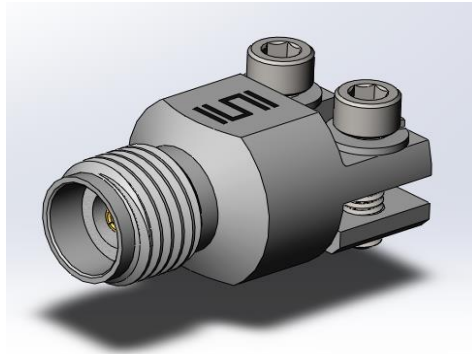




Project Number: Design Qualification Test Report	Tracking Code: CR-858401_Report_Rev_1
Requested by: Iris Wang	Date: 1/15/2025
Part #: 292-J-P-EP-ST-EL-01/RF086-92SP-505050-034	Tech: Peter Chen
Part description: 292-J-P / RF086-92SP	Qty to test: 20
Test Start: 12/8/2022	Test Completed: 12/20/2022



## DESIGN QUALIFICATION TEST REPORT

292-J-P / RF086-92SP  
292-J-P-EP-ST-EL-01/RF086-92SP-505050-034  
292-J-P-EP-ST-ELW-01

Tracking Code: CR-858401_Report_Rev_1	Part #: 292-J-P-EP-ST-EL-01/RF086-92SP-505050-034
Part description: 292-J-P / RF086-92SP	

**REVISION HISTORY**

<b>DATA</b>	<b>REV.NUM.</b>	<b>DESCRIPTION</b>	<b>ENG</b>
3/15/2023	1	Initial Issue	PC

## CERTIFICATION

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

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### SCOPE

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

### APPLICABLE DOCUMENTS

Standards: MIL-PRF-39012 and EIA-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) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
- 4) The automated procedure is used with aqueous compatible soldering materials.
- 5) Any additional preparation will be noted in the individual test sequences.

**FLOWCHARTS****Normal Force**Group 1

292-J-P-EP-ST-EL-01  
RF086-92SP-505050-034  
8 Contacts Minimum  
Without Thermal Age

Step	Description
1.	Contact Gaps
2.	Normal Force <sup>(1)</sup> Deflection = 0.0023 " Expected Force at Max Deflection = 132.56 g

Group 2

292-J-P-EP-ST-EL-01  
RF086-92SP-505050-034  
8 Contacts Minimum  
With Thermal Age

Step	Description
1.	Contact Gaps
2.	Thermal Age <sup>(2)</sup>
3.	Contact Gaps
4.	Normal Force <sup>(1)</sup> Deflection = 0.0023 " Expected Force at Max Deflection = 132.56 g

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(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17  
Test Condition = 4 (105°C)  
Time Condition = B (250 Hours)

**FLOWCHARTS Continued****IR/DWV****Pin-to-Ground****Group 1**

292-J-P-EP-ST-EL-01

RF086-92SP-505050-034

8 Assemblies

Step	Description
1.	Interface Gaging <i>Note: Measure and record center contact recess from interface reference plane</i>
2.	IR (2) - Non Standard
3.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 VAC
4.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
5.	Thermal Shock (4) - Non Standard
6.	IR (2) - Non Standard
7.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 VAC
8.	LLCR (3) - Non Standard Max Delta = 15 mOhm <i>Note: Signal and ground.</i>
9.	Interface Gaging <i>Note: Measure and record center contact recess from interface reference plane</i>

**(1) DWV at Test Voltage = Other**

Test Condition = 1 (Sea Level) Test voltage applied for 60 seconds  
MIL-PRF-39012, Paragraph. 4.6.14 per MIL-STD-202-301

**(2) IR = Other**

Test Condition = 500V DC, 2 Minutes Max  
MIL-PRF-39012, Paragraph 4.6.8 per MIL-STD-202-302

**(3) LLCR = Other**

Open Circuit Voltage = 20 mV Max  
Test Current = 100 mA Max  
MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

**(4) Thermal Shock = Other**

Exposure Time at Temperature Extremes = 1/2 Hour  
Test Condition = I (-65°C to +125°C)  
Test Duration = test condition B except 10 cycles instead of 5.  
MIL-PRF-39012, Paragraph. 4.6.17 per MIL-STD-202-107

**FLOWCHARTS Continued****Center Contact Retention****Minimum Force**Group 1

292-J-P-EP-ST-EL-01

8 Assemblies

Minimum Force

*Note: Test I.A.W. MIL-PRF-39012 par.  
4.6.9.*

**Step Description**

1. Measure Contact Recess @ Interface
2. Apply Minimum Force Onto Socket Face  
*Note: Applied Force = 4 lbf (17.8 N)*
3. Apply Minimum Force Onto Contact In Opposite Direc  
*Note: Applied Force = 4 lbf (17.8 N)*
4. Measure Contact Recess @ Interface

**Center Contact Captivation**Group 1

292-J-P-EP-ST-EL-01

8

Maximum Force.

*Note: This is a destructive test.  
Apply force to the center socket contact  
(push on contact from pin end of  
assembly) and record maximum force at  
captivation failure and note cause of  
failure. Examples of failure; Contact  
disengaged from internal dielectric  
capture bead. Interface bushing  
disengaged.*

**Step Description**

1. Apply Force On The Socket Center Contact  
*Note: Crosshead speed range 0.5-5.0 mm/min will be sufficient.  
Maximum force is the load force measured at captivation failure.*

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### THERMAL SHOCK:

- 1) MIL-PRF-39012, *Paragraph. 4.6.17 per MIL-STD-202-107*
- 2) Test Condition: I (-65°C to +125°C)
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Test Duration: Test condition B except 10 cycles instead of 5.
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

### LLCR:

- 1) MIL-PRF-39012, *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

### 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: MIL-PRF-39012, *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.

**ATTRIBUTE DEFINITIONS Continued**

The following is a brief, simplified description of attributes

**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: MIL-PRF-39012, *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).

**NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):**

- 1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
- 2) The contacts shall be tested in the loose state, *not* inserted in connector housing.
- 3) The contacts shall be prepared to allow access to the spring member at the same attitude and deflection level as would occur in actual use.
- 4) In the event that portions of the contact prevent insertion of the test probe and/or deflection of the spring member under evaluation, said material shall be removed leaving the appropriate contact surfaces exposed.
- 5) In the case of multi-tine contacts, each tine shall be tested independently on separate samples as required.
- 6) The connector housing shall be simulated, if required, in order to provide an accurate representation of the actual contact system performance.
- 7) A holding fixture shall be fashioned to allow the contact to be properly deflected.
- 8) Said holding fixture shall be mounted on a floating, adjustable, X-Y table on the base of the Dillon TC<sup>2</sup>, computer controlled test stand with a deflection measurement system accuracy of 5  $\mu\text{m}$  (0.0002").
- 9) The probe shall be attached to a Dillon P/N 49761-0105, 5 N (1.1 Lb) load cell providing an accuracy of  $\pm 0.2\%$ .
- 10) The nominal deflection rate shall be 5 mm (0.2")/minute.
- 11) Unless otherwise noted a minimum of five contacts shall be tested.
- 12) The force/deflection characteristic to load and unload each contact shall be repeated five times.
- 13) The system shall utilize the TC<sup>2</sup> software in order to acquire and record the test data.
- 14) The permanent set of each contact shall be measured within the TC<sup>2</sup> software.
- 15) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

**ATTRIBUTE DEFINITIONS Continued**

The following is a brief, simplified description of attributes

**Center Contact Retention**

Measure Contact Recess Interface before Apply Minimum Force on to Socket Face and Contact In Opposite Direction.

**Center Contact Captivation**

This is a destructive test. Apply force to the center socket contact (push on contact from pin end of assembly) and record maximum force at captivation failure.

**RESULTS****Normal Force deflection-0.0017 Inch**

- **Initial**
  - Min -----54.80 gf                      Set ----- 0.0000 in
  - Max -----77.10 gf                      Set ----- 0.0001 in
- **Thermal**
  - Min -----37.00 gf                      Set ----- 0.0000 in
  - Max -----68.50 gf                      Set ----- 0.0004 in

**Center Contact Captivation**

- Min ----- 4.40 lbs
- Max ----- 5.55 lbs

**Insulation Resistance minimums, IR****Pin to Ground**

- **Initial**
  - Mated -----45000 Meg  $\Omega$  ----- Passed
- **Thermal Shock**
  - Mated -----45000 Meg  $\Omega$  ----- Passed

**Dielectric Withstanding Voltage minimums, DWV**

- **Minimums**
  - Test Voltage -----500 VAC

**Pin to Ground**

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

**RESULTS Continued****Interface Gaging****IR/DWV Group****Initial**

- Min ----- 0.010 mm
- Max ----- 0.004 mm

**After Thermal Shock**

- Min ----- 0.002 mm
- Max ----- 0.002 mm

**Center Contact Retention Group****Initial**

- Min ----- 0.008 mm
- Max ----- 0.034 mm

**After Thermal Shock**

- Min ----- 0.008 mm
- Max ----- 0.034 mm

**LLCR IR/DWV (4 signal and 4 ground LLCR test points)****Signal Pin**

- Initial ----- 30.56 mOhms Max
- Thermal Shock
  - <= +5.0 mOhms ----- 4 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

**Ground Pin**

- Initial ----- 15.22 mOhms Max
- Thermal Shock
  - <= +5.0 mOhms ----- 4 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

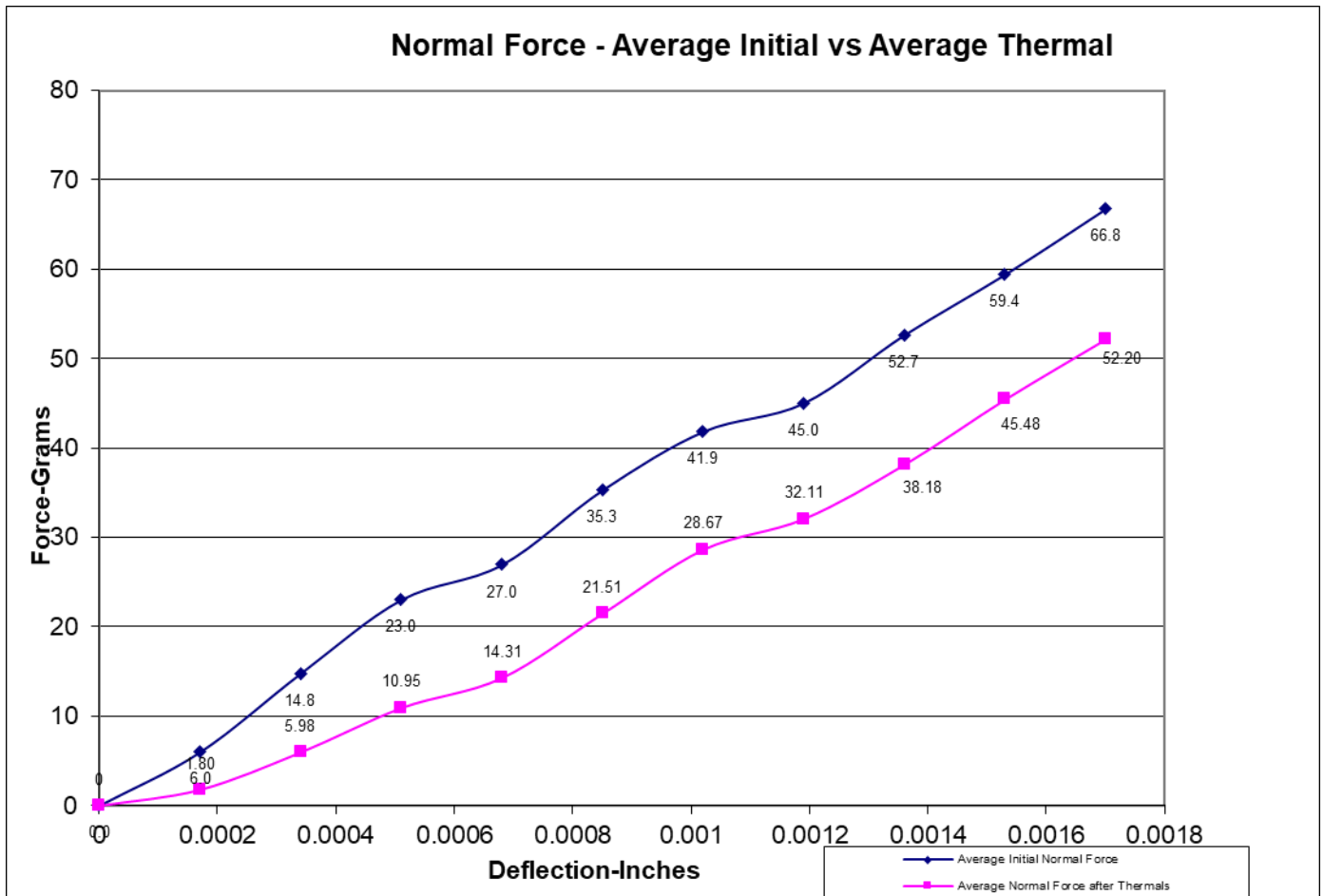
### DATA SUMMARIES

#### NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

- 1) Calibrated force gauges are used along with computer controlled positioning equipment.
- 2) For Normal force 8-10 measurements are taken and the averages reported.

Initial	Deflections in inches Forces in Grams										
	<u>0.0002</u>	<u>0.0003</u>	<u>0.0005</u>	<u>0.0007</u>	<u>0.0009</u>	<u>0.0010</u>	<u>0.0012</u>	<u>0.0014</u>	<u>0.0015</u>	<u>0.0017</u>	SET
Averages	5.99	14.78	23.03	26.95	35.30	41.85	45.03	52.68	59.44	66.77	0.0000
Min	2.80	9.80	15.90	18.00	25.90	31.80	34.90	41.50	47.20	54.80	0.0000
Max	13.70	21.40	36.10	39.00	46.60	53.80	56.80	63.30	72.80	77.10	0.0001
St. Dev	3.384	3.800	6.285	6.601	6.119	6.379	7.168	7.025	7.859	8.045	0.0000
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0002</u>	<u>0.0003</u>	<u>0.0005</u>	<u>0.0007</u>	<u>0.0009</u>	<u>0.0010</u>	<u>0.0012</u>	<u>0.0014</u>	<u>0.0015</u>	<u>0.0017</u>	SET
Averages	1.80	5.98	10.95	14.31	21.51	28.67	32.11	38.18	45.48	52.20	0.0001
Min	-0.10	-0.10	0.10	2.60	9.70	15.50	18.50	24.00	32.30	37.00	0.0000
Max	4.50	13.10	20.00	22.70	34.20	38.50	41.20	52.90	58.60	68.50	0.0004
St. Dev	1.814	5.582	7.321	6.328	7.728	7.787	7.061	8.454	9.009	10.702	0.0001
Count	12	12	12	12	12	12	12	12	12	12	12



**DATA SUMMARIES****Center Contact Captivation:**

	Force (lbs)
Minimum	<b>4.40</b>
Maximum	5.55
Average	4.80

**INSULATION RESISTANCE (IR):**

	Pin to Ground
	Mated
Minimum	<b>292-J-P/92SP</b>
Initial	45000
Thermal Shock	45000

**DIELECTRIC WITHSTANDING VOLTAGE (DWV):**

Voltage Rating Summary	
Minimum	<b>292-J-P/92SP</b>
Test Voltage	500

Pin to Ground (500 VAC)	
Initial Test Voltage	Pass
After Thermal Shock Test Voltage	Pass

**DATA SUMMARIES Continued****INTERFACE GAGING****IR/DWV Group**

<b>Gaging (0.20/0.00)(mm)</b>			
<b>292-J-P</b>	<b>Initial</b>	<b>Post Ther Shock</b>	<b>Delta</b>
1	0.010	0.002	0.008
2	0.030	0.002	0.028
3	0.030	0.002	0.028
4	0.030	0.002	0.028
5	0.040	0.002	0.038
6	0.010	0.002	0.008
7	0.040	0.002	0.038
8	0.030	0.002	0.028
Min	0.010	0.002	0.008
Max	0.040	0.002	0.038
Average	0.0275	0.002	0.0255

**Center Contact Retention Group**

<b>Gaging (0.20/0.00)(mm)</b>			
<b>292-J-P</b>	<b>Initial</b>	<b>Post Ther Shock</b>	<b>Delta</b>
1	0.034	0.034	0.000
2	0.034	0.034	0.000
3	0.008	0.008	0.000
4	0.021	0.034	0.013
5	0.034	0.034	0.000
6	0.034	0.021	0.013
7	0.021	0.021	0.000
8	0.021	0.021	0.000
Min	0.008	0.008	0.000
Max	0.034	0.034	0.013
Average	0.026	0.026	0.003

**DATA SUMMARIES Continued**

**LLCR IR/DWV:**

- 1) A total of 4 signal and 4 ground points were measured.
- 2) MIL-PRF-39012, *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.  $\leq +5.0$  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

LLCR Measurement Summaries by Pin Type			
Date	12/8/2022	12/20/2022	
Room Temp (Deg C)	22	22	
Rel Humidity (%)	50	50	
Technician	Peter Chen	Peter Chen	
<b>mOhm values</b>	Actual Initial	<b>Delta</b> Thermal Shock	
<b>Pin Type: Signal 1</b>			
Average	29.60	1.33	
St. Dev.	0.81	0.62	
Min	28.58	0.74	
Max	30.56	2.2	
Summary Count	4	4	
Total Count	4	4	
<b>Pin Type: GND 1</b>			
Average	13.78	0.54	
St. Dev.	0.97	0.41	
Min	13.2	0.07	
Max	15.22	1.06	
Summary Count	4	4	
Total Count	4	4	

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	$\leq 5$	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	$>1000$
<b>After Thermal shock</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** HZ-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: 05/29/2022, Next Cal: 05/29/2023

**Equipment #:** HZ-MO-11**Description:** Switch/Multimeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 120169**Accuracy:** See Manual

... Last Cal: 09/11/2022, Next Cal: 09/11/2023

**Equipment #:** HZ-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: 06/30/2022, Next Cal: 06/30/2023

**Equipment #:** HZ-HPT-01**Description:** Hipot Safety Tester**Manufacturer:** Vitrek**Model:** V73**Serial #:** 019808**Accuracy:**

... Last Cal: 05/15/2022, Next Cal: 05/15/2023