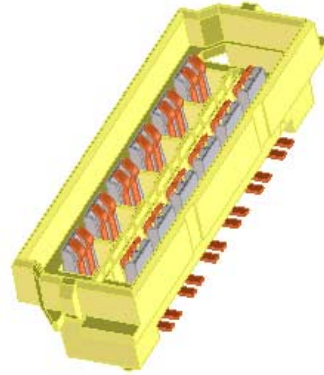
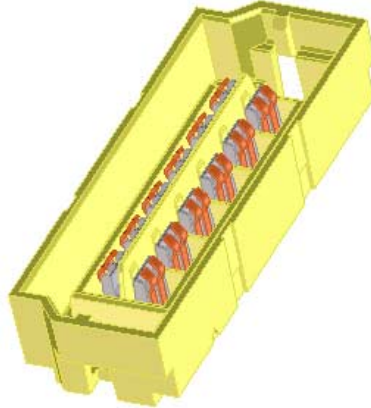




HIGH SPEED MEZZANINE TEST SUMMARY

HIGH SPEED MEZZANINE BOARD TO BOARD CONNECTOR



75005 Receptacle Assembly

75003 Plug Assembly

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HIGH SPEED MEZZANINE TEST SUMMARY

1.0 Scope

This document is a summary of testing done for the Molex High Speed Mezzanine connector system. The High Speed Mezzanine connector utilizes plated plastic technology to achieve high speed performance. This summary includes testing done to the standards in Product Specification PS-75005-001 and additional testing done to confirm the performance of this system.

2.0 Product Description

The following parts were used in the testing described in this document.

2.1 Product Name and Part Numbers: High Speed Mezzanine Connector

6 Pair	8.5 mm	Plug Assembly	75003-2000
12 Pair	8.5 mm	Plug Assembly	75003-0008
6 Pair	6.5 mm	Receptacle Assembly	75005-2000
12 Pair	6.5 mm	Receptacle Assembly	75003-0006

2.2 Dimensions, Materials, Platings, and Markings: (See appropriate sales drawings for information)

3.0 Applicable Documents and Specifications

SD-75003-001	High Speed Mezzanine Plug Sales Drawing
SD-75005-001	High Speed Mezzanine Receptacle Sales Drawing
PS-75005-001	High Speed Mezzanine Product Specification
AS-75005-001	High Speed Mezzanine Application Specification
EIA 364-1000.01	EIA Environmental Test Methodology for Electrical Connectors
ASTM D 3359-78	Adhesion Tape Test

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HIGH SPEED MEZZANINE TEST SUMMARY

4.0 Testing Sequences

4.1 Sample Preparation

All samples were prepared and reflowed using the appropriate EIA standards and processing specifications laid out in the High Speed Mezzanine Application Specification (AS-75005-001).

4.2 EIA 364 Sequences

Test or Examination	EIA-364-1000.01 Test Group Sequences				
	1	2	3	4	5
LLCR or Contact Resistance (5.2.1)	1, 4, 6	1, 4, 6, 8	1, 4, 6	1, 4, 6, 8,10	1, 4, 6, 8
Dielectric Withstanding Voltage (5.2.2)					
Durability (5.3.2)					
Durability (preconditioning) (5.3.3)	2	2	2	2	2
Reseating (5.3.4)	5	7		9	7
Vibration (5.3.5)			5		
Thermal Shock (5.4.1)		3			
Temperature Life (5.4.2)	3				
Temperature Life (preconditioning) (5.4.3)			3	3	3
Humidity - Temp. Cycling (5.4.4)		5			
Thermal Disturbance (5.4.5)				7	
Thermal Cycling (5.4.7)					5
Mixed Flowing Gas (FMG) (5.4.6)				5	
Sample Size	5/12	5/12	5/12	10/24	5/12

Notes:

- 1) The sample size for sequences 1-3, and 5 consisted of 5 High Speed Mezzanine Assemblies and 12 Individual Ground Assemblies. (75005-0006 and 75003-0008)
- 2) The sample size for sequence 4, consisted of 10 High Speed Mezzanine Assemblies and 24 Individual Ground Assemblies. (75005-0006 and 75003-0008)
- 3) The sample size for sequence 4 also included 2 high speed test boards with assemblies that will be sent through the entire sequence. The boards will be checked for any change in the High Speed performance of the connectors.

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HIGH SPEED MEZZANINE TEST SUMMARY

4.3 Additional Testing

Test or Examination	Additional Test Sequences					
	A	B	C	D	E	F
Dielectric Withstanding Voltage (5.2.2)	1					
Insulation Resistance (5.2.3)	2, 5					
Thermal Shock (5.4.1)	3					
Humidity - Temp. Cycling (5.4.4)	4					
Temperature Rise (5.4.8)		1				
Mating Force (5.3.1)			1			
Unmating Force (5.3.1)			2			
Retention Force - Chicklet to Housing (5.3.6)				1		
Axial Pull of Soldered Assemblies (5.3.7)					1	
Side Load of Soldered Assemblies (5.3.8)					2	
Plating Adhesion (5.4.9)						1

Test Sequence E				
Test #	Board Thickness	Description	Sample Size	
			Receptacles	Plugs
1	0.062	EIA 364 Samples	(4) 75005-0006	(4) 75003-0008
2	0.072	Unstressed - 50% Fill	(10) 75005-2000	(10) 75003-2000
3	0.072	Unstressed - Normal Process	(10) 75005-2000	(10) 75003-2000
4	0.072	Unstressed - Normal Process, Soldered Locating Pegs	(10) 75005-2000	(10) 75003-2000
5	0.072	Stressed - Normal Process (see note 5)	(10) 75005-2000	(10) 75003-2000
6	0.072	Reworked Parts (see note 6)	(10) 75005-2000	(10) 75003-2000

Notes:

- 1) The sample size for sequence A consisted of 3 Assemblies (75005-0006 and 75003-0008).
- 2) The sample size for sequence B consisted of 30 Individual Contact Pairs and 1 Fully Powered Assembly. (This testing consisted of P/N 74874-0006 which was replaced by P/N's 75005-0006 and 75003-0008 however the electrical interface did not change.)
- 3) The sample size for sequence C consisted of 5 Assemblies (75005-0006 and 75003-0008).
- 4) The sample size for sequence D consisted of 24 chicklets of both types (75005-0006 and 75003-0008).
- 5) The stressed test sequence consisted of 3 environmental sequences. Thermal Shock : 10 Cycles of -40°C to 65°C, 10 minute dwell at extremes, Ramp < 2 minutes between extremes. Temperature Cycling: 500 Cycles of -40°C to 65°C, 10 minute dwell at extremes, Ramp < 20°C/minute. Humidity: 500 Hours at 85°C and 85% RH
- 6) Reworked parts were subjected to 2 rework cycles.

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HIGH SPEED MEZZANINE TEST SUMMARY

5.0 Testing Sequences

5.1 EIA 364-1000.01 Results

Sequence 1 - Thermal Aging							
Treatment	Requirement	Signal Contacts			Ground Contacts		
		Max	Min	Mean	Max	Min	Mean
After Durability	10 milliohms MAX (change from initial)	0.69	-0.32	0.05	0.20	-1.21	-0.23
After Thermal Aging	10 milliohms MAX (change from initial)	1.52	-0.60	0.42	0.45	-1.53	-0.01

Sequence 2 - Cyclic Humidity							
Treatment	Requirement	Signal Contacts			Ground Contacts		
		Max	Min	Mean	Max	Min	Mean
After Durability	10 milliohms MAX (change from initial)	0.53	-1.51	-0.14	0.49	-0.15	0.05
After Thermal Shock	10 milliohms MAX (change from initial)	1.06	-1.62	-0.05	0.55	-0.38	0.09
After Cyclic Humidity	10 milliohms MAX (change from initial)	0.82	-1.10	0.05	0.57	-0.31	0.07
After Reseating	No Opens/Damage	Passed			Passed		

Sequence 3 - Vibration							
Treatment	Requirement	Signal Contacts			Ground Contacts		
		Max	Min	Mean	Max	Min	Mean
After Durability	10 milliohms MAX (change from initial)	1.15	-0.56	0.10	0.19	-0.90	-0.19
After Thermal Aging	10 milliohms MAX (change from initial)	0.75	-0.43	0.08	0.50	-1.12	-0.02
After Vibration	10 milliohms MAX (change from initial)	0.43	-0.76	-0.11	0.32	-1.60	-0.22

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HIGH SPEED MEZZANINE TEST SUMMARY

Sequence 4 - FMG								
Treatment	Requirement	FMG Sequence	Signal Contacts			Ground Contacts		
			Max	Min	Mean	Max	Min	Mean
After Durability	10 milliohms MAX (change from initial)		0.94	-0.68	0.07	0.21	-2.40	-0.58
After Thermal Aging	10 milliohms MAX (change from initial)		4.76	-0.29	0.57	0.38	-2.45	-0.36
After FMG	10 milliohms MAX (change from initial)	7 Days Mated	2.90	0.00	0.55	0.46	-1.62	-0.34
		5 Days Unmated 2 Days Mated	11.91	-0.28	1.13	2.96	-1.50	0.72
After Thermal Disturbance	10 milliohms MAX (change from initial)	7 Days Mated	1.55	-0.08	0.48	0.34	-1.61	-0.38
		5 Days Unmated 2 Days Mated	9.69	-0.37	1.15	3.45	-1.41	0.77
After Reseating	No Opens/Damage	7 Days Mated	Passed			Passed		
		5 Days Unmated 2 Days Mated	Passed			Passed		

Sequence 5 - Thermal Cycling							
Treatment	Requirement	Signal Contacts			Ground Contacts		
		Max	Min	Mean	Max	Min	Mean
After Durability	10 milliohms MAX (change from initial)	0.75	-0.74	-0.06	0.02	-0.92	-0.23
After Thermal Aging	10 milliohms MAX (change from initial)	1.85	-0.54	0.31	0.45	-0.57	0.08
After Thermal Cycling	10 milliohms MAX (change from initial)	1.46	-0.64	0.30	0.30	-0.69	-0.04
After Reseating	No Opens/Damage	Passed			Passed		

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TS-75005-001		Ken Stiles	Ken Stiles
		<u>APPROVED BY:</u>	
		Manny Banakis	

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HIGH SPEED MEZZANINE TEST SUMMARY

5.2 Additional Testing Results

Sequence A		
Treatment	Requirement	Result
Dielectric Withstanding Voltage	No Breakdown at 500 V AC	Passed
Insulation Resistance	1 GigaOhm MIN	Passed

Sequence B - Temperature Rise		
Treatment	Requirement	Result
Temperature Rise	30°C Change (change from initial)	Passed

Sequence C - Mating /Unmating Force					
Treatment	Requirement	# of Pairs	Max	Min	Mean
Mating Force	31.24 N MAX	12	30.85	27.06	28.66
Unmating Force	33.47 N MIN	12	40.01	34.22	37.07

Sequence D - Chicklet Retention				
Treatment	Requirement	Max	Min	Mean
75003 Plug Assembly	3.33 N MIN	10.46	5.78	8.48
75005 Recp Assembly	3.33 N MIN	15.43	4.29	7.06

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HIGH SPEED MEZZANINE TEST SUMMARY

Sequence E - Axial Force						
Treatment	Requirement	Board Thickness	# of Pairs	Max	Min	Mean
EIA 364 Test Samples	80.07 N MIN	1.57 mm	12	278.00	124.00	209.00
Unstressed 50% Fill	53.38 N MIN	1.83 mm	6	142.00	102.00	127.00
Unstressed 100% Fill	53.38 N MIN	1.83 mm	6	166.00	112.00	158.00
Unstressed 100% Fill Soldered locating Pegs	53.38 N MIN	1.83 mm	6	233.00	158.00	175.00
Stressed 100% Fill	53.38 N MIN	1.83 mm	6	153.46	82.29	108.89
Reworked	53.38 N MIN	1.83 mm	6	189.83	151.84	170.83

Sequence E - Side Load Force						
Treatment	Requirement	Board Thickness	# of Pairs	Max	Min	Mean
EIA 364 Test Samples	53.37 N MIN	1.57 mm	12	85.40	72.80	77.20
Unstressed 50% Fill	35.58 N MIN	1.83 mm	6	54.60	44.90	50.20
Unstressed 100% Fill	35.58 N MIN	1.83 mm	6	55.70	41.70	49.10
Unstressed 100% Fill Soldered locating Pegs	35.58 N MIN	1.83 mm	6	64.00	50.50	57.00
Stressed 100% Fill	35.58 N MIN	1.83 mm	6	58.27	40.03	48.73
Reworked	35.58 N MIN	1.83 mm	6	75.44	71.43	73.44

Sequence F - Plating Adhesion Test		
Treatment	Requirement	Result
4/4/16 Thermal Shock and Cyclic Humidity	No Flaking, Peeling, or other adhesion Failure	Passed

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HIGH SPEED MEZZANINE TEST SUMMARY

5.3 High Speed Electrical Testing Results

High Speed Electrical Performance			
Test	Treatment	Pre-FMG	Post-FMG
Impedance	77 ps risetime	94 Ohms	93 Ohms
Propagation Delay	NA	40.00 ps	40.00 ps
Near-End Cross Talk NEXT	77 ps risetime (10/90%) (2 adjacent lines driven)	1.9%	1.7%
Bandwidth (Insertion Loss)	3db Down	4.3 GHz	4.2 GHz
Bandwidth (Return Loss)	10db Down	3.3 GHz	3.3 GHz

Note:

- 1) All Performance Data includes systems effects including via's and transmission line loss.
- 2) ps = picoseconds

All data for this summary was pulled from the plots on the next page.

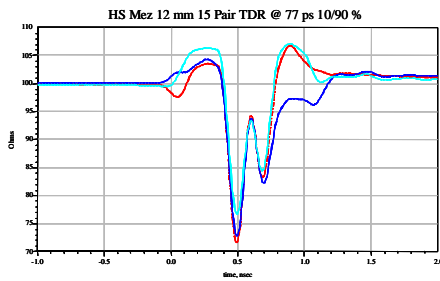
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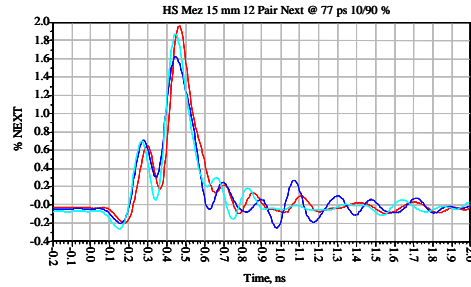
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Impedance Pre and Post FMG



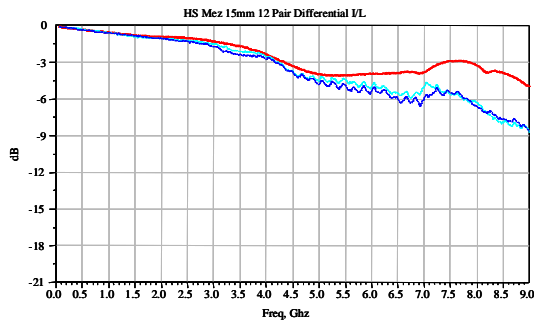
Red: Initial Data
Blue: Post Mated FMG
Lt Blue: Post Unmated FMG

Near End Cross Talk (NEXT) Pre and Post FMG



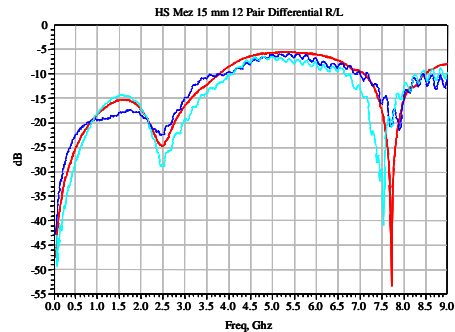
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Blue: Post Mated FMG
Lt Blue: Post Unmated FMG

Insertion Loss Pre and Post FMG



Red: Initial Data
Blue: Post Mated FMG
Lt Blue: Post Unmated FMG

Return Loss Pre and Post FMG



Red: Initial Data
Blue: Post Mated FMG
Lt Blue: Post Unmated FMG

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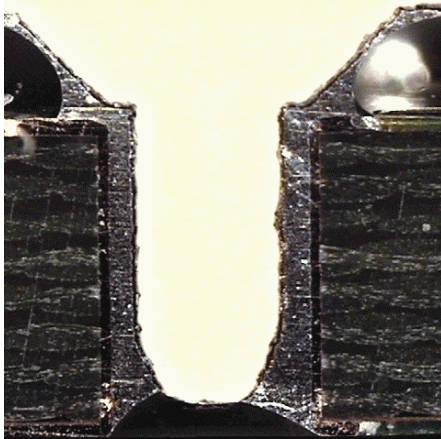
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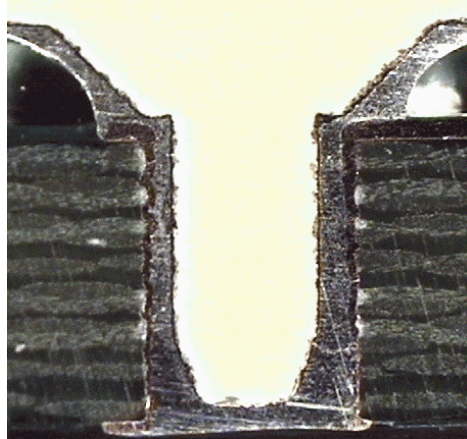
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Appendix A - Cross Sections from Test Sequence E

EIA Sequence 1

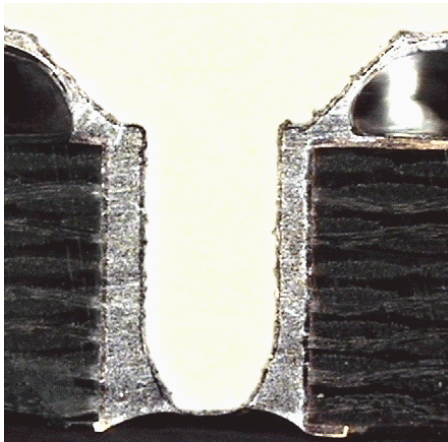


Typical 75005 Solder Joint



Typical 75003 Solder Joint

EIA Sequence 2



Typical 75005 Solder Joint

Typical 75003 Solder Joint

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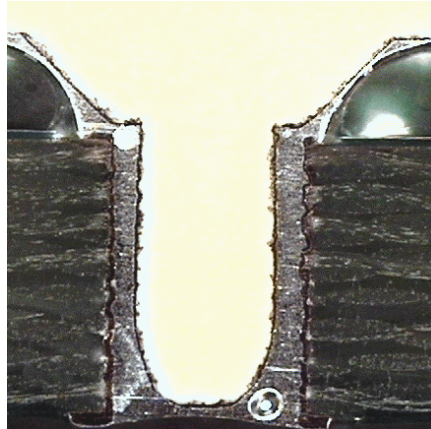
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EIA Sequence 3

Typical 75005 Solder Joint

Typical 75003 Solder Joint

EIA Sequence 4



Typical 75005 Solder Joint

Typical 75003 Solder Joint

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