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HARWiN

Test Report Summary

HT08701

Gecko-MT Standard Layout (G125 Series)
General Testing

gecko

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1. Introduction

1.1 Description and Purpose

The Harwin Gecko-MT Standard Layout (G125 Series) range is a range for the 1.25mm pitch Gecko connector series, offering a combination or signal and power contacts in a variety of configurations. The following tests were carried out to verify the Component Specification criteria and determine whether any alterations are required for this new range.

1.2 Conclusion

The following data has been collated from Harwin test reports QA000226, QA000227, QA000240, QA000278, QA000279, QA000290 & QA000318. The results show that the range adheres to the Component Specification for the Gecko range, which can be downloaded here:

https://cdn.harwin.com/pdfs/C125XX_G125_Gecko_Connectors.pdf

2. Test Method, Requirements and Results

2.1 Specification Parameters

Tests were either carried out in general accordance with EIA-364 standards (or their BS EN 60068 equivalent. The list of tests covered in this summary are as follows:

Testing Standard	Description of Test	Section	Page No.
EIA-364-09C: 1999	Durability	3.1	3-4
EIA-364-05B: 1998	Contact Insertion & Retention	3.2	5-6
EIA-364-35B: 1998	Insert Retention	3.2	5-6
EIA-364-20C: 2004	Withstand Voltage	3.3	7
EIA-364-21C: 2000	Insulation Resistance	3.4	8-9
EIA-364-70A: 1998	Temperature Rise versus Current & De-Rating Curves	3.5	10-14
EIA-364-32C: 2000 (BS EN 60068-2-14:2009)	Thermal Shock (Temperature Cycling)	3.6	15
EIA-364-26B: 1999 (BS EN 60068-2-11:1999)	Salt Spray	3.7	16
EIA-364-31B: 1999 (BS EN 60068-2-78: 2013)	Humidity	3.8, 3.9	16
EIA-364-28D: 1999 (BS EN 60068-2-6: 2008)	Vibration	3.10	17
EIA-364-27B: 1996 (BS EN 60068-2-27:2009)	Mechanical Shock	3.11	18

3. Individual Test Results

3.1 Durability to EIA-364-09C: 1999

Connectors were tested for durability in a variety of configurations to determine maximum insertion forces and minimum withdrawal forces for each combination available at launch. The connectors were mated and unmated a total of 1,000 cycles at a speed of 25mm/min with maximum insertion and minimum withdrawal force values recorded for each environmental test condition as well as pre-conditioned values.

Specification set at:

- Signal Contacts - Maximum Insertion Force (per contact) = 2.8N Max.
- Power Contacts - Maximum Insertion Force (per contact) = 7.0N Max.
- Signal & Power Contacts - Withdrawal Force (per contact) = 0.2N Min.
- Durability = 1,000 operations

Female Connector	Male Connector	Test Setup	Condition	Average Force (N)	
				Max. Insertion	Min. Withdrawal
G125-22496F1-02-04-00	G125-MH104M4-02AD000P	1	Initial	26.7	12.4
			Temp. Life – 96hrs	15.7	9.5
			Temp. Life – 1000hrs	14.0	8.0
			Humidity - 96hrs	26.1	8.3
			Thermal Shock	23.3	7.7
			Salt Spray	26.8	13.2
G125-22496F1-02-24-00	G125-MH124M4-02AD000P	2	Initial	101.2	17.8
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	-	-
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-
G125-22496F1-06-08-00	G125-MH108M3-06AD000P	3	Initial	52.7	19.0
			Temp. Life – 96hrs	34.8	5.2
			Temp. Life – 1000hrs	23.2	10.8
			Humidity - 96hrs	38.6	13.5
			Thermal Shock	39.3	12.7
			Salt Spray	57.9	20.5
G125-FV104F1-02AB000P	G125-32496M1-02-04-00	5	Initial	21.6	7.3
			Temp. Life – 96hrs	34.5	12.8
			Temp. Life – 1000hrs	28.0	11.3
			Humidity - 96hrs	31.1	10.8
			Thermal Shock	19.0	5.9
			Salt Spray	30.0	10.8
G125-FV124F1-02AB000P	G125-32496M1-02-24-00	6	Initial	41.8	9.1
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	57.3	15.6
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-

Female Connector	Male Connector	Test Setup	Condition	Average Force (N)	
				Max. Insertion	Min. Withdrawal
G125-FV108F1-06AB000P	G125-32496M1-06-08-00	7	Initial	53.7	14.1
			Temp. Life – 96hrs	60.2	28.1
			Temp. Life – 1000hrs	57.9	28.0
			Humidity - 96hrs	53.2	14.4
			Thermal Shock	34.6	11.3
			Salt Spray	41.8	16.8
G125-22496F1-04-16-00	G125-32496M1-04-16-00	9	Initial	60.2	12.0
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	-	-
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-
G125-22496F2-04-04-00	G125-MH104M3-04AD000P	10	Initial	60.2	12.0
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	-	-
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-
G125-22496F2-03-08-00	G125-MH108M3-03AD000P	11	Initial	35.8	10.4
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	57.1	5.9
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-
G125-FV108F1-03AB000P	G125-32496M2-03-08-00	12	Initial	76.9	20.6
			Temp. Life – 96hrs	-	-
			Temp. Life – 1000hrs	-	-
			Humidity - 96hrs	-	-
			Thermal Shock	-	-
			Salt Spray	-	-

3.2 Contact Insertion & Retention to EIA-364-05B: 1998 & Insert Retention to EIA-364-35B: 1998

Contacts and hardware were tested for retention in housings across the range of Gecko-MT connectors. Using an automated force gauge, pressure testing was conducted in accordance with EIA-364-05B and EIA-364-35B. Further destructive testing was also performed, pushing contacts and hardware from the housings, recording the force to do so.

Specification set at:

- Contact Retention in Housing (all contact types) = 6.0N Min.
- Screw-Lok Retention in Housing = 20.0N Min.

All samples adhere to the above specification, with certain environmental test conditions having a greater impact on contact and hardware retention.

Connector Part No.	Condition	Average Contact Retention Force (N)		Average Hardware Retention Force (N)
		Signal Contact	Power Contact	
G125-22496F1-02-04-00	Initial	24.3	92.6	38.8
	Temp. Life – 96hrs	26.7	105.6	-
	Temp. Life – 1000hrs	18.6	78.7	-
	Humidity - 96hrs	23.5	95.9	-
	Thermal Shock	24.3	117.7	-
	Salt Spray	21.0	103.8	-
G125-22496F1-06-08-00	Initial	23.3	108.3	32.2
	Temp. Life – 96hrs	25.6	102.9	-
	Temp. Life – 1000hrs	16.4	79.2	-
	Humidity - 96hrs	24.0	114.4	-
	Thermal Shock	23.2	113.5	-
	Salt Spray	21.8	108.5	-
G125-22496F1-06-08-00	Initial	-	-	90.4
G125-22496F3-06-08-00	Initial	-	-	82.2
G125-22496F1-02-04-00	Initial	-	-	26.8
G125-22496F1-04-04-00	Initial	-	-	23.7
G125-22496F1-04-04-00	Initial	-	-	31.0
G125-22496F2-04-16-00	Initial	-	-	27.0
G125-22496F1-03-08-00	Initial	-	-	37.1
G125-32496M1-02-04-00	Initial	21.5	86.7	88.8
	Temp. Life – 96hrs	28.6	109.4	-
	Temp. Life – 1000hrs	21.8	80.7	-
	Humidity - 96hrs	18.8	96.7	-
	Thermal Shock	20.7	111.3	-
	Salt Spray	27.4	104.8	-
G125-32496M1-06-08-00	Initial	19.4	93.9	70.7
	Temp. Life – 96hrs	33.0	114.9	-
	Temp. Life – 1000hrs	20.3	76.5	-
	Humidity - 96hrs	23.9	106.5	-
	Thermal Shock	24.4	116.3	-
	Salt Spray	32.41	123.7	-
G125-32496M3-03-08-00	Initial	-	-	42.3

Connector Part No.	Condition	Average Contact Retention Force (N)		Average Hardware Retention Force (N)
		Signal Contact	Power Contact	
G125-FV104F1-02AB000P	Initial	17.1	116.8	59.6
	Temp. Life – 96hrs	18.9	137.3	-
	Temp. Life – 1000hrs	14.9	63.3	-
	Humidity - 96hrs	16.7	112.4	-
	Thermal Shock	15.0	113.5	-
	Salt Spray	10.6	106.27	-
G125-FV108F3-06AB000P	Initial	12.5	108.9	92.1
	Temp. Life – 96hrs	13.2	112.9	-
	Temp. Life – 1000hrs	12.7	60.8	-
	Humidity - 96hrs	12.9	105.6	-
	Thermal Shock	11.9	111.9	-
	Salt Spray	20.8	106.8	-
G125-FV104F3-02AB000P	Initial	15.7	111.9	108.4
G125-FV108F1-06AB000P	Initial	14.6	110.2	49.6
G125-MH104M4-02AD000P	Initial	10.7	66.5	92.4
	Temp. Life – 96hrs	17.6	78.8	-
	Temp. Life – 1000hrs	14.0	52.3	-
	Humidity - 96hrs	10.9	63.2	-
	Thermal Shock	13.0	72.0	-
	Salt Spray	15.8	76.8	-
G125-MH108M4-06AD000P	Initial	9.8	63.2	100.2
	Temp. Life – 96hrs	17.5	64.8	-
	Temp. Life – 1000hrs	13.5	43.9	-
	Humidity - 96hrs	8.8	61.1	-
	Thermal Shock	13.8	67.2	-
	Salt Spray	14.7	67.3	-
G125-MH104M3-02AD000P	Initial	-	-	58.8
G125-MH108M3-06AD000P	Initial	-	-	52.7

3.3 Withstand Voltage to EIA-364-20C: 2004

Connectors were tested in a variety of configurations.

- Sea Level conditions were carried out at an ambient absolute pressure of 986mB.
- Altitude was carried out in a vacuum chamber reduced to an absolute pressure of 44mB, to represent an altitude of 21,336m (70,000ft).

Specification set at:

- Working Voltage at sea level = 450V DC or AC_{peak}
- Voltage Proof at sea level = 600V DC or AC_{peak}
- Working Voltage at 21,336m (70,000ft) = 250V DC or AC_{peak}
- Voltage Proof at 21,336m (70,000ft) = 350V DC or AC_{peak}

Female Connector	Male Connector	Test Setup	Condition	Power Result	Signal Result
G125-22496F1-02-04-00	**G125-MH104M4-02AD000P**	13	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-22496F1-02-24-00	**G125-MH124M4-02AD000P**	14	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-22496F1-06-08-00	**G125-MH108M3-06AD000P**	15	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV104F1-02AB000P	**G125-32496M1-02-04-00**	16	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV124F1-02AB000P	**G125-32496M1-02-24-00**	17	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV108F1-06AB000P	**G125-32496M1-06-08-00**	18	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-22496F2-04-04-00	**G125-MH104M3-04AD000P**	19	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-22496F2-03-08-00	**G125-MH108M3-03AD000P**	20	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV104F1-04AB000P	**G125-32496M2-04-04-00**	21	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV108F1-03AB000P	**G125-32496M2-03-08-00**	22	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-22496F2-04-16-00	**G125-MH116M3-04AD000P**	23	Sea Level	PASS	PASS
			Altitude	PASS	PASS
G125-FV116F1-04AB000P	**G125-32496M2-04-16-00**	24	Sea Level	PASS	PASS
			Altitude	PASS	PASS

3.4 Insulation Resistance to EIA-364-21C: 2000

The connectors were tested for the Initial insulation resistance prior to, and following, conditioning in a variety of configurations. 12 test setups of various contact configurations were tested for each environmental condition. Tests were carried out using a 500V DC voltage source.

Specification set at:

- Insulation Resistance (initial and after conditioning) = 10GΩ minimum at 500V DC
- Insulation Resistance (after Salt Spray conditioning) = 1GΩ minimum at 500V DC

Female Connector	Male Connector	Test Setup	Condition	Power Result	Signal Result
G125-22496F1-02-04-00	G125-MH104M4-02AD000P	13	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-22496F1-02-24-00	G125-MH124M4-02AD000P	14	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-22496F1-06-08-00	G125-MH108M3-06AD000P	15	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-FV104F1-02AB000P	G125-32496M1-02-04-00	16	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-FV124F1-02AB000P	G125-32496M1-02-24-00	17	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-FV108F1-06AB000P	G125-32496M1-06-08-00	18	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-22496F2-04-04-00	G125-MH104M3-04AD000P	19	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-22496F2-03-08-00	G125-MH108M3-03AD000P	20	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS

G125-FV104F1-04AB000P	**G125-32496M2-04-04-00**	21	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-FV108F1-03AB000P	**G125-32496M2-03-08-00**	22	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-22496F2-04-16-00	**G125-MH116M3-04AD000P**	23	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS
G125-FV116F1-04AB000P	**G125-32496M2-04-16-00**	24	Initial	PASS	PASS
			Temp. Life – 96hrs	PASS	PASS
			Temp. Life – 1000hrs	PASS	PASS
			Thermal Shock	PASS	PASS
			Salt Spray	PASS	PASS

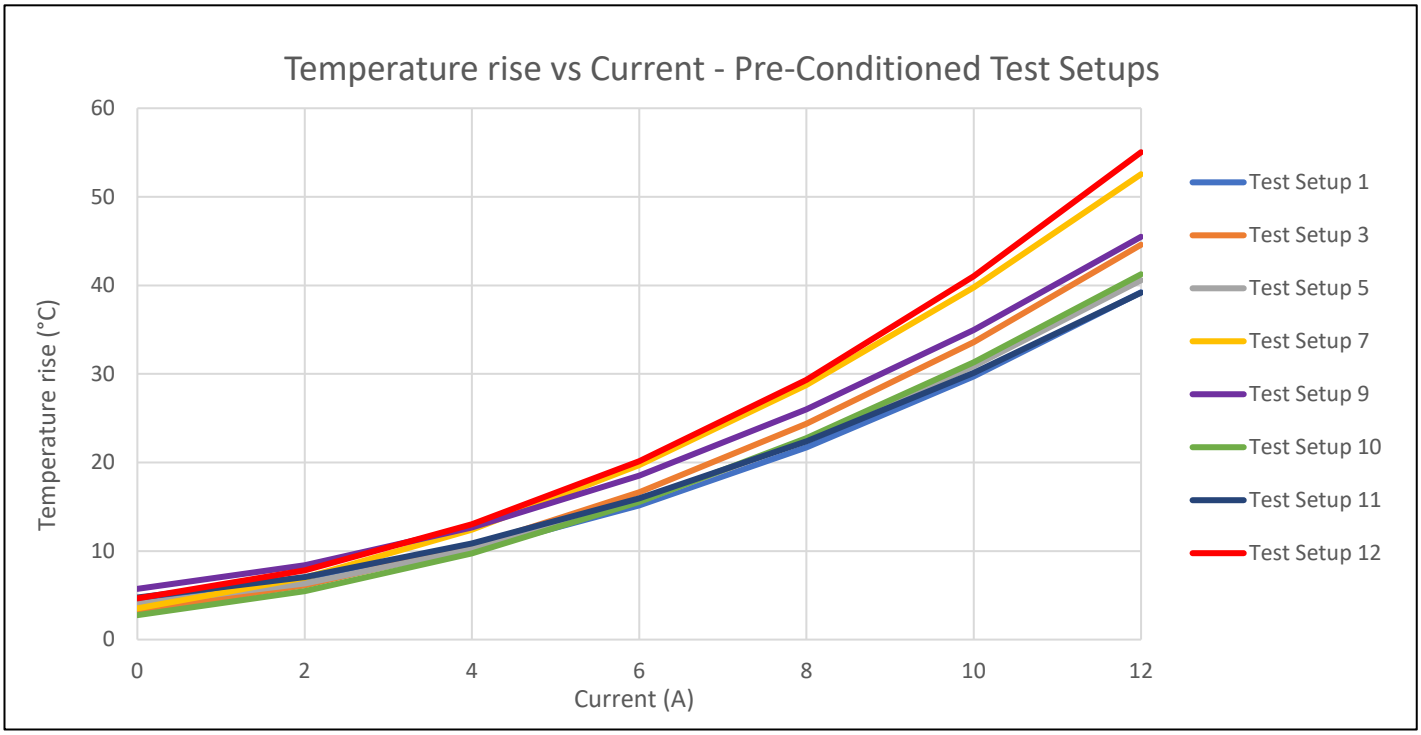
3.5 Temperature Rise versus Current to EIA-364-70A: 1998

Connector test setups were tested to establish a temperature rise (above ambient) vs the level of applied current. Each combination was tested with signal and power contacts on separate circuits, with a constant 2A being passed through the signal contacts and increasing the output to the power contacts by 2A incrementally, with overall system temperature rise being measured. This test was carried out beginning at ambient temperature averaging 25°C.

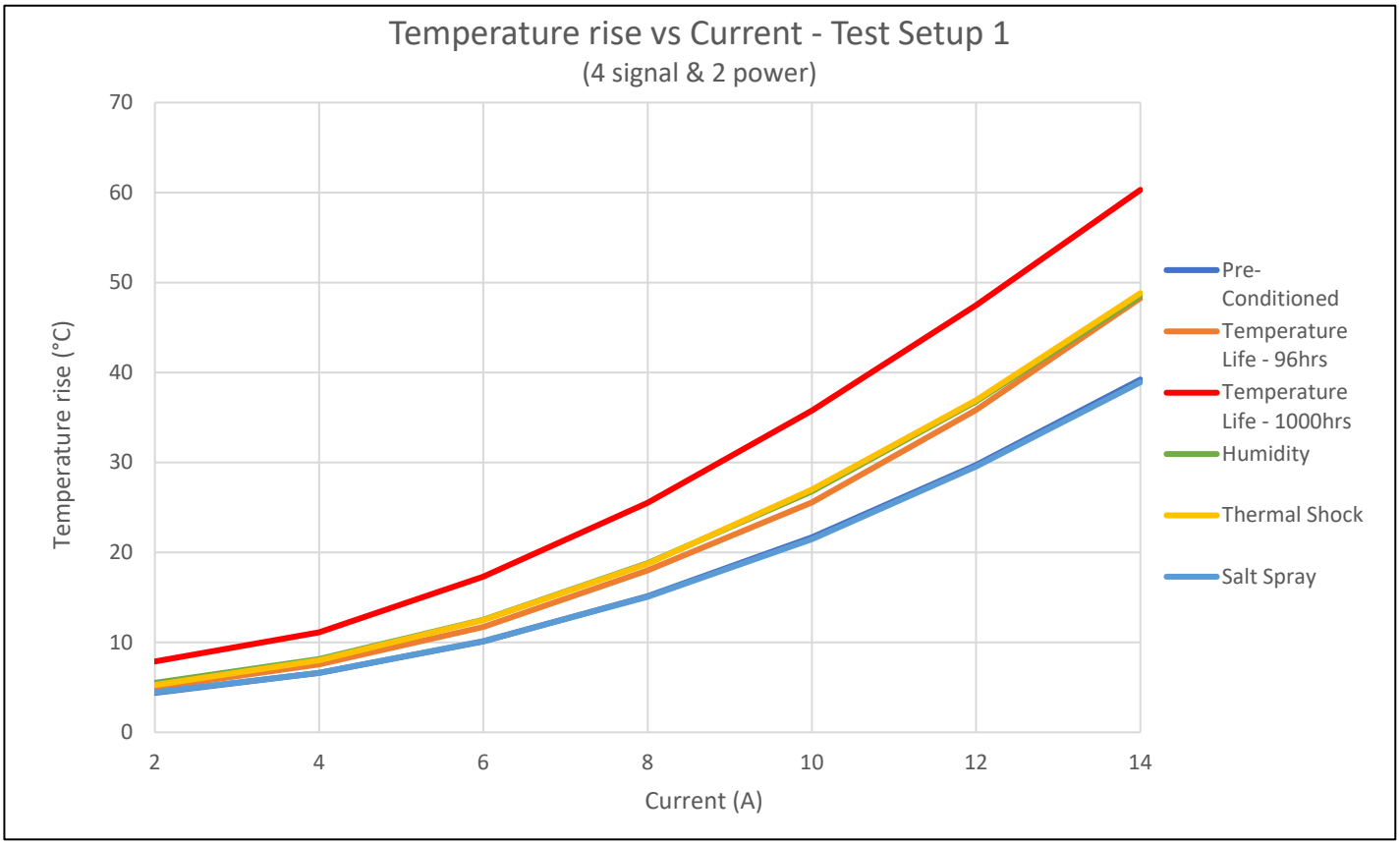
Specification set at:

- Current Rating at Ambient (25°C) - Signal Contact = 2.0A max
- Current Rating (25°C) – Power Contact = 10.0A max

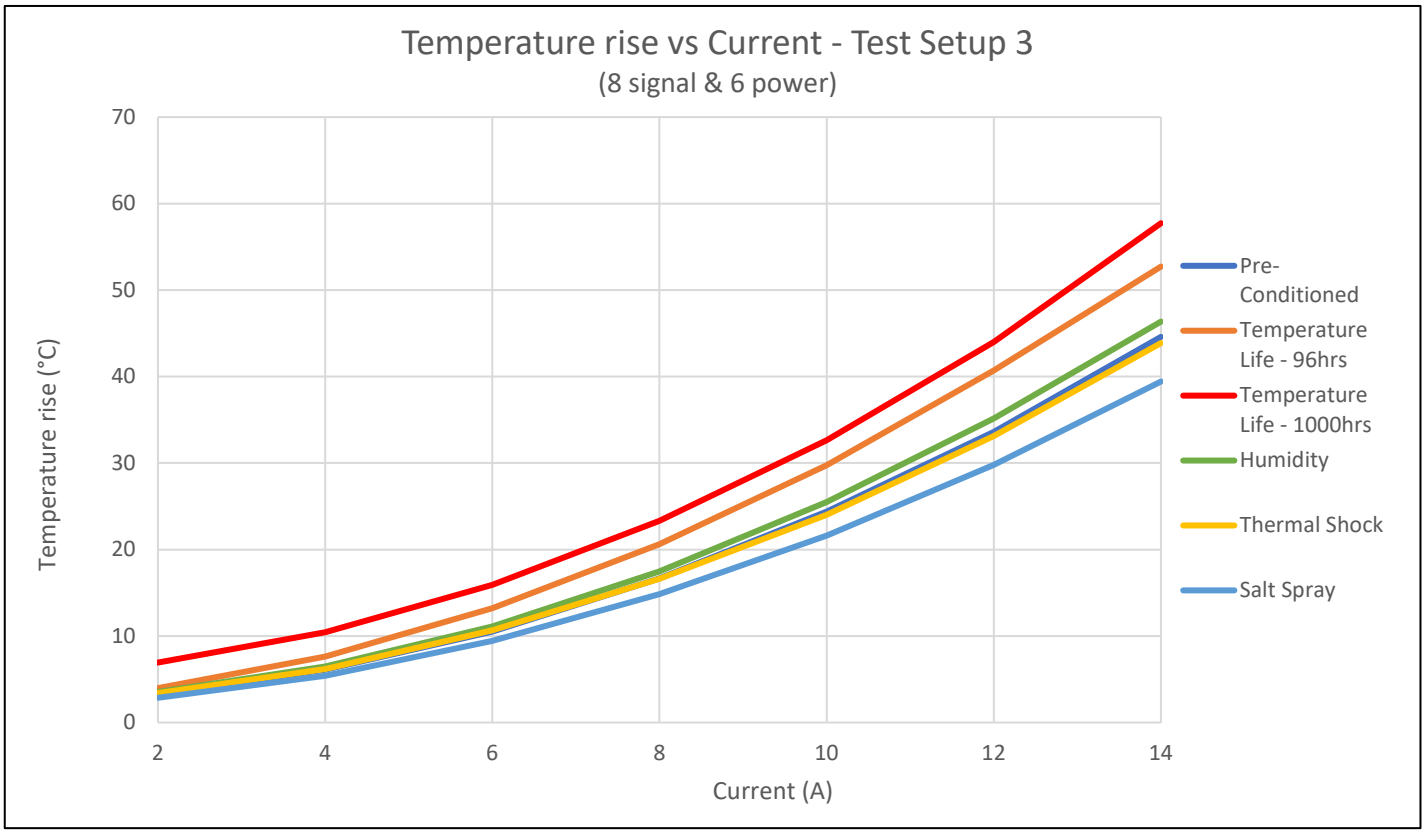
Female Connector	Male Connector	Test Setup	Power Contacts Current for 30°C temp. rise (A)					
			Pre-Cond.	Temp. Life		Salt Spray	Humidity	Thermal Shock
				96 hrs	1000 hrs			
G125-22496F1-02-04-00	G125-MH104M4-02AD000P	1	12	10	8	12	10	10
G125-22496F1-06-08-00	G125-MH108M4-06AD000P	3	11	10	9	12	11	11
G125-FV104F1-02AB000P	G125-32496M1-02-04-00	5	11	11	6	12	12	12
G125-FV108F1-06AB000P	G125-32496M1-06-08-00	7	10	8	6	10	9	9
G125-22496F2-04-16-00	G125-32496M3-04-16-00	9	12	-	-	-	-	-
G125-22496F2-04-04-00	G125-32496M3-04-04-00	10	11	-	-	-	-	-
G125-22496F2-03-08-00	G125-32496M3-03-08-00	11	12	-	-	-	-	-
G125-FV108F1-03AB000P	G125-32496M2-03-08-00	12	10	-	-	-	-	-



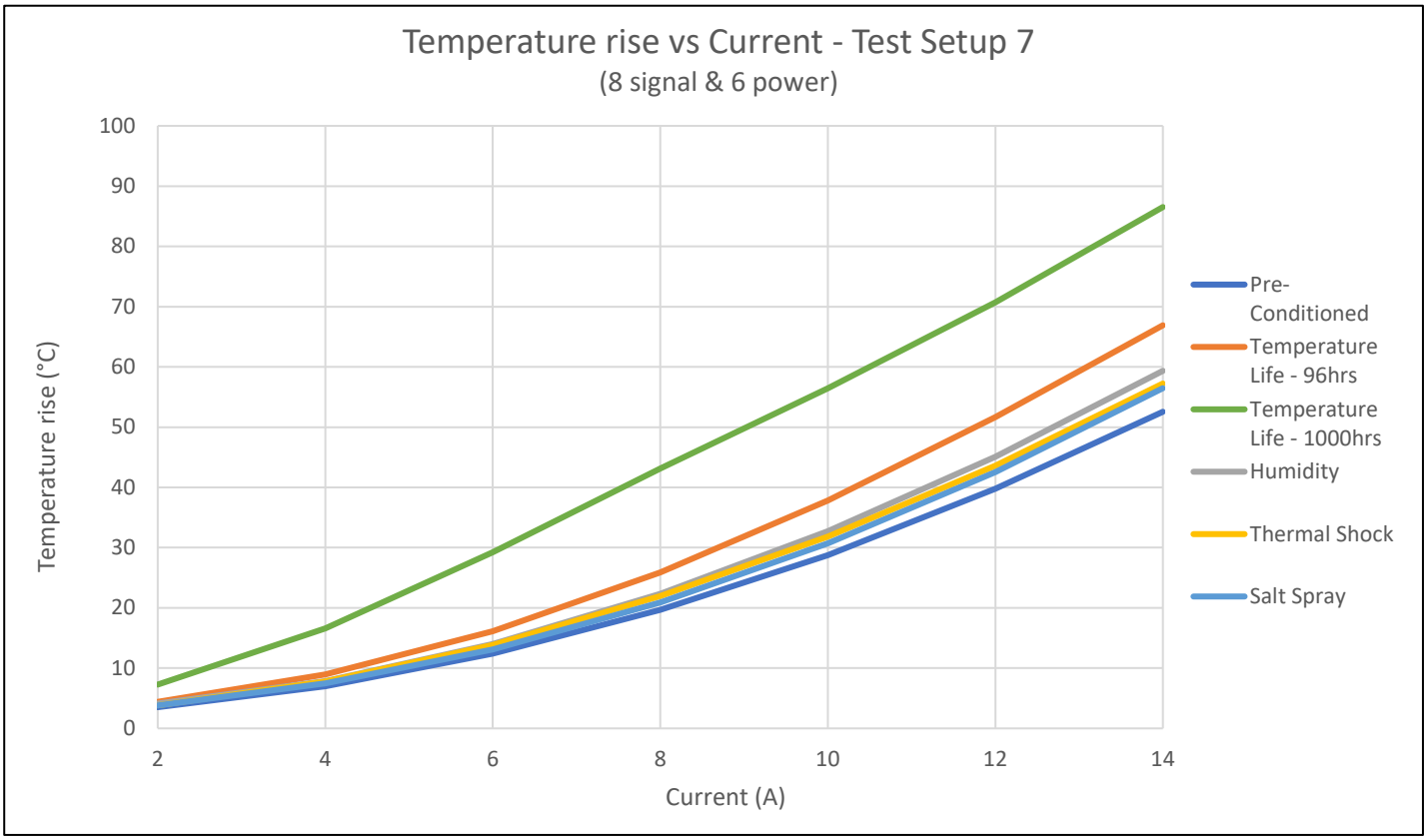
Graph 1: Comparison of Pre-Conditioned Test Setups



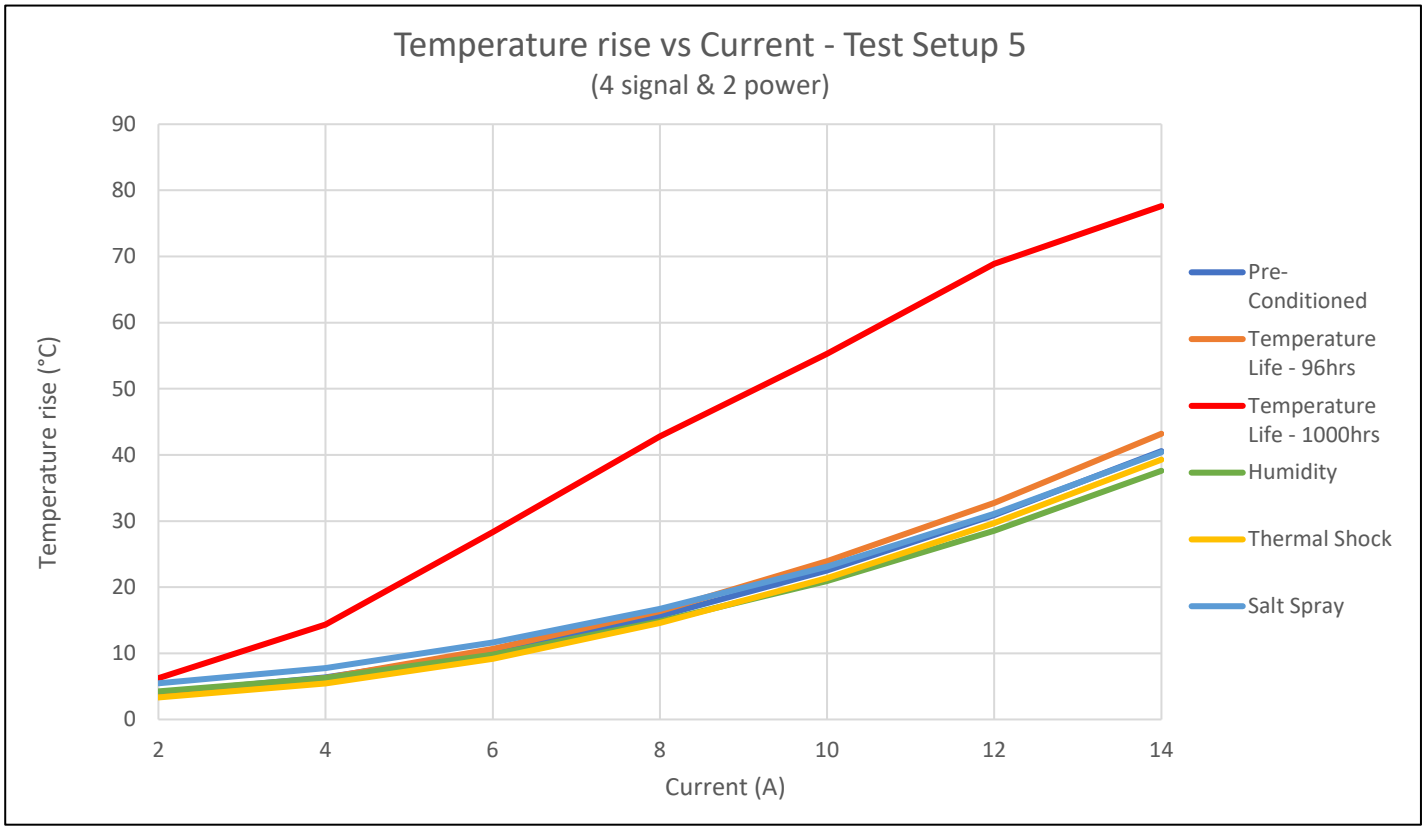
Graph 2: Condition comparison of Test Setup 1



Graph 3: Condition comparison of Test Setup 3

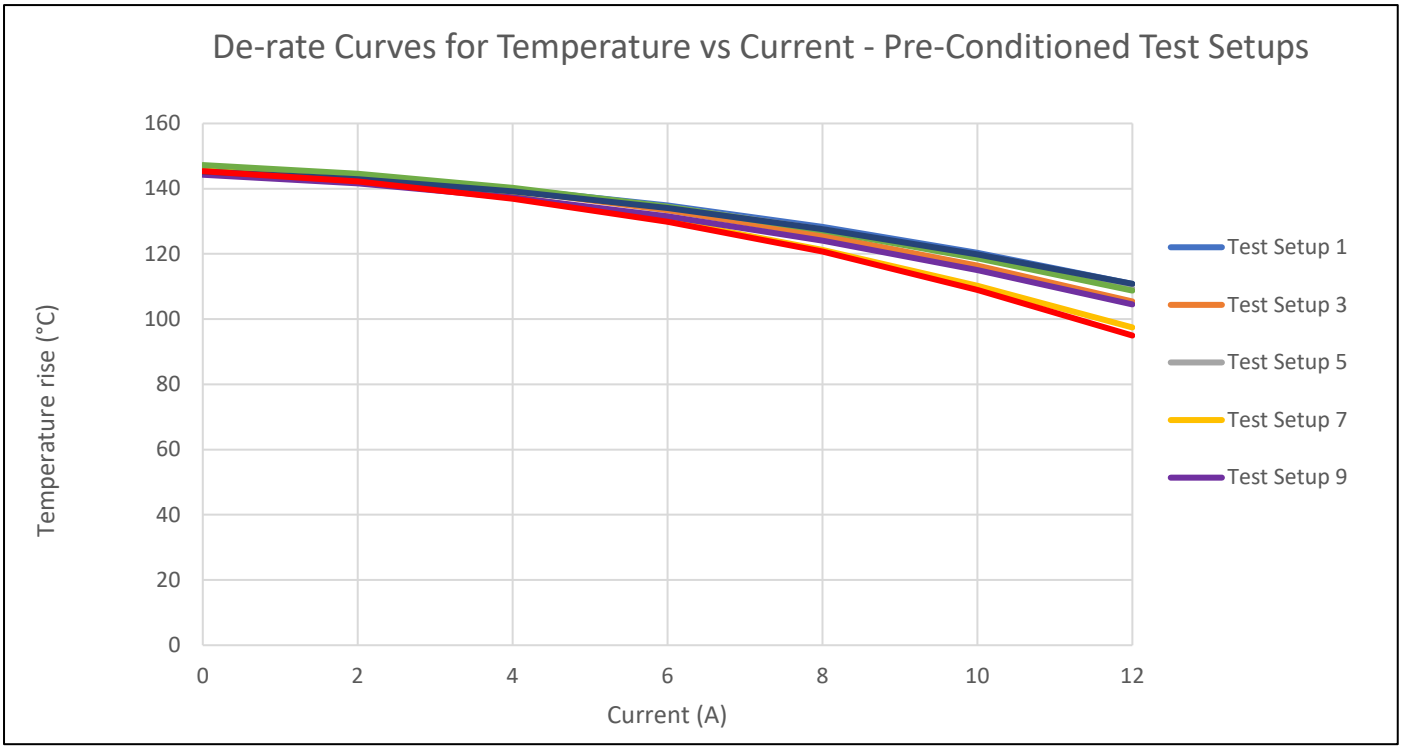


Graph 4: Condition comparison of Test Setup 5

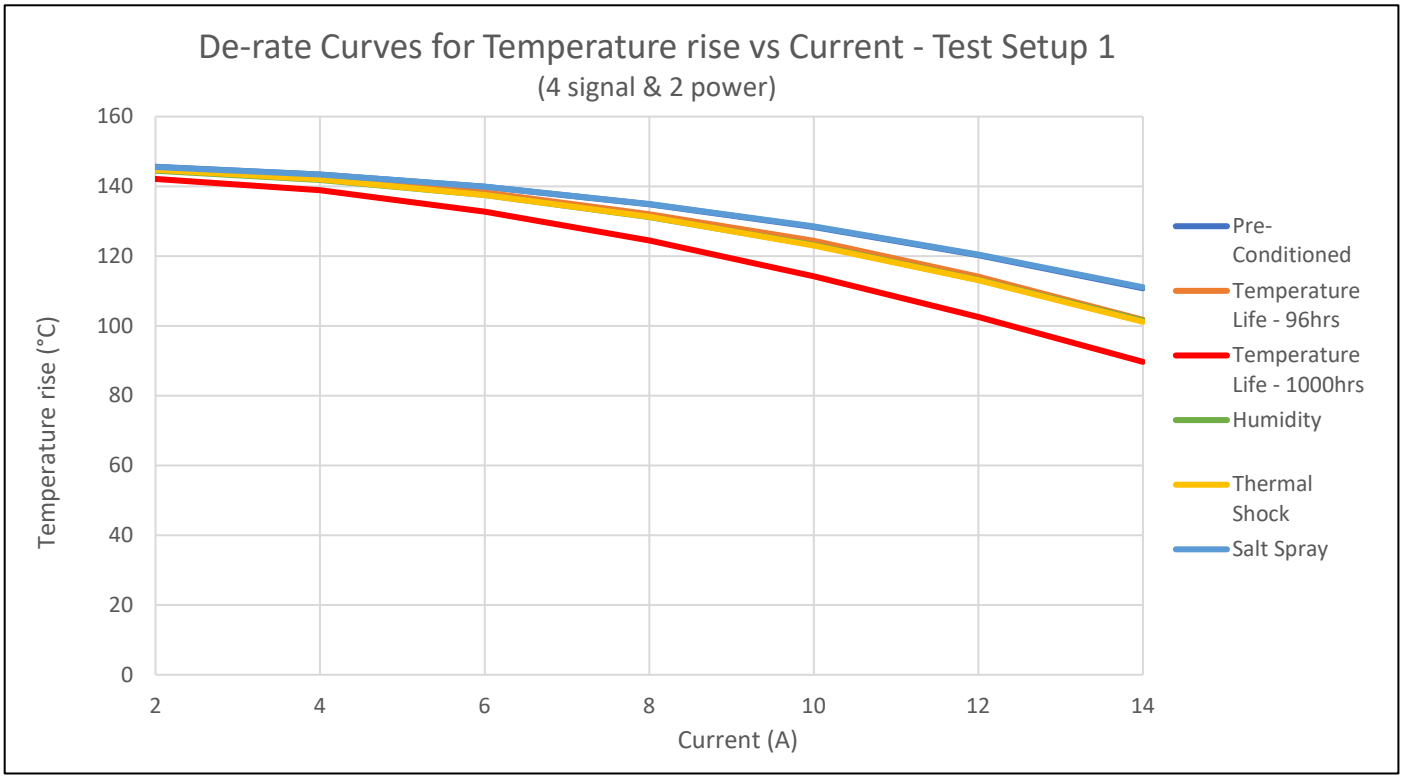


Graph 5: Condition comparison of Test Setup 7

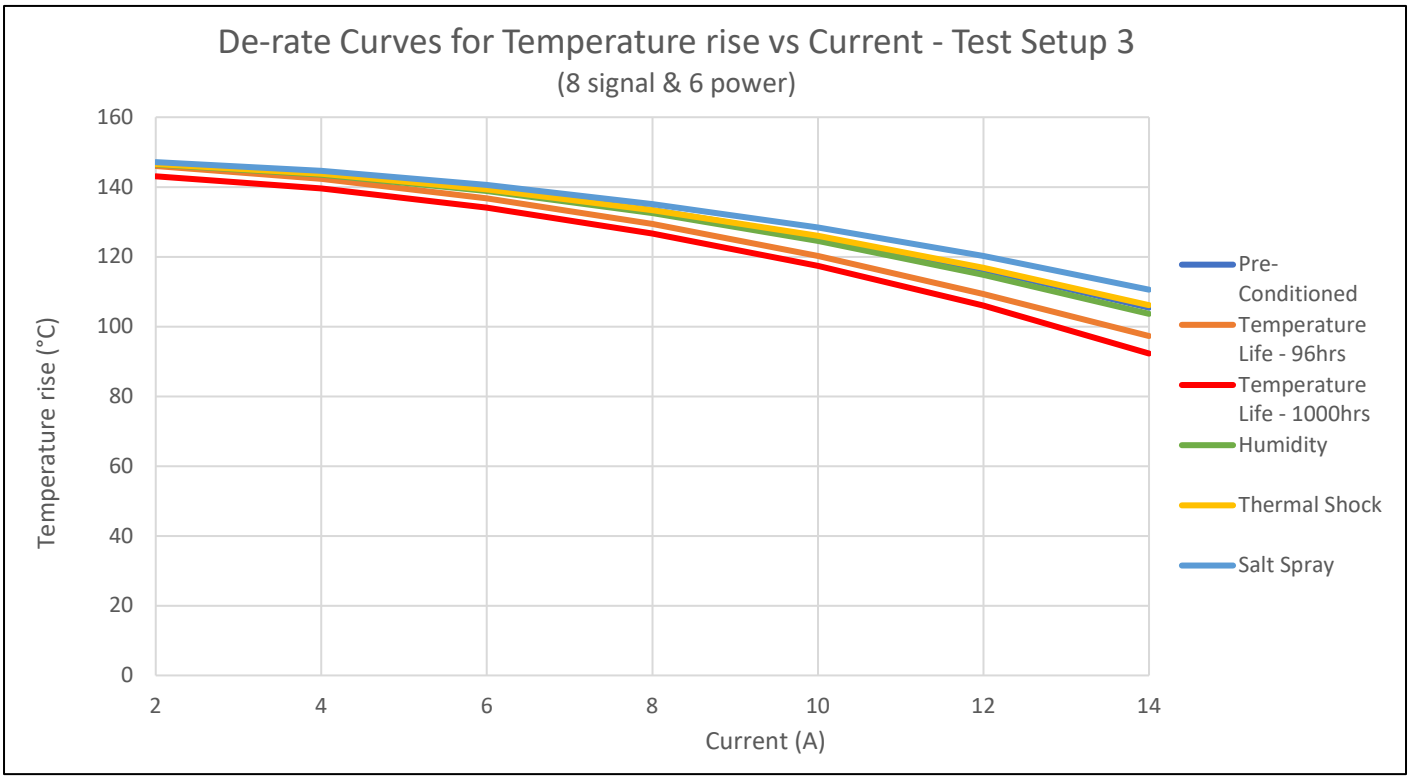
De-Rate Curves for Current versus Ambient Temperature



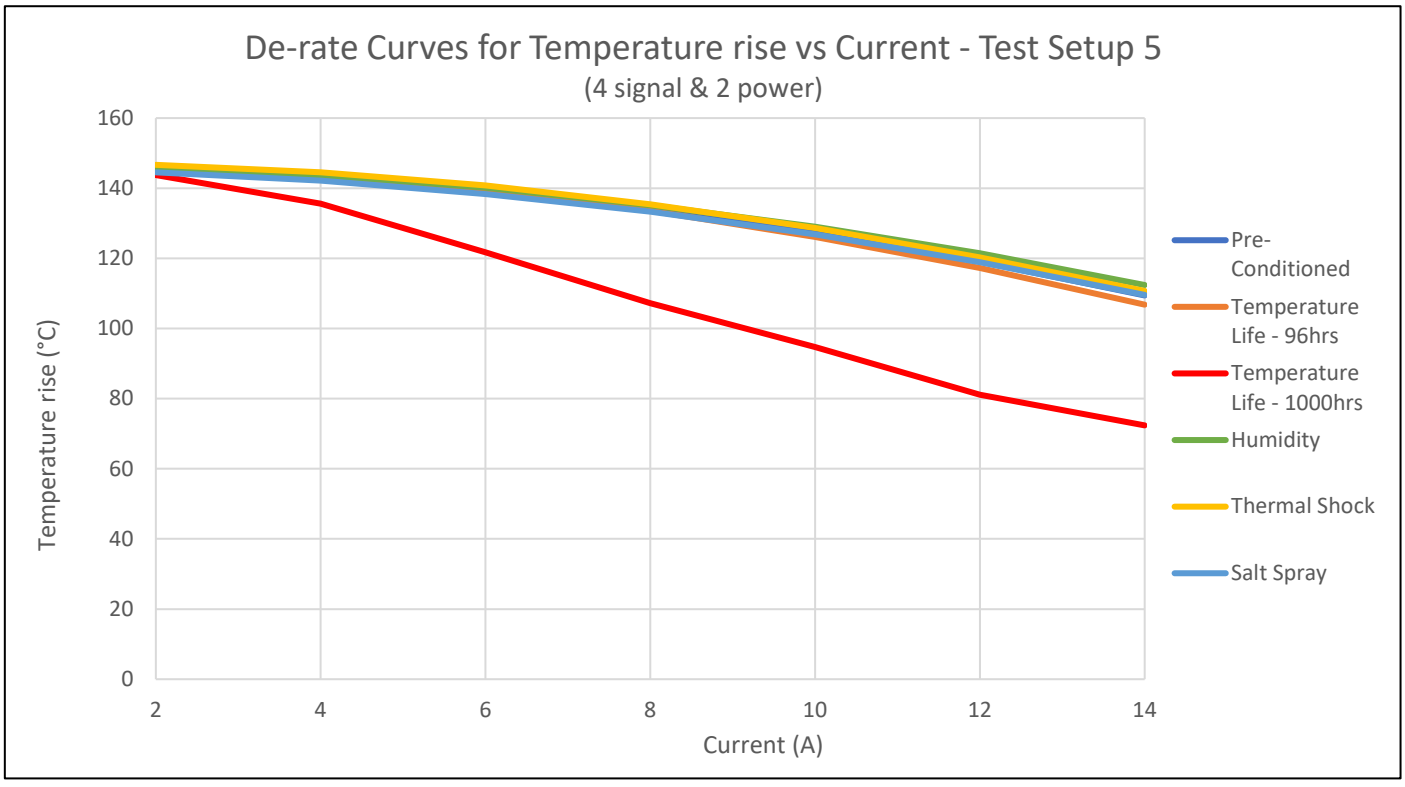
Graph 6: Condition comparison of Pre-Conditioned Test Setups



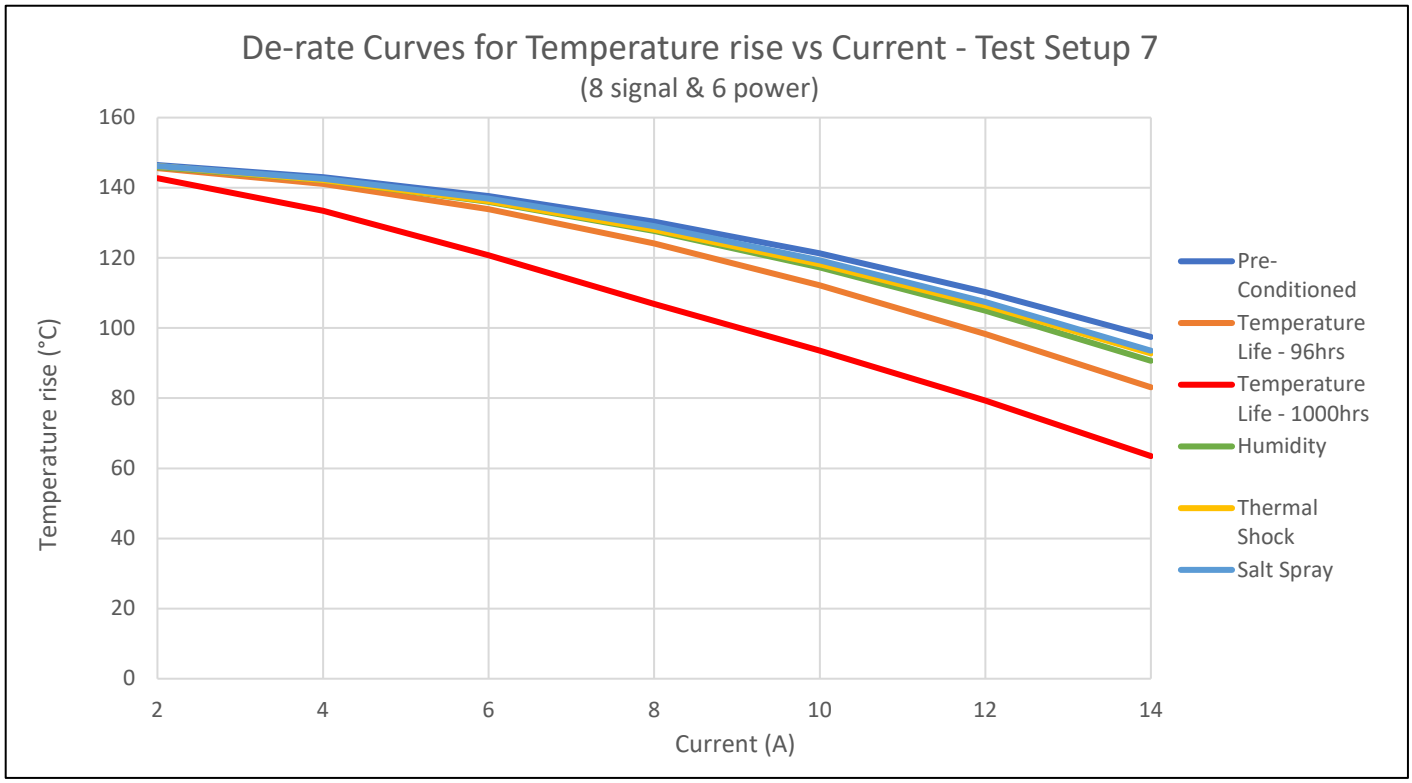
Graph 7: Condition comparison of Test Setup 1



Graph 8: Condition comparison of Test Setup 3



Graph 9: Condition comparison of Test Setup 5



Graph 10: Condition comparison of Test Setup 7

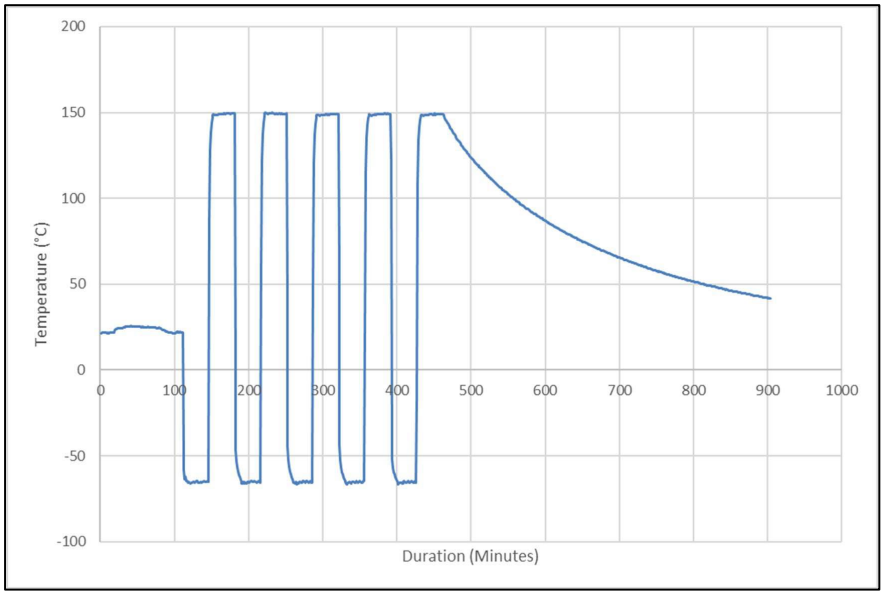
3.6 Thermal Shock (Temperature Cycling) to EIA-364-32C: 2000

This test was conducted in general accordance with BS EN 60068-2-14:2009 Test Na & EIA-364-32C Test Condition 4.

Specification set at:

- Temperature extremes of -65°C to +150°C
- 5 cycles with a dwell time of 30 minutes

The samples were subjected to post-conditioned tests for temperature vs current, voltage breakdown, insulation resistance and durability, the results for which can be found in their respective sections of this report. Following visual inspection of the samples there was no obvious change to the samples noted.



Graph 9: Thermal Shock Temperature Plot

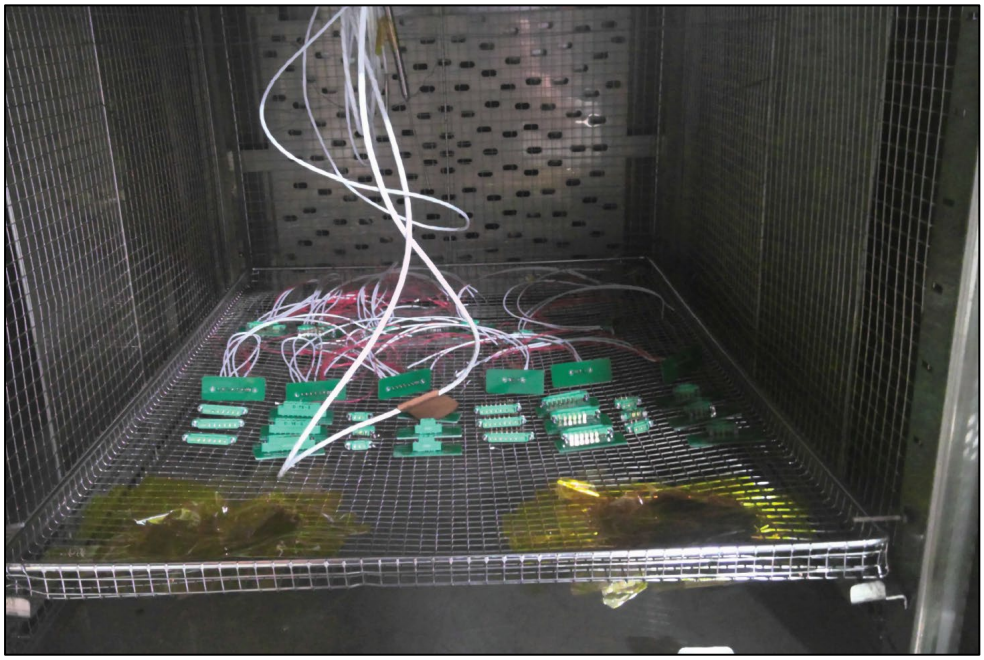


Figure 1: Samples in Thermal Shock Chamber

3.7 Salt Spray to EIA-364-26B: 1999

Samples were tested for Salt Spray in accordance with BS EN 60068-2-11:1999 & EIA-364-26B Test Condition B.

Specification set at:

- 48 hours continuous exposure with 5% NaCl @+35°C
- Washed and then dried for 16 hours @ +38°C

The samples were subjected to post-conditioned tests for temperature vs current, voltage breakdown, insulation resistance and durability, the results for which can be found in their respective sections of this report. Following visual inspection of the samples there was no obvious change to the samples noted other than some observed rusting/corrosion on the stainless steel hardware of the connectors.

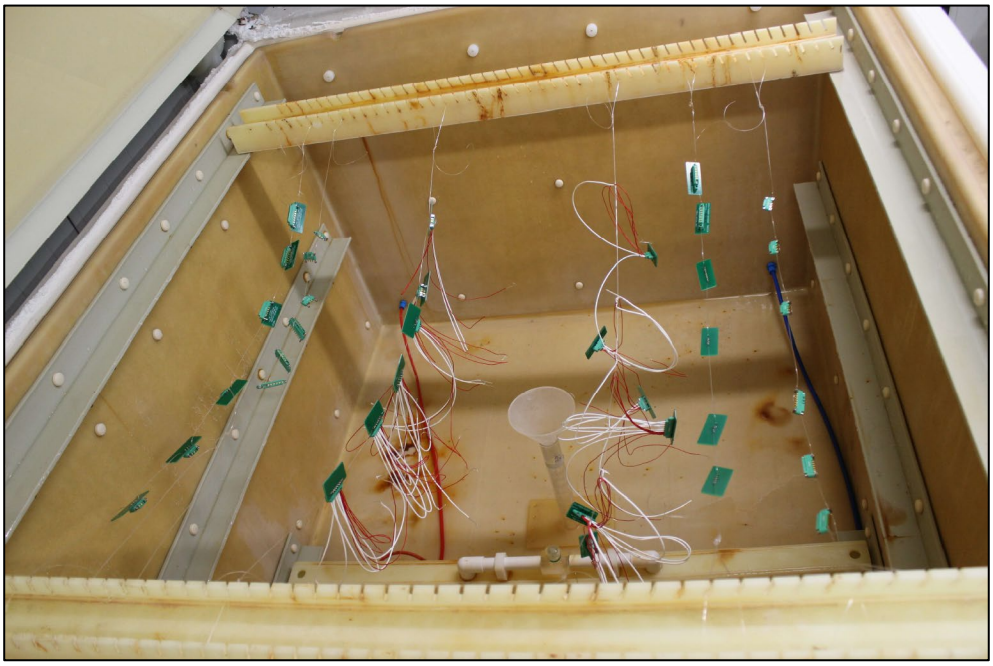


Figure 2: Samples in Thermal Shock Chamber

3.8 Humidity to EIA-364-31B: 1999

Test is in general accordance with BS EN 60068-2-78: 2013 Test Cab and EIA-364-31B: 2000 Method 2 Test Condition A. The samples were pre-conditioned for 24 hours at 50°C then suspended in a humidity chamber for 96 hours at 40°C with a relative humidity of 90-95%. The connector assemblies were measured for temperature vs current, voltage breakdown, insulation resistance and durability, as well as visual inspection post-testing.

Specification set at:

- 90-95% Relative Humidity at +40°C for 96 hours duration.

The samples were subjected to post-conditioned tests for temperature vs current, voltage breakdown, insulation resistance and durability, the results for which can be found in their respective sections of this report. There were no obvious visual changes to the connector assemblies.

3.10 Mechanical Vibration to EIA-364-28B: 1999

Samples were tested in general accordance with BS EN 60068-2-6: 2008 Test Fc & EIA-364-28B: 1999 Test Condition 4. The samples were subjected to a swept sine test, with continuous monitoring for discontinuities of 1 microsecond or longer. Samples were tested for 12 cycles of 20 minutes, for a duration of 4 hours in each axis and cables were restrained at a minimum of 200mm from the connectors.

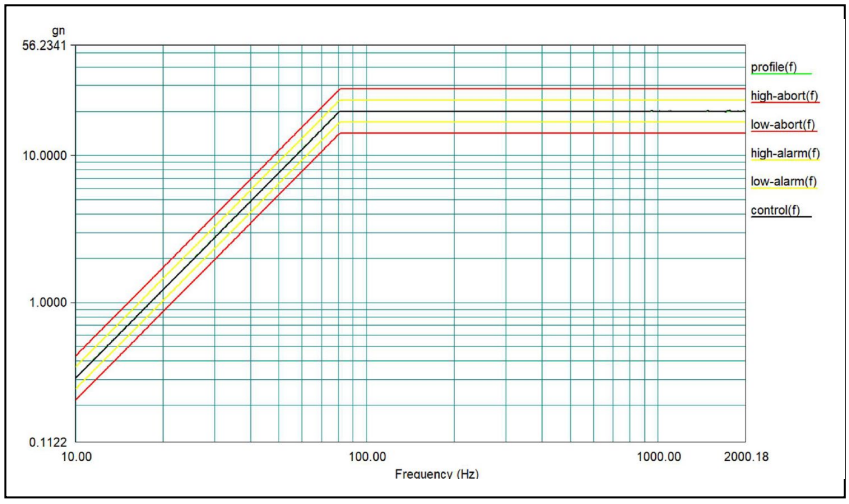
The following combinations were tested:

- G125-22496F1-02-04-00 & G125-MH104M4-02AD000P (Test Setup 1)
- G125-22496F3-06-08-00 & G125-MH108M3-06AD000P (Test Setup 4)
- G125-FV104F1-02AB000P & G125-32496M1-02-04-00 (Test Setup 5)
- G125-FV108F3-06AB000P & G125-32496M3-06-08-00 (Test Setup 8)

Specification set at:

- 10Hz - 2,000Hz, 196.1m/s^2 (20gn) peak in all three axes (X/Y/Z).

There were no discontinuities or triggers noted on any sample during the testing process. Upon completion, the samples were visually inspected with no obvious changes to the samples noted.



Graph 11: Typical Swept Sine Vibration Plot

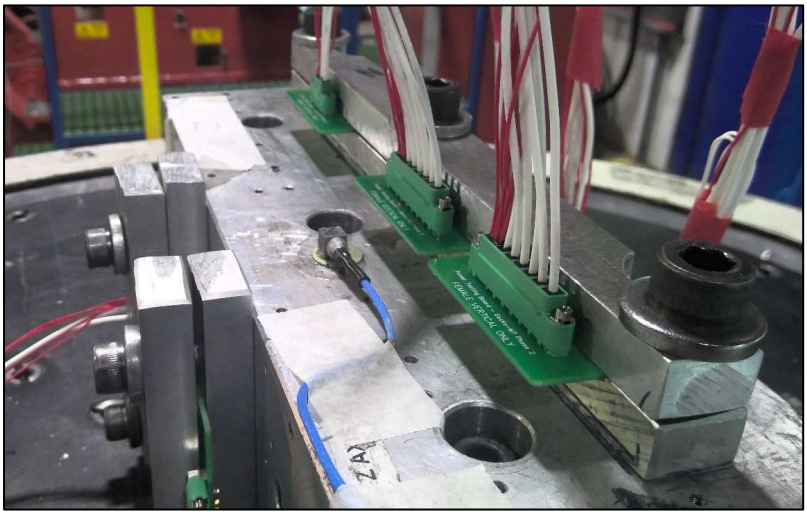


Figure 3: Vibration test setup with accelerometer position

3.10 Mechanical Shock to EIA-364-27B : 1996

Test is in general accordance with BS EN 60068-2-27:2009 Test Ea & EIA-364-27B Test Condition C. The samples were subjected to a half haversine shock test, with three shocks in each axis and continuous monitoring of 1 microsecond or longer.

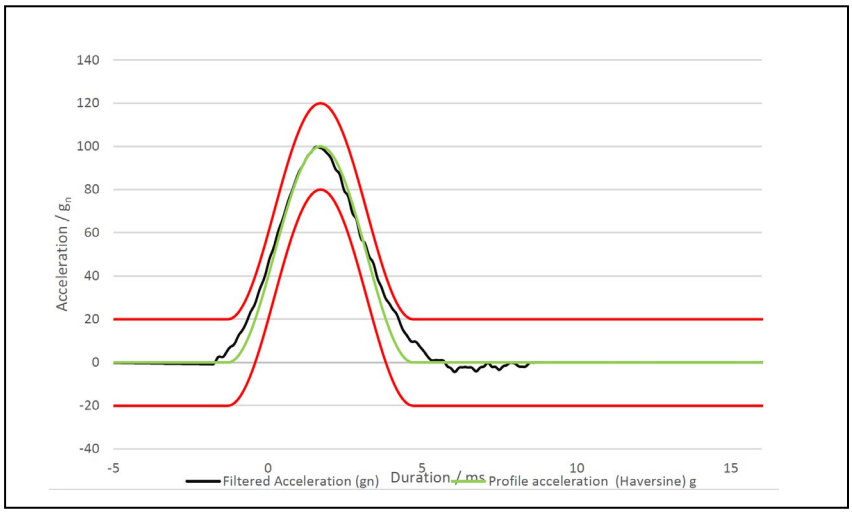
The following combinations were tested:

- G125-22496F1-02-04-00 & G125-MH104M4-02AD000P (Test Setup 1)
- G125-22496F3-06-08-00 & G125-MH108M3-06AD000P (Test Setup 4)
- G125-FV104F1-02AB000P & G125-32496M1-02-04-00 (Test Setup 5)
- G125-FV108F3-06AB000P & G125-32496M3-06-08-00 (Test Setup 8)

Specification set at:

- Shock Pulse: 100g
- Pulse Duration: 6ms Half Haversine
- 3 shocks in each axis

The were no discontinuities or triggers noted on any sample during the testing process. Upon completion, the samples were visually inspected with no obvious changes to the samples noted.



Graph 12: Typical Half Haversine Shock plot

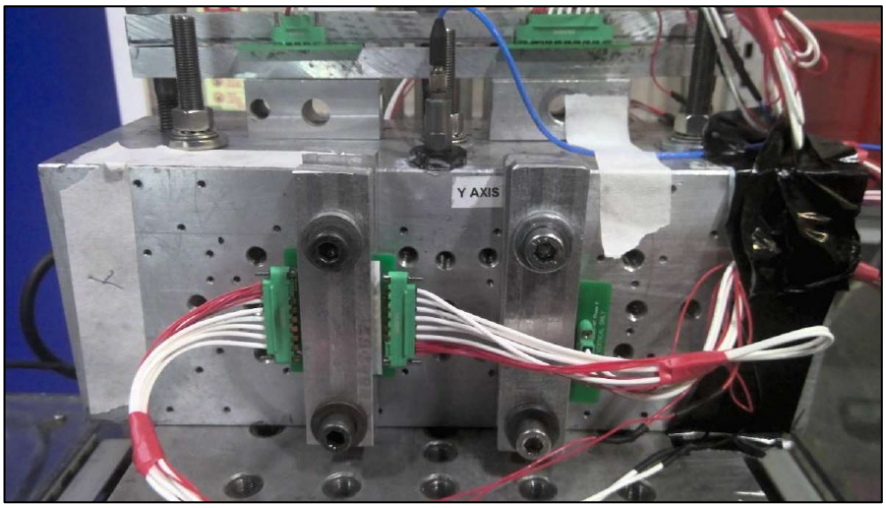


Figure 4: Shock test setup with accelerometer position