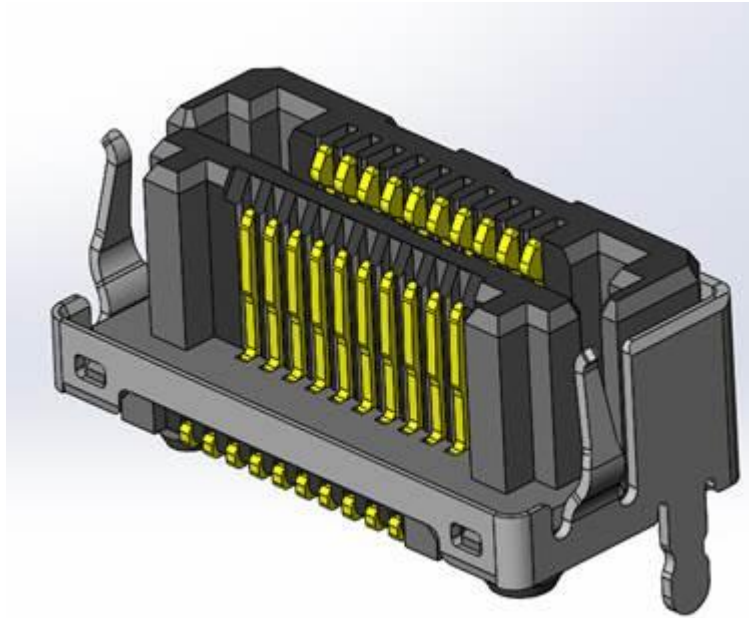




Project Number: Design Qualification Test Report	Tracking Code: 740209_Report_Rev_1
Requested by: Roy Luo	Date: 5/20/2016
Part #: LSHM-110-02.5-L-DV-A-S-K-TR/ LSHM-110-02.5-L-DV-A-S-K-TR	Tech: Peter Chen
Part description: LSHM/LSHM	Qty to test: 64
Test Start: 11/25/2015	Test Completed: 12/10/2015



DESIGN QUALIFICATION TEST REPORT

**LSHM-110-02.5-L-DV-A-S-K-TR/ LSHM-110-02.5-L-DV-A-S-K-TR
DV TO DV 5&10 Position Mating Unmating force**

LSHM/LSHM

Tracking Code: 740209_Report_Rev_1	Part #: LSHM-110-02.5-L-DV-A-S-K-TR/ LSHM-110-02.5-L-DV-A-S-K-TR
Part description: LSHM/LSHM	

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
05/04/2016	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: EIA Publication 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.
- 6) Solder Information: Lead free
- 7) Samtec Test PCBs used: PCB-106702-TST-XX, PCB-106711-TST-XX.

FLOWCHARTS

Mating/Unmating/Durability

<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>																																								
LSHM-110-02.5-L-DV-A-S-K-TR LSHM-110-02.5-L-DV-A-S-K-TR 8 Assemblies	LSHM-105-02.5-L-DV-A-N-K-TR LSHM-105-02.5-L-DV-A-N-K-TR 8 Assemblies	LSHM-105-02.5-L-DV-A-S-K-TR LSHM-105-02.5-L-DV-A-S-K-TR 8 Assemblies	LSHM-105-06.0-L-DV-A-S-K-TR LSHM-105-06.0-L-DV-A-S-K-TR 8 Assemblies																																								
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ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

MATING/UNMATING:

- 1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
- 2) The full insertion position was to within 0.003” to 0.004” of the plug bottoming out in the receptacle to prevent damage to the system under test.
- 3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

RESULTS

Mating\Unmating Durability Group:

Group 1: LSHM-110-02.5-L-DV-A-S-K-TR/ LSHM-110-02.5-L-DV-A-S-K-TR

- **Initial**
 - **Mating**
 - **Min** ----- 3.79 Lbs
 - **Max** ----- 5.42 Lbs
 - **Unmating**
 - **Min** ----- 3.07 Lbs
 - **Max** ----- 4.87 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 3.83 Lbs
 - **Max** ----- 5.49 Lbs
 - **Unmating**
 - **Min** ----- 3.49 Lbs
 - **Max** ----- 4.84 Lbs

Group 2: LSHM-105-02.5-L-DV-A-S-K-TR/ LSHM-105-02.5-L-DV-A-S-K-TR

- **Initial**
 - **Mating**
 - **Min** ----- 1.18 Lbs
 - **Max** ----- 2.12 Lbs
 - **Unmating**
 - **Min** ----- 1.61 Lbs
 - **Max** ----- 2.57 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 1.75 Lbs
 - **Max** ----- 2.21 Lbs
 - **Unmating**
 - **Min** ----- 1.63 Lbs
 - **Max** ----- 2.88 Lbs

RESULTS Continued

Group 3: LSHM-105-02.5-L-DV-A-N-K-TR/ LSHM-105-02.5-L-DV-A-S-N-TR

- **Initial**
 - **Mating**
 - **Min** ----- 2.13 Lbs
 - **Max** ----- 2.68 Lbs
 - **Unmating**
 - **Min** ----- 2.03 Lbs
 - **Max** ----- 2.60 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 2.15 Lbs
 - **Max** ----- 2.77 Lbs
 - **Unmating**
 - **Min** ----- 2.08 Lbs
 - **Max** ----- 2.62 Lbs

Group 4: LSHM-110-06.0-L-DV-A-N-K-TR/ LSHM-110-06.0-L-DV-A-N-K-TR

- **Initial**
 - **Mating**
 - **Min** ----- 2.39 Lbs
 - **Max** ----- 3.31 Lbs
 - **Unmating**
 - **Min** ----- 3.17 Lbs
 - **Max** ----- 4.09 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 2.23 Lbs
 - **Max** ----- 3.46 Lbs
 - **Unmating**
 - **Min** ----- 3.02 Lbs
 - **Max** ----- 3.84 Lbs

RESULTS Continued

Group 5: LSHM-110-06.0-L-DV-A-N-K-TR/ LSHM-110-06.0-L-DV-A-S-N-TR

- **Initial**
 - **Mating**
 - **Min** ----- 3.81 Lbs
 - **Max** ----- 4.98 Lbs
 - **Unmating**
 - **Min** ----- 4.11 Lbs
 - **Max** ----- 6.45 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 3.77 Lbs
 - **Max** ----- 4.66 Lbs
 - **Unmating**
 - **Min** ----- 4.09 Lbs
 - **Max** ----- 6.00 Lbs

Group 6: LSHM-110-02.5-L-DV-A-N-K-TR/ LSHM-110-02.5-L-DV-A-N-K-TR

- **Initial**
 - **Mating**
 - **Min** ----- 4.00 Lbs
 - **Max** ----- 4.75 Lbs
 - **Unmating**
 - **Min** ----- 4.06 Lbs
 - **Max** ----- 5.15 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 4.11 Lbs
 - **Max** ----- 4.89 Lbs
 - **Unmating**
 - **Min** ----- 4.11 Lbs
 - **Max** ----- 4.76 Lbs

RESULTS Continued

Group 7: LSHM-105-06.0-L-DV-A-N-K-TR/ LSHM-105-06.0-L-DV-A-S-N-TR

- **Initial**
 - **Mating**
 - **Min** ----- 2.42 Lbs
 - **Max** ----- 3.24 Lbs
 - **Unmating**
 - **Min** ----- 3.24 Lbs
 - **Max** ----- 4.49 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 2.51 Lbs
 - **Max** ----- 3.59 Lbs
 - **Unmating**
 - **Min** ----- 2.99 Lbs
 - **Max** ----- 4.10 Lbs

Group 8: LSHM-110-06.0-L-DV-A-N-K-TR/ LSHM-110-06.0-L-DV-A-N-K-TR

- **Initial**
 - **Mating**
 - **Min** ----- 3.18 Lbs
 - **Max** ----- 4.11 Lbs
 - **Unmating**
 - **Min** ----- 4.39 Lbs
 - **Max** ----- 6.28 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 3.07 Lbs
 - **Max** ----- 4.16 Lbs
 - **Unmating**
 - **Min** ----- 3.08 Lbs
 - **Max** ----- 5.54 Lbs

DATA SUMMARIES

Mating/Unmating Durability Group

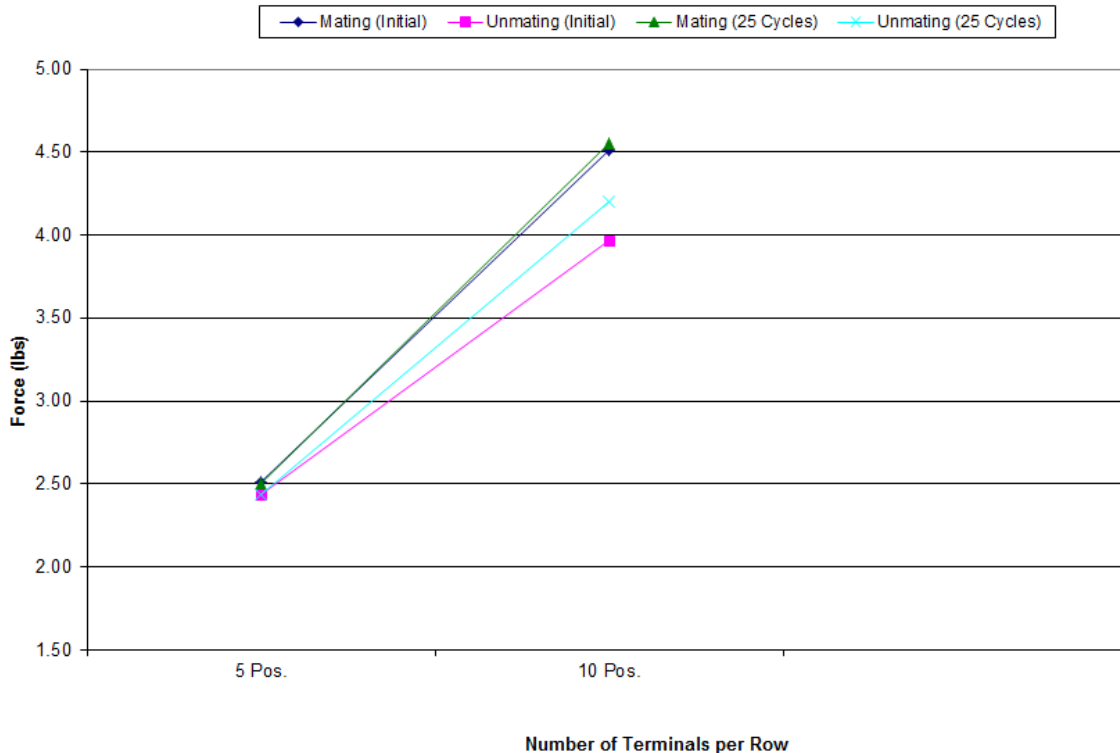
Group 1-LSHM-110-02.5-L-DV-A-S-K-TR/ LSHM-110-02.5-L-DV-A-S-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	16.86	3.79	13.66	3.07	17.04	3.83	15.52	3.49
Maximum	24.11	5.42	21.62	4.86	24.42	5.49	21.53	4.84
Average	20.06	4.51	17.64	3.97	20.25	4.55	18.70	4.21
St Dev	2.18	0.49	2.92	0.66	2.08	0.47	2.18	0.49
Count	8	8	8	8	8	8	8	8

Group 3-LSHM-105-02.5-L-DV-A-S-K-TR/ LSHM-105-02.5-L-DV-A-S-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	9.47	2.13	9.03	2.03	9.56	2.15	9.25	2.08
Maximum	11.92	2.68	11.56	2.60	12.32	2.77	11.65	2.62
Average	11.19	2.52	10.84	2.44	11.13	2.50	10.83	2.43
St Dev	0.85	0.19	0.84	0.19	0.81	0.18	0.74	0.17
Count	8	8	8	8	8	8	8	8

Mating/Unmating Data for 5 and 10 Position LSHM-DV-S/LSHM-DV-S



DATA SUMMARIES Continued

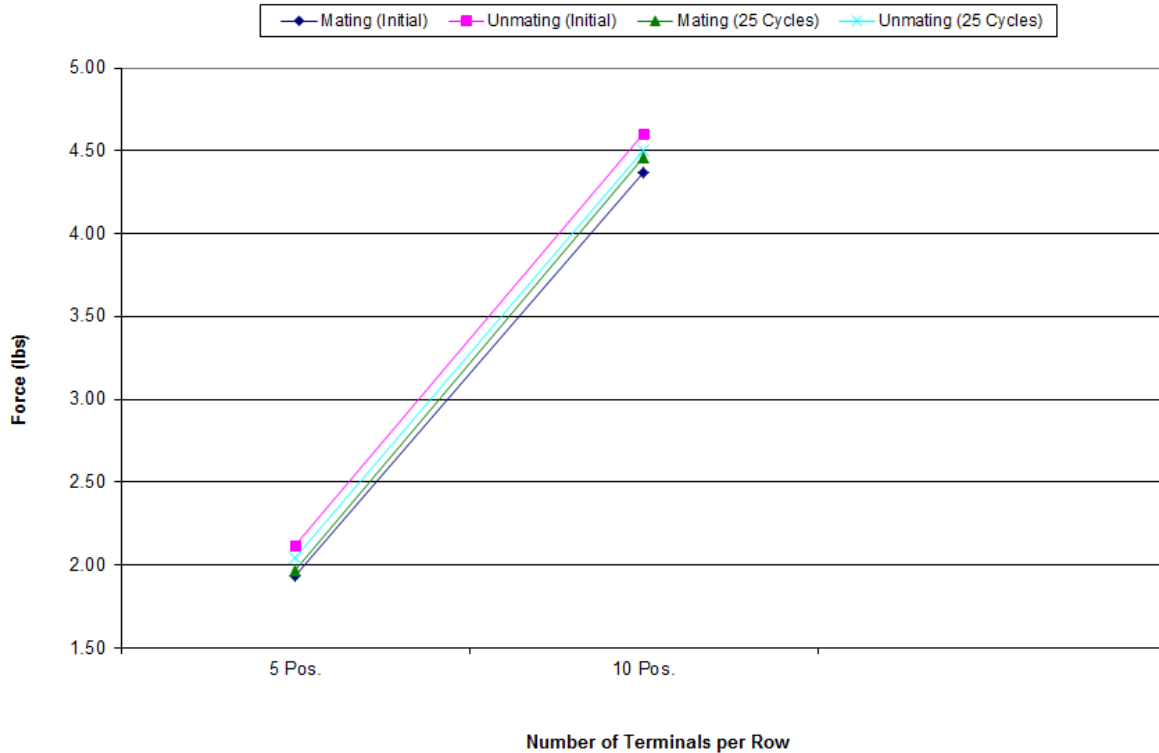
Group 6-LSHM-110-02.5-L-DV-A-N-K-TR/ LSHM-110-02.5-L-DV-A-S-N-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	17.79	4.00	18.06	4.06	18.28	4.11	18.28	4.11
Maximum	21.13	4.75	22.91	5.15	21.75	4.89	21.17	4.76
Average	19.44	4.37	20.48	4.60	19.85	4.46	20.02	4.50
St Dev	1.11	0.25	1.48	0.33	1.14	0.26	0.96	0.22
Count	8	8	8	8	8	8	8	8

Group 2-LSHM-105-02.5-L-DV-A-N-K-TR/ LSHM-105-02.5-L-DV-A-N-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	7.92	1.78	7.16	1.61	7.78	1.75	7.25	1.63
Maximum	9.43	2.12	11.43	2.57	9.83	2.21	12.81	2.88
Average	8.61	1.94	9.40	2.11	8.76	1.97	9.10	2.05
St Dev	0.51	0.12	1.51	0.34	0.69	0.15	1.70	0.38
Count	8	8	8	8	8	8	8	8

Mating/Unmating Data for 5 and 10 Position LSHM-DV-S/LSHM-DV-S



DATA SUMMARIES Continued

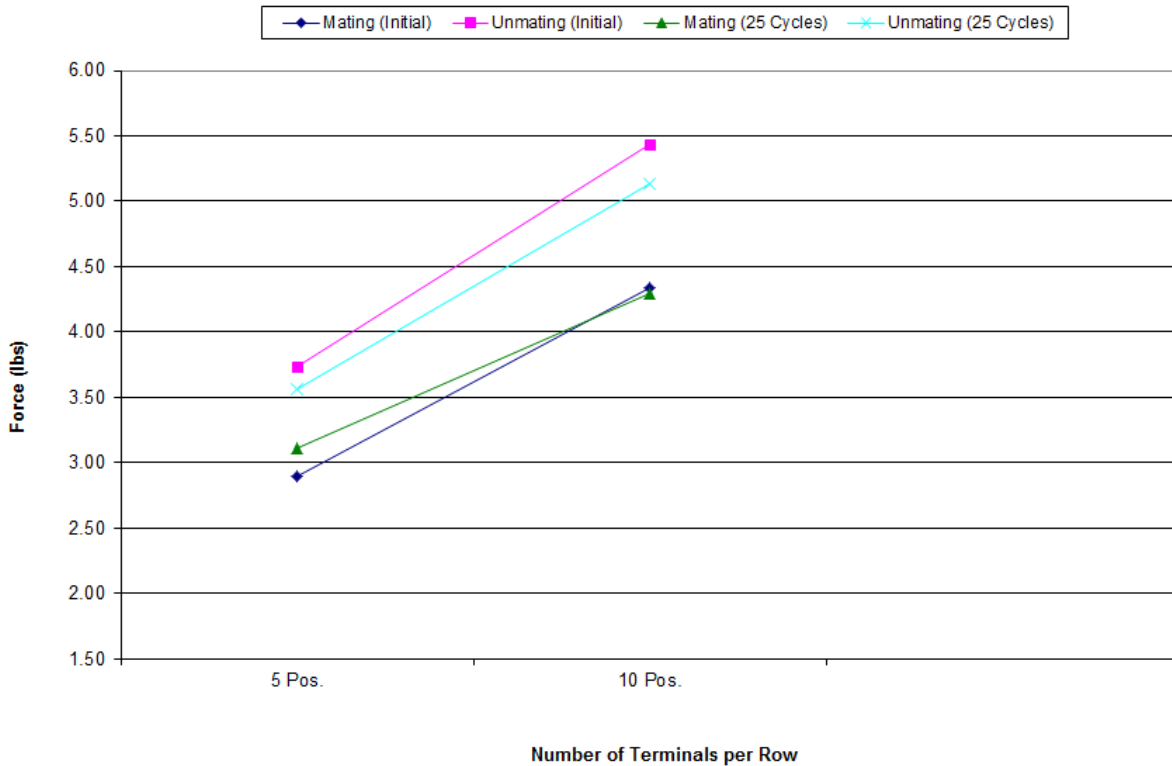
Group 5-LSHM-110-06.0-L-DV-A-N-K-TR/ LSHM-110-06.0-L-DV-A-S-N-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	16.95	3.81	18.28	4.11	16.77	3.77	18.19	4.09
Maximum	22.15	4.98	28.69	6.45	20.73	4.66	26.69	6.00
Average	19.30	4.34	24.19	5.44	19.10	4.29	22.81	5.13
St Dev	1.55	0.35	3.47	0.78	1.40	0.31	2.94	0.66
Count	8	8	8	8	8	8	8	8

Group 7-LSHM-105-06.0-L-DV-A-N-K-TR/ LSHM-105-06.0-L-DV-A-N-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	10.76	2.42	14.41	3.24	11.16	2.51	13.30	2.99
Maximum	14.41	3.24	19.97	4.49	15.97	3.59	18.24	4.10
Average	12.88	2.90	16.60	3.73	13.85	3.11	15.83	3.56
St Dev	1.24	0.28	2.02	0.45	1.37	0.31	1.74	0.39
Count	8	8	8	8	8	8	8	8

Mating/Unmating Data for 5 and 10 Position LSHM-DV-S/LSHM-DV-S



DATA SUMMARIES Continued

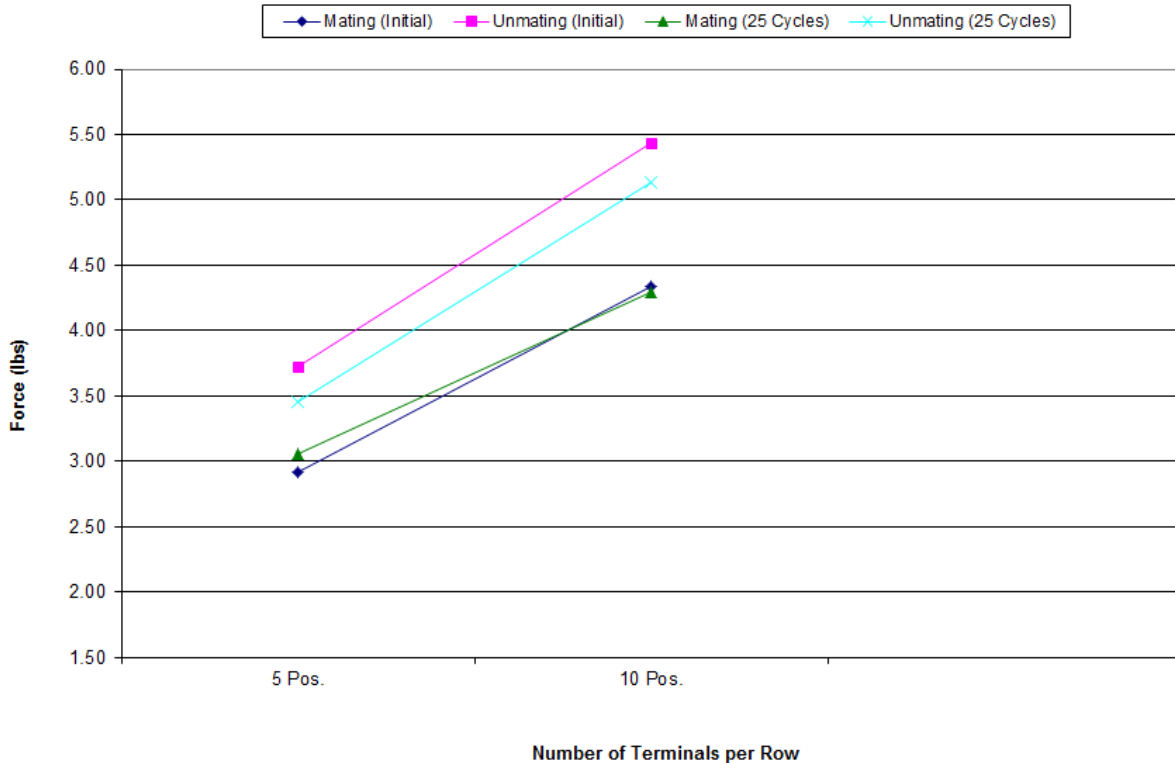
Group 8-LSHM-110-06.0-L-DV-A-S-K-TR/ LSHM-110-06.0-L-DV-A-S-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	14.14	3.18	19.53	4.39	13.66	3.07	13.70	3.08
Maximum	18.28	4.11	27.93	6.28	18.50	4.16	24.64	5.54
Average	15.71	3.53	22.56	5.07	15.58	3.50	19.62	4.41
St Dev	1.46	0.33	2.98	0.67	1.60	0.36	3.49	0.79
Count	8	8	8	8	8	8	8	8

Group 4-LSHM-105-06.0-L-DV-A-S-K-TR/ LSHM-105-06.0-L-DV-A-S-K-TR

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	10.63	2.39	14.10	3.17	9.92	2.23	13.43	3.02
Maximum	14.72	3.31	18.19	4.09	15.39	3.46	17.08	3.84
Average	12.98	2.92	16.59	3.73	13.58	3.05	15.37	3.46
St Dev	1.40	0.31	1.61	0.36	1.73	0.39	1.34	0.30
Count	8	8	8	8	8	8	8	8

Mating/Unmating Data for 5 and 10 Position LSHM-DV-S/LSHM-DV-S



EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** HZ-TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 08-1049-04**Accuracy:** Last Cal: 2016-3-8, Next Cal: 2017-3-7