temperature extreme.
4) Number of Cycles: 100
5) All test samples are pre-conditioned at ambient.
6) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition B, 240 Hours.
3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition C
3) Peak Value: 100 G
4) Duration: 6 Milliseconds
5) Wave Form: Half Sine
6) Velocity: 12.3 ft/s
7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

VIBRATION:

1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition V, Letter B
3) Power Spectral Density: 0.04 G^2 / Hz
4) G 'RMS': 7.56
5) Frequency: 50 to 2000 Hz
6) Duration: 2.0 Hours per axis (3 axis total)

MATING/UNMATING:

1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

LLCR:

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
3) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
    a. <= +5.0 mOhms: ----------Stable
    b. +5.1 to +10.0 mOhms:----------Minor
    c. +10.1 to +15.0 mOhms: ----------Acceptable
    d. +15.1 to +50.0 mOhms: ----------Marginal
    e. +50.1 to +1000 mOhms: ----------Unstable
    f. >+1000 mOhms:----------Open Failure

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

INSULATION RESISTANCE (IR):

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

1) PROCEDURE:
    a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Electrification Time 2.0 minutes
        iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
2) MEASUREMENTS:
3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 5000 megohms.

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

To determine if the sockets can operate at its rated voltage and withstand momentary over potentials due to switching, surges, and other similar phenomenon. Separate samples are used to evaluate the effect of environmental stresses so not to influence the readings from arcing that occurs during the measurement process.

1) PROCEDURE:
    a. Reference document: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Barometric Test Condition 1
        iii. Rate of Application 500 V/Sec
        iv. Test Voltage (VAC) until breakdown occurs.
2) MEASUREMENTS/CALCULATIONS
    a. The breakdown voltage shall be measured and recorded.
    b. The dielectric withstanding voltage shall be recorded as 75% of the minimum breakdown voltage.
    c. The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

RESULTS

Mating – Unmating Forces

Mating/Unmating Durability

Group1: ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

- **Initial**
  - **Mating**
    - **Min ----------21.12 lbs**
    - **Max----------24.14 lbs**
  - **Unmating**
    - **Min ---------- 9.07 lbs**
    - **Max----------23.46 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------11.26 lbs**
    - **Max----------27.59 lbs**
  - **Unmating**
    - **Min ---------- 8.81 lbs**
    - **Max----------13.57 lbs**
- **After Humidity**
  - **Mating**
    - **Min ----------14.10 lbs**
    - **Max----------16.38 lbs**
  - **Unmating**
    - **Min ---------- 8.16 lbs**
    - **Max----------10.89 lbs**

Group2: ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

- **Initial**
  - **Mating**
    - **Min ----------22.36 lbs**
    - **Max----------28.74 lbs**
  - **Unmating**
    - **Min ----------12.98 lbs**
    - **Max----------15.18 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------29.42 lbs**
    - **Max----------33.85 lbs**
  - **Unmating**
    - **Min ----------13.43 lbs**
    - **Max----------15.81 lbs**
- **After Humidity**
  - **Mating**
    - **Min ----------17.67 lbs**
    - **Max----------20.60 lbs**
  - **Unmating**
    - **Min ----------11.39 lbs**
    - **Max----------13.05 lbs**

RESULTS Continued

Mating/Unmating Basic

Group1: ASP-230333-02(WT Male 1.5)/ASP-209946-01(Non-WT Female 3.5)

- **Initial**
  - **Mating**
    - **Min ----------19.34 lbs**
    - **Max----------21.28 lbs**
  - **Unmating**
    - **Min ---------- 9.15 lbs**
    - **Max----------11.72 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------22.09 lbs**
    - **Max----------25.21 lbs**
  - **Unmating**
    - **Min ----------12.26 lbs**
    - **Max----------15.06 lbs**

Group2: ASP-209948-01(Non-WT Male 6.5)/ASP-230332-02(WT Female 3.5)

- **Initial**
  - **Mating**
    - **Min ----------23.88 lbs**
    - **Max----------27.46 lbs**
  - **Unmating**
    - **Min ----------15.68 lbs**
    - **Max----------18.91 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------29.55 lbs**
    - **Max----------33.68 lbs**
  - **Unmating**
    - **Min ----------17.09 lbs**
    - **Max----------18.43 lbs**

RESULTS Continued

Pull Force:

Group1: ASP-214802-01(Control – 1.5 Male)
- **Min----------49.01 lbs**
- **Max ----------56.33 lbs**

Group4: ASP-230333-02(Male 1.5 WT)
- **Min----------52.19 lbs**
- **Max ----------73.41 lbs**

Group2: ASP-209946-01(Control – 3.5 Female)
- **Min---------- 103.49 lbs**
- **Max ---------- 123.81 lbs**

Group5: ASP-230332-02(Female 3.5 WT)
- **Min---------- 105.43 lbs**
- **Max ---------- 113.88 lbs**

Group3: ASP-209948-01(Control – 6.5 Male)
- **Min----------58.32 lbs**
- **Max ----------69.16 lbs**

Group6: ASP-230336-02(Male 6.5 WT)
- **Min---------- 119.09 lbs**
- **Max ---------- 124.65 lbs**

Shear Force:

Group1: ASP-214802-02(Control – 1.5 Male)
- **Min----------36.22 lbs**
- **Max ----------58.73 lbs**

Group4: ASP-230333-02(Male 1.5 WT)
- **Min---------- 160.31 lbs**
- **Max ---------- 179.58 lbs**

Group2: ASP-209946-02(Control – 3.5 Female)
- **Min----------91.32 lbs**
- **Max ---------- 131.35 lbs**

Group5: ASP-230332-02(Female 3.5 WT)
- **Min---------- 129.00 lbs**
- **Max ---------- 170.68 lbs**

Group3: ASP-209948-02(Control – 6.5 Male)
- **Min----------33.61 lbs**
- **Max ----------93.33 lbs**

Group6: ASP-230336-02(Male 6.5 WT)
- **Min---------- 154.17 lbs**
- **Max ---------- 221.08 lbs**

RESULTS Continued

Insulation Resistance minimums, IR

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

Pin to Closest Metallic Hardware

Position 1 to Weld Tab

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

Position 100 to Weld Tab

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

Pin to Closest Metallic Hardware

Position 1 to Weld Tab

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

Position 100 to Weld Tab

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

RESULTS Continued

Dielectric Withstanding Voltage minimums, DWV

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

- **Minimums**
  - **Breakdown Voltage---------- 1388 VAC**
  - **Test Voltage ---------- 1041 VAC**
  - **Working Voltage ----------347 VAC**

Pin to Closest Metallic Hardware

Position 1 to Weld Tab

- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

Position 100 to Weld Tab

- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

- **Minimums**
  - **Breakdown Voltage---------- 1187 VAC**
  - **Test Voltage ----------890 VAC**
  - **Working Voltage ----------297 VAC**

Pin to Closest Metallic Hardware

Position 1 to Weld Tab

- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

Position 100 to Weld Tab

- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

RESULTS Continued

LLCR Durability (928 LLCR test points)

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

- **Initial ---------- 25.97 mOhms Max**
- **Durability, 25 Cycles**
  - **<= +5.0 mOhms----------927 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**
- **Thermal**
  - **<= +5.0 mOhms----------927 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms----------915 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms---------- 13 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

- **Initial ---------- 33.55 mOhms Max**
- **Durability, 25 Cycles**
  - **<= +5.0 mOhms----------928 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**
- **Thermal**
  - **<= +5.0 mOhms----------928 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms----------922 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------6 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

RESULTS Continued

LLCR Shock & Vibration (928 LLCR test points)

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

- **Initial ---------- 25.89 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms----------924 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------4 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

- **Initial ---------- 38.92 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms----------924 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------4 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

DATA SUMMARIES

MATING/UNMATING:

Mating/Unmating Durability

Group1: ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	93.92	21.12	40.34	9.07	50.08	11.26	39.19	8.81
Maximum	107.35	24.14	104.35	23.46	122.70	27.59	60.36	13.57
Average	101.71	**22.87**	53.93	**12.12**	102.67	**23.08**	54.93	**12.35**
St Dev	4.14	0.93	20.57	4.62	22.06	4.96	6.68	1.50
Count	8	8	8	8	8	8	8	8

	After Humidity			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	62.72	14.10	36.30	8.16
Maximum	72.86	16.38	48.44	10.89
Average	68.36	**15.37**	43.67	**9.82**
St Dev	3.68	0.83	3.92	0.88
Count	8	8	8	8

Group2: ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	99.46	22.36	57.71	12.98	130.86	29.42	59.74	13.43
Maximum	127.81	28.74	67.52	15.18	150.56	33.85	70.30	15.81
Average	111.42	**25.05**	61.70	**13.87**	138.05	**31.04**	64.77	**14.56**
St Dev	10.99	2.47	3.12	0.70	5.91	1.33	4.27	0.96
Count	8	8	8	8	8	8	8	8

	After Humidity			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	78.60	17.67	50.66	11.39
Maximum	91.63	20.60	58.05	13.05
Average	83.96	**18.88**	54.65	**12.29**
St Dev	4.80	1.08	2.44	0.55
Count	8	8	8	8

DATA SUMMARIES Continued

Mating/Unmating Basic

Group1: ASP-230333-02(WT Male 1.5)/ASP-209946-01(Non-WT Female 3.5)

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	86.02	19.34	40.70	9.15	98.26	22.09	54.53	12.26
Maximum	94.65	21.28	52.13	11.72	112.13	25.21	66.99	15.06
Average	89.80	**20.19**	44.65	**10.04**	106.86	**24.03**	59.75	**13.43**
St Dev	3.78	0.85	3.60	0.81	4.76	1.07	3.90	0.88
Count	8	8	8	8	8	8	8	8

Group2: ASP-209948-01(Non-WT Male 6.5)/ASP-230332-02(WT Female 3.5)

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	106.22	23.88	69.74	15.68	131.44	29.55	76.02	17.09
Maximum	122.14	27.46	84.11	18.91	149.81	33.68	81.98	18.43
Average	114.07	**25.65**	76.51	**17.20**	138.44	**31.13**	78.79	**17.71**
St Dev	4.73	1.06	5.35	1.20	6.77	1.52	2.12	0.48
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

Pull Force:

Group1: ASP-214802-01(Control - 1.5 Male)

	Force (lbs)
Minimum	**49.01**
Maximum	56.33
Average	53.23

Group4: ASP-230333-02(Male 1.5 WT)

	Force (lbs)
Minimum	**52.19**
Maximum	73.41
Average	63.87

Group2: ASP-209946-01(Control – 3.5 Female)

	Force (lbs)
Minimum	**103.49**
Maximum	123.81
Average	112.80

Group5: ASP-230332-02(Female 3.5 WT)

	Force (lbs)
Minimum	**105.43**
Maximum	113.88
Average	111.06

Group3: ASP-209948-01(Control – 6.5 Male)

	Force (lbs)
Minimum	**58.32**
Maximum	69.16
Average	62.89

Group6: ASP-230336-02(Male 6.5 WT)

	Force (lbs)
Minimum	**119.09**
Maximum	124.65
Average	121.75

DATA SUMMARIES Continued

Shear Force:

Group1: ASP-214802-02(Control – 1.5 Male)

	Force (lbs)
Minimum	**36.22**
Maximum	58.73
Average	48.96

Group4: ASP-230333-02(Male 1.5 WT)

	Force (lbs)
Minimum	**160.31**
Maximum	179.58
Average	169.62

Group2: ASP-209946-02(Control – 3.5 Female)

	Force (lbs)
Minimum	**91.32**
Maximum	131.35
Average	111.92

Group5: ASP-230332-02(Female 3.5 WT)

	Force (lbs)
Minimum	**129.00**
Maximum	170.68
Average	149.29

Group3: ASP-209948-02(Control – 6.5 Male)

	Force (lbs)
Minimum	**33.61**
Maximum	93.33
Average	67.14

Group6: ASP-230336-02(Male 6.5 WT)

	Force (lbs)
Minimum	**154.17**
Maximum	221.08
Average	182.04

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

Position 1 to Weld Tab

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**ASP (M)/ASP (F)**	**ASP (M)**	**ASP (F)**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

Position 100 to Weld Tab

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**ASP (M)/ASP (F)**	**ASP (M)**	**ASP (F)**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

Position 1 to Weld Tab

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**ASP (M)/ASP (F)**	**ASP (M)**	**ASP (F)**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

Position 100 to Weld Tab

	Pin to Closest Metallic Hardware		
	Mated	Unmated	Unmated
Minimum	**ASP (M)/ASP (F)**	**ASP (M)**	**ASP (F)**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

DATA SUMMARIES Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

Voltage Rating Summary	
Minimum	**ASP (M)/ASP (F)**
Break Down Voltage	1388
Test Voltage	1041
Working Voltage	347

Position 1 to Weld Tab

Pin to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Position 100 to Weld Tab

Pin to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

Voltage Rating Summary	
Minimum	**ASP (M)/ASP (F)**
Break Down Voltage	1187
Test Voltage	890
Working Voltage	297

Position 1 to Weld Tab

Pin to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Position 100 to Weld Tab

Pin to Closest Metallic Hardware	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

DATA SUMMARIES Continued

LLCR Durability:

1) A total of 928 points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +5.0 mOhms: ----------Stable
   b. +5.1 to +10.0 mOhms: ----------Minor
   c. +10.1 to +15.0 mOhms:----------Acceptable
   d. +15.1 to +50.0 mOhms:----------Marginal
   e. +50.1 to +1000 mOhms----------Unstable
   f. >+1000 mOhms:----------Open Failure

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

	LLCR Measurement Summaries by Pin Type			
Date	2024/2/26	2024/3/1	2024/3/7	2024/3/20
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	37	30	42	22
Technician	Daniel Haydon	Daniel Haydon	Richard Ison	Daniel Haydon
mOhm values	Actual **Initial**	**Delta 25 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type: Signal 1			
Average	18.24	0.68	0.67	0.79
St. Dev.	1.2	0.62	0.56	0.98
Min	14.87	0	0	0
Max	25.97	8.49	8.53	8.86
Summary Count	928	928	928	928
Total Count	928	928	928	928

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
25 Cycles	**927**	**1**	**0**	**0**	**0**	**0**
Therm Shck	**927**	**1**	**0**	**0**	**0**	**0**
Humidity	**915**	**13**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

	LLCR Measurement Summaries by Pin Type			
Date	2024/2/27	2024/3/2	2024/3/7	2024/3/20
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	40	39	41	20
Technician	Daniel Haydon	Daniel Haydon	Richard Ison	Daniel Haydon
mOhm values	Actual **Initial**	**Delta 25 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type: Signal 1			
Average	30.17	0.71	0.72	0.8
St. Dev.	1.26	0.61	0.62	0.85
Min	26.88	0	0	0
Max	33.55	3.56	4.99	6.41
Summary Count	928	928	928	928
Total Count	928	928	928	928

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
25 Cycles	**928**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**928**	**0**	**0**	**0**	**0**	**0**
Humidity	**922**	**6**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Shock &Vibration:

1). A total of 928 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3). The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +5.0 mOhms: ----------Stable
   b. +5.1 to +10.0 mOhms: ----------Minor
   c. +10.1 to +15.0 mOhms: ----------Acceptable
   d. +15.1 to +50.0 mOhms: ----------Marginal
   e. +50.1 to +1000 mOhms ----------Unstable
   f. >+1000 mOhms: ----------Open Failure

ASP-230333-02(WT Male 1.5)/ASP-230332-02(WT Female 3.5)

	LLCR Measurement Summaries by Pin Type	
Date	2023/10/19	2023/11/27
Room Temp (Deg C)	23	22
Rel Humidity (%)	45	28
Technician	John Crawford	John Crawford
mOhm values	Actual **Initial**	**Delta Shock-Vib**
	Pin Type: Signal 1	
Average	19.31	0.85
St. Dev.	1.58	0.76
Min	15.46	0
Max	25.89	6.08
Summary Count	928	928
Total Count	928	928

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**924**	**4**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

ASP-230336-02(WT Male 6.5)/ASP-230332-02(WT Female 3.5)

	LLCR Measurement Summaries by Pin Type	
Date	2023/10/20	2023/11/27
Room Temp (Deg C)	23	22
Rel Humidity (%)	44	28
Technician	John Crawford	John Crawford
mOhm values	Actual **Initial**	**Delta Shock-Vib**
	Pin Type: Signal 1	
Average	31.86	0.88
St. Dev.	1.34	0.8
Min	27.89	0
Max	38.92	6.15
Summary Count	928	928
Total Count	928	928

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**924**	**4**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: TCT-04
Description: Dillon Quantrol TC21 25-1000 mm/min series test stand
Manufacturer: Dillon Quantrol
Model: TC2 I series test stand
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;
… Last Cal: 05/29/2023, Next Cal: 05/29/2024

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 09/11/2023, Next Cal: 09/11/2024

Equipment #: TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnati Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14993
Accuracy: See Manual
… Last Cal: 06/30/2023, Next Cal: 06/30/2024

Equipment #: THC-05
Description: Temperature/Humidity Chamber (Chamber Room)
Manufacturer: Thermotron
Model: SM-8-3800
Serial #: 05 23 00 02
Accuracy: See Manual
… Last Cal: 11/14/2023, Next Cal: 11/14/2024

Equipment #: HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 019808
Accuracy:
… Last Cal: 05/15/2023, Next Cal: 05/15/2024

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 04/22/2023, Next Cal: 04/22/2024

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/18/2023, Next Cal: 07/18/2024