



# HARWIN

## Test Report Summary

**HT07702**

General Testing  
S1961-46R and S1971-46R  
Mini Multi-Directional Spring Contacts

## 1. Introduction

### 1.1. Description and Purpose

The purpose of this test program is to confirm the environmental, mechanical, and electrical performance of Multi-Directional Spring Contacts S1961-46R and S1971-46R.

### 1.2. Conclusion

This report is a summary of the testing documented in QA000168. For both contacts: under the specified conditions the requirements for environmental, mechanical, and electrical testing were met.

## 2. Test Method and Requirements

### 2.1. Specification Parameters

Testing Standard	Description of Test	Section	Page No.
EIA-364-06C: 2006	Contact Resistance	3.1	2
EIA-364-09C: 1999	Durability	3.2	3
EIA-364-70A:1998	Temperature vs Current	3.3	4-5
N/A	Force vs Deflection	3.4	6
EIA-364-17B: 1999	Temperature Life (without loading)	3.5	7
EIA-364-32C: 2000 (BS EN 60068-2-14:2009)	Thermal Shock (Temperature Cycling)	3.6	7
EIA-364-31B: 1999 (BS EN 60068-2-78:2013)	Humidity	3.7	8
EIA-364-26B: 1999 (BS EN 60068-2-11:1999)	Salt Spray	3.8	9

### 2.2. List of Test Samples

For all these tests the clips had been mounted and reflow soldered to a test board, in the following configurations:

- S1961-46R (3.5mm high, Tin finish) mounted to HM2186 PCB Test Board
- S1971-46R (4.5mm high, Tin finish) mounted to HM2186 PCB Test Board

## 3. Test Results

### 3.1. Contact Resistance: EIA-364-06C: 1999

Methodology: The contact resistance of the spring contact was measured prior to any electrical, mechanical, or environmental testing. Samples were also tested post-conditioning.

Results: All values are in mΩ

Test	S1961-46R			S1971-46R			
	Max	Min	Average	Max	Min	Average	
Initial	0.62	0.48	0.56	0.77	0.70	0.75	
Durability	0.75	0.68	0.72	0.88	0.83	0.85	
Humidity	0.77	0.74	0.76	0.68	0.67	0.68	
Thermal Shock	0.79	0.78	0.79	0.89	0.84	0.87	
Salt Spray	0.83	0.80	0.82	0.92	0.90	0.91	
Temperature Life	96hrs	0.73	0.72	0.73	0.70	0.68	0.69
	500 hrs	0.76	0.72	0.74	0.82	0.76	0.79

**3.2. Durability: EIA-364-09C: 1999**

Methodology: Contacts assembled to boards were compressed vertically (by 0.6mm) and horizontally (by 0.5mm) under separate tests. The test was performed at a speed of 25mm/min for 5,000 cycles. Compression forces were measured. Samples were also tested post-conditioning.

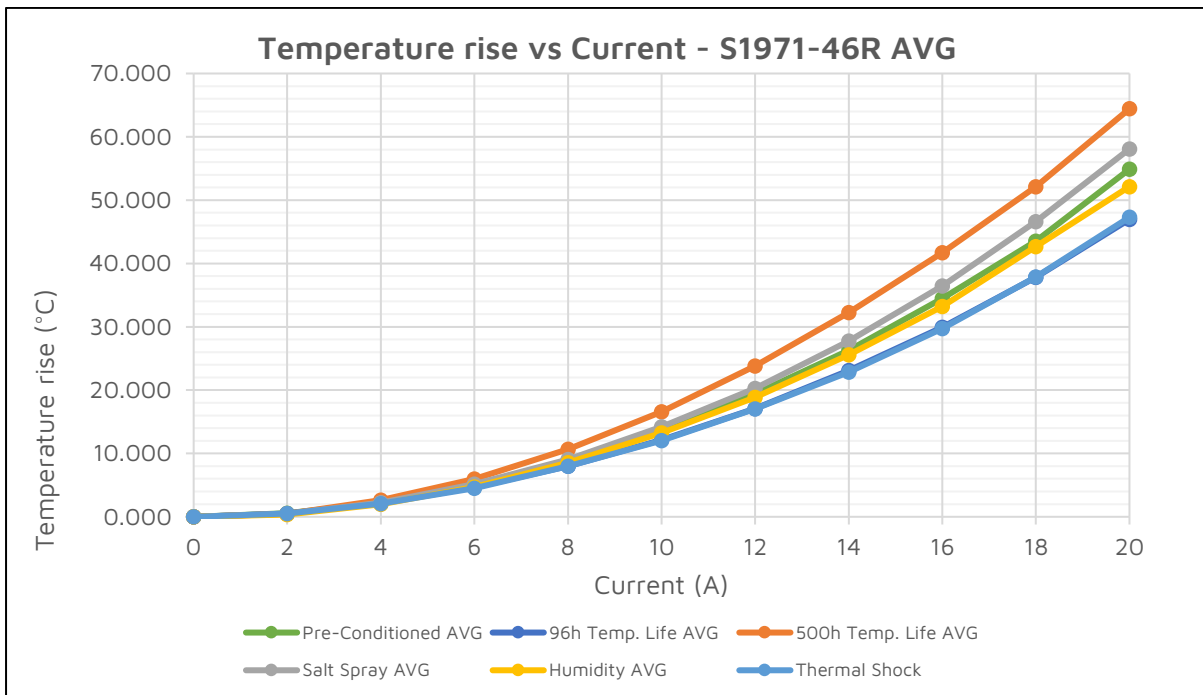
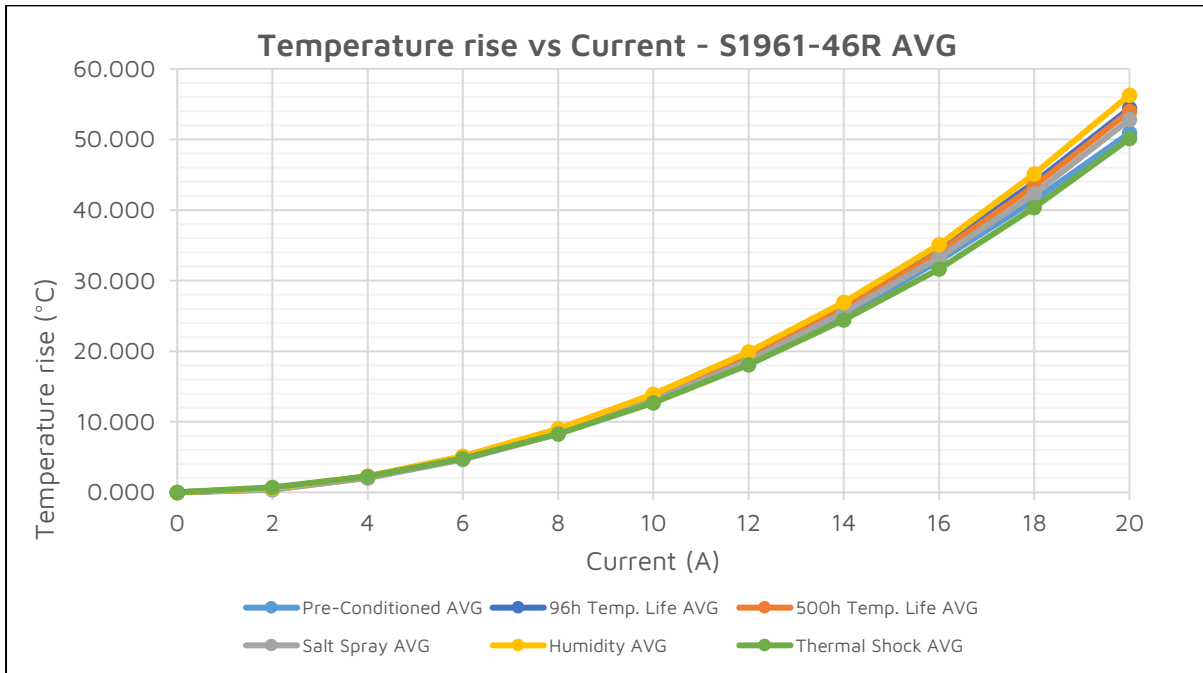
Results: All values are the forces measured in N.

Compression Direction	Condition	S1961-46R				S1971-46R			
		Initial	Max	Min	Final	Initial	Max	Min	Final
Vertical	Initial	4.29	6.80	4.18	4.07	3.81	4.30	3.40	3.40
	Salt Spray	7.36	7.96	7.43	7.43	4.22	4.39	3.96	3.96
	Humidity	5.16	6.46	4.89	4.89	4.00	4.34	3.47	3.47
	Thermal Shock	8.40	8.51	8.25	8.25	4.10	4.48	3.55	3.55
	Temp . Life	96 hrs	5.12	5.97	5.04	5.04			
500 hrs									
Horizontal	Initial	5.00	5.90	5.00	5.57				
	Salt Spray	9.45	9.86	8.74	8.74				
	Humidity	8.78	9.04	8.33	8.74				
	Thermal Shock	5.34	6.20	5.23	5.23				
	Temp . Life	96 hrs	5.38	5.95	5.38	5.79			
500 hrs									
Vertical	Initial								
	Salt Spray								
	Humidity								
	Thermal Shock								
	Temp . Life	96 hrs	4.11	4.26	3.74	3.74			
500 hrs		5.27	5.86	5.12	5.23				
Horizontal	Initial	2.91	3.18	2.51	2.51				
	Salt Spray	4.03	4.51	4.03	4.29				
	Humidity	3.40	3.51	2.95	2.95				
	Thermal Shock	3.47	3.62	3.07	3.07				
	Temp . Life	96 hrs	4.19	4.30	3.85	3.85			
500 hrs									

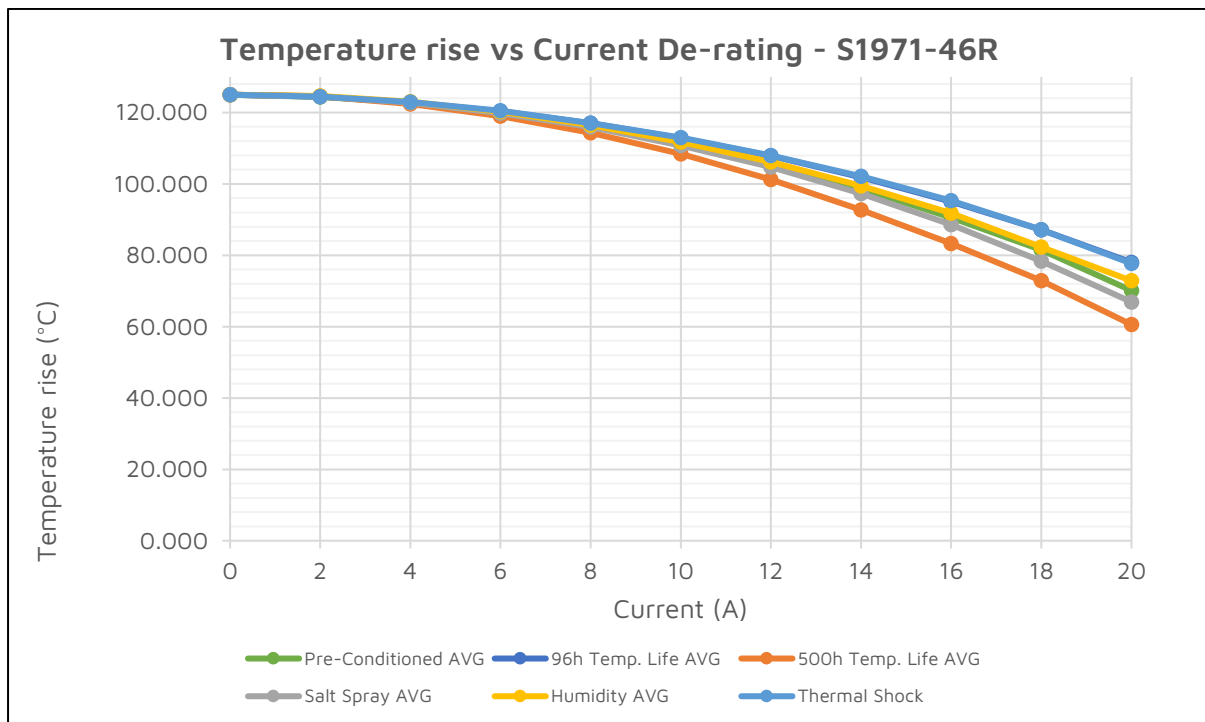
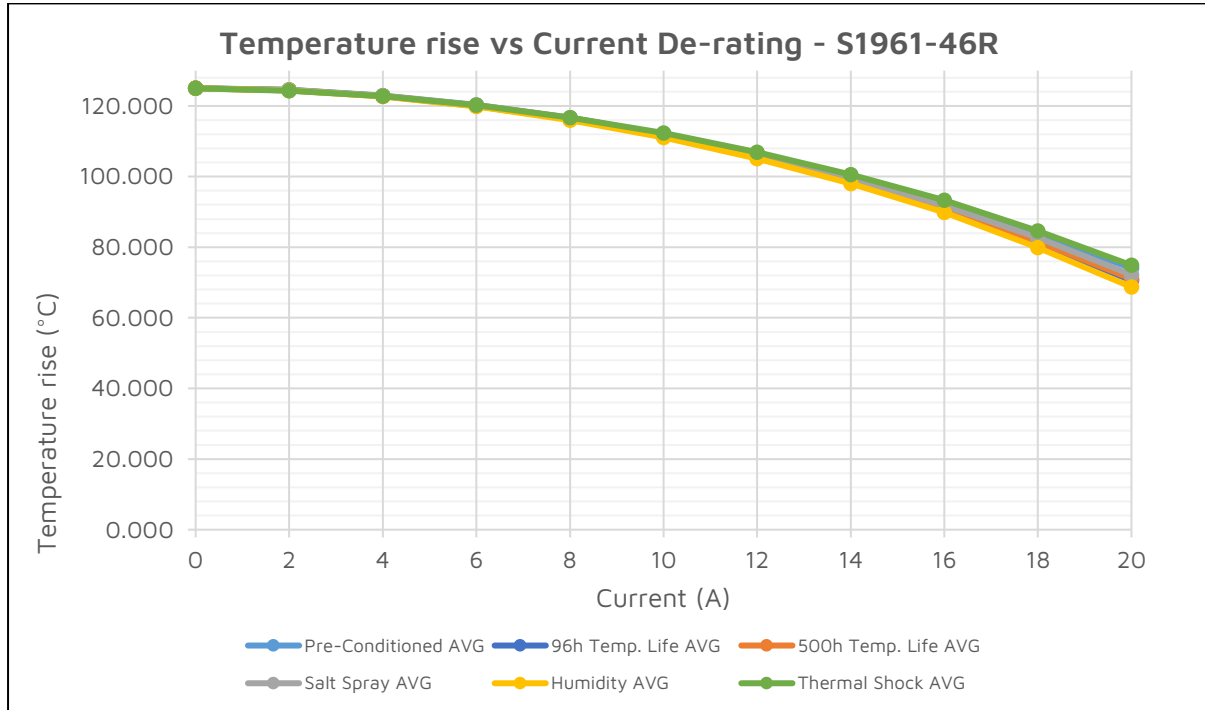
### 3.3. Temperature vs Current: EIA-364-70A:1998

**Methodology:** Spring contacts were assembled to test boards and mated with an opposing test board which was wired to create a complete circuit. The spacing of the two boards was constrained at the respective recommended working height of the contact and a current was passed through to observe the corresponding temperature rise of the component. The current applied was increased in increments of 2A, leaving the temperature to stabilise between each stage.

**Results:**



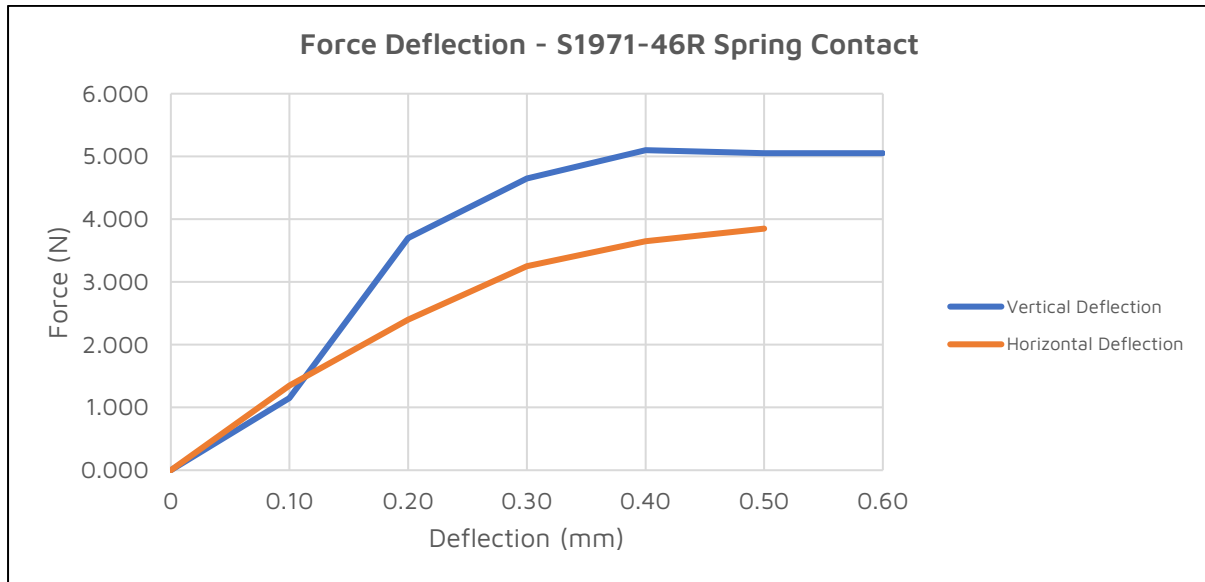
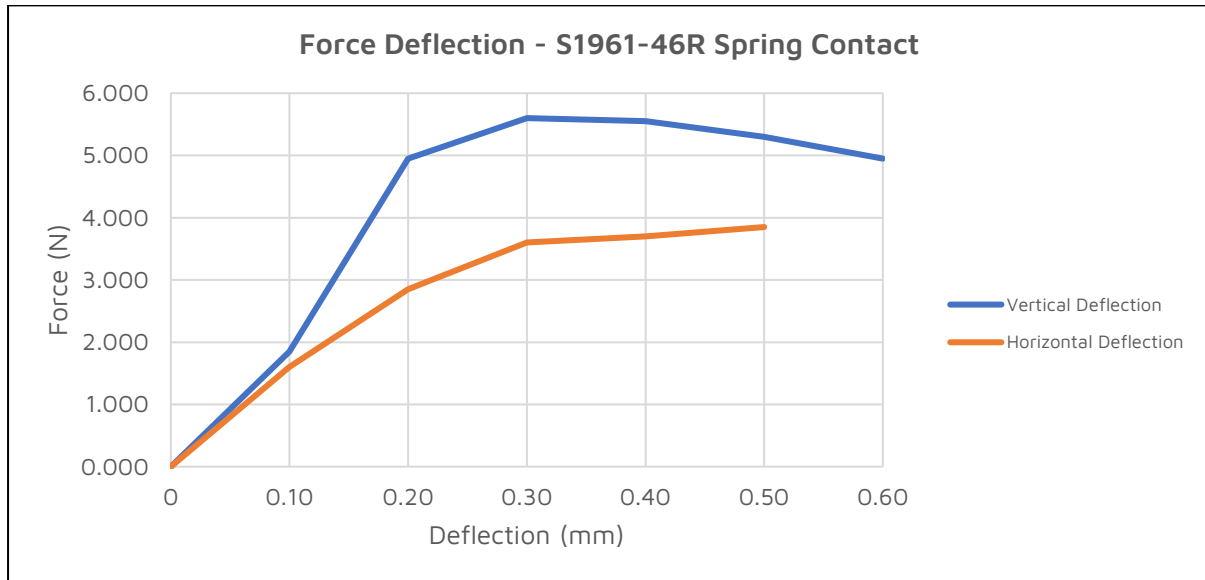
Results: Temperature vs current de-rating curves are based on the recommended maximum operating of 125°C.



### 3.4. Force vs Deflection

**Methodology:** The spring contacts were assembled on to test boards. A force was applied to both the front and top faces under separate tests (for horizontal & vertical respectively) at deflection increments of 0.10mm – the force at each step was noted. Deflection was continued up to 0.60mm vertical deflection and 0.50mm horizontal deflection for both contacts. The distance of permanent set after maximum deflection was measured.

**Results:**



**Results:** Permanent set (in mm) after 0.6mm deflection

Part Number	Compression Direction	Average Set
S1961-46R	Vertical	0.30
	Horizontal	0.28
S1971-46R	Vertical	0.25
	Horizontal	0.25

**3.5. Temperature life (Without Load): EIA-364-17B:1999, Condition 5, Method A**

Methodology: Spring contacts assembled to test boards were subjected to 96 hours and 500 hours at 125±5°C. The samples were measured for contact resistance, current vs temperature and durability, as well as a visual inspection after testing.

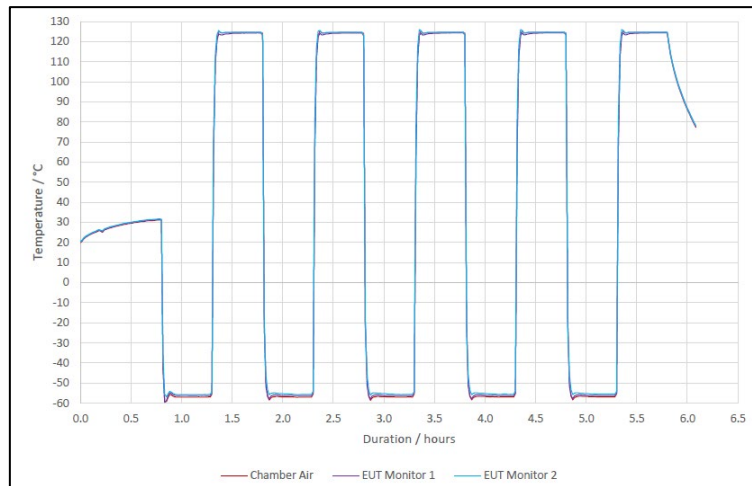
Results: No obvious visual changes were noted.

Part Number	Duration in Temperature Testing Oven	
	96 hours at +125°C	500 hours at +125°C
S1961-46R	Pass	Pass
S1971-46R	Pass	Pass

**3.6. Thermal Shock: EIA-364-32C: 2000, Condition 3 / BS EN 60068-2-14:2009, Test Na**

Methodology: Thermal Shock Testing was performed on the spring contacts assembled to the test boards, using the following conditions:

- Temperature Extremes = -55°C and +125°C
- Dwell times = 1 hr at each temperature extreme
- 5 cycles



The samples were measured for contact resistance, current vs temperature and durability, as well as a visual inspection after testing.



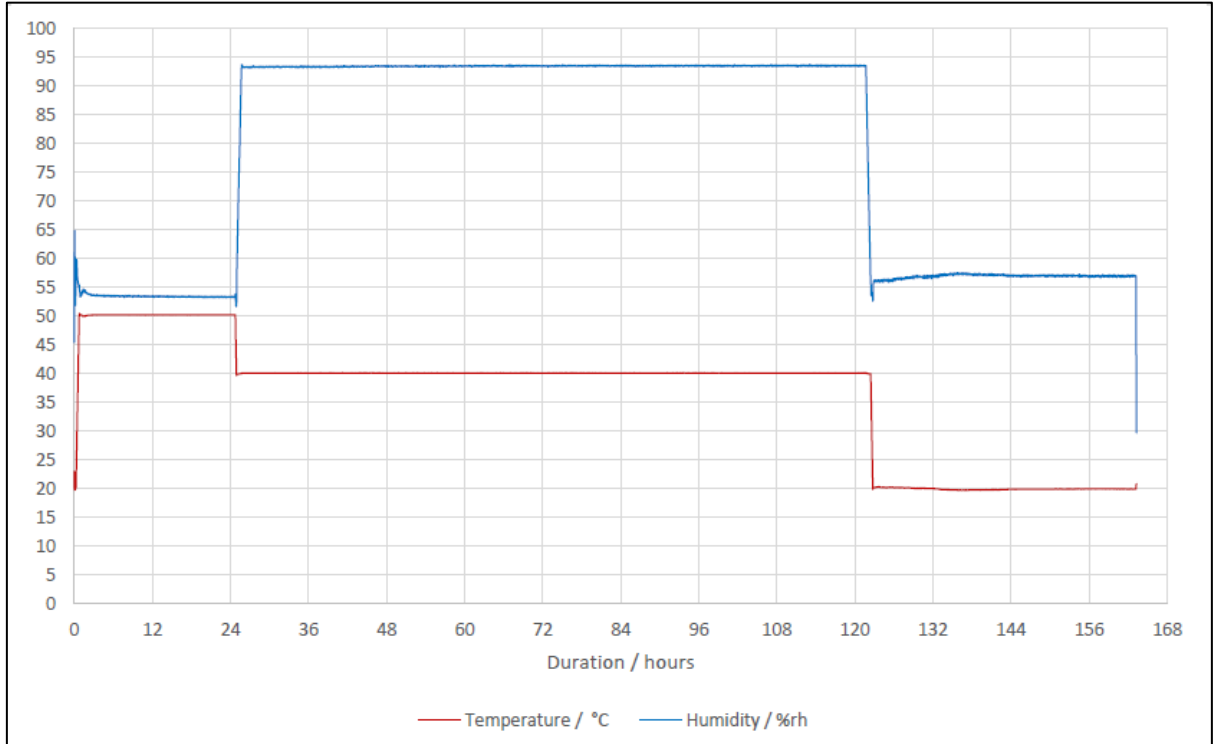
*Samples in Thermal Shock Chamber*

Results: There were no obvious changes as a result.

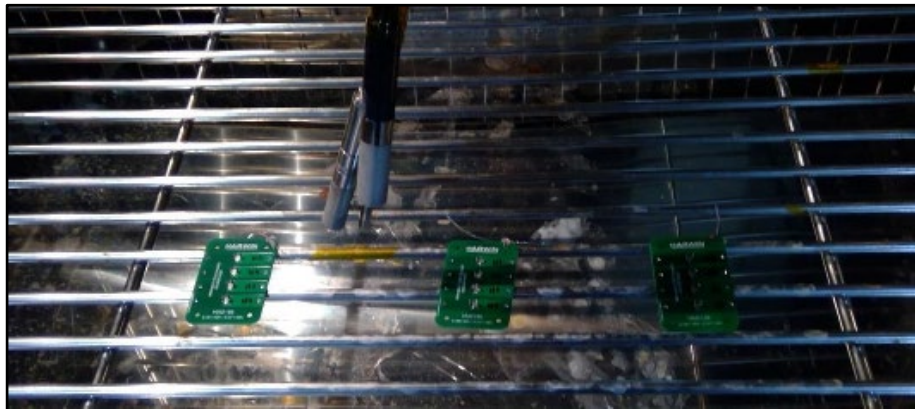
**3.7. Humidity Steady State: EIA-364-31B: 1999, Method 2, Condition A / BS EN 60068-2-78-2013 Test Cab**

Methodology: A Steady State Humidity test was performed on the two contacts assembled to test boards, using the following conditions:

- Ambient Temperature = +40°C
- Steady state humidity = 90% to 95% Rh
- Duration = 96hrs



The samples were measured for contact resistance, current vs temperature and durability, as well as a visual inspection after testing.



*Samples in Humidity Chamber*

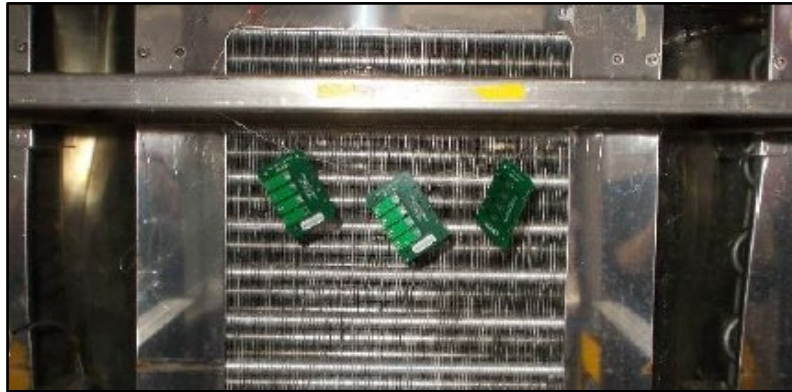
Results: There were no obvious changes as a result.



**3.8. Salt Spray: EIA-364-26B: 1999 / BS EN 60068-2-11:1999 Test Ka**

Methodology: A salt mist test was performed on test boards including the two contacts, using the following conditions:

- Salt solution = 5% NaCl
- Salt Mist chamber temperature = +35°C
- Salt spray duration = 96hrs continuous
- Fallout rates = 0.5-3ml per hr
- pH level = 6.5 to 7.2



*Samples in Salt Spray Chamber*

On completion of the salt mist duration, the samples were dipped in running water and placed into a temperature chamber at +38°C for 16hrs. The samples were measured for contact resistance, current vs temperature and durability, as well as a visual inspection after testing.

Results: There were no obvious changes as a result.