HRi RANGE EZi RANGE BBi RANGE

HARWiN

Test Report Summary

HT07604

Electrical, Mechanical & Environmental Testing
Kona

KONA

// HARWIN.COM

1. Introduction

1.1. Description and Purpose

Kona is a high reliability connector range, based on a single row, 8.5mm pitch mating connector pair. These connectors are designed for higher power applications with a rugged or durable requirement. Each contact on both male and female connectors is individually shrouded and recessed (to prevent accidental touch). Polarization and contact 1 identification marks are also incorporated into the housing designs. The following tests were carried out to establish and confirm the operating parameters of the Kona connectors.

1.2. Conclusion

The following data has been summarized from Harwin test reports QA000027, QA000106, QA000108, QA000112, QA000321. The results were used to create Component Specification C052XX for the Kona range. The tests indicate that the Kona range performs as required, suitable for a wide range of applications calling for high power interconnects.

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	3
EIA-364-70A: 1998	Power Rating	3.2	3–11
EIA-364-09C: 1999	Durability, Insertion & Withdrawal Forces	3.3	12–13
EIA-364-20C: 2004	Withstand Voltage	3.4.1	13–14
EIA-364-21C: 2000	Insulation Resistance	3.4.2	14
EIA-364-05B: 1998	Contact Retention	3.5.1	14-15
EIA-364-35C: 2012	Insert (Fixing) Retention	3.5.2	15
EIA-364-17B: 1999	Temperature Life (without load)	3.6	16
EIA-364-32C: 2000 (BS EN 60068-2-14: 2009)	Thermal Shock (Temperature Cycling)	3.7	16
EIA-364-26B: 1999 (BS EN 60068-2-11: 1999)	Salt Spray	3.8	16
364-31B: 1999 (BS EN 60068-2-78: 2013)	Humidity	3.9	17
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

2.2. List of Test Samples

The following components/connectors are used throughout the testing (x = 2, 3 or 4 = number of contacts):

- KA1-0400005 – Female Power Solder Cup Cable Contact
- KA1-1410005 – Male Power Solder Cup Cable Contact
- KA1-2010x98F1 – Female Cable Housing, Thumbscrews (standard gender fixing)
- KA1-2010x98F2 – Female Cable Housing, Reverse Fix with panel mount
- KA1-3010x98M1 – Male Cable Housing, Standard Gender fixing with panel mount
- KA1-3010x98M3 – Male Cable Housing, Standard Gender fixing
- KA1-3010x98M5 – Male Cable Housing, Thumbscrews (reverse fix)
- KA1-1100005 – Male Power PCB Throughboard contact (piece part)
- KA1-MV10x05M1 – Male Vertical Throughboard, standard gender fixing
- KA1-MV10x05M2 – Male Vertical Throughboard, reverse fixing
- HM2202-x – Voltage Breakdown & Insulation resistance test PCB
- HM2197-x – Current vs Temperature test PCB
- 8AWG Silicone Rubber Insulated Wire

3. Test Results

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

Methodology: Power contacts on each connector were measured using a precision milli/micro-ohmmeter for resistance both before and after to any electrical, mechanical, or environmental testing. Mated samples were then submitted to individual environmental conditions and each contact pair was measured for contact resistance.

Specification: 2mΩ Max per contact

Results: The initial values are detailed in the table below. Results after each conditioning test are given in the applicable section.

Part Numbers	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-board)	0.39	0.34	0.36
KA1-0400005 & KA1-1410005 (cable-to-cable)	0.63	0.51	0.57

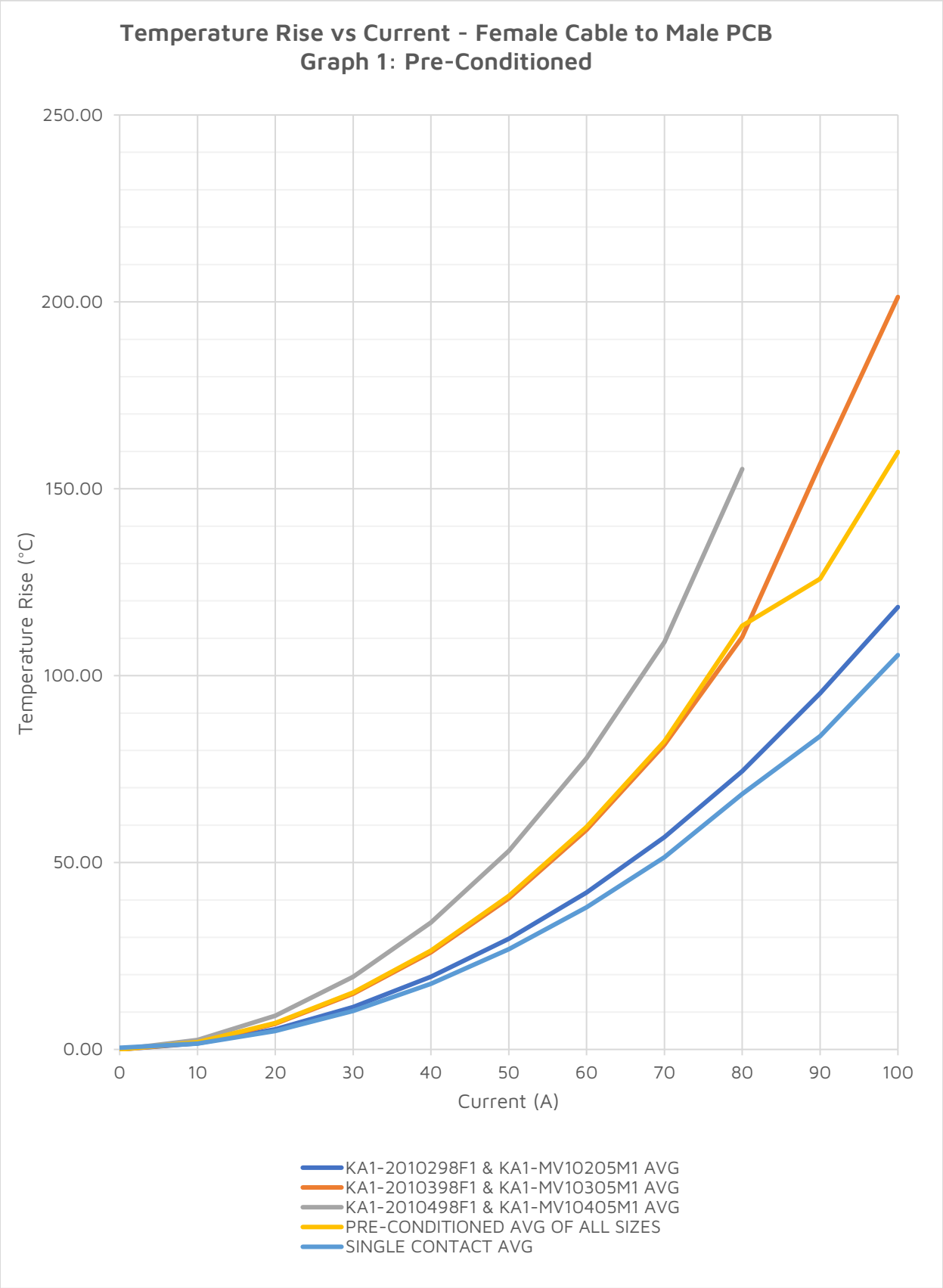
3.2. Power Rating (Current v Temperature Rise): EIA-364-70A (Method 2): 1998

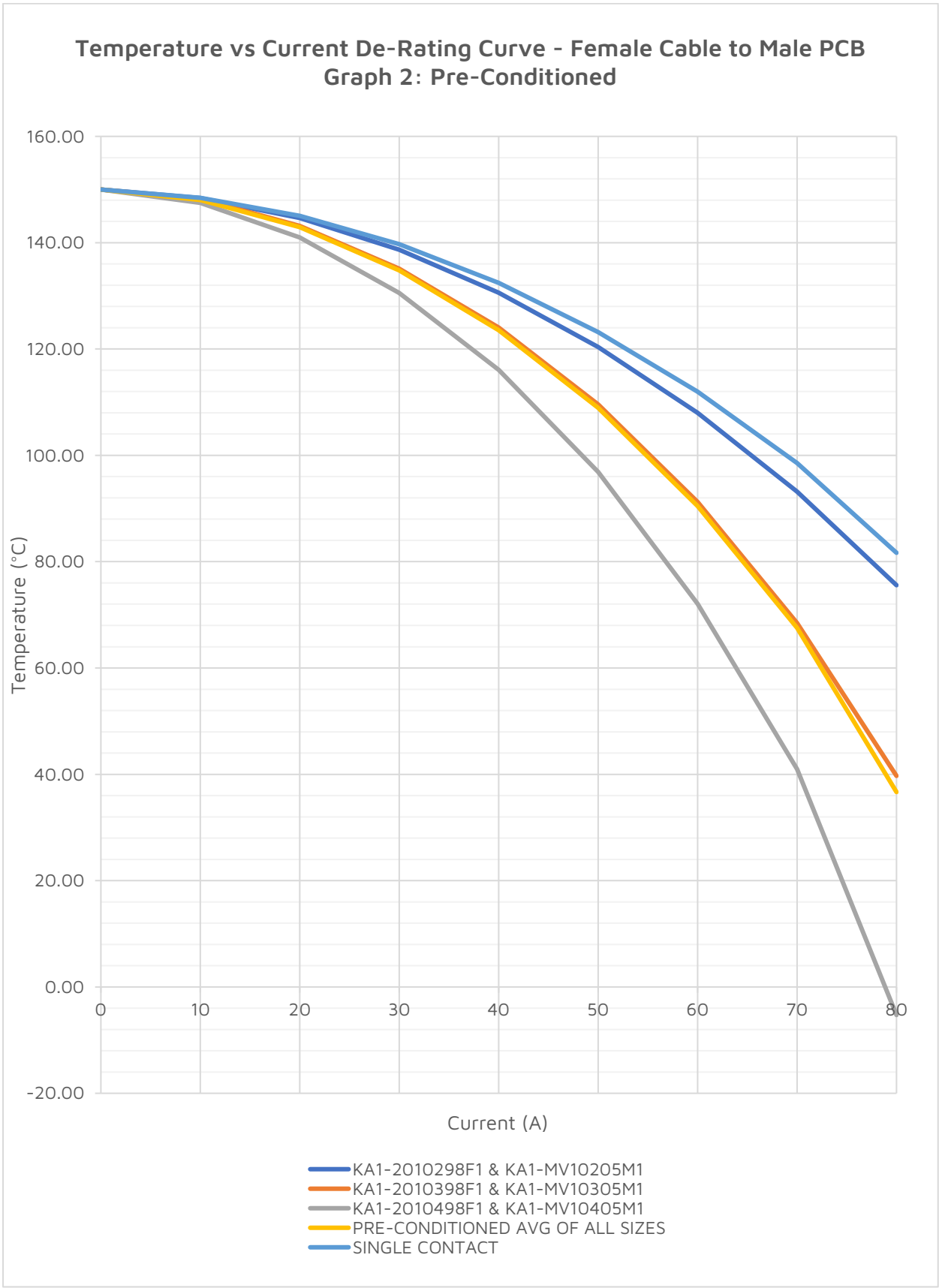
Methodology: This test demonstrates the current carrying capability of the Kona connector system, both before and after environmental conditioning. The mated connector pairing was wired in a series circuit using 8AWG Silicone Rubber insulated wire and a custom PCB to complete the circuit. Power was supplied using a controlled power source. Current was applied in 10A increments to the connector, and the temperature rise above ambient recorded in each case.

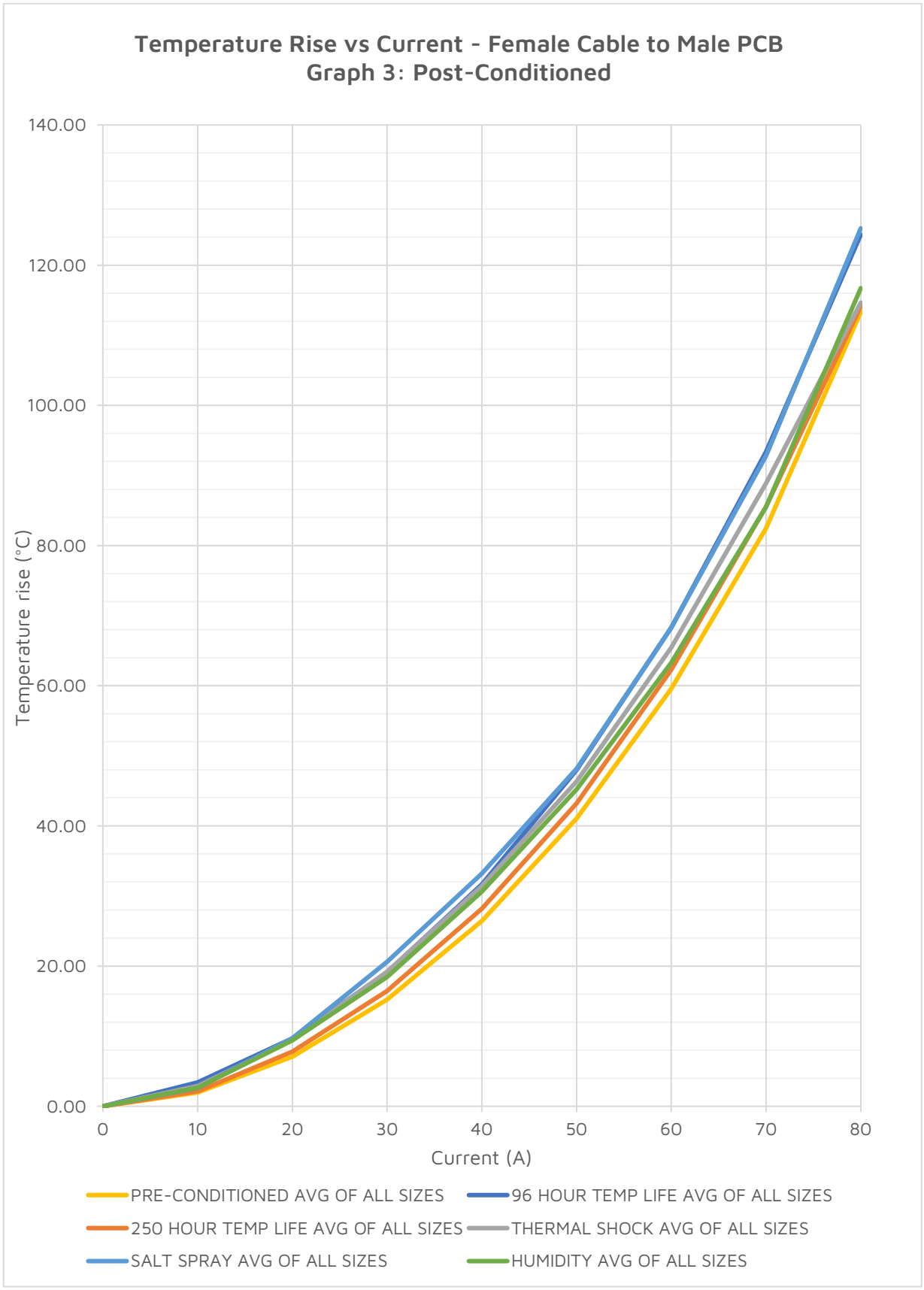
Specification: Current Rating (when all contacts are electrically loaded) = 60.0A

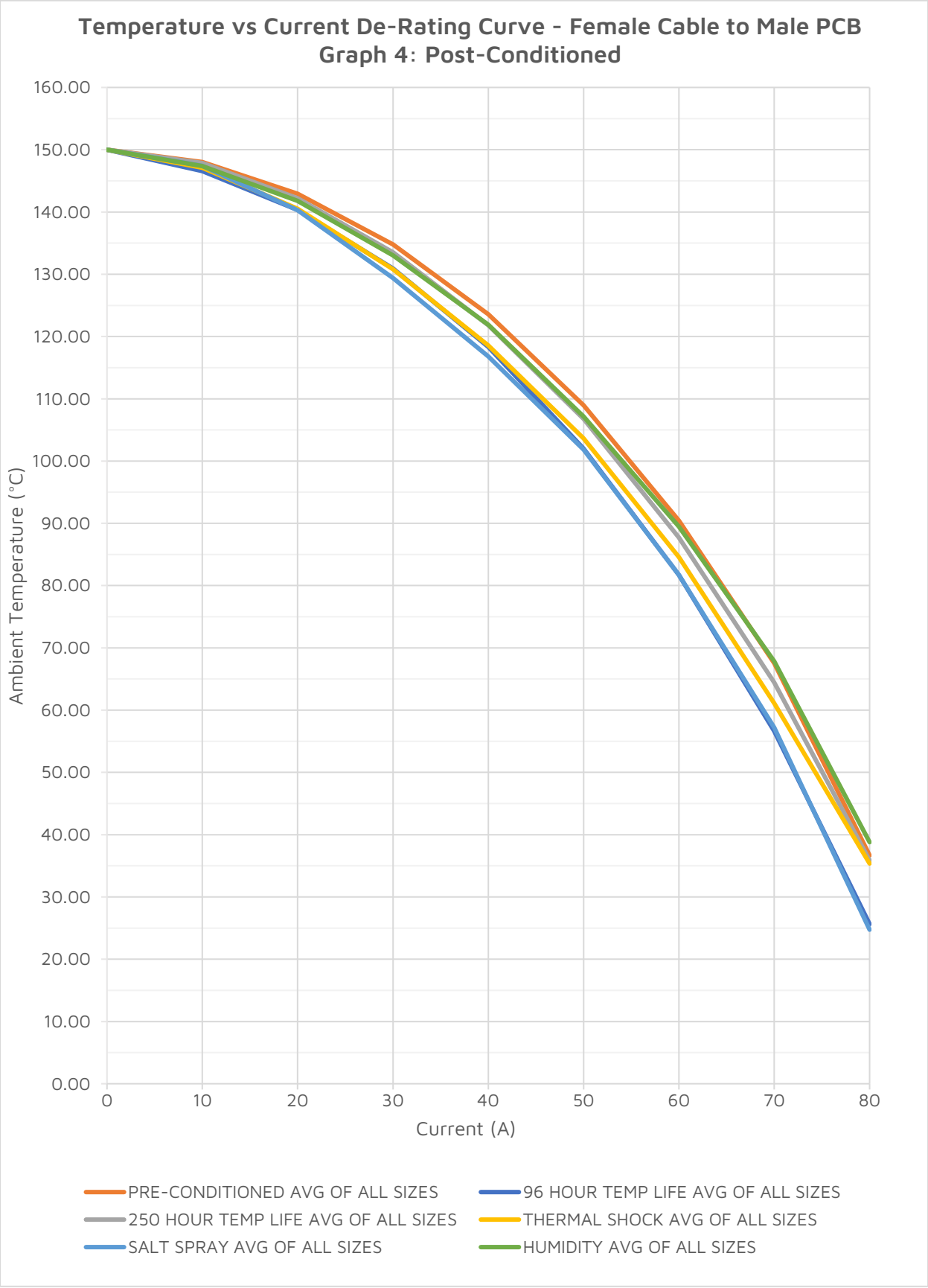
Results: The graphs below detail the results up to 80A.

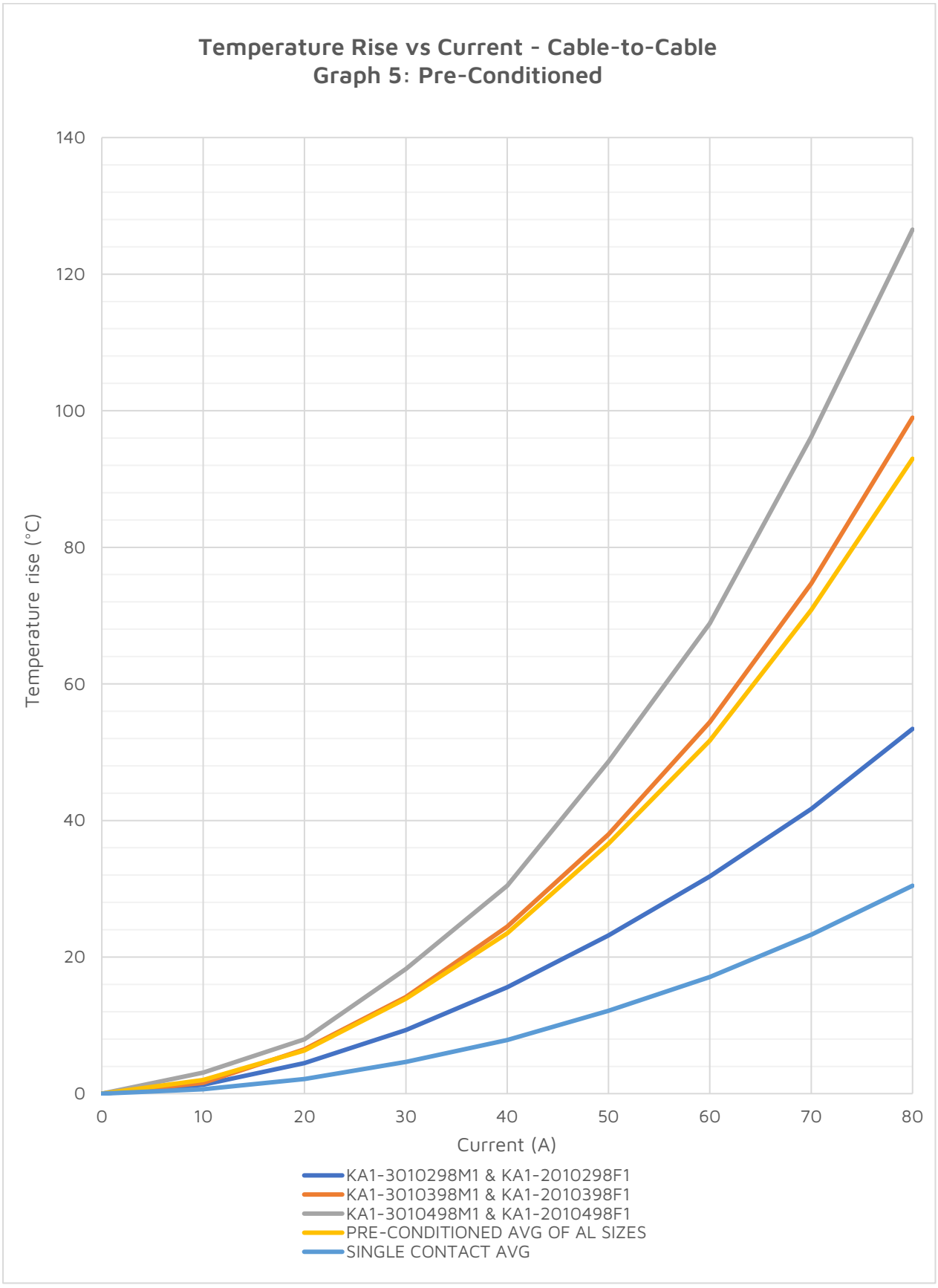
- Graphs 1, 2, 5 and 6 show pre-conditioned results, for mated connectors before any other electrical, mechanical, or environmental testing.
- Graphs 3, 4, 7 and 8 show environmental post-conditioned results, comparing each conditioning test carried out.
- Graphs 1 to 4 are for female cable to male PCB connectors; graphs 5 to 8 are for female cable to male cable connectors.

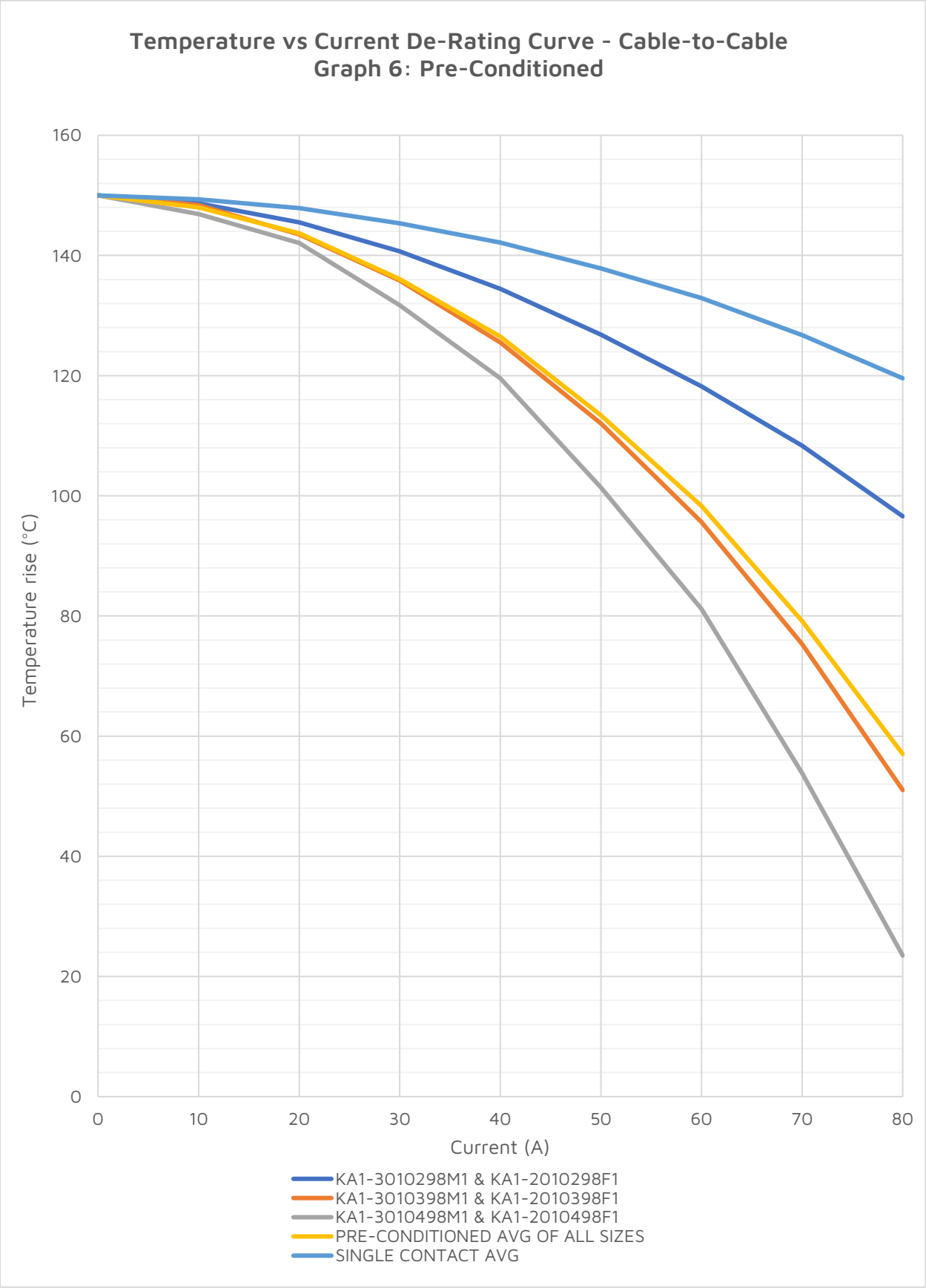

Temperature Rise vs Current - Female Cable to Male PCB
Graph 1: Pre-Conditioned
250.00
200.00
150.00
100.00
50.00
0.00
Temperature Rise (°C)
0
10
20
30
40
50
60
70
80
90
100
Current (A)
KA1-2010298F1 & KA1-MV10205M1 AVG
KA1-2010398F1 & KA1-MV10305M1 AVG
KA1-2010498F1 & KA1-MV10405M1 AVG
PRE-CONDITIONED AVG OF ALL SIZES
SINGLE CONTACT AVG

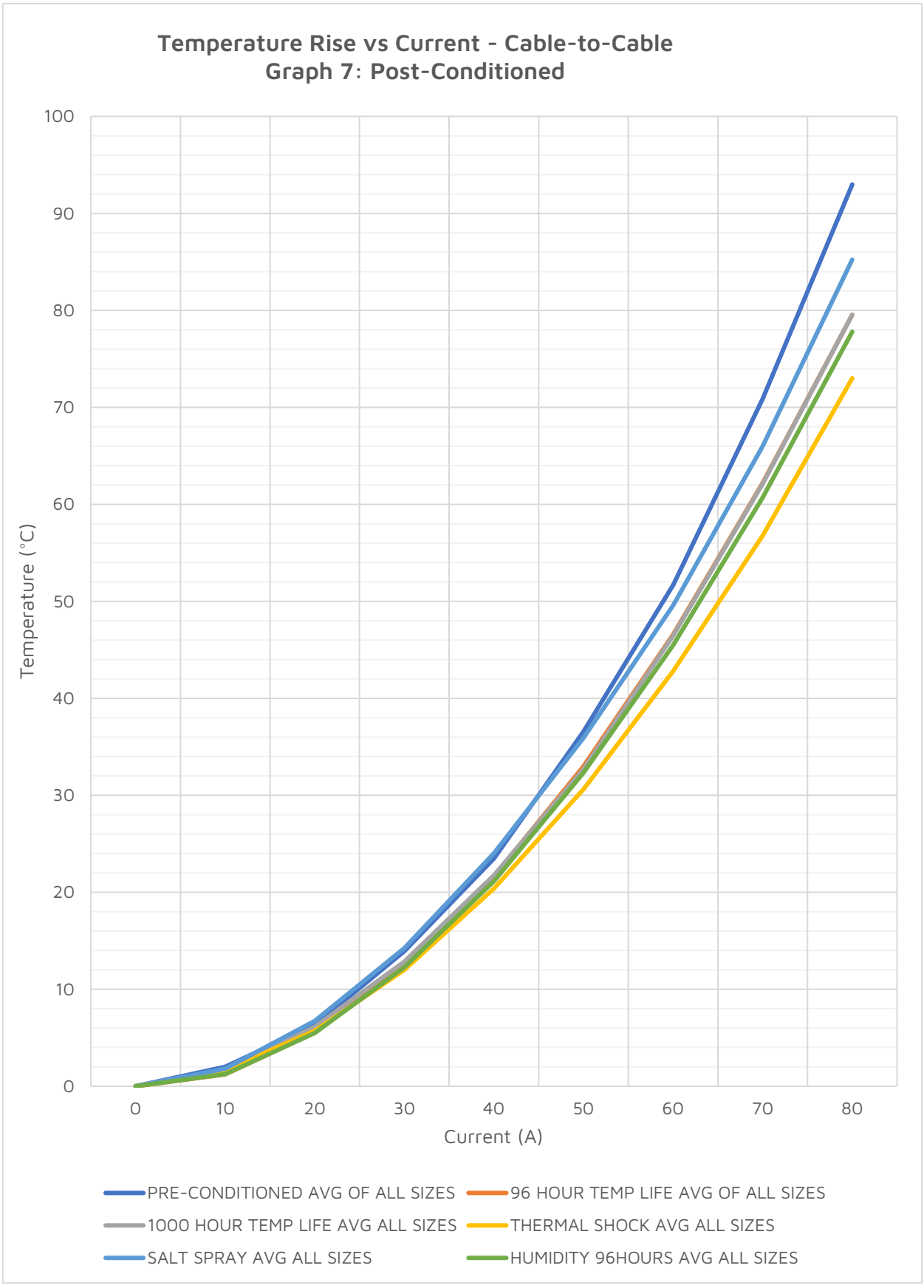

Temperature vs Current De-Rating Curve - Female Cable to Male PCB
Graph 2: Pre-Conditioned
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
Temperature (°C)
0
10
20
30
40
50
60
70
80
Current (A)
KA1-2010298F1 & KA1-MV10205M1
KA1-2010398F1 & KA1-MV10305M1
KA1-2010498F1 & KA1-MV10405M1
PRE-CONDITIONED AVG OF ALL SIZES
SINGLE CONTACT

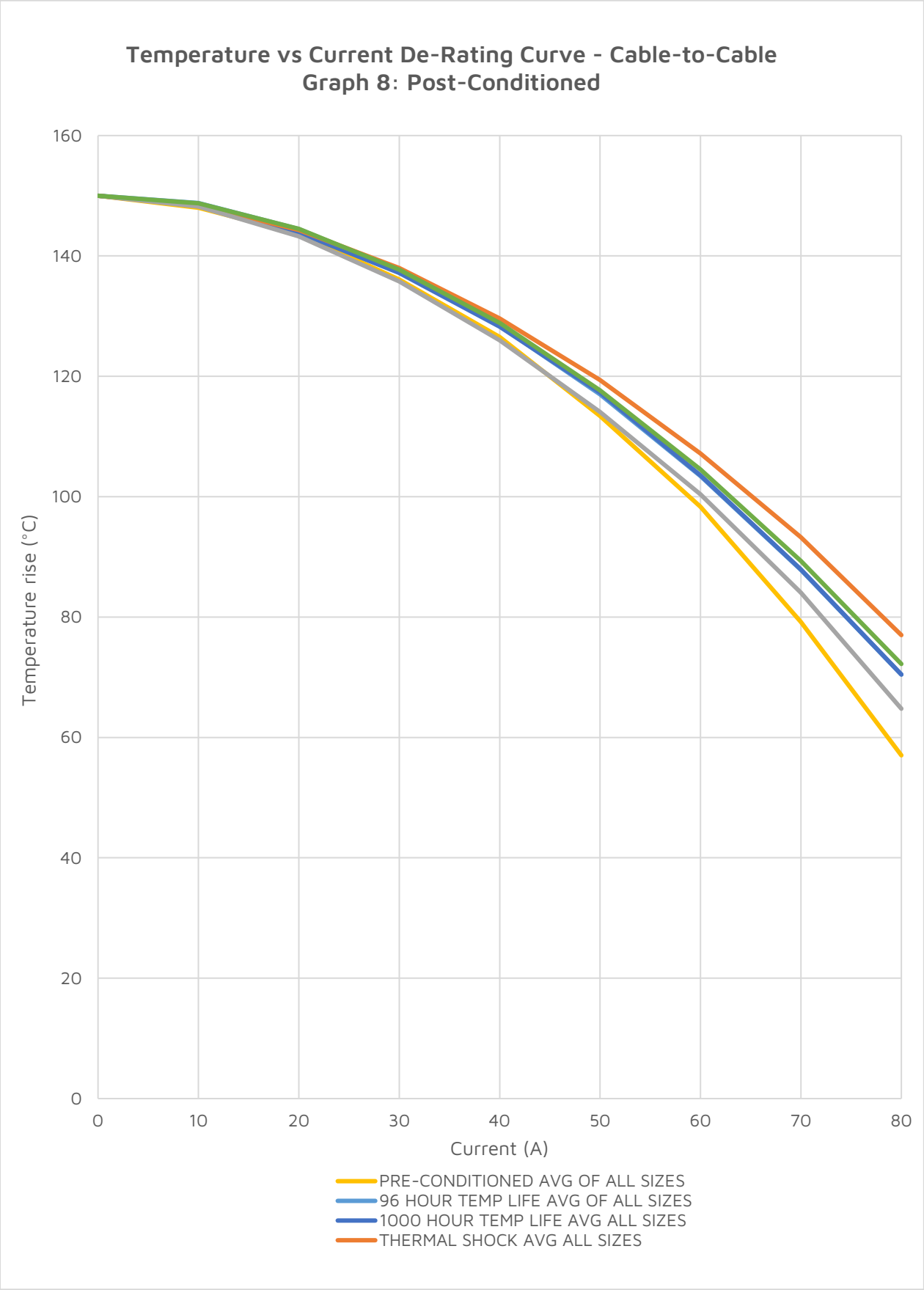

Temperature Rise vs Current - Female Cable to Male PCB
Graph 3: Post-Conditioned
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Temperature rise (°C)
0
10
20
30
40
50
60
70
80
Current (A)
PRE-CONDITIONED AVG OF ALL SIZES
96 HOUR TEMP LIFE AVG OF ALL SIZES
250 HOUR TEMP LIFE AVG OF ALL SIZES
THERMAL SHOCK AVG OF ALL SIZES
SALT SPRAY AVG OF ALL SIZES
HUMIDITY AVG OF ALL SIZES


Temperature vs Current De-Rating Curve - Female Cable to Male PCB
Graph 4: Post-Conditioned
Ambient Temperature (°C)
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
10
20
30
40
50
60
70
80
Current (A)
PRE-CONDITIONED AVG OF ALL SIZES
96 HOUR TEMP LIFE AVG OF ALL SIZES
250 HOUR TEMP LIFE AVG OF ALL SIZES
THERMAL SHOCK AVG OF ALL SIZES
SALT SPRAY AVG OF ALL SIZES
HUMIDITY AVG OF ALL SIZES


Temperature Rise vs Current - Cable-to-Cable
Graph 5: Pre-Conditioned
Temperature rise (°C)
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Current (A)
KA1-3010298M1 & KA1-2010298F1
KA1-3010398M1 & KA1-2010398F1
KA1-3010498M1 & KA1-2010498F1
PRE-CONDITIONED AVG OF AL SIZES
SINGLE CONTACT AVG


Temperature vs Current De-Rating Curve - Cable-to-Cable
Graph 6: Pre-Conditioned
Temperature rise (°C)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Current (A)
KA1-3010298M1 & KA1-2010298F1
KA1-3010398M1 & KA1-2010398F1
KA1-3010498M1 & KA1-2010498F1
PRE-CONDITIONED AVG OF ALL SIZES
SINGLE CONTACT AVG


Temperature Rise vs Current - Cable-to-Cable
Graph 7: Post-Conditioned
Temperature (°C)
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Current (A)
PRE-CONDITIONED AVG OF ALL SIZES
96 HOUR TEMP LIFE AVG OF ALL SIZES
1000 HOUR TEMP LIFE AVG ALL SIZES
THERMAL SHOCK AVG ALL SIZES
SALT SPRAY AVG ALL SIZES
HUMIDITY 96HOURS AVG ALL SIZES


Temperature vs Current De-Rating Curve - Cable-to-Cable
Graph 8: Post-Conditioned
Temperature rise (°C)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Current (A)
PRE-CONDITIONED AVG OF ALL SIZES
96 HOUR TEMP LIFE AVG OF ALL SIZES
1000 HOUR TEMP LIFE AVG ALL SIZES
THERMAL SHOCK AVG ALL SIZES

3.3. Durability, Insertion & Withdrawal Forces to EIA-364-09C: 1999

Methodology: For this test, both individual power contacts and fully-assembled connector pairs were mated at a speed of 25mm/min for 250 cycles. Readings were taken on the first insertion and withdrawal (initial), and then during the 250 cycles. Contact resistance was also measured after the 250 cycles.

Post-conditioned environmental samples were also cycled on the force gauge to compare the effects of additional conditions on insertion and withdrawal forces over 250 cycles.

Specification:

- Durability = 250 mating cycles (operation) minimum
- Insertion Force = 50N max per contact (using mating contact); initial and during 250 mating cycles
- Insertion Force = 70N max per contact (using mating contact), after conditioning tests
- Withdrawal Force = 5N min per contact (using mating contact)

Results: Average forces are taken from multiple samples in each test setup. Inspection of the plating in the contact area was performed post-cycling, and little contact wear was observed.

Insertion Force (N)

Connector Pair	Conditioning	Initial (Average)		250 cycles (Max)	
		Connector	Contact	Connector	Contact
Single contact female cable to male PCB	No conditioning	-	16.01	-	37.22
2-contact female cable to male PCB	No conditioning	44.03	22.01	79.76	39.88
3-contact female cable to male PCB	No conditioning	56.53	18.84	118.11	39.37
4-contact female cable to male PCB	No conditioning	63.12	15.78	135.93	33.98
Female cable contact to male PCB contact (average per contact)	No conditioning	18.16		37.61	
	Temp. Life: 96h	27.77		34.27	
	Temp. Life: 250h	23.57		44.22	
	Temp. Life: 1,000h	23.84		46.72	
	Thermal Shock	26.32		47.78	
	Salt Spray	37.96		53.16	
	Humidity	23.29		69.23	
Single contact cable to cable	No conditioning	-	17.42	-	28.92
2-contact cable to cable	No conditioning	39.23	19.61	70.55	35.28
3-contact cable to cable	No conditioning	57.21	19.07	97.02	32.34
4-contact cable to cable	No conditioning	74.40	18.60	108.66	27.17
Cable contact to cable contact (average per contact)	No conditioning	18.68		30.93	
	Temp. Life: 96h	8.58		22.22	
	Temp. Life: 1,000h	6.31		16.83	
	Thermal Shock	13.14		32.22	
	Salt Spray	16.83		30.03	
	Humidity	14.26		29.58	

Withdrawal Forces (N):

Connector Pair	Conditioning	Initial (Average)		250 cycles (Min)		250 cycles (Max)	
		Connector	Contact	Connector	Contact	Connector	Contact
Single contact female cable to male PCB	No conditioning	-	13.60	-	10.08	-	26.43
2-contact female cable to male PCB	No conditioning	23.50	11.75	24.30	12.15	50.21	25.11
3-contact female cable to male PCB	No conditioning	33.75	11.25	30.24	10.08	69.67	23.22
4-contact female cable to male PCB	No conditioning	46.56	11.64	44.12	11.03	85.42	21.36
Female cable contact to male PCB contact (average per contact)	No conditioning	12.06		10.84		24.03	
	Temp. Life: 96h	5.58		5.02		19.12	
	Temp. Life: 250h	6.10		5.17		17.77	
	Temp. Life: 1,000h	5.56		9.11		13.84	
	Thermal Shock	10.85		10.21		24.39	
	Salt Spray	12.47		11.33		26.79	
	Humidity	10.91		8.74		29.24	
Single contact cable to cable	No conditioning	-	11.58	-	10.78	-	21.60
2-contact cable to cable	No conditioning	30.60	15.30	28.00	14.00	41.74	20.87
3-contact cable to cable	No conditioning	46.60	15.53	41.46	13.82	60.14	20.05
4-contact cable to cable	No conditioning	57.52	14.38	53.24	13.31	73.76	18.44
Cable contact to cable contact (average per contact)	No conditioning	14.20		12.98		20.24	
	Temp. Life: 96h	8.16		6.10		14.90	
	Temp. Life: 1,000h	5.92		4.08		12.05	
	Thermal Shock	12.35		9.78		21.17	
	Salt Spray	15.68		10.79		21.47	
	Humidity	13.32		10.58		19.75	

Contact Resistance:

Part Numbers	Condition	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-PCB)	No conditioning	0.39	0.34	0.36
	250 cycles	0.55	0.33	0.46
KA1-0400005 & KA1-1410005 (cable-to-cable)	No conditioning	0.63	0.51	0.57
	250 cycles	0.70	0.55	0.62

3.4. Withstand Voltage and Insulation Resistance to EIA-364-21C: 2000

Samples: The following connector pairs are used throughout this test sequence. Multiple samples were tested for each combination.

A. KA1-MV10205M1 (male PCB) mated to KA1-2010298F1 (female cable)
B. KA1-MV10305M2 (male PCB) mated to KA1-2010398F2 (female cable)
C. KA1-MV10405M1 (male PCB) mated to KA1-2010498F1 (female cable)
D. KA1-3010298M1 (male cable) mated to KA1-2010298F1 (female cable)
E. KA1-3010398M3 (male cable) mated to KA1-2010398F1 (female cable)
F. KA1-3010498M5 (male cable) mated to KA1-2010498F2 (female cable)

3.4.1. Withstand Voltage: EIA-364-20C: 2004

Methodology: 3,000V or 3,500V was applied to connector pairs wired in two series circuits for 60 seconds to determine whether breakdown or flashover occurred. Samples were then put into a vacuum chamber at a reduced air pressure of 44mb to simulate 70,000ft, and 500V was applied to connector pairs wired in two series to determine whether breakdown or flashover occurred.

Current leakage was measured during the test as the indicator for breakdown or flashover occurrence. Pass values were applied for all values below 5mA.

Specification:

- Voltage Proof (sea level) = 3,000V DC/AC for 60 seconds
- Voltage Proof (70,000 feet) = 500V DC/AC for 60 seconds
- Current leakage = 5mA max

Results: Samples were visually inspected following the test, with no obvious changes to the connectors occurring.

Sample	Altitude	Initial	Temperature Life		Thermal Shock	Salt Spray	Humidity 96 hours
			96 hours	250 hours			
A (all)	Sea level	Pass	Pass	Pass	Pass	Pass	Pass
	70,000ft	Pass	Pass	Pass	Pass	Pass	Pass
B (all)	Sea level	Pass	Pass	Pass	Pass	Pass	Pass
	70,000ft	Pass	Pass	Pass	Pass	Pass	Pass
C (all)	Sea level	Pass	Pass	Pass	Pass	Pass	Pass
	70,000ft	Pass	Pass	Pass	Pass	Pass	Pass
D (all)	Sea level	Pass	Pass	-	Pass	Pass	Pass
	70,000ft	Pass	Pass	-	Pass	Pass	Pass
E (all)	Sea level	Pass	Pass	-	Pass	Pass	Pass
	70,000ft	Pass	Pass	-	Pass	Pass	Pass
F (all)	Sea level	Pass	Pass	-	Pass	Pass	Pass
	70,000ft	Pass	Pass	-	Pass	Pass	Pass

3.4.2. Insulation Resistance: EIA-364-21C: 2000

Methodology: 1,000V was applied to connector pairs wired in two series for 2 minutes to determine whether the resistance satisfies the required specification values of 10GΩ minimum.

Specification: 10GΩ Min pre- and post-conditioning (excluding salt mist conditioning) at 1,000V

Results: Samples were visually inspected following the test, with no obvious changes to the connectors occurring. Values are in MΩ.

Sample	Altitude	Initial	Temperature Life		Thermal Shock	Salt Spray	Humidity 96 hours
			96 hours	250 hours			
A1	>9,999	>9,999	>9,999	>9,999	>9,999	4,833	>9,999
A (others)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999
B (all)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999
C (all)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999
D (all)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999
E (all)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999
F (all)	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999	>9,999

3.5. Contact and Insert Retention

3.5.1. Contact Retention in Housing: EIA-364-05B: 1998

Methodology: Test carried out on both pre-conditioned and post-conditioned samples. All power contacts were removed from each assembly, measuring the force required to do so with an automatic force gauge.

Specification: Contact Retention in Housing = 75N min

Results: Initial retention, pre-conditioned (N)

Part Number	Max	Min	Average
KA1-2010298xx (Female Cable)	166.86	102.22	130.18
KA1-2010398xx (Female Cable)	169.91	136.67	148.39
KA1-2010498xx (Female Cable)	171.18	140.62	161.50
KA1-MV10298xx (Male PCB)	174.91	149.71	160.40
KA1-MV10398xx (Male PCB)	172.97	136.00	153.20
KA1-MV10498xx (Male PCB)	155.83	105.43	132.50
KA1-3010298xx (Male Cable)	188.38	158.27	171.19
KA1-3010398xx (Male Cable)	189.93	129.55	160.72
KA1-3010498xx (Male Cable)	194.72	141.22	170.92

Results: Post-conditioned (N):

Condition	Female Cable			Male PCB			Male Cable		
	Max	Min	Average	Max	Min	Average	Max	Min	Average
Temp. Life: 96hrs	210.02	95.89	153.66	124.07	90.37	105.83	197.89	127.48	174.22
Temp. Life: 250hrs	192.28	107.67	154.49	109.68	79.93	92.99	-	-	-
Temp. Life: 1,000hrs	199.06	81.73	146.45	136.07	93.95	115.27	184.60	115.00	164.53
Thermal Shock	203.83	88.21	156.22	109.23	76.73	92.08	192.10	125.30	165.29
Salt Spray	203.09	98.93	159.09	151.65	91.19	114.03	297.20	106.50	171.44
Humidity: 96hrs	200.85	84.99	142.84	150.98	83.21	107.81	198.10	114.10	159.08

3.5.2. Insert (Fixing) Retention in Housing: EIA-364-35C: 2012

Methodology: Insert retention was tested for both pre and post conditioned samples. Samples were loaded into the automatic force gauge where an axial load of 30N and 50N was applied at a rate of 69kPa, held for 10 seconds. Samples were then visually inspected and given a pass or fail.

Specification: Fixing (insert) retention = 30N.

Results: All results are Pass – the value shows whether the pass was at 50N or 30N axial load.

Part Number	Initial	Temperature Life			Thermal Shock	Salt Spray	Humidity	
		96h	250h	1,000h			96h	56 days
KA1-201xx98F1	50N	50N	50N	50N	50N	50N	50N	50N
KA1-201xx98F2	50N	50N	50N	50N	50N	50N	50N	50N
KA1-MV1xx98M1	50N	50N	50N	50N	50N	50N	50N	50N
KA1-MV1xx98M2	50N	50N	50N	50N	50N	50N	50N	50N
KA1-301xx98M1	50N	50N	-	50N	50N	50N	50N	50N
KA1-301xx98M3	50N	50N	-	50N	50N	50N	50N	50N
KA1-301xx98M5	30N	30N	-	30N	30N	30N	30N	30N

3.6. Temperature Life (without load): EIA-364-17B: 1999, Condition 10, Method A

Methodology: Connectors were subjected to 96 hours and 1,000 hours at 150±5°C. Readings were also taken at 250 hours for the Female cable / Male PCB combination.

Specification: Operating temperature = -65°C to +150°C.

Results: There were no obvious visual changes. Contact Resistance results in table below. See also sections 3.2 (Current vs Temperature), 3.3 (Durability), 3.4 (Withstand Voltage & Insulation Resistance) and 3.5 (Contact/Fixing Retention).

Mating Pair	Condition	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-PCB)	Before Test	0.39	0.34	0.36
	After 96 hours	0.55	0.37	0.42
	After 250 hours	0.55	0.39	0.46
	After 1,000 hours	0.55	0.41	0.48
KA1-0400005 & KA1-1410005 (cable-to-cable)	Before Test	0.63	0.51	0.57
	After 96 hours	0.68	0.45	0.52
	After 1,000 hours	0.84	0.50	0.61

3.7. Thermal Shock (Temperature Cycling): EIA-364-32C: 2000 Condition 4 / BS EN 60068-2-14: 2009

Methodology: This test was conducted using automated transfer every 30 minutes between climatic chambers at the two temperature extremes (-65°C to +150°C). The connectors were measured for contact resistance, current, voltage breakdown, insulation resistance and durability, as well as visual inspection after testing.

Specification: Operating temperature = -65°C to +150°C.

Results: There were no obvious visual changes. Contact Resistance results in table below. See also sections 3.2 (Current vs Temperature), 3.3 (Durability), 3.4 (Withstand Voltage & Insulation Resistance) and 3.5 (Contact/Fixing Retention).

Mating Pair	Condition	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-PCB)	Before Test	0.39	0.34	0.36
	After Test	0.44	0.38	0.42
KA1-0400005 & KA1-1410005 (cable-to-cable)	Before Test	0.63	0.51	0.57
	After Test	0.65	0.49	0.55

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

Methodology: The samples were placed into the salt mist chamber for 48 hours and measured for contact resistance, current, voltage breakdown, insulation resistance and durability, as well as visual inspection post-testing.

Specification:

- Duration = 48 hours continuous
- Water/Salt Mix = 5% NaCl
- Chamber Temperature = +35°C
- pH Level = 6.5-7.2

Results: Insulation resistance on one sample was affected (see section 3.4). No other issues were noted. Visual changes were noted on the majority of samples. Contact Resistance results in table below. See also sections 3.2 (Current vs Temperature), 3.3 (Durability), 3.4 (Withstand Voltage & Insulation Resistance) and 3.5 (Contact/Fixing Retention).

Mating Pair	Condition	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-PCB)	Before Test	0.39	0.34	0.36
	After Test	0.50	0.38	0.44
KA1-0400005 & KA1-1410005 (cable-to-cable)	Before Test	0.63	0.51	0.57
	After Test	0.65	0.44	0.53

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

Methodology: The samples were pre-conditioned for 24 hours at 50°C then suspended in a humidity chamber for 96 hours at 40°C with 90-95% relative humidity. The connectors were measured for contact resistance, current, voltage breakdown, insulation resistance and durability, as well as visual inspection post-testing.

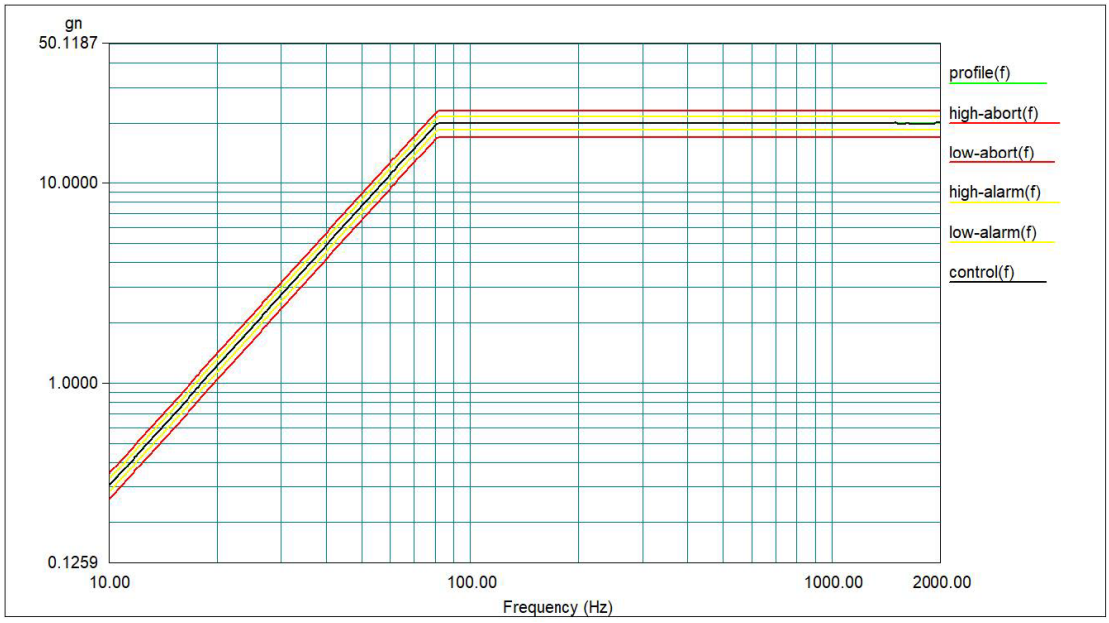
Specification: 90-95% Relative humidity at +40°C for 96 hours duration

Results: There were no obvious visual changes. Contact Resistance results in table below. See also sections 3.2 (Current vs Temperature), 3.3 (Durability), 3.4 (Withstand Voltage & Insulation Resistance) and 3.5 (Contact/Fixing Retention).

Mating Pair	Condition	Max (mΩ)	Min (mΩ)	Average (mΩ)
KA1-0400005 & KA1-1100005 (cable-to-PCB)	Before Test	0.39	0.34	0.36
	After Test	0.48	0.36	0.42
KA1-0400005 & KA1-1410005 (cable-to-cable)	Before Test	0.63	0.51	0.57
	After Test	0.75	0.47	0.52

3.10. Vibration: EIA-364-28D: 1999, Condition 4 / BS EN 60068-2-6: 2008, Test Fc

Methodology: The samples were subjected to a Swept Sine Test, with continuous monitoring for discontinuities of 1 microsecond or longer.



Test parameters for vibration frequency

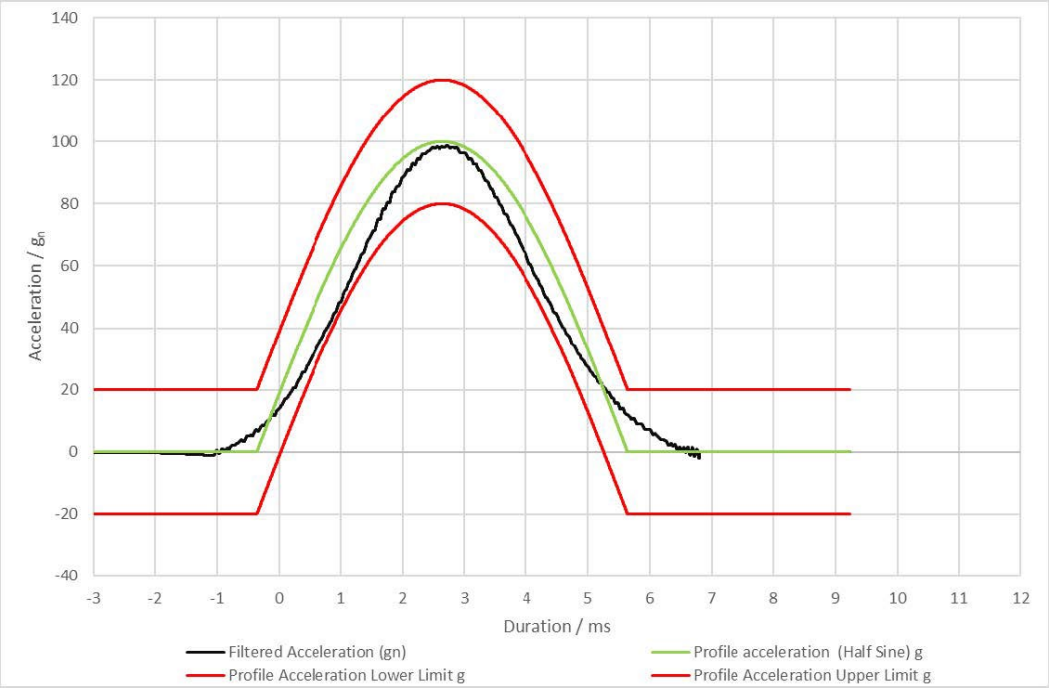
Specification:

- 10Hz to 2,000Hz
- 1.52mm peak-to-peak displacement or 198m/s² (20G) peak (whichever is less)
- 12 cycles per axis (X / Y / Z), 20 minutes per cycle
- Cables restrained above 200mm from connectors

Results: No triggers were noted on any sample during the test process. Upon completion of testing the samples were visually inspected; no obvious changes to the samples were noted.

3.11. Mechanical Shock to EIA-364-27B: 1996 & BS EN 60068-2-27: 2009

Methodology: Shock Test Sequence was carried out on all samples. During the test, the samples were monitored continuously for discontinuities of 1 microsecond or longer.



Typical plot generated during Mechanical Shock test

Specification:

- Acceleration = 100g
- Shock Duration = 6ms
- Shock Shape = Half Sine Pulse, 3 shocks in each axis

Results: No triggers were noted on any sample during the test process. Upon completion of testing the samples were visually inspected; no obvious changes to the samples were noted.