# Test Report

## HD Stacker Qualification
## GT-17-221

Revision B

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# TEST REPORT

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**Table 1: Report Revision History**

| Revision | Date | Approved | Description |
|---|---|---|---|
| A | 11/01/17 | S. Peeling | Initial Release |
| B | 11/16/23 | K. Howerton | Correct Title and Max Temp |

## 1.0 Summary of Testing

All testing in this report is performed in accordance with test plan "Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G". The testing is divided into two test groups with each group consisting of a pair of mating Stacker connectors. Group 1 focuses on mechanical testing such as Vibration and Shock. Group 2 focuses on environmental testing such as Thermal Shock and Humidity Exposure. All testing was performed on Glenair owned and operated equipment. All samples underwent testing in accordance with their associated specifications and no failures or deviations of testing were witnessed at any time. Please see Table 4 for a description of each group and the order of testing. All test results are included in sections 4 and 5.

# 2.0 General Information

## 2.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-37 – Contact Engagement and Separation Test Procedure for Electrical Connectors
- EIA-364-29 – Contact Retention Test Procedure for Electrical Connectors
- EIA-364-20 – Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
- EIA-364-23 – Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets
- EIA-364-28 – Vibration Test Procedure for Electrical Connectors and Sockets
- EIA-364-27 – Mechanical Shock (Specified Pulse) Test Procedure for Electrical Connectors and Sockets
- EIA-364-21 – Insulation Resistance Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
- EIA-364-32 – Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets
- EIA-364-06 – Contact Resistance Test Procedure for Electrical Connectors
- EIA-364-31 – Humidity Test Procedure for Electrical Connectors and Sockets

## 2.2 Test Samples

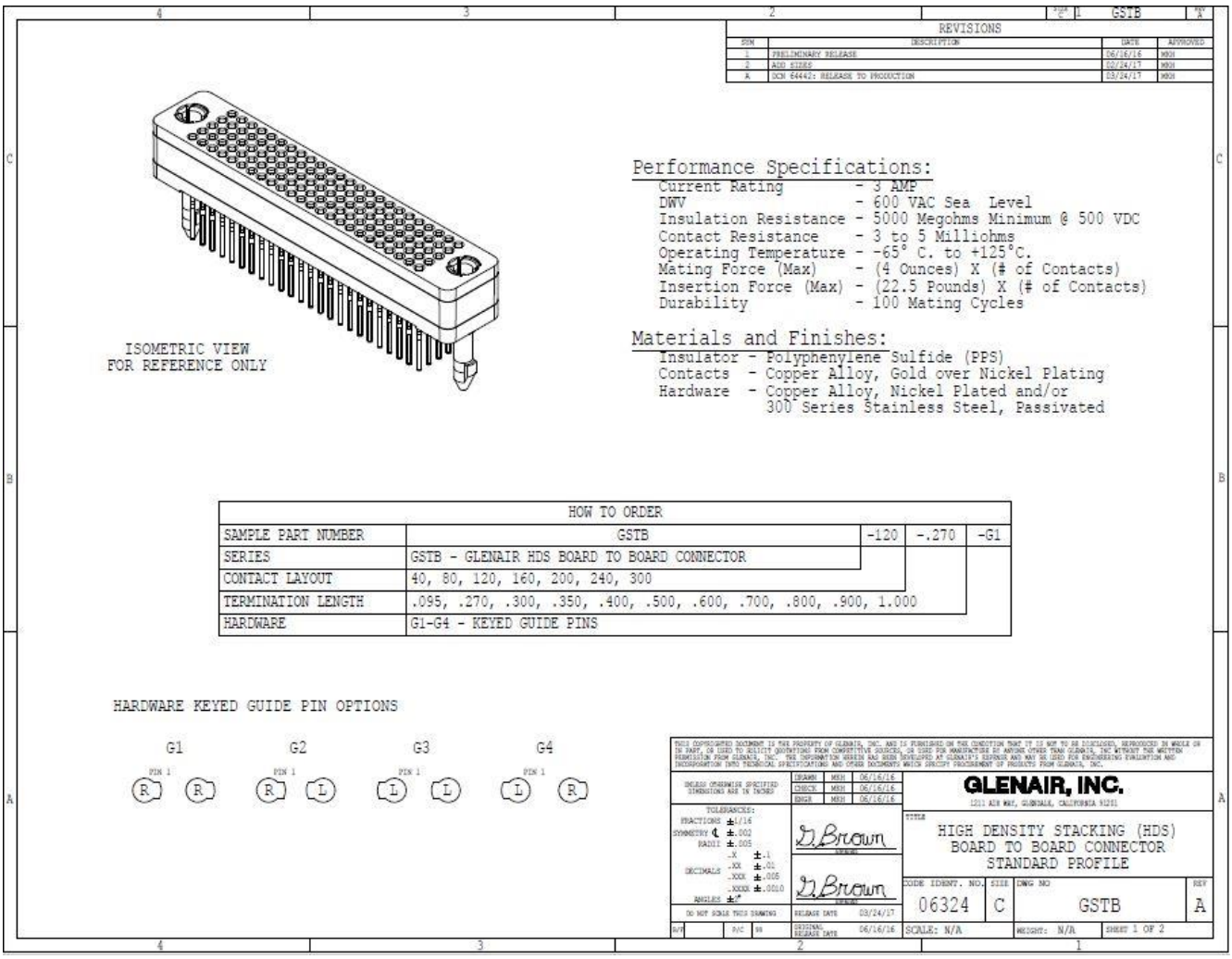


**Figure 1: Drawing of Test Sample**

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**Figure 2: Stacker Mated Pair from Group 1**

**Table 2: Test Sample Identification**

| Group Number | Sample Part Number | Description | Sample Label |
|---|---|---|---|
| 1 | GSTB-120-.270-G1 | 120 Pin “Stacker” Connector | 1A |
| 1 | GSTB-120-.270-G1 | 120 Pin “Stacker” Connector | 2A |
| 2 | GSTB-120-.270-G1 | 120 Pin “Stacker” Connector | 1B |
| 2 | GSTB-120-.270-G1 | 120 Pin “Stacker” Connector | 2B |

## 3.0 Test Sequence

**Table 3: Test Groups and Order of Testing**

| Test Description | Group 1 | Group 2 |
|---|---|---|
| Visual Inspection | X | X |
| Contact Engagement and Separation Forces | X | |
| Contact Retention | X | |
| DWV at Altitude | X | |
| Contact Compliant Mating Forces | X | X |
| Contact Life | X | |
| Mating and Unmating Force | X | |
| Low Level Contact Resistance | X | |
| Vibration | X | |
| Shock | X | |
| DWV at Sea Level | | X |
| Insulation Resistance | | X |
| Temperature Cycling | | X |
| Contact Resistance | | X |
| Humidity Exposure | | X |
| Insulation Resistance | | X |
| Contact Resistance | | X |
| Low Level Contact Resistance | X | X |
| Mating and Unmating Force | X | X |
| Contact Compliant Removal Forces | | X |

# 4.0 Group 1 Testing

## 4.1 Visual Inspection

### 4.1.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G

### 4.1.2 Test Equipment

**Table 4: Visual Inspection Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Celestron | 44308 | Digital Microscope |

### 4.1.3 Test Method and Setup

Samples were inspected at 10X magnification under a digital microscope. All parts of the sample were documented.

### 4.1.4 Test Results

Samples 1A and 2A were found to be in good working order with no obvious damage or defects that would hinder their operation or performance. All of these pictures are archived so they may be compared to the test samples at the conclusion of testing if required.

### 4.1.5 Deviation of Test

No Deviations of Testing were recorded during Visual Examination.

### 4.1.6 Photographs

**Figure 3: Example of Initial Picture of Sample 1A at 10x Magnification**


**Figure 4: Example of Initial Picture of Sample 2A at 10x Magnification**

## 4.2 Contact Engagement and Separation Forces

### 4.2.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-37 – Contact Engagement and Separation Test Procedure for Electrical Connectors

### 4.2.2 Test Equipment

**Table 5: Contact Engagement and Separation Forces Testing Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | DFGS-R-ND, 363-D3-50-0031 | 50 lb load cell |
| Meyer | .022 (+) and .023 (-) and .020 (+) | Assorted Gauge Pins |

### 4.2.3 Test Method and Setup

Samples 1A and 2A were mounted in a vice fixture and Glenair specified gauge pins were inserted and extracted into 7 different contacts. The maximum force for the insertion and extraction of each female contact was recorded and reported in the tables below.

### 4.2.4 Test Results

All testing was conducted in accordance with the specifications in section 4.2.1 above.

**Table 6: .022" (+) Gauge Pin Results in lb**

| Sample Number | Contact #1 | Contact #2 | Contact #3 | Contact #4 | Contact #5 | Contact #6 | Contact #7 |
|---|---|---|---|---|---|---|---|
| 1A Engage | .10 | .22 | .18 | .24 | .23 | .20 | .22 |
| 2A Engage | .16 | .20 | .12 | .16 | .18 | .20 | .18 |

**Table 7: .023" (-) Gauge Pin Results in lb**

| Sample Number | Contact #8 | Contact #9 | Contact #10 | Contact #11 | Contact #12 | Contact #13 | Contact #14 |
|---|---|---|---|---|---|---|---|
| 1A Engage | .18 | .18 | .20 | .14 | .22 | .26 | .24 |
| 2A Engage | .16 | .18 | .18 | .20 | .14 | .18 | .16 |

**Table 8: .020" (+) Gauge Pin Results in lb**

| Sample Number | Contact #8 | Contact #9 | Contact #10 | Contact #11 | Contact #12 | Contact #13 | Contact #14 |
|---|---|---|---|---|---|---|---|
| 1A Separation | .14 | .12 | .10 | .12 | .12 | .10 | .12 |
| 2A Separation | .12 | .10 | .12 | .14 | .10 | .12 | .12 |

### 4.2.5 Deviation of Test

No Deviations of Testing were recorded during Contact Engagement and Separation Forces Testing.

### 4.2.6 Photographs

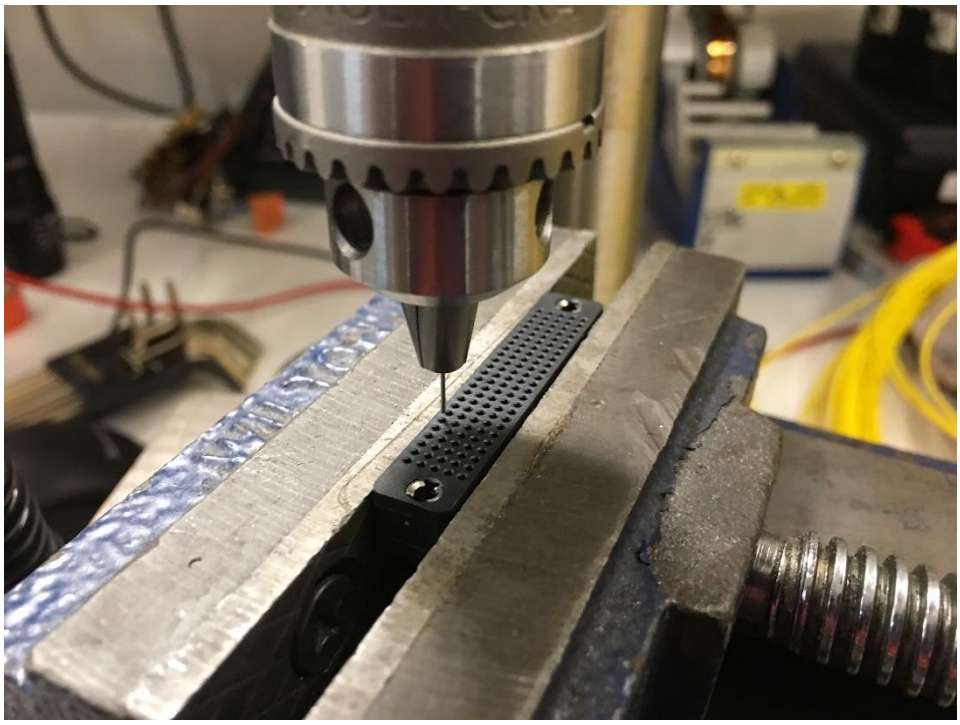

**Figure 5: Example of Contact Engagement and Separation Test Setup**

## 4.3 Contact Retention

### 4.3.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-29 – Contact Retention Test Procedure for Electrical Connectors

### 4.3.2 Test Equipment

**Table 9: Contact Retention Testing Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | DFGS-R-ND, 363-D3-50-0031 | 50 lb load cell |
| Mitutoyo | CD-6” CSX | 6” Calipers |

### 4.3.3 Test Method and Setup

Samples 1A and 2A were mounted in a vice fixture with the male side contacts facing upward. A load of 5 lb was exerted on a single contact axially for 5 seconds. This was repeated on 7 different contacts on each test sample. Prior to and after loading a contact the height of the test sample was measured. The movement of the contact is required to be less than .015”.

### 4.3.4 Test Results

All testing on sample 1A and 2A were conducted in accordance with the specifications in section 4.3.1 above. At no time was any contact movement post testing larger than .015”. Please see table below for results.

**Table 10: Contact Retention Testing Results**

| Contact Number | Sample 1A | Sample 2A |
|---|---|---|
| 8 | < .015” | < .015” |
| 9 | < .015” | < .015” |
| 10 | < .015” | < .015” |
| 11 | < .015” | < .015” |
| 12 | < .015” | < .015” |
| 13 | < .015” | < .015” |
| 14 | < .015” | < .015” |

### 4.3.5 Deviation of Test

No Deviations of Testing were recorded during Contact Retention Testing.

### 4.3.6 Photographs

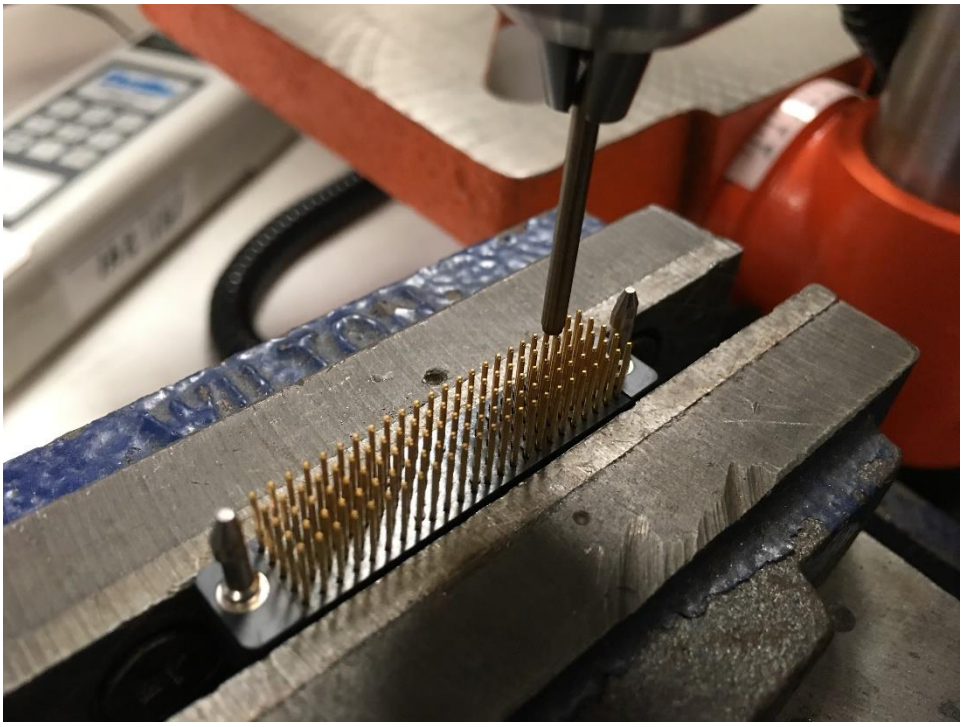

**Figure 6: Example of Contact Retention Test Setup**

## 4.4 DWV at Altitude

### 4.4.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-20 – Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts

### 4.4.2 Test Equipment

**Table 11: DWV at Altitude Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Associated Electronics | Model 03770 | Hi Pot Tester |
| Varian | Custom | Altitude Chamber |

### 4.4.3 Test Method and Setup

Samples 1A and 2A were tested in accordance with EIA-364-20, Method A, Test Condition 4. This defines an altitude of 70,000 feet and a test duration of 2 minutest at 150 VAC. There cannot be a leakage current of greater than 5 milliamps at any time during the 2 minute interval. Both the electrical feedthroughs and Glenair supplied cable harness were tested independently before official testing in order to confirm any failures would be due to the Stacker sample and not the test set up.

### 4.4.4 Test Results

All testing on sample 1A and 2A were conducted in accordance with the specifications in section 4.3.3 above. At no time during testing was a leakage current of greater than 5 milliamps detected.

### 4.4.5 Deviation of Test

No Deviations of Testing were recorded during DWV at Altitude Testing.

### 4.4.6 Photographs

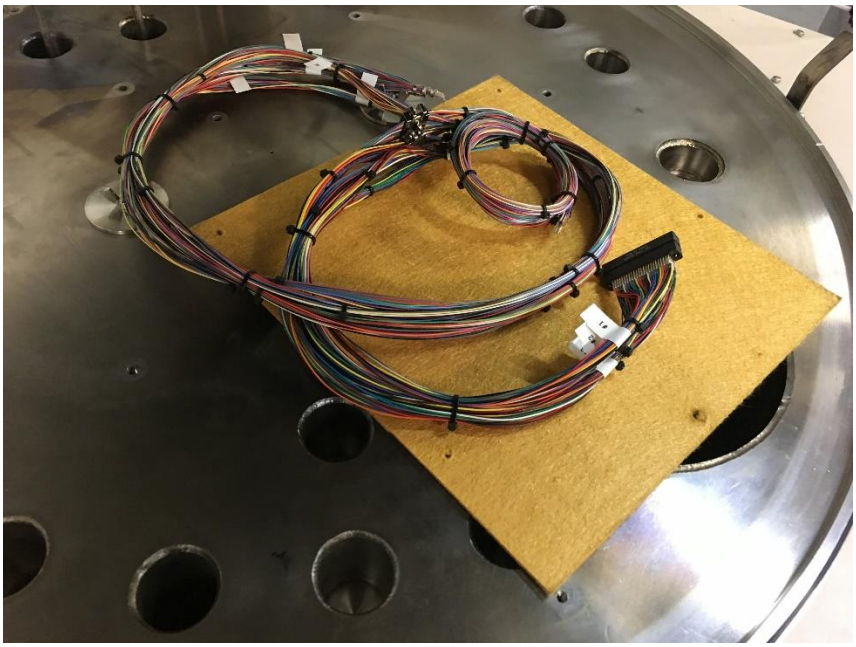

**Figure 7: Stacker Sample Ready for DWV at Altitude in Chamber.**

## 4.5 Contact Compliant Mating Forces

### 4.5.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 4.5.2 Test Equipment

**Table 12: Contact Compliant Mating Forces Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Instron | 3366 | 2250 lb Tensile Tester |

### 4.5.3 Test Method and Setup

Samples 1A and 2A were mounted onto the tensile tester using a special fixture in order to press the Stacker connector onto its PCB board. The maximum amount of force required to completely install the sample on the board is recorded and reported.

### 4.5.4 Test Results

**Table 13: Contact Compliance Mating Forces Results**

| Sample Number | Ultimate PCB Mounting Force lb |
|---|---|
| 1A | 1,757.08 |
| 2A | 1,951.98 |

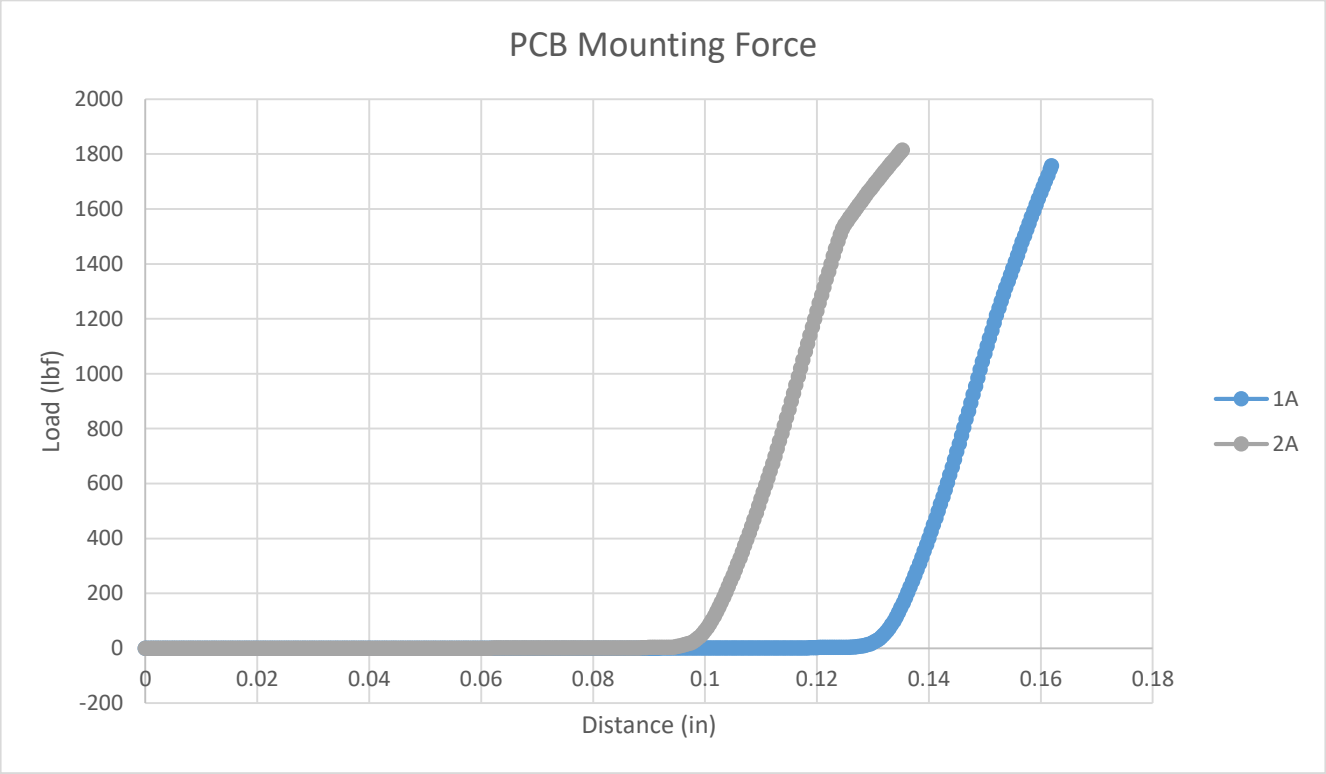


**Figure 8: PCB Mating Force for Samples 1A and 2A**

### 4.5.5 Deviation of Test

No Deviations of Testing were recorded during Contact Compliant Mating Forces Testing.

### 4.5.6 Photographs

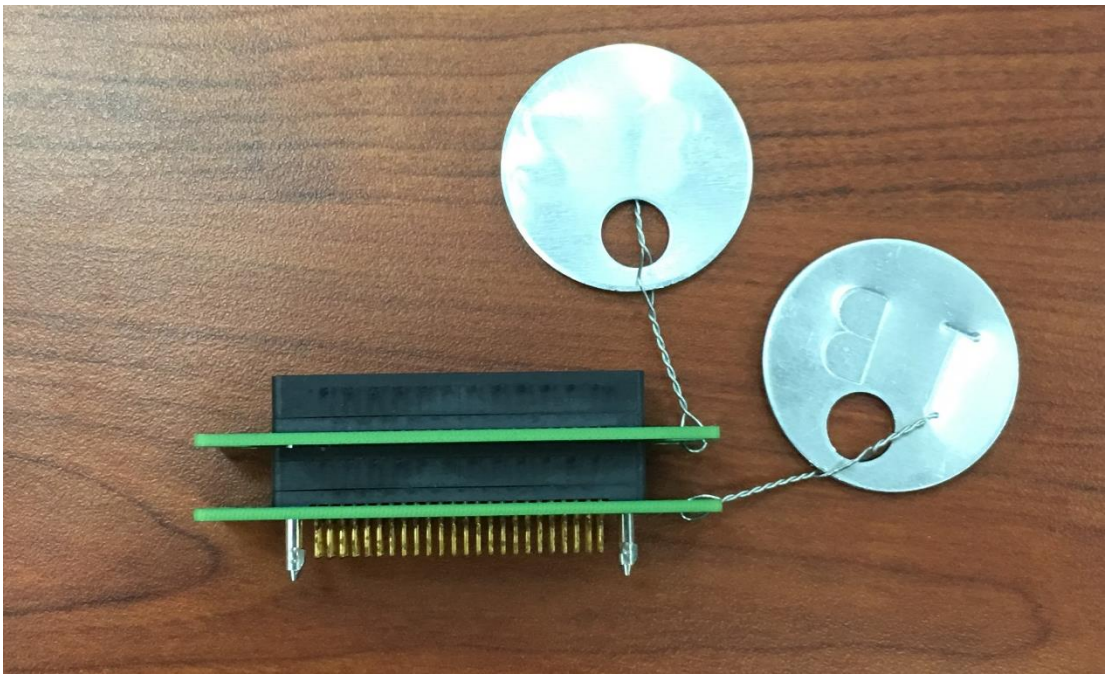

**Figure 9: Samples shown with PCB boards installed**

## 4.6 Contact Life

### 4.6.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 4.6.2 Test Equipment

**Table 14: Contact Life Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | TCD200 | 200 lb Tensile Tester Load Frame |
| Chatillon | DFIS 200 | 200 lb Load Cell |

### 4.6.3 Test Method and Setup

Samples 1A and 2A were set up for push pull contact life connector testing and tested in accordance with MIL-DTL-55302G. Each side of the mated pair was mounted to a custom fixture to ensure proper mating of Stacker connectors during testing. Samples were mated 100 times at a rate of approximately 400 cycles per hour.

### 4.6.4 Test Results

Sample 1A and 2A completed contact life testing with no problems or issues. Both samples were in good working condition and showed no signs of cracking, bending, or binding.

### 4.6.5 Deviation of Test

No Deviations of Testing were recorded during Contact Life Testing.

### 4.6.6 Photographs

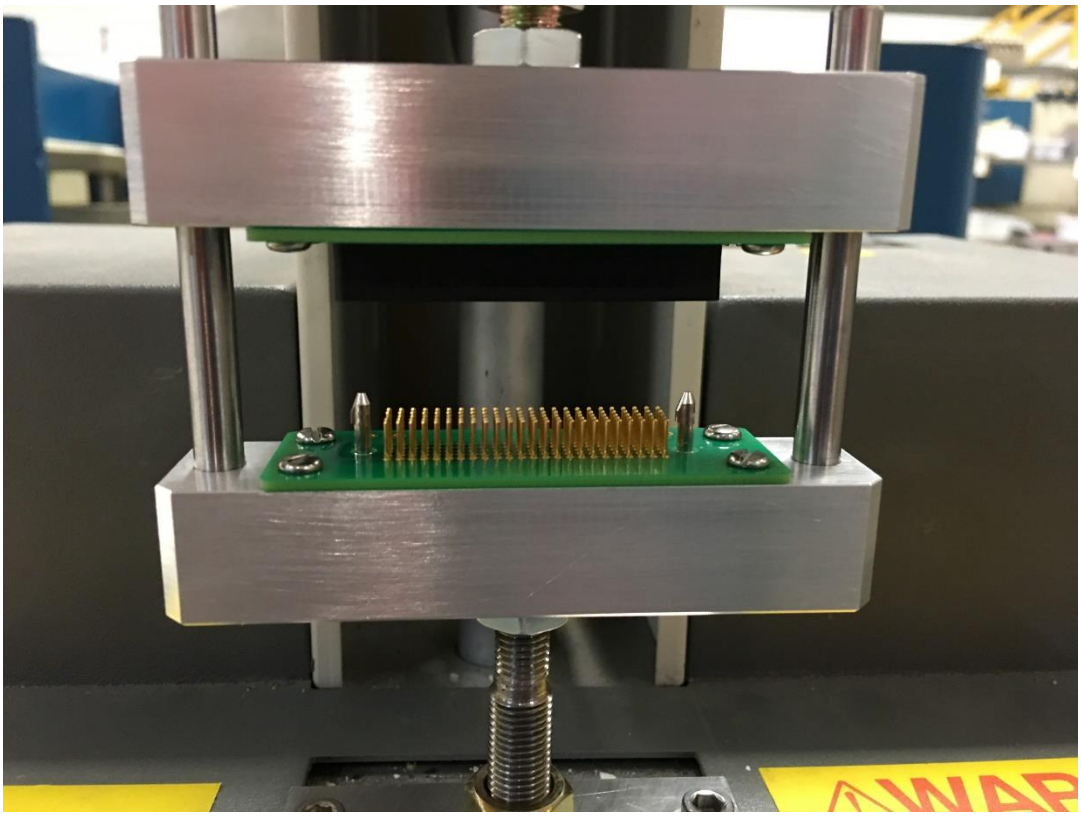

**Figure 10: Contact Life Testing Setup**

## 4.7 Mating and Unmating Force

### 4.7.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 4.7.2 Test Equipment

**Table 15: Mating and Unmating Force Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | TCD200 | 200 lb Tensile Tester Load Frame |
| Chatillon | DFIS 200 | 200 lb Load Cell |

### 4.7.3 Test Method and Setup

Samples 1A and 2A were mounted in the same custom fixture used during Contact Life Testing. All test set up parameters were the same except for the rate of mating, which was set to 60 cycles per hour per MIL-DTL-55302G para 4.5.4. The maximum mate or unmate force cannot exceed 30 lb.

### 4.7.4 Test Results

During all Mating and Unmating Force testing no sample registered a force of greater than 30 lb. Sample 2A was inserted into sample 1A.

**Table 16: Pre Vibration and Shock Mating and Unmating Force Results**

| Sample Number | Ultimate Mating Force lb | Ultimate Un-mating Force lb |
|---|---|---|
| 2A into 1A Mated Pair | 23.75 | 12.25 |

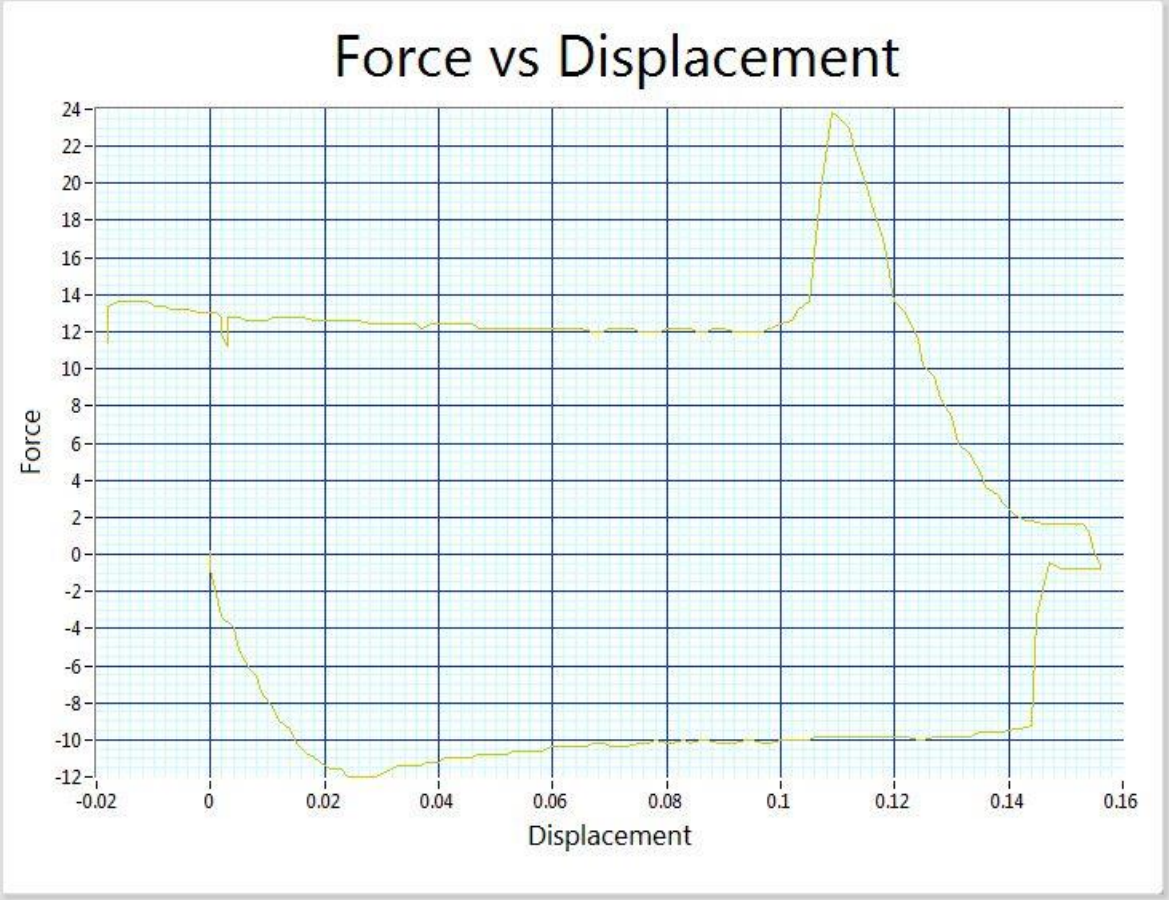


**Figure 11: Sample 2A-1A Mating and Unmating Force Pre Vibration and Shock**

### 4.7.5 Deviation of Test

No Deviations of Testing were recorded during Mating and Unmating Force Testing.

### 4.7.6 Photographs

Please see figure 10.

## 4.8 Low Level Contact Resistance

### 4.8.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-23 – Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets

### 4.8.2 Test Equipment

**Table 17: Low Level Contact Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Fluke | 287 | True RMS Digital Multimeter |
| Sorensen | XHR 40-25 | DC Power Supply |

### 4.8.3 Test Method and Setup

Using the voltage drop method the low level contact resistance of 7 contacts on each sample 1A and 2A were measured. A test current of 0.1 amps DC was applied across the contact while the voltage drop was measured. In order to probe the final side of the contact, virgin uninstalled contacts were provided to be used as a mounting point for power supply. Voltage drop measurement cannot exceed .3 millivolts.

### 4.8.4 Test Results

**Table 18: Pre Vibration and Shock Low Level Contact Resistance Results**

| Voltage drop per position (mV) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| 1A | .154 | .149 | .155 | .158 | .156 | .166 | .155 |
| 2A | .192 | .139 | .122 | .131 | .124 | .112 | .121 |

### 4.8.5 Deviation of Test

No Deviations of Testing were recorded during Low Level Contact Resistance Testing.

### 4.8.6 Photographs


**Figure 12: Stacker Connector Sample during Low Level Resistance Testing**

## 4.9 Vibration

### 4.9.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-28 – Vibration Test Procedure for Electrical Connectors and Sockets

### 4.9.2 Test Equipment

**Table 19: Vibration Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Ling | A395 | Electrodynamic Shaker |
| Vibration Research | VR9500 | Vibration Controller |
| Dytran | 3056D1 | Accelerometer |

### 4.9.3 Test Method and Setup

Sample 1A and 2A were mounted to the vibration fixture as a mated pair on the fixture plate. Samples underwent 4 hours of Sinusoidal Vibration in each axis. During vibration testing samples are monitored electrically using a discontinuity tester. There cannot be a discontinuity greater than 1 microsecond during vibration testing at any time.

### 4.9.4 Test Results

Both samples 1A and 2A underwent vibration testing with no issues. Visually there was no damage to either sample and both had no defects that would hinder their performance. At no time during vibration testing was an electrical discontinuity of 1 microsecond or greater measured.

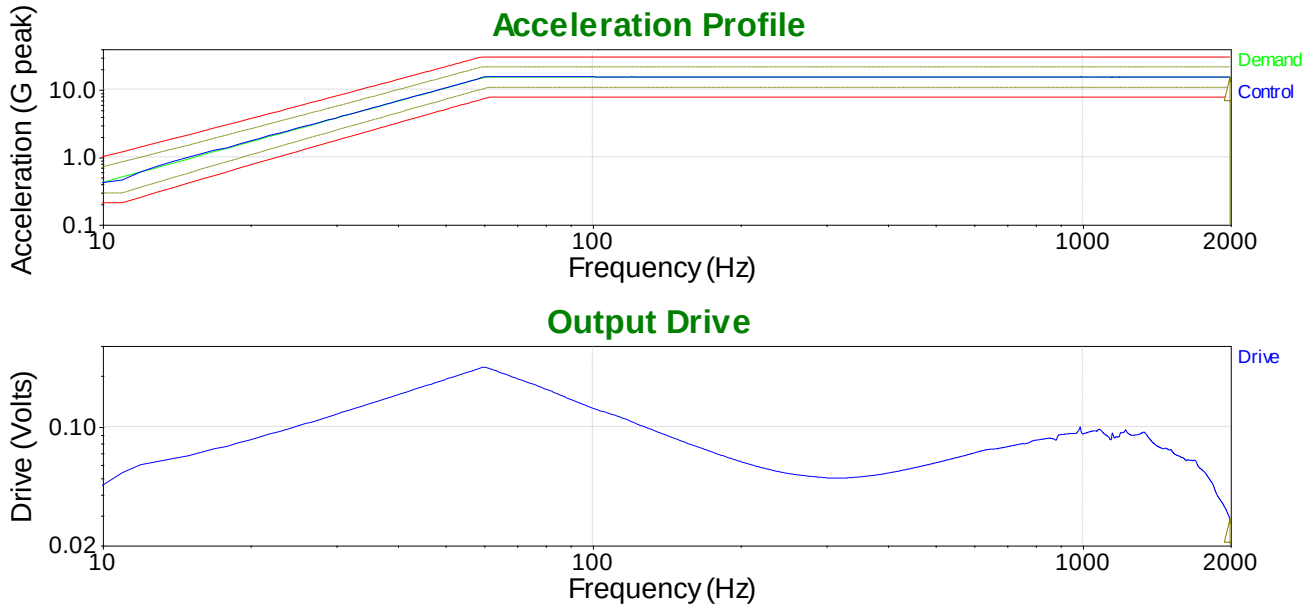


**Figure 13: Vibration Profile**

### 4.9.5 Deviation of Test

No Deviations of Testing were recorded during Vibration Testing.

### 4.9.6 Photographs

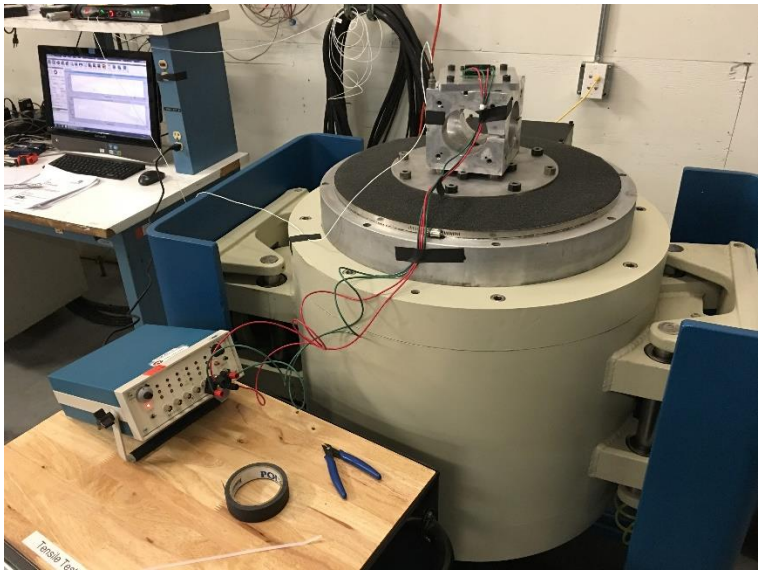

**Figure 14: Vibration Shaker and Discontinuity Tester Setup**

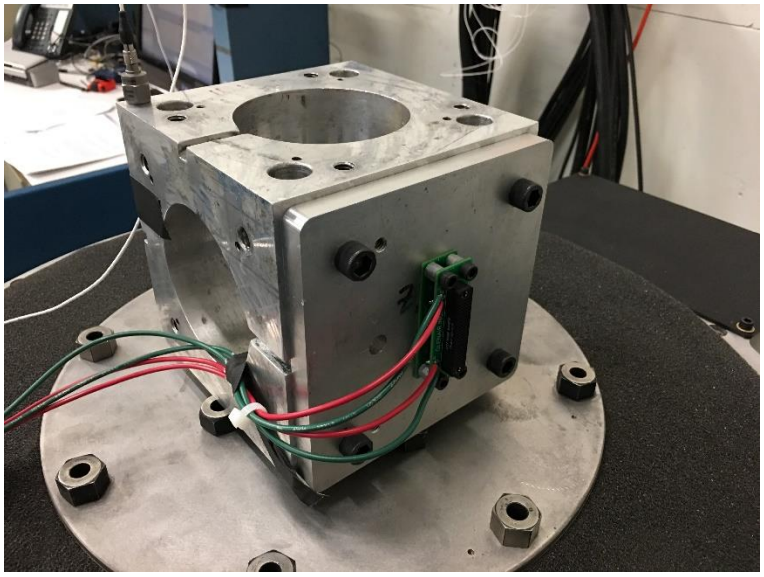

**Figure 15: Close up of Stacker Vibration Fixture**

## 4.10 Mechanical Shock

### 4.10.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-27 – Mechanical Shock (Specified Impulse) Test Procedure for Electrical Connectors and Sockets

### 4.10.2 Test Equipment

**Table 20: Mechanical Shock Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Ling | A395 | Electrodynamic Shaker |
| Vibration Research | VR9500 | Vibration Controller |
| Dytran | 3056D1 | Accelerometer |

### 4.10.3 Test Method and Setup

The mated samples 1A and 2A underwent one shock in each direction for a total of 6 shocks. EIA-364-27, Test Condition G: Saw Tooth Shock Pulse. 100G peak acceleration. Samples were monitored electrically using a discontinuity tester. There cannot be a discontinuity greater than 1 microsecond during shock testing at any time.

### 4.10.4 Test Results

All testing was performed in accordance with EIA-364-27. Mated samples 1A and 2A underwent all shock testing, no discontinuity of 1 microsecond or greater was measured at any time. Samples were visually inspected and found to be undamaged and fully operational.

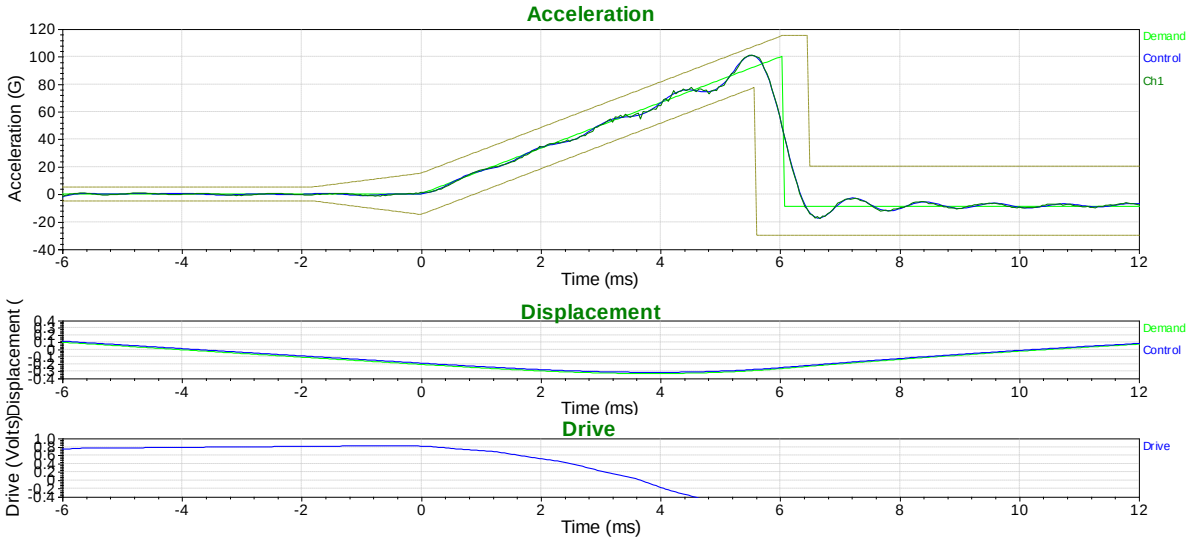


**Figure 16: Terminal Sawtooth Shock in Positive Direction**

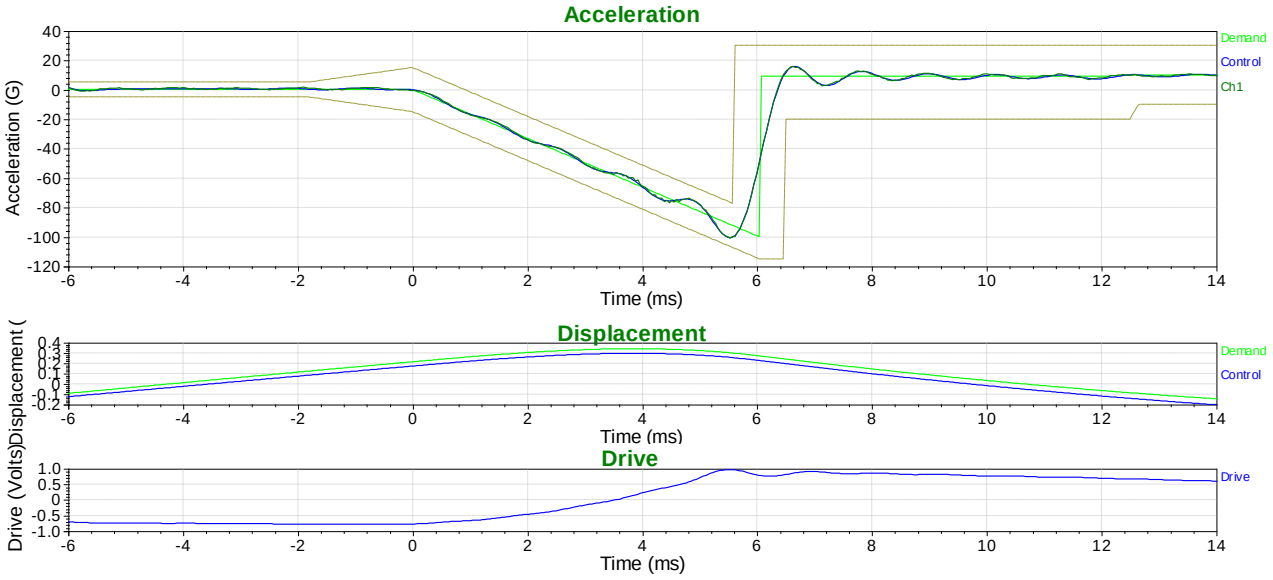


**Figure 17: Terminal Sawtooth Shock in Negative Direction**

### 4.10.5 Deviation of Test

No Deviations of Testing were recorded during Mating and Unmating Force Testing.

### 4.10.6 Photographs

Please see section 4.9.6.

## 4.11 Low Level Contact Resistance

### 4.11.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-23 – Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets

### 4.11.2 Test Equipment

**Table 21: Low Level Contact Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Fluke | 287 | True RMS Digital Multimeter |
| Sorensen | XHR 40-25 | DC Power Supply |

### 4.11.3 Test Method and Setup

Using the voltage drop method the low level contact resistance of 7 contacts on each sample 1A and 2A were measured. A test current of 0.1 amps DC was applied across the contact while the voltage drop was measured. In order to probe the final side of the contact, virgin uninstalled contacts were provided to be used as a mounting point for power supply. Voltage drop cannot exceed .3 millivolts.

### 4.11.4 Test Results

**Table 22: Post Vibration and Shock Low Level Contact Resistance Results**

| | Voltage drop per position (mV) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| 1A | .165 | .137 | .143 | .180 | .115 | .197 | .153 |
| 2A | .165 | .137 | .143 | .180 | .115 | .197 | .153 |

### 4.11.5 Deviation of Test

No Deviations of Testing were recorded during Low Level Contact Resistance Testing.

### 4.11.6 Photographs

Please see Figure 12.

## 4.12 Mating and Unmating Force

### 4.12.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 4.12.2 Test Equipment

**Table 23: Mating and Unmating Force Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | TCD200 | 200 lb Tensile Tester Load Frame |
| Chatillon | DFIS 200 | 200 lb Load Cell |

### 4.12.3 Test Method and Setup

Samples 1A and 2A were mounted in the same custom fixture used during Contact Life testing. All test set up parameters were the same except for the rate of mating, which was set to 60 cycles per hour per MIL-DTL-55302G para 4.5.4. The maximum mate or unmate force cannot exceed 30 lb.

### 4.12.4 Test Results

**Table 24: Post Vibration and Shock Mating and Unmating Force**

| Sample Number | Ultimate Mating Force lb | Ultimate Un-mating Force lb |
|---|---|---|
| 2A into 1A Mated Pair | 25.0 | 19.75 |

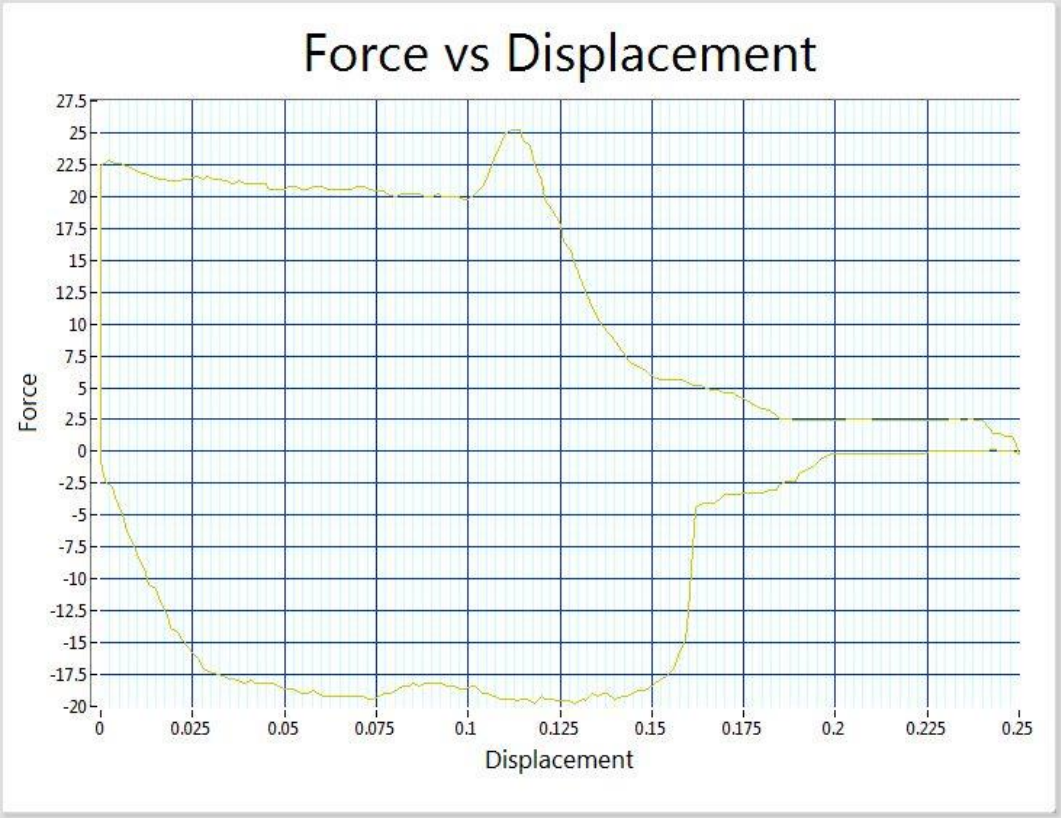


**Figure 18: Sample 2A-1A Mating and Unmating Force Post Vibration and Shock**

### 4.12.5 Deviation of Test

No Deviations of Testing were recorded during Mating and Unmating Force Testing.

### 4.12.6 Photographs

Please see Figure 10.

# 5.0 Group 2 Testing

## 5.1 Contact Compliant Forces

### 5.1.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 5.1.2 Test Equipment

**Table 25: Contact Compliant Forces Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Instron | 3366 | 2250 lb Tensile Tester |

### 5.1.3 Test Method and Setup

Samples 1B and 2B were mounted onto the tensile tester using a special fixture in order to press the Stacker connector onto its PCB board. The maximum amount of force required to completely install the sample on the board is recorded and reported.

### 5.1.4 Test Results

**Table 26: Contact Compliance Mating Forces Results**

| Sample Number | Ultimate PCB Mounting Force lb |
|---|---|
| 1B | 1,951.9 |
| 2B | 1,795.4 |

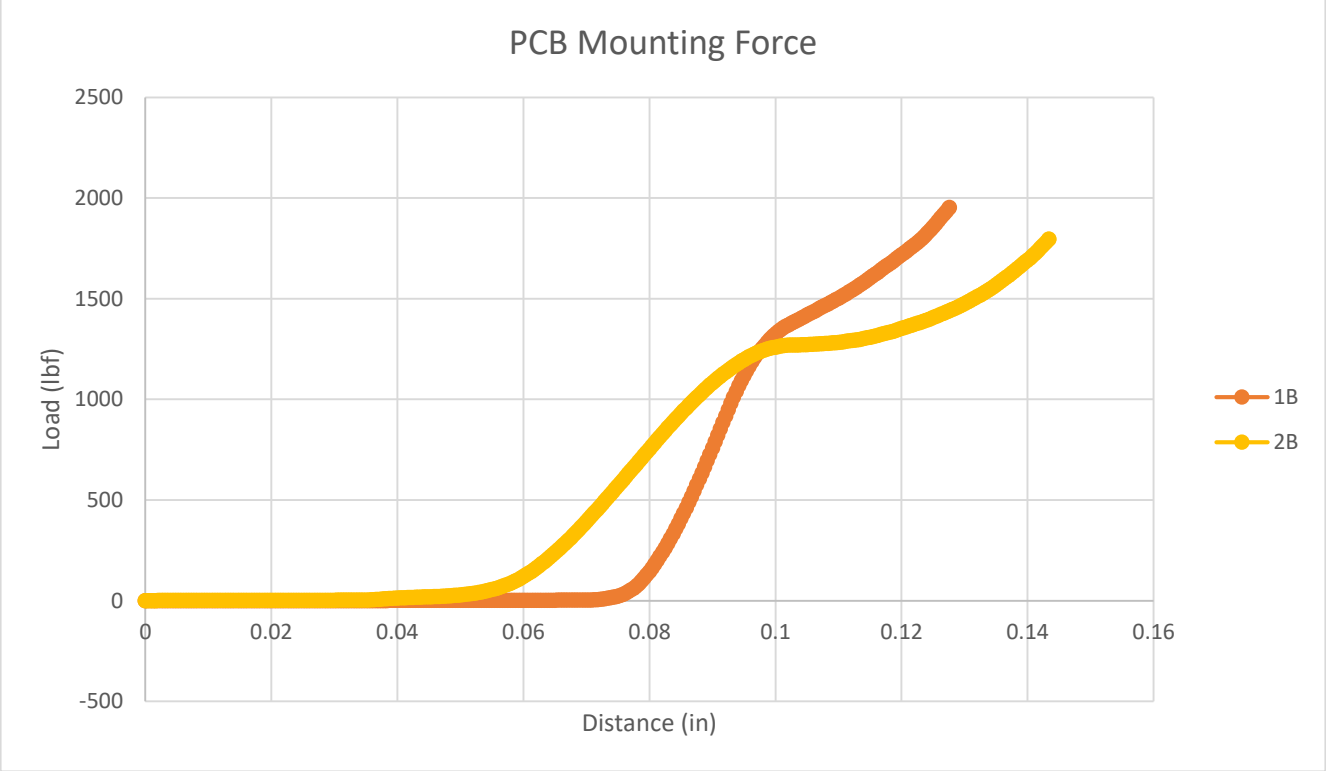


**Figure 19: Contact Compliant Mating Forces of Sample 1B and 2B**

### 5.1.5 Deviation of Test

No Deviations of Testing were recorded during Contact Compliance Forces Testing.

### 5.1.6 Photographs

Please see Figure 9.

## 5.2 DWV at Sea Level

### 5.2.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-20 – Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts

### 5.2.2 Test Equipment

**Table 27: DWV at Sea Level Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Associated Electronics | Model 03770 | HiPot Tester |

### 5.2.3 Test Method and Setup

Samples 1B and 2B were tested in accordance with EIA-364-20. Samples were tested at 600 VAC for a 2 minute duration. There cannot be a leakage current of greater than 5 milliamps at any time during that 2 minute interval. Both the electrical feedthroughs and Glenair supplied cable harness were tested independently before official testing in order to confirm any failures would be due to the Stacker sample and not the test set up.

### 5.2.4 Test Results

All testing on sample 1B and 2B were conducted in accordance with the specifications in section 4.3.3 above. At no time during testing was a leakage current of greater than 5 milliamps detected.

### 5.2.5 Deviation of Test

No Deviations of Testing were recorded during DWV at Sea Level Testing.

### 5.2.6 Photographs

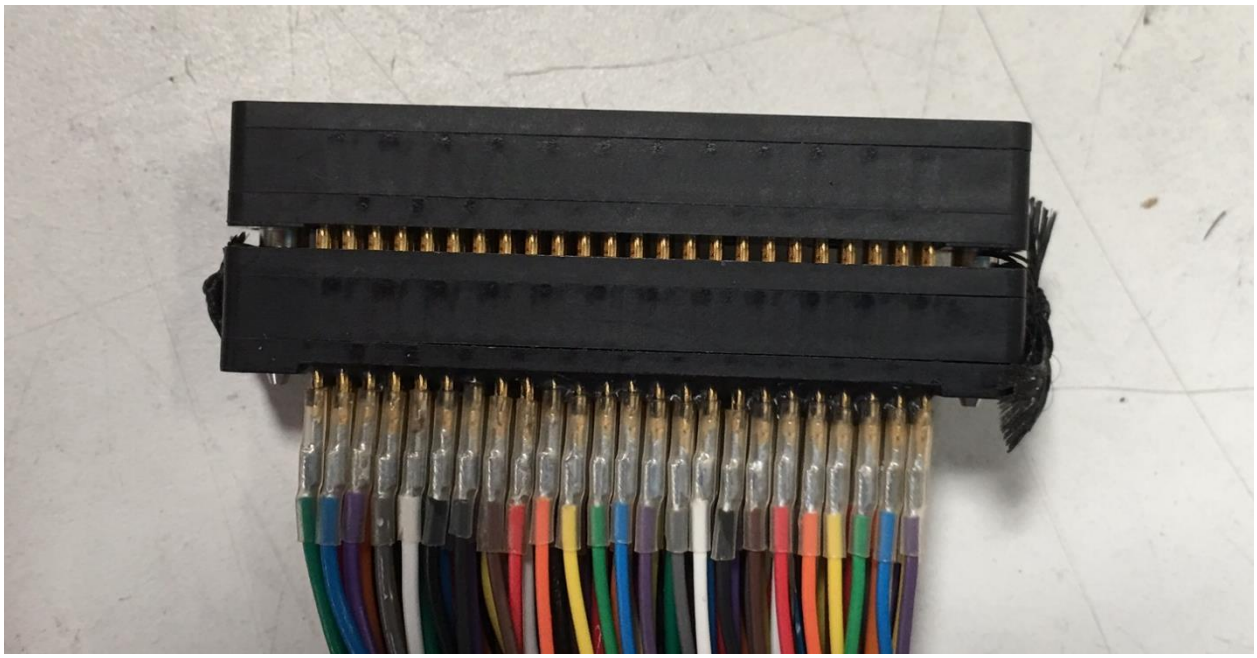

**Figure 20: Stacker Test Sample Attached to Adapter for DWV Testing**

## 5.3 Insulation Resistance

### 5.3.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-21 – Insulation Resistance Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts

### 5.3.2 Test Equipment

**Table 28: Insulation Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Associated Electronics | Model 03770 | HiPot Tester |

### 5.3.3 Test Method and Setup

Samples 1B and 2B were tested in accordance with EIA-364-21, 500 VDC for a duration of 2 minutes or until 5,000 Megohms was reached. Identical test harness used for DWV testing was also to be used for IR testing. Both the electrical feedthroughs and Glenair supplied cable harness were tested independently before official testing in order to confirm any failures would be due to the Stacker sample and not the test set up.

### 5.3.4 Test Results

Both samples reached 5,000 Megohms of resistance within 5 seconds. Visual inspection revealed no damage to any of the test samples

### 5.3.5 Deviation of Test

No Deviations of Testing were recorded during Insulation Resistance Testing.

### 5.3.6 Photographs

Please see Figure 20.

## 5.4 Temperature Cycling

### 5.4.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-32 – Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets

### 5.4.2 Test Equipment

**Table 29: Temperature Cycling Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Ransco | 9102 | Thermal Shock Chamber |

### 5.4.3 Test Method and Setup

Samples 1B and 2B were tested in accordance with EIA-364-32, Method A, Test Condition III, except requiring 5 cycles, -65°C to +200°C with 15 minute soak at each temperature extreme for 2.5 hour total test duration.

### 5.4.4 Test Results

Visual Inspection revealed no damage to either sample 1B or 2B. See below for temperature profile.

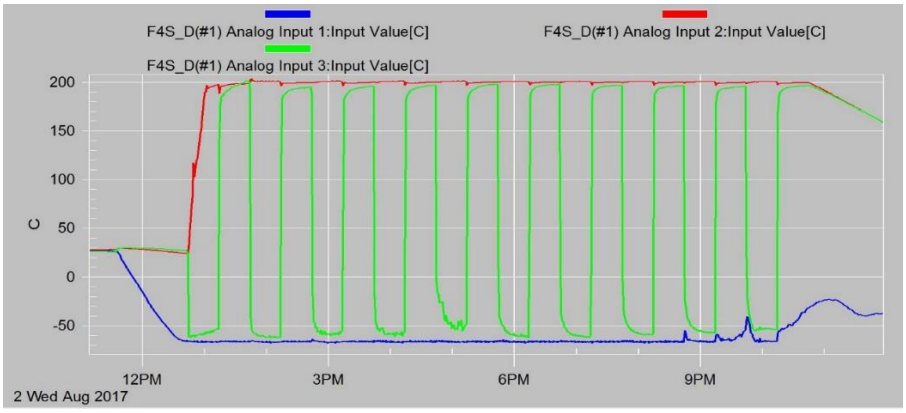


**Figure 21: Thermal Shock Temperature Profile**

### 5.4.5 Deviation of Test

No Deviations of Testing were recorded during Thermal Shock Testing.

### 5.4.6 Photographs

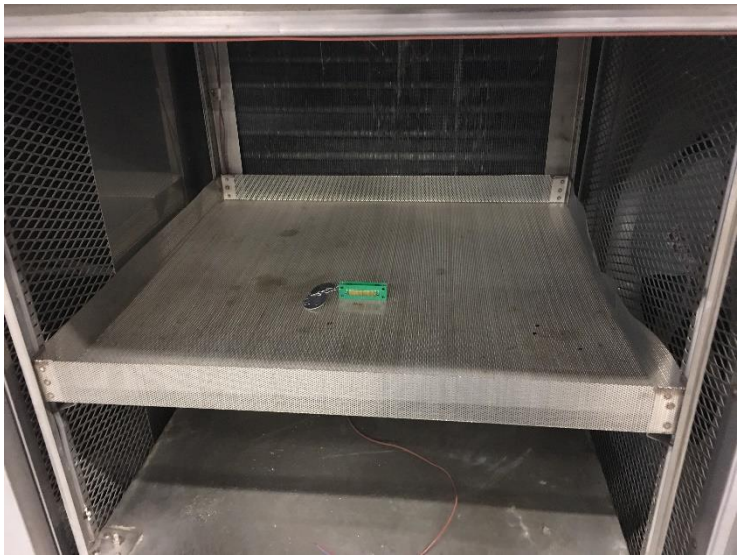

**Figure 22: Samples Read for Thermal Shock Testing**

## 5.5 Contact Resistance

### 5.5.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-06 – Contact Resistance Test Procedure for Electrical Connectors

### 5.5.2 Test Equipment

**Table 30: Contact Resistance Testing Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Fluke | 287 | True RMS Digital Multimeter |
| Sorensen | XHR 40-25 | DC Power Supply |

### 5.5.3 Test Method and Setup

Using the voltage drop method the low level contact resistance of 7 contacts on each sample 1B and 2B were measured. A test current of 5 amps DC was applied across the contact while the voltage drop was measured. In order to probe the final side of the contact, virgin uninstalled contacts were provided to be used as a mounting point for power supply. Voltage drop cannot exceed 75 millivolts.

### 5.5.4 Test Results

All samples were measured and no contact exceeded 75 millivolts of voltage drop.

**Table 31: Post Thermal Shock Contact Resistance Results**

| | Voltage drop per position (mV) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| 1B | 11.38 | 7.40 | 7.04 | 6.02 | 9.30 | 6.05 | 6.78 |
| 2B | 7.89 | 11.70 | 9.35 | 11.40 | 8.17 | 10.344 | 6.05 |

### 5.5.5 Deviation of Test

No Deviations of Testing were recorded during Contact Resistance Testing.

### 5.5.6 Photographs

Please see Figure 12.

## 5.6 Humidity Exposure

### 5.6.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-31- Humidity Test Procedure for Electrical Connectors and Sockets

### 5.6.2 Test Equipment

**Table 32: Humidity Exposure Testing Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Espec | SH-220 | Humidity Chamber |
| Dickson | RH-2 | Temp and Humidity Logger |

### 5.6.3 Test Method and Setup

Samples 1B and 2B were tested in accordance with EIA-364-31, Method IV, which specifies 10 continuous 24 hour cycles. Samples were placed in the humidity chamber and not removed until all humidity cycling was complete. Per MIL-DTL-55302G, steps 7a and 7b were not required.

### 5.6.4 Test Results

Visual Inspection revealed no damage to either of the test samples 1B or 2B. A small amount of discoloration was visible on the contact surface.

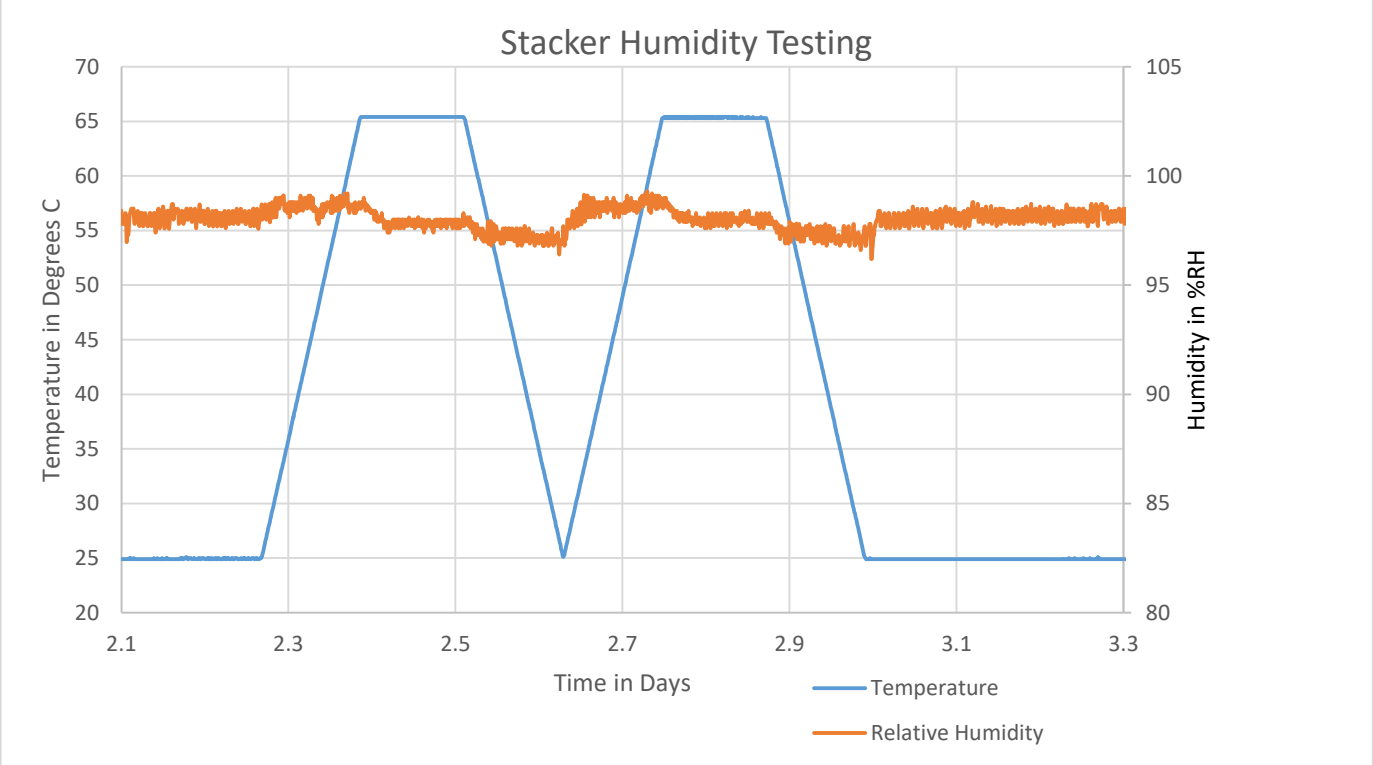


**Figure 23: A Single Cycle of Humidity Exposure Testing**

### 5.6.5 Deviation of Test

No Deviations of Testing were recorded during Humidity Exposure Testing.

### 5.6.6 Photographs

**Figure 24: Samples 2A and 2B ready for Humidity Exposure Testing**

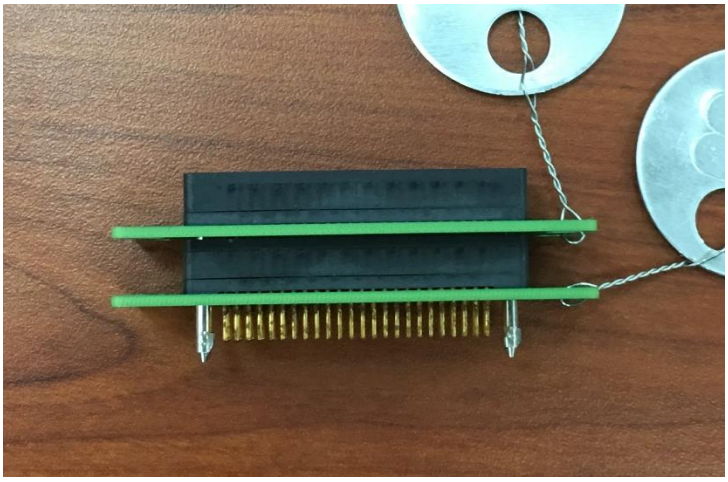

**Figure 25: Small Amount of Discoloration Visible on Sample Contacts**

## 5.7 Insulation Resistance

### 5.7.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-21 – Insulation Resistance Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts

### 5.7.2 Test Equipment

**Table 33: Insulation Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Associated Electronics | Model 03770 | HiPot Tester |

### 5.7.3 Test Method and Setup

Samples 1B and 2B were tested in accordance with EIA-364-21 for a duration of 2 minutes or until 5,000 Megohms was reached. Test voltage was 100 VDC per MIL-DTL-55302G. Identical test harness use for DWV testing was also to be used for IR testing. Both the electrical feedthroughs and Glenair supplied cable harness were tested independently before official testing in order to confirm any failures would be due to the Stacker sample and not the test set up. Samples were conditioned in an environmental chamber for 2 hours at 35C before IR testing was conducted, as specified in EIA-364-21.

### 5.7.4 Test Results

Both samples 1B and 2B reached 5,000 Megohms of resistance within 5 seconds. Visual inspection revealed no damage to any of the test samples caused because of IR testing.

### 5.7.5 Deviation of Test

No Deviations of Testing were recorded during Humidity Exposure Testing.

### 5.7.6 Photographs

Please see Figure 20.

## 5.8 Contact Resistance

### 5.8.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 5.8.2 Test Equipment

**Table 34: Contact Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Fluke | 287 | True RMS Digital Multimeter |
| Sorensen | XHR 40-25 | DC Power Supply |

### 5.8.3 Test Method and Setup

Using the voltage drop method the contact resistance of 7 contacts on each sample 1B and 2B were measured. A test current of 5 amps DC was applied across the contact while the voltage drop was measured. In order to probe the final side of the contact, virgin uninstalled contacts were provided to be used as a mounting point for power supply. Voltage drop cannot exceed 75 millivolts.

### 5.8.4 Test Results

**Table 35: Post Humidity Exposure Contact Resistance Results**

| | Voltage drop per position (mV) | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Number | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 1B | 6.94 | 7.33 | 6.05 | 6.25 | 10.87 | 6.97 | 10.30 |
| 2B | 6.61 | 10.46 | 6.15 | 10.09 | 6.27 | 9.36 | 8.39 |

### 5.8.5 Deviation of Test

No Deviations of Testing were recorded during Contact Resistance Testing.

### 5.8.6 Photographs

Please see Figure 12.

## 5.9 Low Level Contact Resistance

### 5.9.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories
- EIA-364-23 – Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets

### 5.9.2 Test Equipment

**Table 36: Low Level Contact Resistance Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Fluke | 287 | True RMS Digital Multimeter |
| Sorensen | XHR 40-25 | DC Power Supply |

### 5.9.3 Test Method and Setup

Using the voltage drop method the low level contact resistance of 7 contacts on each sample 1B and 2B were measured. A test current of 0.1 amps DC was applied across the contact while the voltage drop was measured. In order to probe the final side of the contact, virgin uninstalled contacts were provided to be used as a mounting point for power supply. Voltage drop measurement cannot exceed .3 millivolts.

### 5.9.4 Test Results

**Table 37: Low Level Contact Resistance Results**

| Voltage drop per position (mV) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Number** | **114** | **115** | **116** | **117** | **118** | **119** | **120** |
| 1B | .153 | .165 | .187 | .173 | .190 | .159 | .148 |
| 2B | .182 | .190 | .201 | .185 | .172 | .162 | .208 |

### 5.9.5 Deviations of Test

No Deviations of Testing were recorded during Low Level Contact Resistance Testing.

## 5.10 Mating and Unmating Force

### 5.10.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 5.10.2 Test Equipment

**Table 38: Post Humidity Mating and Unmating Force Results**

| Manufacturer | Model Number | Description |
|---|---|---|
| Chatillon | TCD200 | 200 lb Tensile Tester Load Frame |
| Chatillon | DFIS 200 | 200 lb Load Cell |

### 5.10.3 Test Method and Setup

Samples 1B and 2B were mounted in the same custom fixture used during Contact Life testing. All test set up parameters were the same except for the rate of mating, which was set to 60 cycles per hour per MIL-DTL-55302G para 4.5.4. The maximum mate or unmate force cannot exceed 30 lb.

### 5.10.4 Test Results

**Table 39: Post Humidity Mating and Unmating Force Results**

| Sample Number | Ultimate Mating Force lb | Ultimate Un-mating Force lb |
|---|---|---|
| 2B into 1B Mated Pair | 23.0 | 16.0 |

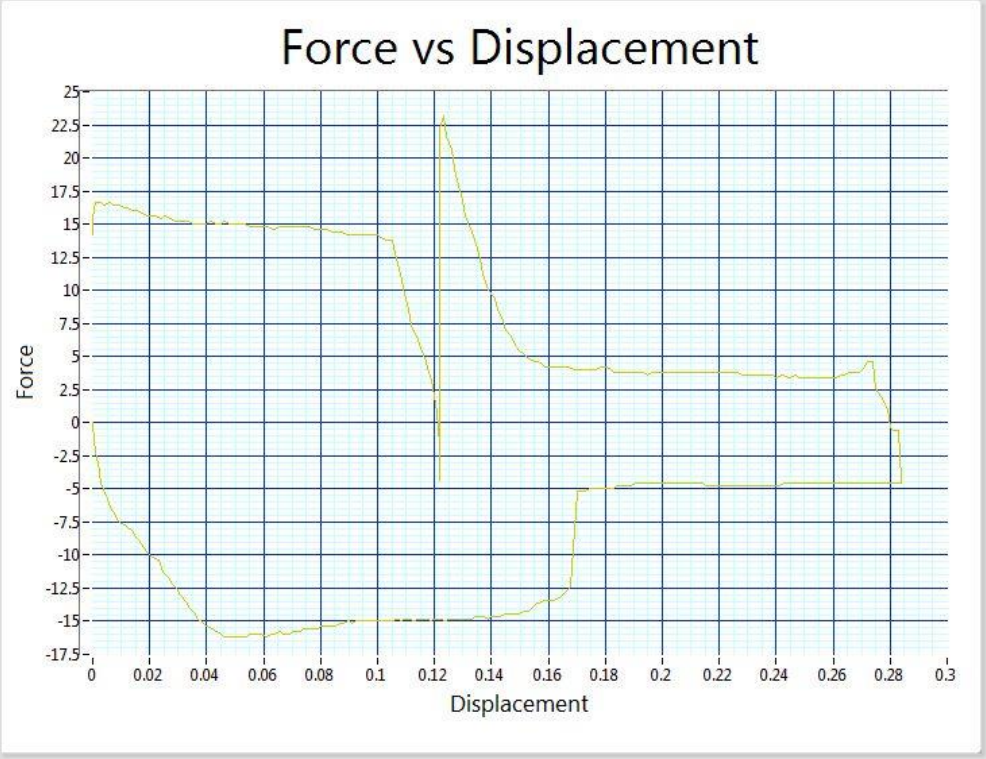


**Figure 26: Sample 2B-1B Post Humidity Mating and Unmating Force Trace**

### 5.10.5 Deviation of Test

No Deviations of Testing were recorded during Mating and Unmating Force Testing.

### 5.10.6 Photographs

Please see Figure 10.

## 5.11 Contact Compliant Removal Forces

### 5.11.1 References

- Mini-Qual Test Plan (STACKER) based on MIL-DTL-55302G
- MIL-DTL-55302G – Connectors, Printed Circuit Subassembly and Accessories

### 5.11.2 Test Equipment

**Table 40: Contact Compliant Removal Forces Test Equipment**

| Manufacturer | Model Number | Description |
|---|---|---|
| Instron | 3366 | 2250 lb Tensile Tester |

### 5.11.3 Test Method and Setup

Sample 2B was dismounted onto the tensile tester using a special fixture in order to release the Stacker connector from its PCB board. The maximum amount of force required to completely remove the sample from its board is recorded and reported.

### 5.11.4 Test Results

**Table 41: Contact Compliant Removal Forces Results**

| Sample Number | Ultimate PCB Mounting Force |
|---|---|
| 2B | 600.90 lb |

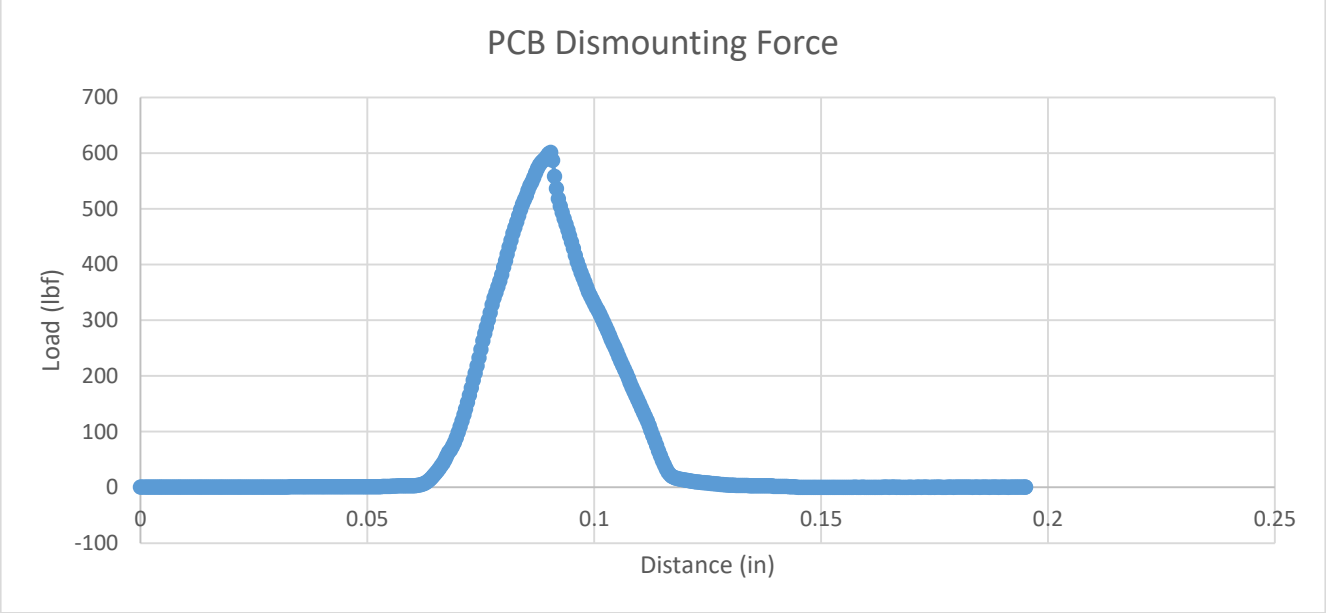


**Figure 27: PCB Dismounting Force for Sample 2B**

### 5.11.5 Deviation of Test

No Deviations of Testing were recorded during Contact Compliant Removal Forces Testing.

## 5.11.6 Photographs

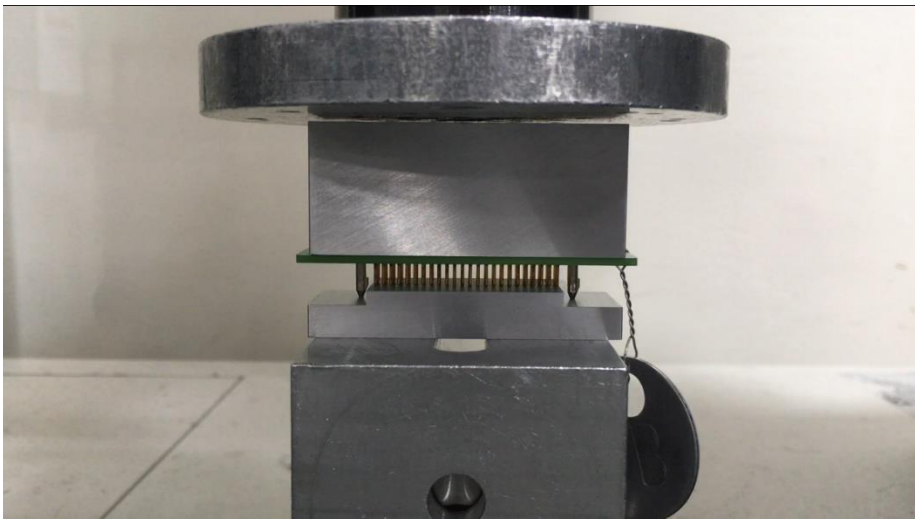

**Figure 28: PCB Dismounting Fixture**

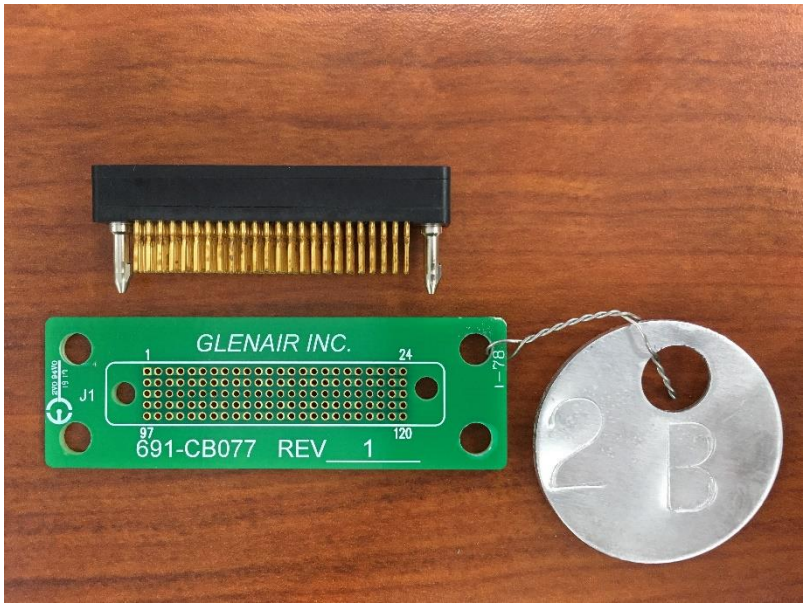


**Figure 29: Dismount Complete**

# END OF REPORT