Molex 74320-1000 PDF

深圳创唯电子有限公司 http://www.molex-connect.com

1.0 Scope

This specification covers the Molex MicroCross™ - Digital Visual Interface (DVI) system which includes cable plugs and board mount receptacles (Right Angle and Vertical).

The Digital Visual Interface connector system supports both analog and digital video transmission.

This specification covers the DVI cable to board, I/O connector system with requirements as set forth by Molex Incorporated.

2.0 Product Description

The MicroCross™ DVI system is designed to meet the industry's requirements for analog and digital computer monitors. There are (2) different receptacle connectors which correspond to the video support present on the host system (mother board/graphics cards). The DVI-D (Digital) receptacle connector supports hosts systems that transmit digital video. The DVI-I (Intergrated) receptacle connector supports host systems that are enabled to transmit both analog and digital video. This is achieved by utilizing two different sets of contacts as shown in Figure 1 below:

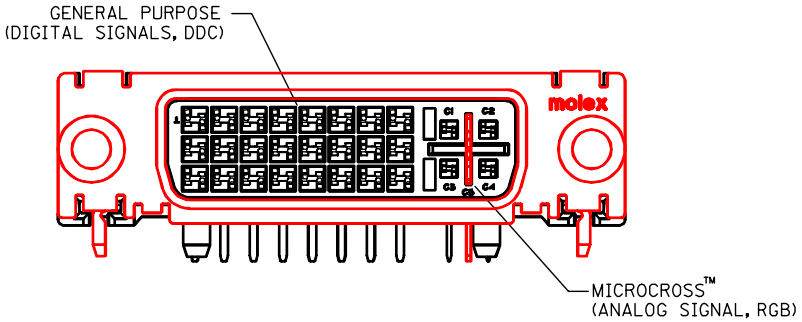


Figure 1: Two sets of contacts
(DVI-I Shown)

REV	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
SHT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

REVISE ON PC ONLY

REV	DESCRIPTION
J	REVISED PER EC# T2003-0134 TONY ZHANG 02/11/22

TITLE: MicroCross™ - DVI I/O Plug and Receptacle Connector System

DESIGN CONTROL	STATUS	WRITTEN BY:	CHECKED BY:	APPROVED BY:	DATE: YR / MO / DAY
UDT	M	SCHMIDGA			

DOCUMENT NO.	FILE NAME	SHT NO.
PS-74320-001	PS74320.LWP	1 OF 17

1. General purpose signals:
   Terminals: 24 circuits on a 0.075 inch/1.91 mm grid
   Signals: Includes power, grounds, digital and video signals, analog synch lines and DDC (Display Data Channel) signals.

Pin	Signal Assignment	Pin	Signal Assignment	Pin	Signal Assignment
1	T.M.D.S. Data2-	9	T.M.D.S. Data1-	17	T.M.D.S. Data 0-
2	T.M.D.S. Data2+	10	T.M.D.S. Data1+	18	T.M.D.S. Data 0+
3	T.M.D.S. Data2/4 Shield	11	T.M.D.S. Data 1/3 Shield	19	T.M.D.S. Data 0/5 Shield
4	T.M.D.S. Data 4-	12	T.M.D.S. Data 3-	20	T.M.D.S. Data 5-
5	T.M.D.S. Data 4+	13	T.M.D.S. 3+	21	T.M.D.S. Data 5+
6	DDC Clock	14	+5 V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (for +5V)	23	T.M.D.S. Clock+
8	No Connect	16	Hot Plug Detect	24	T.M.D.S. Clock-

Table 1: Digital-Only Connector Pin Assignments
Source: Digital Visual Interface Specification, Revision 1.0

2. MicroCross™:
   a) Plug and Receptacle - I - Intergrated analog/digital - see figure 3, sheet 4
      Terminals: 4 circuits on a 0.100 inch/2.54 mm grid with a crossing ground plane in between.
      Signals: High frequency, 75 ohm, analog video
   b) Plug and Receptacle - D - Digital Version
      Terminals: A single key on the plug and corresponding slot on the receptacle.
      Signals: The key is used for mechanical polarization only, it does not carry any electrical signals.

Pin	Signal Assignment	Pin	Signal Assignment	Pin	Signal Assignment
1	T.M.D.S. Data 2-	9	T.M.D.S. Data 1-	17	T.M.D.S. Data 0-
2	T.M.D.S. Data 2+	10	T.M.D.S. Data 1+	18	T.M.D.S. Data 0+
3	T.M.D.S. Data 2/4 Shield	11	T.M.D.S. Data 1/3 Shield	19	T.M.D.S. Data 0/5 Shield
4	T.M.D.S. Data 4-	12	T.M.D.S. Data 3-	20	T.M.D.S. Data 5-
5	T.M.D.S. Data 4+	13	T.M.D.S. Data 3+	21	T.M.D.S. Data 5+
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (return for +5V, HSync, and VSync)	23	T.M.D.S. Clock+
8	Analog Vertical Sync	16	Hot Plug Detect	24	T.M.D.S. Clock-
C1	Analog Red	C2	Analog Green	C3	Analog Blue
C4	Analog Horizontal Sync	C5	Analog Ground (analog R, G, & B return)		

Table 2: Combined Analog and Digital Connector Pin Assignments
Source: Digital Visual Interface, Revision 1.0

Additional general specifications are:

Plug:

-LFH (Low Force Helix) style contacts
-fully shielded RFI/EMI can
-grounding detents on mating shell
-solder tails for cable termination
-positive retention jackscrew: thread 4-40 UNC-2A

Receptacle:

-high cycle, dual beam, LFH shrouded contacts
-polarization achieved by a "D" shaped housing/shield
-single piece shield with integral ground leg
-shield protrudes for ESD considerations
-solder tails for thru hole board mount
-plastic retention pegs
-jackposts: # 4-40 UNC-2A&B threads. The recommended application torque setting is 4 lbf in maximum. To prevent stripping the shield threads while installing the jackposts, it is recommended the jackposts are started by hand or with a lower initial torque driver setting. The engaged threads are rated to hold a minimum of 5 lbf in of torque.

2.1 Product Drawing Numbers

2.1.1 Receptacle:

The DVI receptacle is for systems which support digital video (DVI-D) or both analog and digital video (DVI-I).

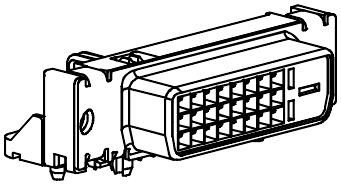


Figure 2:
Right Angle DVI-D version
(Digital)

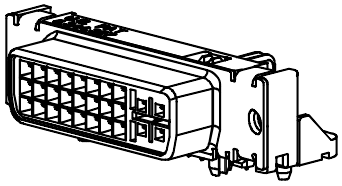


Figure 3:
Right Angle DVI-I version
Intergrated(Analog/Digital)

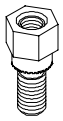


Figure 4: Jackpost

2.1.2 DVI Plug

The DVI plug is for systems which use analog or digital video. The analog DVI plug shown below supports analog video transmission from the host to the display.

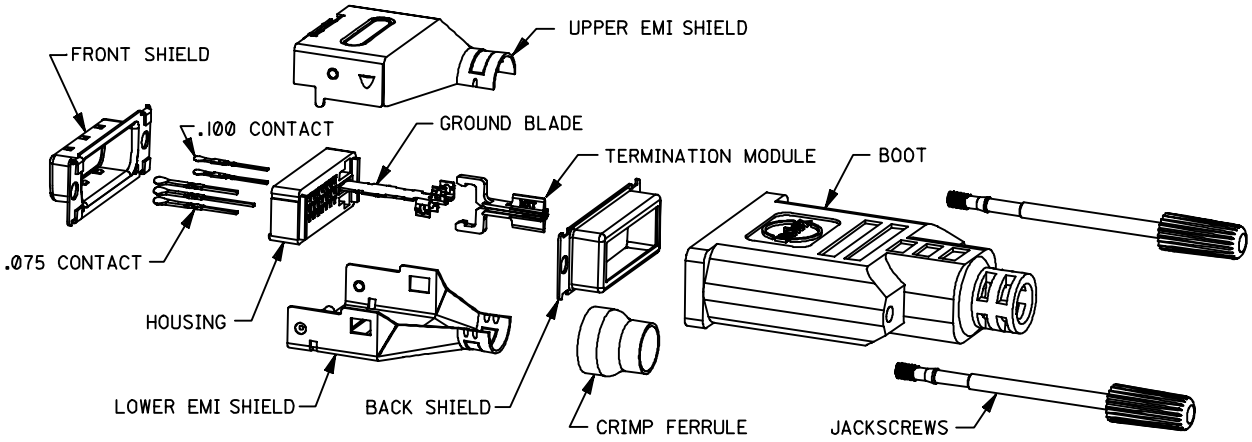


Figure 5:
Analog Version

2.1.3
The digital DVI plug shown below supports digital video tr ansmission from the host to the display.

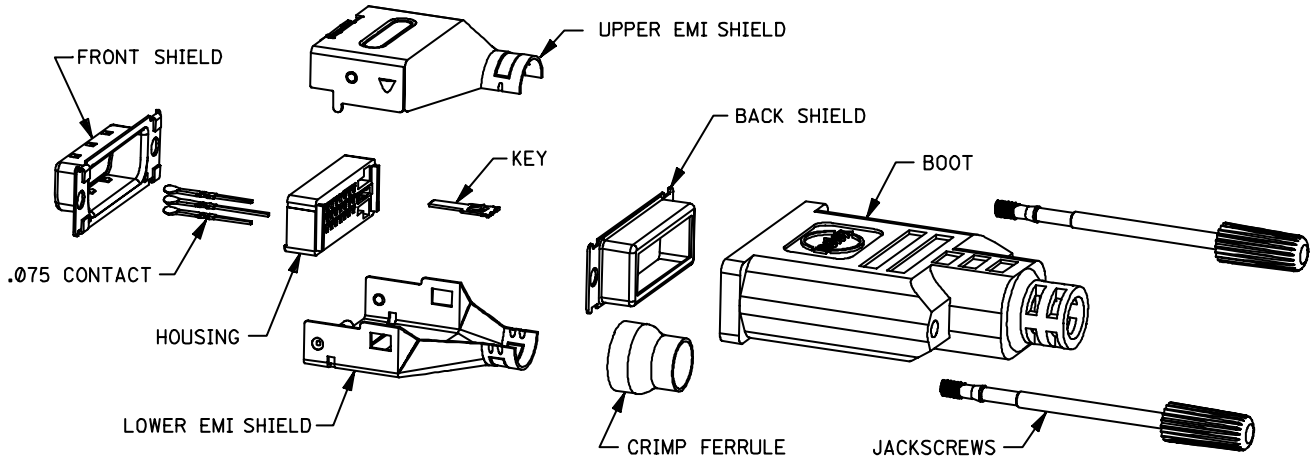


Figure 6:
Digital Version

2.2 Safety Agency Approvals
UL File Number ..... E29179, Volume 10, Section 12
CSA File Number LR19980

3.0 Applicable Documents and Specifications
3.1 All documents referenced shall be of the latest revision. The order of precedence detailing requirements of this specification is as follows:
1. Product Drawings 2. This specification

3.2 Reference Documents
3.2.1 EIA RS-364-(06,09,13,17,18,20,21,23,27,28,31,32,41,46,65,67,70,90) Electronic Industries Association, Recommended Standard

3.2.2 IEC-801-2 International Electrotechnical Commission, Electrostatic Discharge Requirements
3.2.3 MIL STD-202: Test methods for electronics and electrical component parts
3.2.4 Molex PS-74320-9999 Application Specification, DVI Plug Cable Assembly
3.2.5 Molex ES-74320-9998 Termination Specification, DVI Cable Assemblies
3.2.6 Molex PS-74320-9997 Cable Assembly Specification
3.2.7 UL 94: Tests for flammability of plastics materials

4.0 Ratings

4.1 Voltage

40 Volts AC (RMS)

4.2 Current

3.0 Amps per circuit.
30 ^{O}C maximum temperature rise and 55 ^{O}C maximum ambient per EIA-364-70.

4.3 Temperature

Operating: - 20 ^{O}C to + 85 ^{O}C
Nonoperating: - 20 ^{O}C to + 85 ^{O}C

5.0 Performance

5.1 Electrical Performance

ITEM	TEST CONDITION	REQUIREMENT
Contact Resistance	Bulk resistance measured between plug solder tails and receptacle solder tails per ANSI/EIA-364-23	20 milliohm maximum, initial per contact mated pair 10 milliohm maximum change from initial reading per contact mated pair
Shell Resistance	Bulk resistance measured between ground leg on receptacle shield and the plug cable braid. Test current=100mA; Test voltage=5 Volts DC open circuit maximum per ANSI/EIA-364-06A-83	50 milliohm maximum initial 50 milliohm maximum change from initial reading
Insulation Resistance	Test voltage = 500 Volts DC +/- 50 V Unmated and Unmounted per ANSI/EIA 364-21, Method C	1Gigaohm Minimum between adjacent contacts and contacts and shell
Dielectric Withstanding Voltage	Test voltage = 500 Volts DC +/-50 V Unmated and Unmounted per ANSI/EIA 364-20, Method C Barometric pressure of 15 psi	No flashover, No sparkover, No excess leakage, No Breakdown
Contact Current Rating	Maximum ambient = 55 degree C Maximum temperature change = 85 degree C per ANSI/EIA-364-70, TP-70	3.0 A maximum
Applied Voltage Rating		40 Volts AC (rms) continuous maximum, on any signal pin with respect to the shield
Electrostatic Discharge	Test unmated from 1 kV to 8kV in 1 kV steps using 8mm ball prob per IEC 801-2 Contact discharge to shell Air discharge perpendicular to shell Air discharge at angle to shell	No evidence of discharge to contacts at 8kV. Discharge to the shell is acceptable.
T.M.D.S. Signals Time Domain Impedance	Risetime = 330 pS (10%-90%) S:G ratio per DVI pin designation Differential Measurement Specimen Environment Impedance = 100 ohm differential Source-side receptacle connector mounted on a controlled impendance pcb fixture per ANSI/EIA-364-108 draft Proposal	100 ohms +/-15%

T.M.D.S. Signals Time Domain Crosstalk: FEXT	Risetime = 330 pS (10%-90%) S:G ratio per DVI pin designation Differential Measurement Specimen Environment Impedance = 100 ohm differential Source-side receptacle and the load side plug connector are mounted on a controlled impedance pcb fixture (1) Driven pair and (1) victim pair per ANSI/EIA-364-90 Draft Proposal	5% Maximum
T.M.D.S. Signals Rise Time Degradation	S:G ratio per DVI pin designation Differential Measurement Specimen Environment Impedance = 100 ohm differential Source-side receptacle and the load side plug connector are mounted on a controlled impedance pcb fixture per ANSI/EIA-364-102 Draft Proposal	160 pS Maximum (Note: Converted bandwidth using BW=0.35/t rise yields 2.2 GHz)
Analog RGB Coaxial Signals Time Domain Impedance	Risetime = 700 pS (10%-90%) S:G ratio per DVI pin designation Single-ended Measurement Specimen Enviroment Impedance = 75 ohm single-ended Source-side receptacle connector mounted on a controlled impedence pcb fixture per ANSI/EIA-364-108 Draft Proposal	75 ohms +/-10%
Analog RGB Coaxial Signals Time Domain Crosstalk: (FEXT)	Risetime = 700 pS (10%-90%) S:G ratio per DVI pin designation Single-ended Measurement Specimen Enviroment Impedance = 75 ohm single-ended Source-side receptacle connector is mounted on a controlled impedance pcb fixture and the load side plug connector is terminated to semi-rigid coax. (1) Driven line and (1) victim line per ANSI/EIA-364-90 Draft Proposal	3% Maximum
Analog RGB Coaxial Signals Rise Time Degradation	S:G ratio per DVI pin designation Single-ended Measurement Specimen Environment Impedance = 75 ohm single-ended Source-side receptacle connector is mounted on a controlled impedance pcb fixture and the load side plug connector is terminated to semi-rigid coax. per ANSI/EIA-364-102	140pS Maximum (Note: Converted bandwidth using BW=0.35/t rise yields 2.5 GHz)

5.2 Mechanical Performance

ITEM	TEST CONDITION	REQUIREMENT
Mating Force	One pair per ANSI/EIA 364-13 Insertion speed: 1inch (25mm) per minute	10.0 lbf (4.5 kgf) maximum
Unmating Force	Mated pair per ANSI/EIA 364-13 Withdraw speed: 1inch (25mm) per minute	2.2 lbf (1.0 kgf) minimum 8.8 lbf (4.0 kgf) maximum
Receptacle Contact Retention	Individual contact	1.0 lbf (0.45 kgf) minimum
Receptacle Key Retention	Individual key	2.0 lbf (0.90 kgf) minimum
Plug Contact Retention	Push out from mating face; Individual contact	10 lbf (4.5 kgf) minimum
Plug Key Retention	Push out from mating face; Individual key	10 lbf (4.5 kgf) minimum
Durability	Automatic cycling: 100 cycles per ANSI/EIA 364-09 at 100 +/- 50 cycles per hour	Contact Resistance per EIA 364-23: 10 milliohm maximum change from initial per contact pair All samples to be mated Shell Resistance: 50 milliohm maximum (change from initial reading)
Vibration	15 minutes / axis per ANSI/EIA 364-28, Method 5A	No discontinuities at 1 microsecond or longer (each contact) when continuity is tested per EIA-364-46
Shock (Mechanical)	Per ANSI/EIA 364-27, Condition A (specified pulse)	No discontinuities at 1 microsecond or longer (each contact) when continuity is tested per EIA-364-46
Cable Pullout Force	Test for cable strain relief & termination intergrity. Cable subjected to 25.0 lbf (11.3 kgf) static load for one minute while monitoring continuity. Isolate plug & receptacle interface from load.	No discontinuities greater than 1 microsecond
Board Insertion Force		10.0 lbf (4.5 kgf) maximum
Cable Flex	100 cycles in each of 2 planes Dimension X=3.7x Cable Diameter per ANSI/EIA 364-41, Condition I	No discontinuities greater than 1 microsecond allowed during flexing on contacts or shields per EIA-364-46 Dielectric Withstanding Voltage and Insulation Resistance tested per requirements of section 5.1
Normal Force	For reference only	.050" pitch terminals: 75 grams typical .075" pitch terminals: 90 grams typical Ground Plane: 100 grams typical
Thread Torque	Mounted to panel; Test to failure; Tighten jackposts with torque gage until threads are stripped and jackpost turns freely	5.0 lbf in (5.76 kgf cm) minimum

5.3 Environmental Performance

ITEM	TEST CONDITION	REQUIREMENT
Thermal Shock	10 cycles Mated/Unmated per ANSI/EIA 364-32, Condition I	Contact Resistance: **10** milliohm maximum change from initial per contact pair All samples to be mated Shell Resistance: **50** milliohm maximum change from initial per EIA-364-23
Humidity (Cyclic)	ANSI/EIA 364-31, Conditions A and B Method III, omit 7A and 7B	Contact Resistance: **10** milliohm maximum change from initial per contact pair All samples to be mated Shell Resistance: **50** milliohm maximum change from initial per EIA-364-23
Thermal Aging	105 ^{O}C for 250 hours Mated per ANSI/EIA 364-17, Condition 4, Method A.	Contact Resistance: **10** milliohm maximum change from initial per contact pair All samples to be mated Shell Resistance: **50** milliohm maximum change from initial per contact pair per EIA-364-23
Temperature Rise	Per ANSI/EIA 364-70	30 ^{O}C maximum temperature rise
Resistance to Solder Heat	Dip connector solder tails to board for 10 seconds Solder Temp = 260 +/- 5 ^{O}C	No visual damage to insulator
Solderability	Per MIL-STD-202, Method 208	95% minimum coverage
Temperature Rating	Operating	-20 degree C to +85 degree C
Temperature Rating	Non-Operating	-20 degree C to +85 degree C

6.0 Packaging

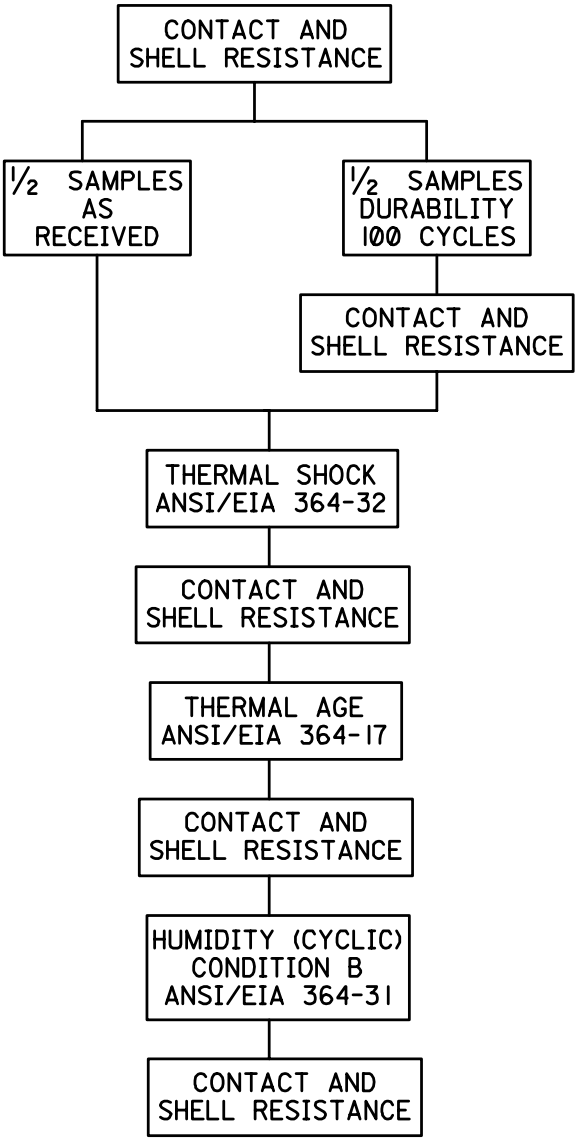
6.1 Receptacles:

All receptacles are packaged in trays. For specific packaging information , refer to PK-74320-001 for right angle receptacles and PK-74320-002 for vertical receptacles.

7.0 Other Information

7.1 Test Sequences

Group 1 : Mated Environmental

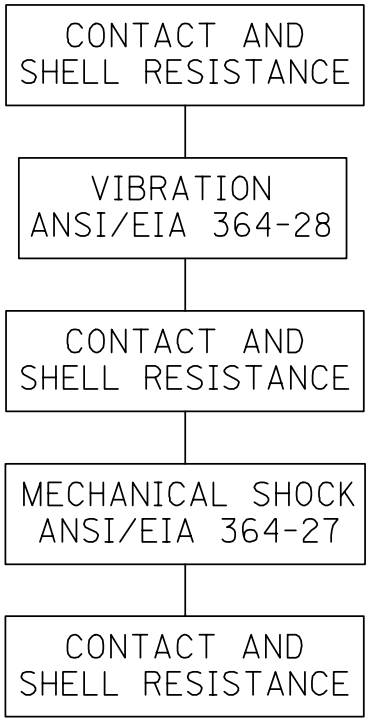


Number of samples

(5) Receptacle assembled to printed circuit board.

(5) Cable assemblies with a plug assembled to one end, 10 inch/25.4 cm long

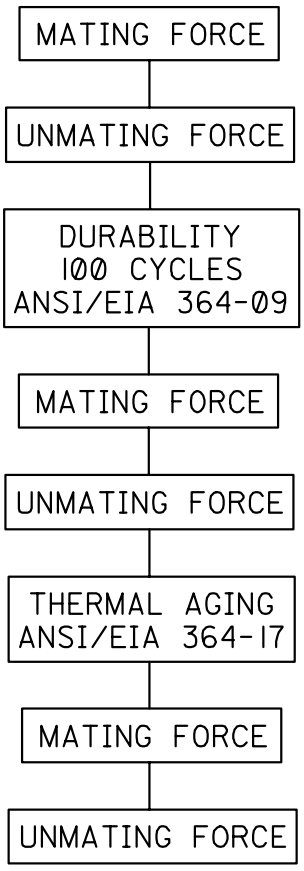
Group 2 : Mated Mechanical



Number of Samples:
(2) Receptacles, assembled to printed circuit board.
(2) Cable assemblies with a plug assembled to one end, 10 inch/25.4 cm long.

Note: Connector is to be mounted on a fixture that simulates the typical application. The receptacle connector shall be mounted to a panel, per the receptacle panel cutout shown in Figure 12, which is permanently affixed to the fixture. The plug shall be mated to the receptacle with jackscrews fully engaged and the other end of the cable shall be permanently clamped to the fixture, 3 inches from connector face.

Group 3 : Mated Mechanical

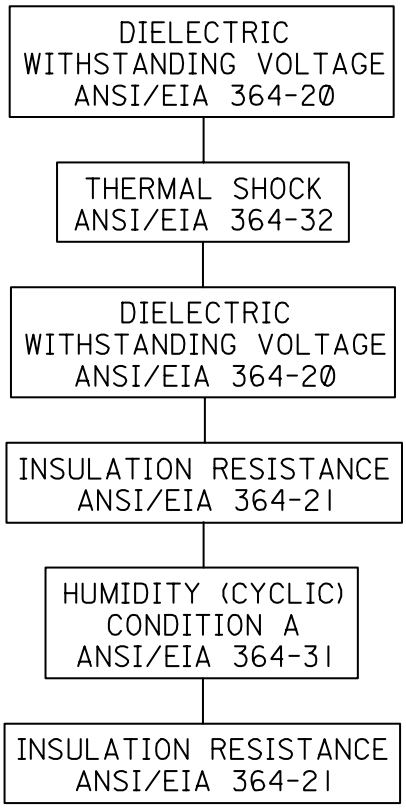


Number of Samples:

(2) Receptacles, assembled to printed circuit board.

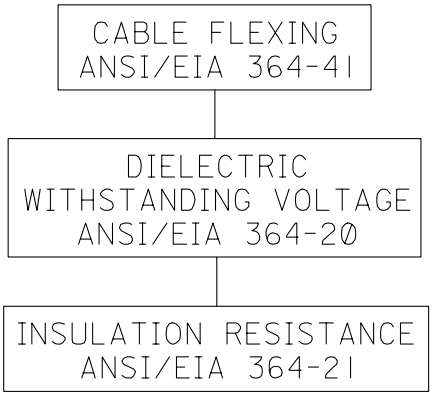
(2) Cable assemblies with a plug assembled to one end, 10 inch/25.4 cm long.

Group 4 : Insulator Intergrity



Number of Samples:
(2) Receptacles, assembled to printed circuit board.
(2) Cable assemblies with a plug assembled to one end, 10 inch/25.4 cm long

Group 5 : Cable Flexing



Number of Samples:
(2) Cable assemblies

Group 6: Electrostatic Discharge

Number of Samples:
(1) Receptacle connector

TEST SUMMARY

1.0 SCOPE

This document is a summary of testing done for the Molex MicroCross ™ DVI connector system. The DVI product utilizes the LFH (Low Force Helix) contact system. This includes testing of both the receptacle and cable assembly to all the requirements in the product specification PS-74320-001.

These results are applicable to the following product families: 74320, and 74323.

2.0 PRODUCT DESCRIPTION

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

2.1 PRODUCT NAME AND PART NUMBERS

Name	Part Number
DVI-I Right Angle Receptacle	74320-1004
Plug Cable Assembly	88741-9000
Lower EMI Can	74326-0011
Upper EMI Can	74326-0012
Ferrule	73772-0002
Boot	74382-0001
Jackscrews	88780-6005
DVI Analog/Digital Cable	88780-8255
Plug Subassembly	74323-0031
75 pitch terminal	74366-0001
100 pitch terminal	74367-0001
Ground blade	67215-0003
Front shield	74324-0001
Back shield	74325-0001

2.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKINGS

Materials

Housings:	High temp glass-filled thermoplastic, black, UL94 V-0 rated
Tail aligner:	High temp glass-filled thermoplastic, black, UL94 V-0 rated
Rcpt terminals:	Copper alloy
Plug terminals:	Brass
Rcpt gnd terminal:	Copper alloy
Plug ground blade:	Brass
Shields:	Steel

Platings

Terminals:
Selective Gold flash (Au) in contact area:
Thickness: 2 microinch / 0.05 micrometer minimum;
Selective Tin-Lead (Sn-Pb) Alloy in pc tail area:
Thickness: 150 microinch / 3.8 micrometer minimum;
Nickel (Ni) overall.

Shields:
Bright Tin (Sn) overall:
Thickness: 100 microinch / 2.5 micrometer minimum;
Nickel (Ni) over Copper Flash (Cu) overall.

2.3 PRODUCT SPECIFICATION TITLE AND DOCUMENT NUMBER

Title: MicroCross™ - DVI I/O Plug and Receptacle Connector System
Document Number: PS-74320-001

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

3.1 TESTING PROCEDURES AND SEQUENCES

Testing is performed sequentially and is divided into ten groups which are illustrated in section 5.

3.2 OTHER DOCUMENTS AND SPECIFICATIONS

*****- Indicates the data provided is from testing performed on the LFH interface system. The LFH interface system is also used on the MicroCross™ - EVC and P&D I/O Plug and Receptacle connector system. Reference test summary, #TS 71182-001.

4.0 QUALIFICATION

Laboratory conditions and sample selection are in accordance with EIA 364.

TEST SUMMARY

5.0 PERFORMANCE

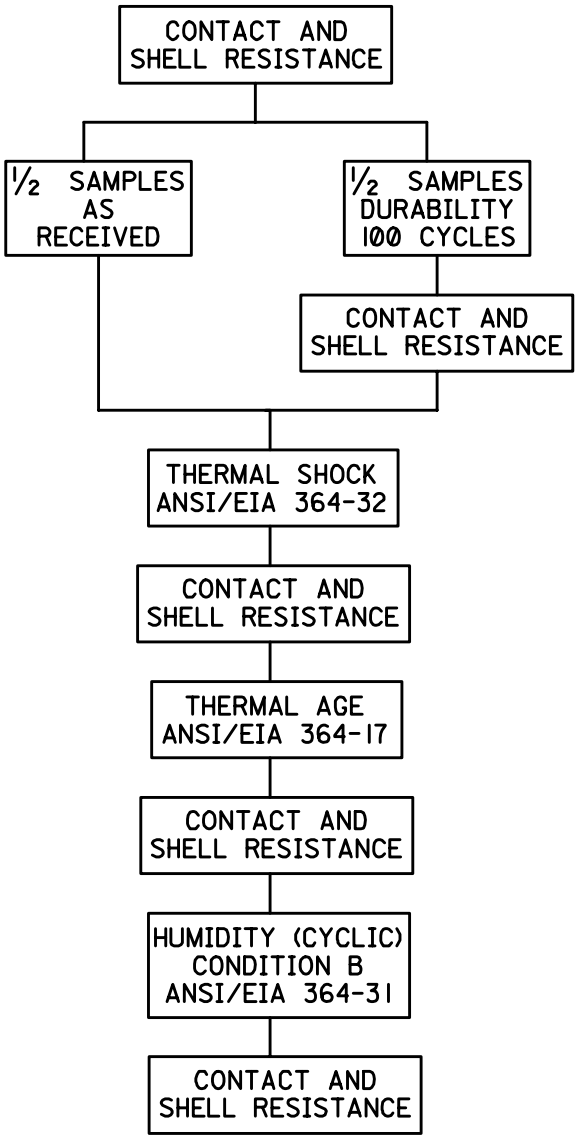
5.1 TEST SEQUENCES

5.1.1 Group 1: Mated Environmental Sequence

TEST CONDITION	TREATMENT		REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Contact Resistance (Low Level)	After Durability (1/2 of samples)		**10** Maximum (change from initial)	milliohms	0.09	-0.48	0.87
	After Thermal Shock	Durability Samples	**10** Maximum (change from initial)	milliohms	0.3	-0.36	1
		Non Durability Samples	**10** Maximum (change from initial)	milliohms	-0.14	-0.9	-0.4
	After Thermal Aging	Durability Samples	**10** Maximum (change from initial)	milliohms	-0.02	-1.01	0.85
		Non Durability Samples	**10** Maximum (change from initial)	milliohms	-0.18	-1.01	0.49
	After Cyclic Humidity	Durability Samples	**10** Maximum (change from initial)	milliohms	0.05	-1.15	0.93
		Non Durability Samples	**10** Maximum (change from initial)	milliohms	-0.05	-1.68	1.41
Shell Resistance (Low Level)	After Durability (1/2 of samples)		**50** Maximum (change from initial)	milliohms	-0.29	-0.72	-0.01
	After Thermal Shock	Durability Samples	**50** Maximum (change from initial)	milliohms	-0.08	-0.42	0.36
		Non Durability Samples	**50** Maximum (change from initial)	milliohms	0.37	0.08	0.66
	After Thermal Aging	Durability Samples	**50** Maximum (change from initial)	milliohms	-0.27	-0.42	-0.12
		Non Durability Samples	**50** Maximum (change from initial)	milliohms	-0.21	-0.47	0.05
	After Cyclic Humidity	Durability Samples	**50** Maximum (change from initial)	milliohms	-0.44	-0.53	-0.35
		Non Durability Samples	**50** Maximum (change from initial)	milliohms	-0.22	-0.57	-0.03

Sequence is illustrated on next page.

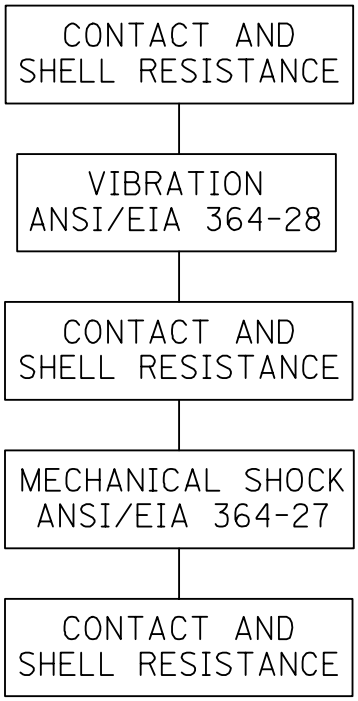
5.1.1 Group 1: Mated Environmental Sequence (Continued)



TEST SUMMARY

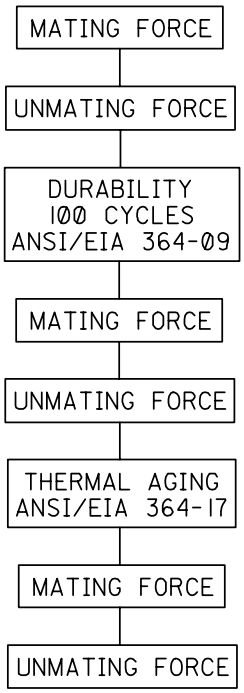
5.1.2 Group 2: Mated Mechanical Sequence

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Contact Resistance (Low Level)	After Vibration and Mechanical Shock	**10** Maximum (change from initial)	milliohms	0.26	-0.65	1
		Discontinuity	No Opens			
Shell Resistance (Low Level)	After Vibration and Mechanical Shock	**50** Maximum (change from initial)	milliohms	-0.22	-0.18	-0.26



5.1.3 Group 3: Mechanical Mate / Unmate Forces Sequence

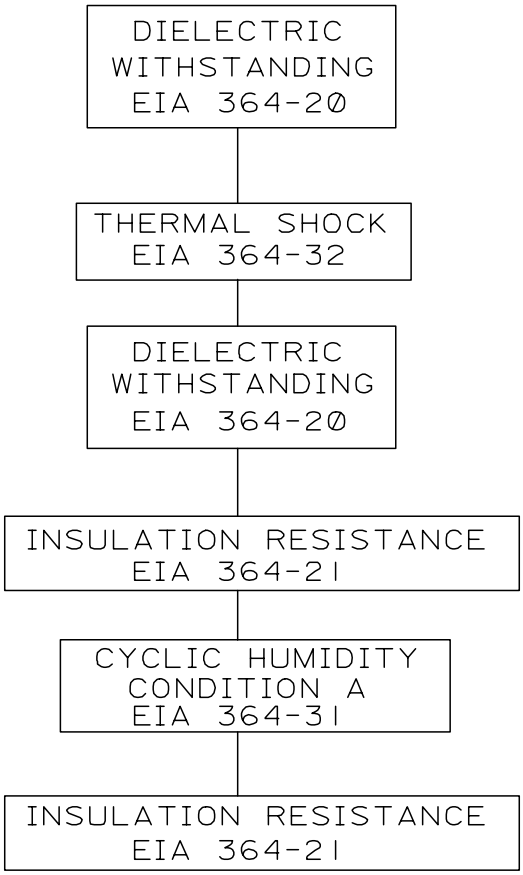
TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Connector Mating and Unmating Forces	Initial Mating	4.5 Maximum (9.9 Maximum)	kgf (lbf)	2.08 (4.59)	1.86 (4.10)	2.30 (5.07)
	Initial Unmating	1.0 min; 4.0 max. (2.2 min.; 8.8 max)	kgf (lbf)	2.36 (5.20)	2.12 (4.67)	2.60 (5.73)
	Mating after Durability	4.5 Maximum (9.9 Maximum)	kgf (lbf)	2.37 (5.23)	2.37 (5.23)	2.37 (5.23)
	Unmating after Durability	1.0 min; 4.0 max. (2.2 min.; 8.8 max)	kgf (lbf)	2.17 (4.78)	1.85 (4.08)	2.48 (5.47)
	Mating after Thermal Aging	4.5 Maximum (9.9 Maximum)	kgf (lbf)	1.58 (3.48)	1.41 (3.11)	1.74 (3.84)
	Unmating after Thermal Aging	1.0 min; 4.0 max. (2.2 min.; 8.8 max)	kgf (lbf)	1.72 (3.79)	1.30 (2.87)	2.14 (4.72)



TEST SUMMARY

5.1.4 Group 4: Insulator Integrity Sequence

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Dielectric Withstanding Voltage	Initial	No Breakdown at 500 VDC	Passed			
	After Thermal Shock	No Breakdown at 500 VDC	Passed			
Insulation Resistance	After Thermal Shock	**1** Minimum	Gigaohm	Passed		
	After Cyclic Humidity	**1** Minimum	Gigaohm	Passed		



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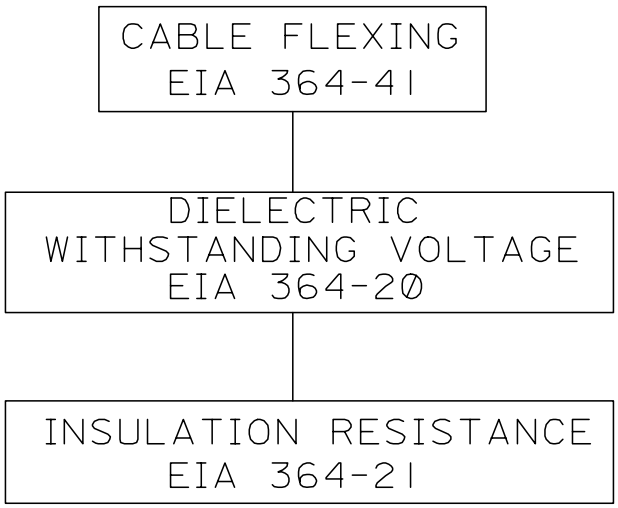
5.1.5 Group 5: Cable Flexing Sequence

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	RESULTS
Continuity	During flexing	No discontinuities	No Opens	
Dielectric Withstanding Voltage	Final	No Breakdown at 500 VDC	Passed	
Insulation Resistance	Final	1 Minimum	Gigaohms	Passed



TEST SUMMARY

5.1.6 Group 6: Electrostatic Discharge Sequence

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
* Electrostatic Discharge	Contact discharge to shell	No evidence of discharge to contacts at 8 kV	Passed			
	Air discharge perpendicular to shell					
	Air discharge at angle to shell					

TEST SUMMARY

5.2 ELECTRICAL PERFORMANCE RESULTS

5.2.1 High Speed Electrical Requirements - Connector Only

TEST	TREATMENT	LINES	REQUIREMENT	UNITS	TYPICAL
Impedance	MicroCross™ Single Ended TDR Method				
		C2 - Analog Green	75 +/- 10%	Ohms	73.6
		C3 - Analog Blue	75 +/- 10%	Ohms	70
		C4 - Horizontal Sync	75 +/- 10%	Ohms	72.5
	Differential Lines 330 psec Risetimes	TMDS Data 5	100 +/- 15%	Ohms	96.1
		TMDS Data 4	100 +/- 15%	Ohms	99.6
		TMDS Data 3	100 +/- 15%	Ohms	97.7
		TMDS Data 2	100 +/- 15%	Ohms	102.4
		TMDS Data 1	100 +/- 15%	Ohms	100.4
		TMDS Data 0	100 +/- 15%	Ohms	95.6
Bandwidth	MicroCross™ Single Ended TDR Method	C1 - Analog Red	140 ps maximum	psec	123
		C2 - Analog Green	140 ps maximum	psec	123
		C3 - Analog Blue	140 ps maximum	psec	106
		C4 - Horizontal Sync	140 ps maximum	psec	115
	Differential Lines TDR Method	TMDS Data 5	160 ps maximum	psec	81
		TMDS Data 4	160 ps maximum	psec	126
		TMDS Data 3	160 ps maximum	psec	88
		TMDS Data 2	160 ps maximum	psec	114
		TMDS Data 1	160 ps maximum	psec	96
		TMDS Data 0	160 ps maximum	psec	86
Crosstalk	Differential Lines 320 psec Risetime * Driven Line listed first, Victim Line listed last	TMDS Data 1- TMDS Data 2	**5** Maximum	%	4.75 NEXT 0.62 FEXT
		TMDS Data 1- TMDS Data 3	**5** Maximum	%	0.15 NEXT 0.10 FEXT
		TMDS Data 4- TMDS Data 5	**5** Maximum	%	0.25 NEXT 0.22 FEXT

TEST SUMMARY

5.2.1 High Speed Electrical Requirements - Connector Only (continued)

TEST CONDITION	TREATMENT	LINES (See Sec. 7 for Pinout)	REQUIREMENT	UNITS	TYPICAL
Propagation Delay	MicroCross™ Single Ended TDR Method at 50% Voltage Level	C1 - Analog Red		psec	122
		C2 - Analog Green		psec	128
		C3 - Analog Blue		psec	98
		C4 - Horizontal Sync		psec	104
	Differential Lines TDR Method at 50% Voltage Level	TMDS Data 5		psec	170
		TMDS Data 4		psec	191
		TMDS Data 3		psec	186
		TMDS Data 2		psec	196
		TMDS Data 1		psec	184
		TMDS Data 0		psec	162
Inter-pair Skew	Differential Lines TDR Method at 50% Voltage Level	TMDS Data 2 - TMDS Data 1		psec	12
		TMDS Data 0 - TMDS Data 1		psec	22
		TMDS Date 0 - TMDS Data 2		psec	34
Intra-pair Skew	Differential Lines TDR Method at 50% Voltage Level	TMDS Data 5		psec	3.04
		TMDS Data 4		psec	-0.71
		TMDS Data 3		psec	1.28
		TMDS Data 2		psec	-4.05
		TMDS Data 1		psec	-1.38
		TMDS Data 0		psec	-3.55

5.2.2 High Speed Electrical Requirements - Cable Assembly

TEST CONDITION	TREATMENT	CABLE LENGTH	LINES (See Sec. 7 for Pinout)	UNITS	TYPICAL
Impedance	Differential Lines 250 psec Risetime	2 m	TMDS Data 0	Ohms	106
			TMDS Data 1	Ohms	113
			TMDS Data 2	Ohms	111
		3 m	TMDS Data 0	Ohms	107
			TMDS Data 1	Ohms	111
			TMDS Data 2	Ohms	113
* Propagation Delay	Differential Lines 50% voltage level	2 m	TMDS Data 1	ns/m (ns/ft)	4.3 (1.3)
			TMDS Clock	ns/m (ns/ft)	4.3 (1.3)
		5 m	TMDS Data 1	ns/m (ns/ft)	4.4 (1.3)
			TMDS Clock	ns/m (ns/ft)	4.4 (1.3)
Inter-pair Skew	Differential Lines 50% voltage level	2 m	Data 1 - Data 2	psec	21.6
		3 m	Data 1 - Data 2	psec	107.4
Intra-pair Skew	Differential Lines 50% voltage level	2 m	TMDS Data 0	psec	-120.4
		3 m	TMDS Data 0	psec	-138.9
Cross-Talk NEXT	Differential Input Risetime 250 ps (10%-90%)	2 m	Data 1 - Data 2	%	4.5
		2 m	Data 4 - Data 5	%	0.26
		3 m	Data 1 - Data 2	%	4.4
		3 m	Data 4 - Data 5	%	0.31
Cross-Talk FEXT	Differential Input Risetime 250 ps (10%-90%)	2 m	Data 1 - Data 2	%	1.4
		2 m	Data 4 - Data 5	%	0.36
		3 m	Data 1 - Data 2	%	1.2
		3 m	Data 4 - Data 5	%	0.5
Risetime	Differential Lines Input Risetime 35 ps (10%-90%)	2 m	TMDS Data 0	psec	403
			TMDS Data 1	psec	311
			TMDS Data 2	psec	220
		3 m	TMDS Data 0	psec	417
			TMDS Data 1	psec	428
			TMDS Data 2	psec	484

TEST SUMMARY

5.2.2 High Speed Electrical Requirements - Cable Assembly (Continued)

TEST CONDITION	TREATMENT	CABLE LENGTH	LINES (See Sec. 7 for Pinout)	UNITS	TYPICAL
Bandwidth	Differential Network Analyzer Method at 3 dB	2 m	TMDS Data 0	MHz	673
			TMDS Data 1	MHz	728
			TMDS Data 2	MHz	850
		3 m	TMDS Data 0	MHz	611
			TMDS Data 1	MHz	580
			TMDS Data 2	MHz	560
Bandwidth	Differential Network Analyzer Method at 6 dB	2 m	TMDS Data 0	GHz	1.3
			TMDS Data 1	GHz	1.66
			TMDS Data 2	GHz	1.98
		3 m	TMDS Data 0	GHz	1.29
			TMDS Data 1	GHz	1.57
			TMDS Data 2	GHz	1.67
* Bit Error Rate (For more information, please contact Molex)	400 mV Peak Swing	2 m	All TMDS Lines	Errors/bit	$< 10^{-12}$
		5 m	All TMDS Lines	Errors/bit	$< 10^{-12}$
		10 m	All TMDS Lines	Errors/bit	$10^{-8} - 10^{-5}$
	800 mV Peak Swing	2 m	All TMDS Lines	Errors/bit	$< 10^{-12}$
		5 m	All TMDS Lines	Errors/bit	$< 10^{-12}$
		10 m	All TMDS Lines	Errors/bit	$< 10^{-12}$
Attenuation	Differential Network Analyzer Method at 425 MHz	2 m	TMDS Data 0	dB	2.02
			TMDS Data 1	dB	1.98
			TMDS Data 2	dB	1.94
		3 m	TMDS Data 0	dB	2.41
			TMDS Data 1	dB	2.46
			TMDS Data 2	dB	2.54
	Differential Network Analyzer Method at 560 MHz	2 m	TMDS Data 0	dB	2.53
			TMDS Data 1	dB	2.44
			TMDS Data 2	dB	2.31
		3 m	TMDS Data 0	dB	2.82
			TMDS Data 1	dB	2.98
			TMDS Data 2	dB	3

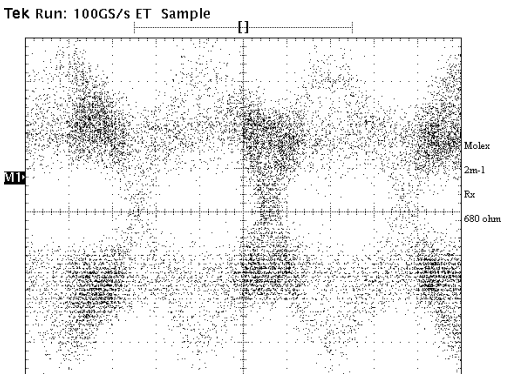
TEST SUMMARY

5.2.2 High Speed Electrical Requirements - Cable Assembly (Continued)

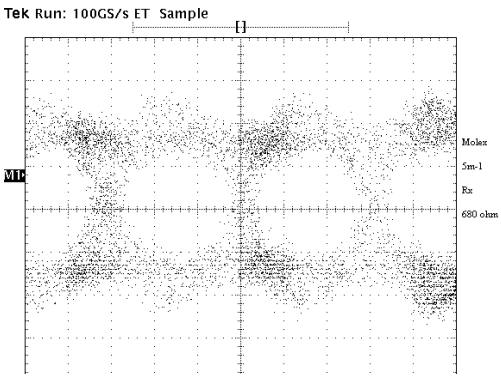
TEST CONDITION	TREATMENT	CABLE LENGTH	LINES (See Sec. 7 for Pinout)	UNITS	TYPICAL
Attenuation (Continued)	Differential Network Analyzer Method at 850 MHz	2 m	TMDS Data 0	dB	3.79
			TMDS Data 1	dB	3.44
			TMDS Data 2	dB	2.88
		3 m	TMDS Data 0	dB	3.87
			TMDS Data 1	dB	4.03
			TMDS Data 2	dB	3.85
* Eye Pattern Measurements		2 m	See plots below (For more information, please contact Molex)		
		5 m			

Eye Diagram Measurements

Receiver at 2 meters



Receiver at 5 meters



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TS-74320-001		TS74320.LWP	14

5.3 MECHANICAL PERFORMANCE RESULTS

5.3.1 Individual Contact Normal Forces

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	TYPICAL
Individual Contact Normal Force	Initial	.050" pitch: **75** typical	grams	84
		.075" pitch: **90** typical	grams	87
		Ground Plane: **100** typical	grams	97
	After Thermal Aging	.050" pitch: **75** typical	grams	70
		.075" pitch: **90** typical	grams	80
		Ground Plane: **100** typical	grams	94

5.3.2 Miscellaneous Mechanical

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Receptacle PCB Insertion Force	Initial	**4.5** Maximum (**10.0** Maximum)	kgf (lbf)	1.95 (4.3)	1.72 (3.8)	2.18 (4.8)
Receptacle Contact Retention	Individual Contact	**0.45** Minimum (**1.0** Minimum)	kgf (lbf)	1.81 (3.99)	1.28 (2.82)	2.43 (5.36)
Plug Contact Retention	Initial Push Out From Mating Face	**4.5** Minimum (**10** Minimum)	kgf (lbf)	5.94 (13.10)	5.72 (12.61)	6.21 (13.69)
Plug Key Retention	Initial Push Out From Mating Face	**4.5** Minimum (**10** Minimum)	kgf (lbf)	6.76 (14.90)	6.58 (14.51)	6.94 (15.30)
Receptacle Thread Torque	Initial	**4.5** Minimum (**5.0** Minimum)	kg-m (lbs-in)	7.8 (8.6)	6.3 (7.0)	12.6 (14.0)
Cable Pullout Force	During 25.0 lbf static load for 1 minute	No discontinuities	No Opens			

TEST SUMMARY

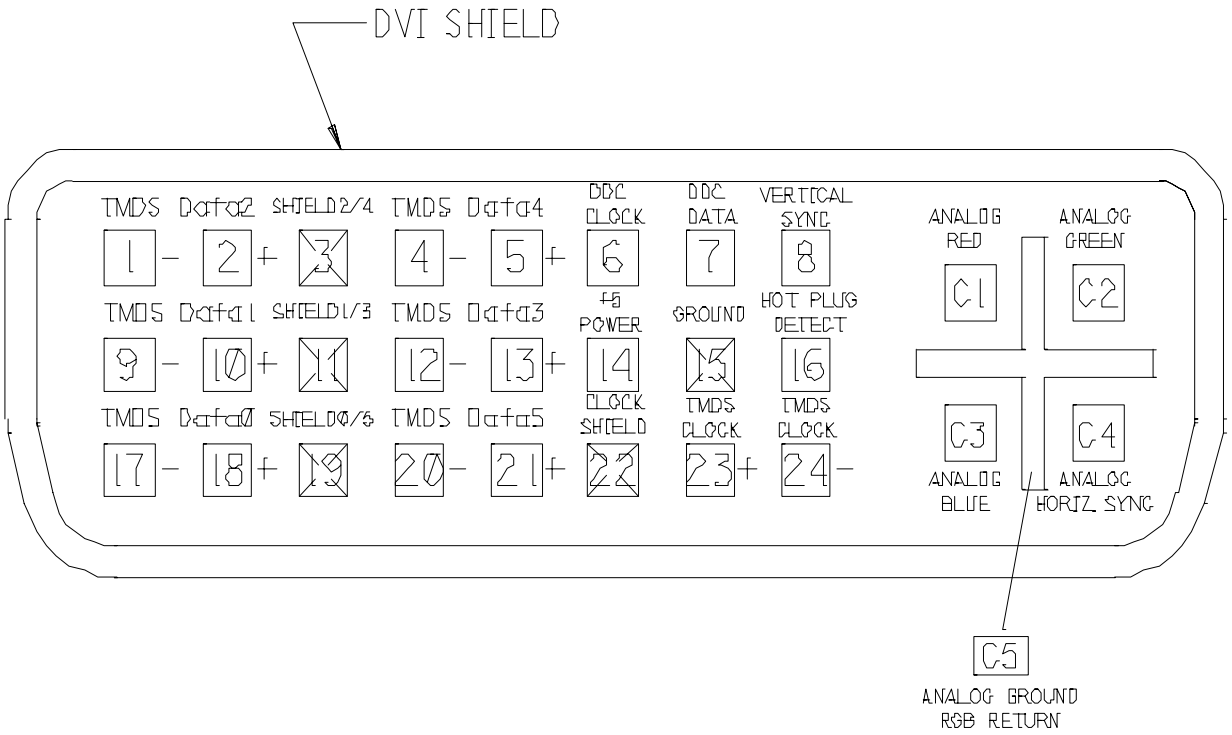
5.4 ENVIRONMENTAL PERFORMANCE RESULTS

5.4.1 Miscellaneous Environmental

TEST CONDITION	TREATMENT	REQUIREMENT	UNITS	MEAN	MINIMUM	MAXIMUM
Temperature Rise	Apply current across all power lines	**30** ^{O}C Maximum Temperature Rise	Amps	Passed up to 3.75 Amps		
* Cold Resistance	-25 ^{O}C for 96 hours	**10** Maximum (change from initial)	milliohms	0.10	-0.17	0.99
Solderability	5 second wetting time	**95%** Minimum Coverage	Passed			
	3 second wetting time					
* Resistance to Solder Heat	Immersion of tails for 10 seconds at 260^{O}C	No visual damage	No Damage			

6.0 ADDITIONAL INFORMATION

6.1 DVI PIN ASSIGNMENTS



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