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Test Report Summary

HT03006

General Testing of
Gecko (G125 Series) Connectors

gecko

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1. Introduction

1.1. Description and Purpose

The Harwin Gecko (G125 Series) connector is a new range of 1.25mm pitch connector series, designed to be comparable to the Datamate (M80 Series) range, but taking up less PCB real estate. The following tests were carried out to establish the Component Specification criteria, as well as a performance comparison to the Datamate range.

1.2. Conclusion

The following data has been collated from Harwin test reports 805, 806, 817, 851, 904, 932 and 1020. The results were used to compile the Component Specification for the Gecko range, which can be downloaded here:

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

The tests indicate that the Gecko connector performs on a comparable level to Datamate and exceeds the performance levels of commercial connectors on a similar pitch.

2. Test Method and Requirements

2.1. Specification Parameters

Tests were either carried out in general accordance with EIA 364 standards, or (in the case of the comparative Datamate tests) to BS9520 (in accordance with BS9525 F0033). The list of tests covered in this summary are as follows:

Testing Standard	Description of Test	Section	Page No.
EIA-364-06C: 1999	Initial Contact Resistance	3.1	3
EIA-364-20C: 2004	Withstand Voltage	3.2	3
EIA-364-21C: 2000	Insulation Resistance	3.3	4
EIA-364-70A: 1998	Temperature Rise versus Current & De-Rating Curves	3.4	4-7
EIA-364-32C: 2000	Thermal Shock (Temperature Cycling)	3.5	8
EIA-364-26B: 1999	Salt Spray	3.6	8
EIA-364-31B: 1999	Humidity: 96 Hours and 56 Days	3.7, 3.8	9
EIA-364-28D: 1999	Vibration	3.9	10
EIA-364-27B: 1996	Mechanical Shock	3.10	10
EIA-364-01A: 2000	Acceleration	3.11	10
BS9520: 1.2.6.2	Bump (to BS2011: Part 2.1 Eb: 1977)	3.12(a)	11
BS9520: 1.2.6.3.1	Vibration (to BS2011: Part 2.1 Fc: 1977)	3.12(b)	11
BS9520: 1.2.6.4	Shock (to BS2011: Part 2.1 Ea: 1977)	3.12(c)	11
BS9520: 1.2.6.5	Acceleration (to BS2011: Part 2.1 Ga: 1977)	3.12(d)	11
BS9520: 1.2.7.1	Mechanical Operations (50 Operations)	3.12(e)	11
-	Latch Integrity Testing (100 Operations)	3.13	11-12
-	Durability (up to 1500 Operations)	3.14	12-14

3. Test Results

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

Methodology: 16-way connectors were tested in a variety of configurations, for initial contact resistance prior to the following tests.
Specification: 20mΩ maximum
Results:

Male connector	Female connector	Average (mΩ)	Maximum (mΩ)	Minimum (mΩ)
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	**8.23**	10.0	4.0
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	**7.17**	10.0	4.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	**4.77**	9.0	3.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Throughboard*	**5.88**	10.0	4.0

3.2. Withstand Voltage to EIA-364-20C: 2004

Methodology: 12-way 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).
- X and Y axis measurements taken from adjoining contact positions along the connectors.

Specification:

- 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

Results:

Male connector	Female connector	Condition	Axis	Average (V)	Maximum (V)	Minimum (V)
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	Sea Level	X	**1,133**	1,200	1,100
			Y	**1,033**	1,100	1,000
		Altitude	X	**650**	700	600
			Y	**617**	650	600
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	Sea Level	X	**900**	1,200	700
			Y	**967**	1,000	900
		Altitude	X	**467**	500	450
			Y	**450**	450	450
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	Sea Level	X	**1,367**	1,900	1,000
			Y	**1,333**	1,700	900
		Altitude	X	**625**	650	600
			Y	**617**	650	600
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Throughboard*	Sea Level	X	**967**	1,100	900
			Y	**1,033**	1,200	800
		Altitude	X	**483**	500	450
			Y	**500**	550	450

3.3. Insulation Resistance to EIA-364-21C: 2000

Methodology: 16-way connectors were tested for the Initial insulation resistance, and (in a separate test) 12-way connectors were tested for insulation resistance after conditioning, in a variety of configurations.

- Tests were carried out using a 500V DC voltage source.
- X and Y axis measurements taken from adjoining contact positions along the connectors.

Specification:

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

Results:

Male connector	Female connector	Condition	Axis	Average (GΩ)	Maximum (GΩ)	Minimum (GΩ)
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Unlatched Throughboard*	Initial	Unspecified	**>10**	-	-
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	Unspecified	**>10**	-	-
		After conditioning	X	**1.83**	2	1
			Y	**1.67**	2	1
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	Unspecified	**>10**	-	-
		After conditioning	X	**1**	1	1
			Y	**1**	1	1
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Unlatched Throughboard*	Initial	Unspecified	**>10**	-	-
		After conditioning	X	**1.50**	2	1
			Y	**1.67**	2	1

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

3.4.1. Individual Contact Testing

Methodology: 12-way connectors were tested to see what current would achieve a 30°C temperature rise over ambient. Each combination was tested with 1, 2... up to 12 contacts all carrying the same current. This test was carried out beginning at ambient temperature averaging 25°C.

Specification:

- Current Rating (when only one contact is electrically loaded) = 2.8A max
- Current Rating (when all contacts are electrically loaded) = 2.0A max

Results:

Male connector	Female connector	No. of contacts electrically loaded (A)											
		1	2	3	4	5	6	7	8	9	10	11	12
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Unlatched Throughboard*	5.60	4.80	4.10	3.60	3.25	3.30	2.95	3.00	2.85	3.00	2.85	2.73
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	5.00	5.30	5.20	5.00	4.90	4.70	4.70	4.70	4.60	4.30	4.30	4.30
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	5.30	5.00	4.80	4.50	3.90	3.90	3.50	3.60	3.45	3.15	3.00	3.05
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Unlatched Throughboard*	2.00	5.00	4.80	4.80	4.90	4.70	4.60	4.80	4.70	4.40	4.60	4.57

3.4.2. Complete Connector Testing

Methodology: The following data has been collected to demonstrate the current carrying capability of the 06, 10, 12, 16, 20, 26, 34 & 50 position G125 connectors at elevated ambient temperatures.

Testing carried out in accordance with EIA-364-70; test procedure method 2. Using 2 samples of each connector mated pair (06, 10, 12, 16, 20, 26, 34 & 50 position parts), pre-assembled Male cable assemblies and Female throughboard connectors were wired up to create a circuit in series. Male cable assemblies had 150mm of wire attached to each contact creating a 300mm loop (series link) between contacts. A cable-to-board configuration was used to be representative of the whole range of G125 connector options.

A 0.5A current was applied and the temperature rise above ambient was recorded. The current was increased in 0.5A increments until a maximum operating temperature of 150°C was reached or marginally exceeded. The ambient temperature was also measured throughout the test, which averaged 21.5°C.

Specification:

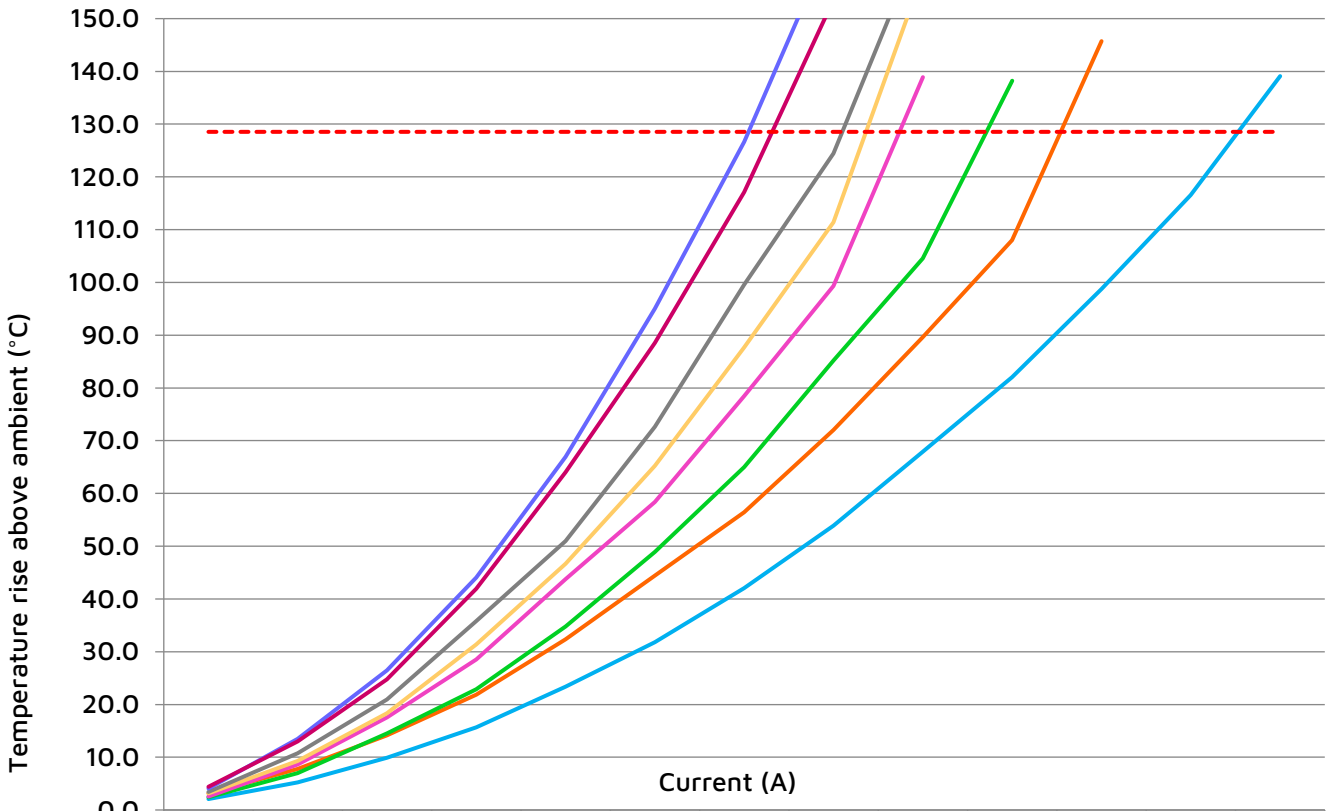
- Current Rating (when only one contact is electrically loaded) = 2.8A max per contact
- Current Rating (when all contacts are electrically loaded) = 2.0A max per contact

Test Samples:

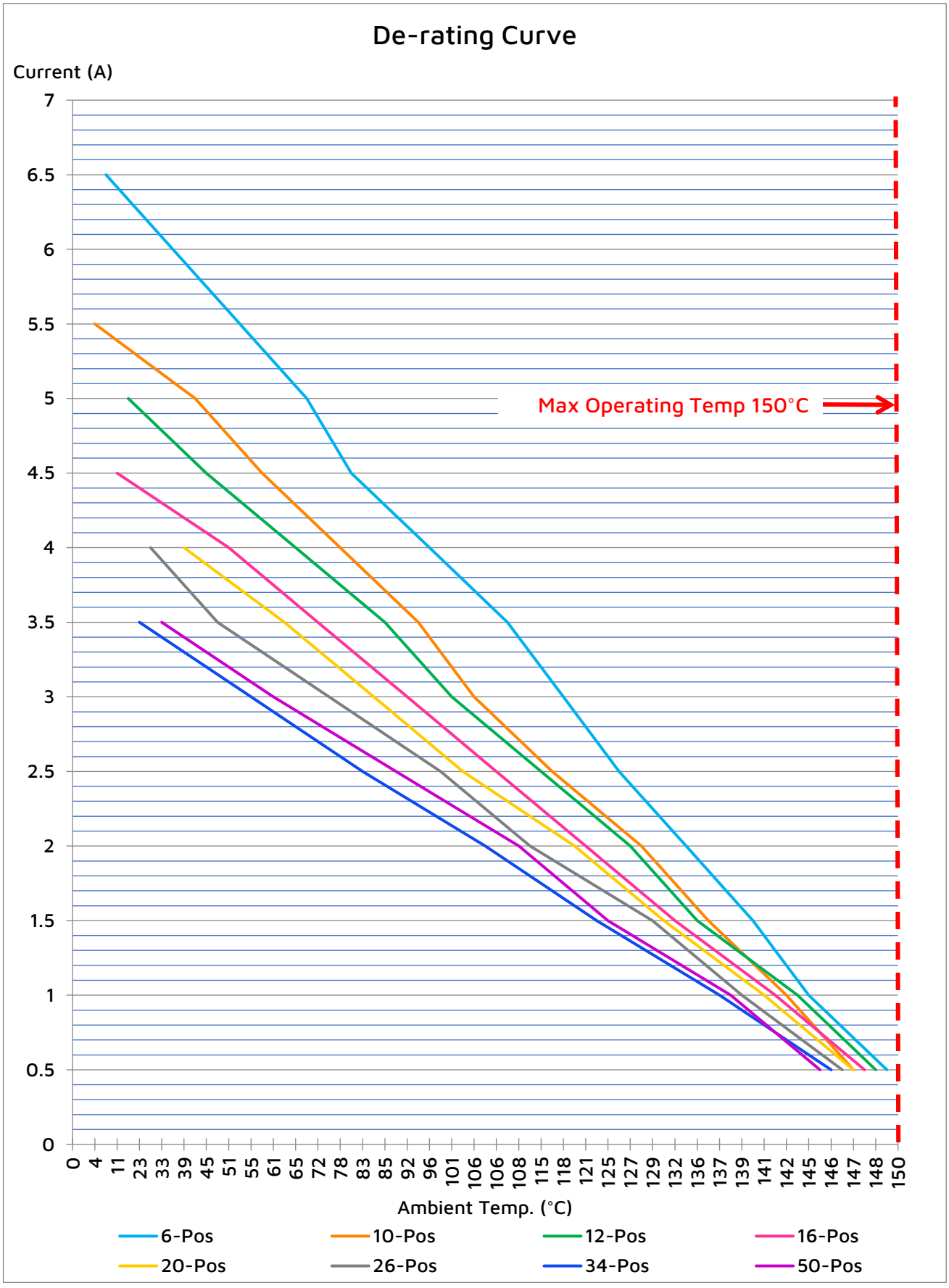
Number of contacts	Male connector	Female connector	Assembly Resistance of mated sample (Ω)	
			Sample 1	Sample 2
6	G125-MC10605L4-0150M *Cable Assembly*	G125-FV20605L0P *Throughboard*	0.071	0.072
10	G125-MC11005L4-0150M *Cable Assembly*	G125-FV21005L0P *Throughboard*	0.180	0.220
12	G125-MC11205L4-0150M *Cable Assembly*	G125-FV21205L0P *Throughboard*	0.260	0.265
16	G125-MC11605L4-0150M *Cable Assembly*	G125-FV21605L0P *Throughboard*	0.340	0.360
6	G125-MC12005L4-0150M *Cable Assembly*	G125-FV22005L0P *Throughboard*	0.465	0.450
10	G125-MC12605L4-0150M *Cable Assembly*	G125-FV22605L0P *Throughboard*	0.580	0.590
12	G125-MC13405L4-0150M *Cable Assembly*	G125-FV23405L0P *Throughboard*	0.780	0.770
16	G125-MC15005L4-0150M *Cable Assembly*	G125-FV25005L0P *Throughboard*	0.999	1.060

Results: see charts on following pages.

Temperature Rise v Current



	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
6-Pos	2.1	5.2	9.9	15.7	23.4	31.8	42.1	53.9	67.9	82.1	98.8	116.6	139.1
10-Pos	3.2	7.8	14.2	21.8	32.4	44.5	56.5	72.0	89.7	108.0	145.7		
12-Pos	2.4	7.0	14.5	22.9	34.8	48.9	65.0	85.2	104.6	138.2			
16-Pos	2.6	8.6	17.6	28.6	43.8	58.4	78.5	99.3	138.9				
20-Pos	3.2	9.3	18.4	31.4	46.7	65.3	87.7	111.4	158.5				
26-Pos	3.4	10.8	20.9	35.8	51.0	72.7	99.6	124.5	165.8				
34-Pos	4.1	13.5	26.5	44.1	67.0	95.0	126.6	165.6					
50-Pos	4.4	13.0	24.8	42.0	64.0	88.6	117.1	153.6					
Limit	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5	128.5


De-rating Curve
Current (A)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Max Operating Temp 150°C
0 4 11 23 33 39 45 51 55 61 65 72 78 83 85 92 96 101 106 106 108 115 118 121 125 127 129 132 136 137 139 141 142 145 146 147 148 150
Ambient Temp. (°C)
6-Pos
10-Pos
12-Pos
16-Pos
20-Pos
26-Pos
34-Pos
50-Pos

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

Methodology: 16-way connectors were tested in a variety of configurations and subjected to temperature extremes of -65°C to +150°C in 30 minute dwells for 5 cycles. Sets of connectors were subjected to this test in both mated and unmated conditions. The connectors were measured for contact resistance, insertion and withdrawal forces before and after testing, and visual inspection after testing.

Specifications:

- Contact Resistance (initial) = 20mΩ maximum
- Contact Resistance (after conditioning) = 25mΩ maximum
- Insertion Force (per contact) = 2.8N maximum
- Withdrawal Force (per contact) = 0.2N minimum

Results:

Male connector	Female connector	Condition	Contact Resistance (mΩ)			Connector Insertion Force (N)	Connector Withdrawal Force (N)
			Avg	Max	Min		
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	Initial	**8.88**	10.0	6.0	15.96	12.68
		After conditioning	**3.69**	5.0	2.0	9.96	4.80
		After cond. (unmated)	**3.94**	5.0	3.0	12.22	9.12
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**7.25**	10.0	5.0	11.48	8.18
		After conditioning	**3.69**	5.0	2.0	8.52	7.10
		After cond. (unmated)	**3.06**	5.0	2.0	13.88	11.62
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**6.44**	9.0	3.0	15.36	8.26
		After conditioning	**4.38**	8.0	3.0	9.64	6.76
		After cond. (unmated)	**2.69**	4.0	2.0	10.92	8.18
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Throughboard*	Initial	**7.38**	10.0	4.0	12.22	7.46
		After conditioning	**3.88**	6.0	2.0	8.84	5.70
		After cond. (unmated)	**3.31**	5.0	2.0	15.64	6.72

- No signs of damage or degradation were found on visual inspection.

3.6. Salt Spray to EIA-364-26B: 1999

Methodology: 16-way connectors were tested in a variety of configurations: they were loaded into the salt mist chamber and subjected to 48 hours continuous exposure using 5% Sodium Chloride solution at +35°C. Sets of connectors were subjected to this test in both mated and unmated conditions. The connectors were measured for contact resistance before and after testing, and visual inspection after testing.

Specifications:

- Contact Resistance (initial) = 20mΩ maximum
- Contact Resistance (after conditioning) = 25mΩ maximum

Results:

Male connector	Female connector	Condition	Contact Resistance (mΩ)		
			Average	Maximum	Minimum
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	Initial	**9.19**	10.0	7.0
		After conditioning	**5.13**	8.0	3.0
		After cond. (unmated)	**4.0**	7.0	2.0
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**7.13**	9.0	4.0
		After conditioning	**4.63**	10.0	2.0
		After cond. (unmated)	**2.82**	5.0	2.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**3.94**	6.0	3.0
		After conditioning	**3.44**	6.0	2.0
		After cond. (unmated)	**3.19**	4.0	3.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Throughboard*	Initial	**5.13**	6.0	4.0
		After conditioning	**4.19**	5.0	2.0
		After cond. (unmated)	**3.25**	7.0	2.0

- No signs of damage or degradation were found on visual inspection.

3.7. Humidity to EIA-364-31B: 1999 (96 hours)

Methodology: 16-way connectors were tested in a variety of configurations. The connectors were subjected to 24 hours pre-conditioning at +50°C, followed by 96 hours at +40°C/93%RH, with a polarising voltage of +60V DC applied. Sets of connectors were subjected to this test in both mated and unmated conditions. The connectors were measured for contact resistance before and after testing, as well as a visual inspection after testing.

Specifications:

- Contact Resistance (initial) = 20mΩ maximum
- Contact Resistance (after conditioning) = 25mΩ maximum

Results:

Male connector	Female connector	Condition	Contact Resistance (mΩ)		
			Average	Maximum	Minimum
G125-MV11605L0 *Unlatched Throughboard*	G125-FV11605L0 *Throughboard*	Initial	**6.63**	9.0	4.0
		After conditioning	**5.63**	8.0	3.0
		After cond. (unmated)	**9.81**	11.0	8.0
G125-MV11605L0 *Unlatched Throughboard*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**7.13**	9.0	4.0
		After conditioning	**5.81**	9.0	3.0
		After cond. (unmated)	**9.94**	12.0	7.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-2041696L0 & G125-0010005 *Crimp*	Initial	**3.94**	6.0	3.0
		After conditioning	**4.06**	8.0	1.0
		After cond. (unmated)	**10.38**	13.0	5.0
G125-3041696L0 & G125-1010005 *Crimp*	G125-FV11605L0 *Throughboard*	Initial	**5.13**	6.0	4.0
		After conditioning	**7.81**	11.0	3.0
		After cond. (unmated)	**11.63**	13.0	6.0

- No signs of damage or degradation were found on visual inspection.

3.8. Humidity to EIA-364-31B: 1999 (56 days)

Methodology: 12-way connectors were tested in a variety of configurations. The connectors were subjected to 24 hours pre-conditioning at +50°C, followed by 56 days (1,344 hours) at +40°C/93%RH, with a polarising voltage of +60V DC applied. Sets of connectors were subjected to this test in both mated and unmated conditions. The connectors were measured for contact resistance before and after testing, as well as a visual inspection after testing.

Specifications:

- Contact Resistance (initial) = 20mΩ maximum
- Contact Resistance (after conditioning) = 25mΩ maximum

Results:

Male connector	Female connector	Condition	Contact Resistance (mΩ)		
			Average	Maximum	Minimum
G125-MV11205L0 *Unlatched Throughboard*	G125-FV21205L0 *Throughboard*	Initial	**9.6**	16.0	3.0
		After conditioning	**12.3**	15.0	5.0
G125-MV21205L0 *Unlatched Throughboard*	G125-FV21205L0 *Throughboard*	Initial (unmated)	-	-	-
		After conditioning	**12.0**	14.0	6.0
G125-MV11205L0 *Unlatched Throughboard*	G125-2041296L0 & G125-0010005 *Crimp*	Initial	**6.3**	10.0	2.0
		After conditioning	**6.3**	10	3.0
G125-MV21205L0 *Unlatched Throughboard*	G125-2041296L0 & G125-0010005 *Crimp*	Initial (unmated)	-	-	-
		After conditioning	**3.8**	8.0	2.0
G125-MV11205L0 *Unlatched Throughboard*	G125-2041296L0 & G125-0010005 *Crimp*	Initial	**6.8**	12.0	4.0
		After conditioning	**5.5**	11.0	3.0
G125-3041296L0 & G125-1010005 *Crimp*	G125-2041296L0 & G125-0010005 *Crimp*	Initial (unmated)	-	-	-
		After conditioning	**6.0**	15.0	2.0
G125-3041296L0 & G125-1010005 *Crimp*	G125-FS11205L0 *SMT*	Initial	**8.3**	13.0	1.0
		After conditioning	**5.4**	11.0	2.0

- No signs of damage or degradation were found on visual inspection.

3.9. Vibration to EIA-364-28D: 1999

Methodology: 12-way Male Crimp connectors with latches were mated to 12-way Female SMT connectors for this test. The connectors were subjected to the following conditions:

- Frequency range = 10 to 2,000Hz
- Acceleration = 20G (196m/s²) or 1.52mm peak-to-peak (whichever is less)
- Number of sweep cycles = 12 per axis
- Time for one sweep = 20 minutes
- Male crimp attached to 15mm long cables, not 200mm as stated in EIA-364-28D

Specification: During this test, the samples were monitored continuously for discontinuities of 1 millisecond or greater, using a constant current source of 100mA.
Results: No discontinuities were found on any samples during any axis of the test, and a visual inspection revealed no distortion or bending to any components.

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

Methodology: 12-way Male Crimp connectors with latches were mated to 12-way Female SMT connectors for this test. Test condition E was applied to the axes across and along the connectors (transverse & longitudinal axes).

- Acceleration = 50G (490m/s²)
- Duration = 11ms
- Pulse shape = Terminal peak sawtooth
- Number of pulses = 3 in both directions on each axis
- Male crimp attached to 15mm long cables, not 200mm as stated in EIA-364-27B

Test condition G was applied in the Vertical axis (across the mated pair).

- Acceleration = 100G (981m/s²)
- Duration = 3ms
- Pulse shape = Terminal peak sawtooth
- Number of pulses = 3 in both directions on each axis
- Male crimp attached to 15mm long cables, not 200mm as stated in EIA-364-27B

Specification: During this test, the samples were monitored continuously for discontinuities of 1 millisecond or greater, using a constant current source of 100mA.
Results: No discontinuities were found on any samples during any axis of the test, and a visual inspection revealed no distortion or bending to any components.

NOTE: Further testing to 100G (981m/s²) with a 6ms Trapezoidal pulse, both directions of three axis, 18 shocks total to BS2011: Part 2.1 Ea: 1977 was further carried out – see section 3.11(c). No discontinuities were detected using a detector capable of measuring open circuits >250ns. Refer to Test Report Summary HT036XX for full details of these results.

3.11. Acceleration to EIA-364-01A: 2000

Methodology: 12-way Female Crimp connectors were mated to 12-way Male SMT connectors with latches for this test. The connectors were subjected to the following conditions:

- Acceleration = 50G (490m/s²).
- Duration = 30s in both directions of all 3 axes (6 total)

Specification: During this test, the samples were monitored continuously for discontinuities of 250 nanoseconds or greater.
Results: No discontinuities were found on any samples during any axis of the test, and a visual inspection revealed no distortion or bending to any components.

3.12. Environmental Performance to BS9525 F0033 Iss 1: Group CD6(i)(D)

NOTE: These test requirements are the same performance requirements applied to the Datamate range – this testing is done to confirm that Gecko will perform to the same level. The following data has been collated from Harwin test report 817.

The Gecko connectors tested met the BS9525-F0033 specification for insertion, withdrawal and contact resistance initially and after multiple engagements and separations up to 50 operations. Further, the product met all the requirements for Vibration, Bump, Shock and Acceleration as required by the British Standard specification.

A calibrated detector capable of registering open circuits lasting longer than 250 nanoseconds was used during the Bump, Vibration, Shock and Acceleration tests to register electrical discontinuity.

3.12.1. Bump to BS9520: 1.2.6.2, BS2011: Part 2.1 Eb

Method/Specification: 40G (390m/s²), duration 6ms, 4000 Bumps, both directions of three axes, continuously monitoring of electrical continuity during the last 200 bumps.
Result: Pass, no issues in electrical continuity or visual inspection.

3.12.2. Vibration to BS9520: 1.2.6.3.1, BS2011: Part 2.1 Fc

Method/Specification: 10Hz to 2kHz, 0.75mm peak/10G (98m/s²), duration 6 hours total (2 hours per axis), continuous monitoring of electrical continuity during initial resonance search and the last two frequency sweeps.
Result: Pass, no issues found in monitoring the vibration for resonance with a strobe light, no issues in electrical continuity or visual inspection after the test.

3.12.3. Shock to BS9520: 1.2.6.4, BS2011: Part 2.1 Ea

Method/Specification: 100G (981m/s²), 6ms Trapezoidal pulse, both directions of three axes, 18 shocks total, continuous monitoring of electrical continuity during application of shocks.
Result: Pass, no issues in electrical continuity or visual inspection.

3.12.4. Acceleration to BS9520: 1.2.6.5, BS2011: Part 2.1 Ga

Method/Specification: 50G (490m/s²), 30 seconds, both directions of three axes, 6 tests total, continuous monitoring of electrical continuity during application of acceleration.
Result: Pass, no issues found in monitoring the vibration for resonance with a strobe light, no issues in electrical continuity or visual inspection after the test.

3.12.5. Mechanical Operation (Durability) to BS9520 1.2.7.1

Method/Specification: 50 operations, at 15 operations per minute maximum.
Result: Pass, no issues found at the mating faces of the connectors.

3.13. Latch Integrity Testing

Conclusion: These tests indicate that the Gecko connector performs on a comparable level to Datamate despite being a much smaller connector system.

Pre-cycling the Gecko latches achieved a minimum of 36.7N - Datamate L-Tek latches achieve a minimum of 40.9N. This was a difference of less than 11% in a connector that is 36% smaller.

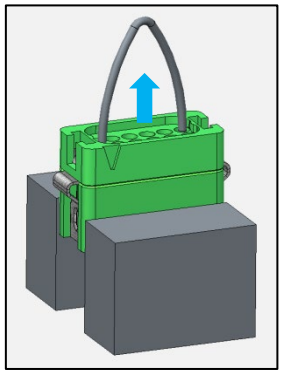
Post-cycling latch integrity is comparable on both connector systems. The Gecko latches achieved a minimum of 20.3N, compared to the Datamate L-Tek latches rated at 20N for 10 seconds (see Component Specification C005xx for the Datamate latch specification).

Test Performed:

A. Pull-apart destructive testing of an unpopulated 12-position Gecko mated pair. Connectors had not been cycled, just engaged, to determine a benchmark of latch performance.
B. Pull-apart destructive testing of an unpopulated 12-position Gecko mated pair. Connectors had been cycled 100 times and de-latched by hand.
C. Pull-apart destructive testing of an unpopulated 12-position Gecko mated pair. Connectors had been cycled 100 times and de-latched using Z125-9261200 tool.
D. Pull-apart destructive testing of an unpopulated 12-position L-Tek mated pair. Connectors had not been cycled, just engaged, to determine a benchmark of latch performance.

Product used:

- Tests A, B, C – Latch G125-4100046, Male housing G125-3011296, Female housing G125-2041296.
- Test D – Latch M80-001, Male housing M80-1021298, Female housing M80-1031298.



Method: Male latched mouldings were secured in a machine vice and the female mouldings had a wire passed through contact position 1 and 12 to create a loop to apply a pull-apart force to. The force applied was steadily increased until the point of failure.

Gecko is shown in the image, same method as Test D on Datamate L-Tek.

Test Number	Force at Failure (N)			Typical Failure mode
	Average	Maximum	Minimum	
A – 40 test samples	**38.1**	39.7	36.7	Latch broached through the plastic of the female housing, one side first. No apparent damage to latch.
B – 16 test samples	**28.4**	34.8	21.7	
C – 16 test samples	**26.9**	34.1	20.3	
D – 6 test samples	**46.1**	49.0	40.9	Latch breaks, one side first. No apparent damage to female housing.

3.14. Durability (Contact Resistance to EIA-364-06C: 1999)

Conclusion: Although some variation in contact resistance figures was noted, all performed within specification – 1,000 mating cycles minimum was exceeded in all cases.

Method: Female PCB Throughboard connectors were mated to Male cable assemblies or Male PCB Throughboard connectors in all 8 contact count options. Readings for insertion and withdrawal forces, Voltage Proof, Insulation Resistance and Contact Resistance were taken initially. The connectors were then un-mated and mated 1,500 cycles, with all readings repeated at 50 / 100 / 250 / 500 / 750 / 1,000 / 1,500 cycles.

For male connectors initially fitted with latches, these were removed for the testing, as this would interfere with readings relating to forces, would slow the testing down, and was not relevant to the test objectives.

Specifications:

- Engaging and Separating forces are measured for the complete connector - required value Is given in the table header row.
- Withstand Voltage Is 600V DC.
- Insulation Resistance is 10GΩ minimum initially, then 1GΩ minimum after.
- Contact Resistance is 20mΩ maximum initially, then 25mΩ maximum after.

6-Contact: G125-FV10605L0P (Female Throughboard), G125-MC10605L4-0150M (Male Cable)

No. of cycles	Engaging Force (16.8N max)	Separating Force (1.2N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	7.7	5.8	Pass	>10GΩ	11.5	12.0	11.0
50	7.6	5.4	Pass	>10GΩ	9.8	13.0	8.0
100	9.0	5.9	Pass	>10GΩ	9.3	10.0	8.0
250	10.6	9.4	Pass	>10GΩ	9.3	12.0	7.0
500	14.1	9.1	Pass	>10GΩ	9.8	10.0	9.0
750	14.3	10.1	Pass	>10GΩ	9.7	10.0	9.0
1,000	10.	6.3	Pass	>10GΩ	10.5	12.0	9.0
1,500	11.2	8.5	Pass	>10GΩ	10.3	12.0	8.0

10-Contact: G125-FV11005L0P (Female Throughboard), G125-MC11005L4-0150L (Male Cable)

No. of cycles	Engaging Force (28.0N max)	Separating Force (2.0N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	14.6	10.7	Pass	>10GΩ	7.5	9.0	5.0
50	14.6	12.6	Pass	>10GΩ	7.7	9.0	5.0
100	12.4	9.5	Pass	>10GΩ	8.7	10.0	7.0
250	13.7	10.3	Pass	>10GΩ	6.3	9.0	5.0
500	20.1	13.6	Pass	>10GΩ	10.0	11.0	9.0
750	21.0	11.9	Pass	>10GΩ	6.0	8.0	4.0
1,000	19.7	12.3	Pass	>10GΩ	5.2	6.0	4.0
1,500	14.9	8.3	Pass	>10GΩ	6.9	8.0	5.0

12-Contact: G125-FV11205L0P (Female Throughboard), G125-MV21205L0P (Male Throughboard)

No. of cycles	Engaging Force (33.6N max)	Separating Force (2.4N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	9.6	6.6	Pass	>10GΩ	2.6	4.0	2.0
50	9.6	7.24	Pass	>10GΩ	2.6	4.0	2.0
100	9.64	7.24	Pass	>10GΩ	2.7	4.0	1.0
250	10.36	7.36	Pass	>10GΩ	2.8	5.0	1.0
500	11.3	8.72	Pass	>10GΩ	3.1	5.0	2.0
750	11.56	9.54	Pass	>10GΩ	3.1	6.0	2.0
1,000	11.48	8.7	Pass	>10GΩ	3.3	5.0	2.0
1,500	14.86	9.2	Pass	>10GΩ	3.4	7.0	2.0

16-Contact: G125-FV11605L0P (Female Throughboard), G125-MV21605L0P (Male Throughboard)

No. of cycles	Engaging Force (44.8N max)	Separating Force (3.2N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	9.18	8.1	Pass	>10GΩ	2.1	3.0	1.0
50	8.0	6.72	Pass	>10GΩ	1.9	3.0	1.0
100	8.9	7.3	Pass	>10GΩ	1.4	3.0	1.0
250	8.7	5.8	Pass	>10GΩ	1.9	3.0	1.0
500	9.84	6.0	Pass	>10GΩ	1.8	3.0	0.0
750	8.96	6.66	Pass	>10GΩ	1.7	3.0	1.0
1,000	8.84	8.92	Pass	>10GΩ	2.4	3.0	2.0
1,500	9.94	4.92	Pass	>10GΩ	2.5	3.0	2.0

20-Contact: G125-FV12005L0P (Female Throughboard), G125-MV22005L0P (Male Throughboard)

No. of cycles	Engaging Force (56.0N max)	Separating Force (4.0N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	10.44	9.08	Pass	>10GΩ	2.6	5.0	2.0
50	10.44	12.46	Pass	>10GΩ	2.1	4.0	1.0
100	10.32	11.26	Pass	>10GΩ	1.6	3.0	1.0
250	11.4	14.42	Pass	>10GΩ	1.5	2.0	1.0
500	14.9	12.1	Pass	>10GΩ	1.2	2.0	1.0
750	16.2	13.64	Pass	>10GΩ	0.5	1.0	0.0
1,000	14.96	12.94	Pass	>10GΩ	2.1	3.0	1.0
1,500	15.01	11.02	Pass	>10GΩ	1.5	2.0	1.0

34-Contact: G125-FV13405L0P (Female Throughboard), G125-MC13405L4-0150L (Male Cable)

No. of cycles	Engaging Force (95.2N max)	Separating Force (6.8N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	29.0	16.4	Pass	>10GΩ	1.5	3.0	1.0
50	27.6	22.5	Pass	>10GΩ	1.7	3.0	0.0
100	31.1	21.1	Pass	>10GΩ	2.0	3.0	1.0
250	35.4	30.3	Pass	>10GΩ	1.9	4.0	1.0
500	37.6	28.3	Pass	>10GΩ	2.9	5.0	1.0
750	33.2	24.0	Pass	>10GΩ	2.8	6.0	1.0
1,000	44.0	30.7	Pass	>10GΩ	2.5	4.0	1.0
1,500	40.1	29.6	Pass	>10GΩ	3.0	5.0	2.0

50-Contact: G125-FV1,5005L0P (Female Throughboard), G125-MC1,5005L4-0150M (Male Cable)

No. of cycles	Engaging Force (140.0N max)	Separating Force (10.0N min)	Withstand Voltage	Insulation Resistance	Contact Resistance (mΩ)		
					Average	Maximum	Minimum
Initial	48.9	39.6	Pass	>10GΩ	2.5	6.0	1.0
50	44.9	29.7	Pass	>10GΩ	3.4	6.0	2.0
100	52.1	43.1	Pass	>10GΩ	2.9	5.0	2.0
250	70.4	47.3	Pass	>10GΩ	3.1	6.0	0.4
500	57.0	31.3	Pass	>10GΩ	3.7	6.0	2.0
750	70.0	37.4	Pass	>10GΩ	3.2	6.0	2.0
1,000	63.0	37.5	Pass	>10GΩ	3.8	5.0	2.0
1,500	71.2	54.1	Pass	>10GΩ	4.0	6.0	3.0