PRODUCT SPECIFICATION

TITLE

1.0 MM PITCH DisplayPort CONNECTOR AND PLUG

TABLE OF CONTENTS

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances requirements and test methods for pitch1.0mm DisplayPort connector series products.

2.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

the following documents are forming a part of this specification to the extent specified. Herewith in the event of conflict between the requirements of the specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of the specification and the referenced documents, this specification shall take precedence.

EIA-364 STANDARD: ELECTRICAL CONNECTOR/SOCKET TEST PROCEDURES INCLUDING ENVIRONMENTAL CLASSIFICATIONS
IEC 61000-4-2: ELECTROMAGNETIC COMPATIBILITY (EMC)-TESTING AND MEASUREMENT TECHNIQUES-ELECTROSTATIC DISCHARGE IMMUNITY TEST
DISPLAYPORT CONNECTOR AND CABLE ASSEMBLY Serialized at Attachment Specification

3.0 PRODUCT DESCRIPTION

3.1 Product Name and Number

a) DisplayPort Receptacle Assembly, 47272-****
b) DisplayPort for plug Assembly 47271-****

3.2 Design and Construction

Connector shall be of the design, construction and physical dimensions specified on the applicable sales drawing.

3.3 Materials

a) Contacts: Refer to respective Molex sales or engineering drawings
b) Housing: Refer to respective Molex sales or engineering drawings
c) Metal Can: Refer to respective Molex sales or engineering drawings
d) Plating: Refer to respective Molex sales or engineering drawings

4.0 PERFORMANCE AND TEST DESCRIPTION

4.1 Performance requirement:

Connector shall be designed to meet the electrical, mechanical and environmental performances requirements specified in paragraph.5.0

4.2 Rated Voltage: 40V AC
4.3 Rated Current: 0.5A
4.4 Temperature

Operating Temperature Range: -20˚C to +85˚C (Without loss function)
Storage Temperature Range: -20˚C to +85˚C (Without loss function)

5.0 TEST REQUIREMENTS AND PROCEDURES

Method of measuring resistance should be used to connector and assembly with DisplayPort cable.

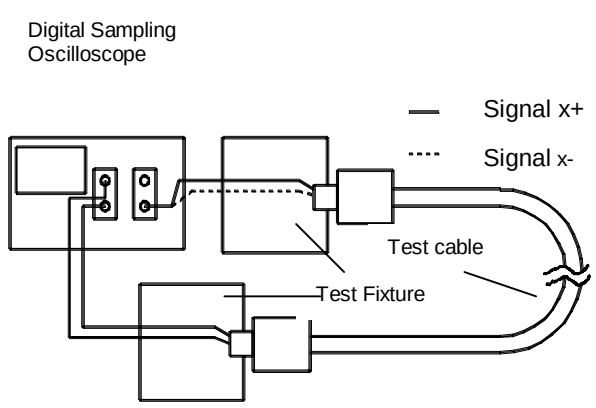
But, requirement of contact resistance should subtract resistance of the cable.

5.1 ELECTRICAL REQUIREMENTS

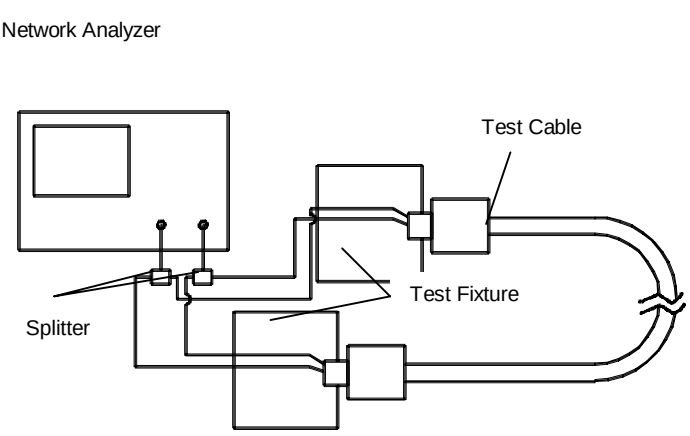
DESCRIPTION		TEST CONDITION	REQUIREMENT
5.1.1	Low level Contact Resistance	Mated connectors, Contact : measure by dry circuit, 20 mV Max., 10 mA (ANSI/EIA-364-23)	30 milliohm Max.
		Shell: measure by dry circuit, 5V Max., 100 mA (ANSI/EIA-364-06A-83)	50 milliohm Max.
5.1.2	Dielectric Withstanding Voltage	Unmated connector, apply 500V AC (rms.) for 1 minute between adjacent terminal and ground. Mated connectors, apply 300V AC (rms.) for 1 minute between adjacent terminal and ground. (ANSI/EIA 364-20)	No Breakdown
5.1.3	Insulation Resistance	Unmated: Unmated connector, apply 500V DC between adjacent terminal and ground. (ANSI/EIA 364-21, method 302)	100megohm Min.
		Mated: Mated connectors, apply 150V DC between adjacent terminal and ground. (ANSI/EIA 364-21, method 302)	10megohm Min.
5.1.4	Contact Current Rating	Initial ambient temperature: 55°C Maximum After temperature changed: 85°C Maximum And temperature rise 30°C Maximum (ANSI/EIA-364-70,TP-70)	0.5A Min.
5.1.5	Applied Voltage Rating	40V AC (rms.) continuous maximum, on any signal pin with respect to the shield.	No Breakdown
5.1.6	Electrostatic Discharge	Test unmated each connector from 1 kV to 8 kV in 1 kV steps using 8 mm ball probe. (IEC 61000-4-2)	No evidence of discharge to contacts at 8 kV

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.1.7	Time Domain differential Impedance(For High-bit-rate and Low-bit-rate cable assembly)	Rise time: 130ps. (20%-80%) Signal to ground pin ratio per Display Port designation. Differential measurement specimen environment impedance :100 ohms differential Source-side receptacle connector mounted on a controlled impedance PCB fixture.	Contact area	100 ohms ±10%
			Transition area	100 ohms ±10%
5.1.8	Crosstalk	Near End Noise (NEN) shall be defined in frequency domain and cover the bandwidth of up to 7GHz.	$Isolation_{min}[dB] = \begin{cases} -26 & ; 0.1 < f \le f_0 \\ -26 + 15Log_{10}\left(\frac{f}{f_0}\right) & ; f_0 < f \le 7 \end{cases}$ where: f is given in GHz f_0=1.35GHz (For High-bit-rate Cable Assembly) f is given in GHz f_0=0.8GHz (For Reduced-bit-rate Cable Assembly)	
		The Far End Noise shall be defined in frequency domain.	· 26dB @100MHz~10GHz (For both High-bit-rate and Reduced-bit-rate Cable Assembly)	
5.1.9	Insertion Loss	Insertion Loss: Connect cable to connector on test fixture, Measure by Network Analyzer. (See fig. Below)	$IL_{min}[dB] = \begin{cases} -8.7 \times \sqrt{\frac{f}{f_0}} & ; 0.1 < f \le \frac{f_0}{3} \\ -4.9 \times \left(\frac{3f - f_0}{3}\right) - 5 & ; \frac{f_0}{3} < f \le 7 \end{cases}$ where: f is given in GHz f0=1.35GHz (For High-bit-rate Cable Assembly) $IL_{min}[dB] = \begin{cases} -1 - 10 \times \sqrt{\frac{f}{f_0}} & ; 0.01 < f \le \frac{f_0}{3} \\ -12 \times \left(\frac{3f - f_0}{3}\right) - 6.8 & ; \frac{f_0}{3} < f \le 3 \end{cases}$ Where: F is given in GNz f0=0.825GHz (For Reduced-bit-rate Cable Assembly)	

DESCRIPTION		TEST CONDITION	REQUIREMENT
5.1.10	Return Loss	Return Loss: Connect cable to connector on test fixture, Measure by Network Analyzer. (See fig. Below)	$RL_{max}[dB] = \begin{cases} -15 & ; \ 0.1 < f \le \frac{f_0}{2} \\ -15 + 12.3\,Log_{10}\left(\frac{2f}{f_0}\right) & ; \ \frac{f_0}{2} < f \le 7 \end{cases}$ where: f is given in GHz f0=1.35GHz (For High-bit-rate Cable Assembly) $RL_{max.}[dB] = \begin{cases} -20 & ; \ f \le f_0 \\ -20 + 33\,Log_{10}\left(\frac{f}{f_0}\right) & ; \ f_0 < f \le 2f_0 \\ -10 + 12.56\,Log_{10}\left(\frac{f}{f_0} \times 0.5\right) & ; \ 2f_0 < f \le 4 \end{cases}$ Where: F is given in GHz f0=0.8GHz (For Low-bit-rate Cable Assembly)



Signal Time Domain Differential Impedance
Signal Skew Measurement Configuration



Crosstalk(FEXT)
Attenuation Measurement configuration

5.2 MECHANICAL REQUIREMENTS

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.2.1	Insertion Force/ Withdrawal Force (without latch type)	Insert and withdraw connectors at a rate of 25±3mm per minute. (ANSI/EIA-364-13)	Insertion Force	44.1N {4.5 kgf} Max.
			Withdraw Force	
			After 2,000 times insert/withdraw	9.8N {1.0 kgf} Min. 39.2N {4.0 kgf} Max.
			After 10,000 times insert/ withdraw	4.9N {0.5 kgf} Min. 39.2N {4.0 kgf} Max.
5.2.2	Latch Strength (with latch type)	Mate connectors, apply axial pull-out force in the axial direction at the speed rate of 13 mm/minute until the latch is disengaged or damaged. (ANSI/EIA-364-98)	Appearance	No Damage on both connectors
			Pull force	49.0N {5.0kgf} Min.
5.2.3	Terminal Pull-out Force	Asemblied in the housing at a rate of 25±3 mm per minute.	2.94N {0.3 kgf } Min.	
5.2.4	Durability	Automatic cycling : 10,000 cycles at 100±50 cycles per hour. (ANSI/EIA-364-9)	Contact Resistance	Change form initial requirement : Contact:30 milliohm Max. Shell:50 milliohm Max.

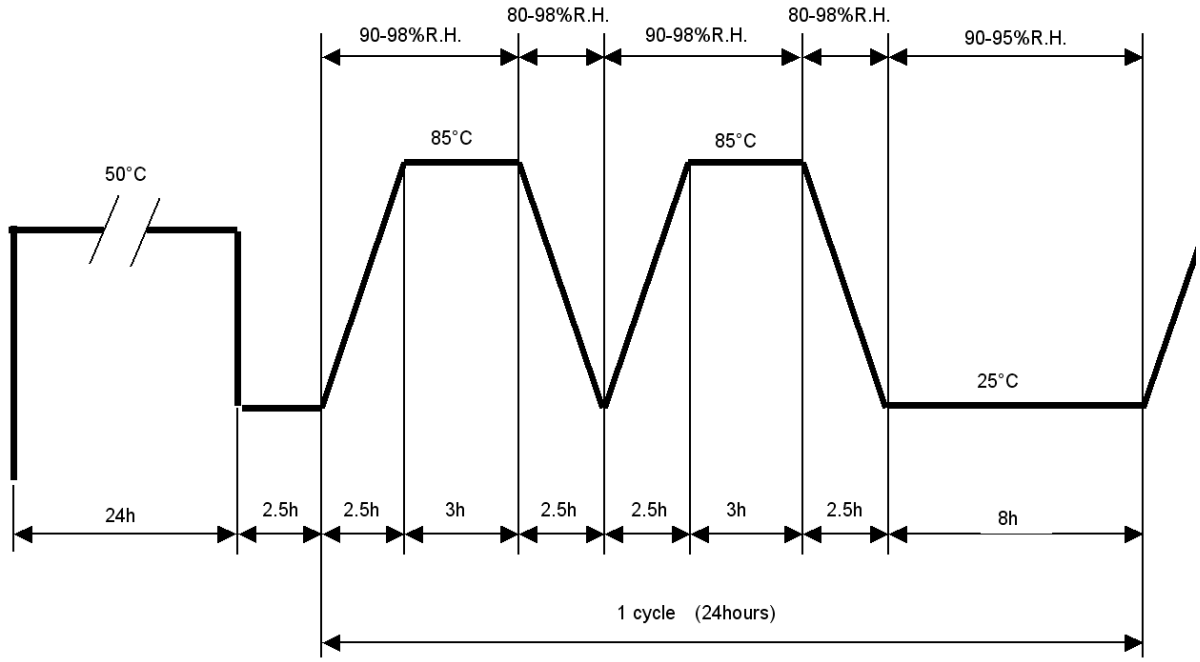
DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.2.5	Vibration	Amplitude : 1.52 mm P-P or 147m/s²{15G} Sweep time : 50-2000-50Hz in 20 minutes Duration : 12 times in each(total of 36 times) X, Y, Z axes. Electrical load : DC 100 mA current shall be Flowed during the test. (ANSI/EIA-364-28, condition Ⅲ, Method 5A)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm Max. Shell:50 milliohm Max.
			Discontinuity	1 microseconds Max.
5.2.6	Shock	Pulse width : 11 msec., Wave form : half sine, 490 m/s² {50G}, 3 strokes in each X, Y, Z axes. (ANSI/EIA-364-27 Condition A)	Appearance	No Damage
			Discontinuity	1 microseconds maximum

5.3 ENVIRONMENTAL REQUIREMENTS

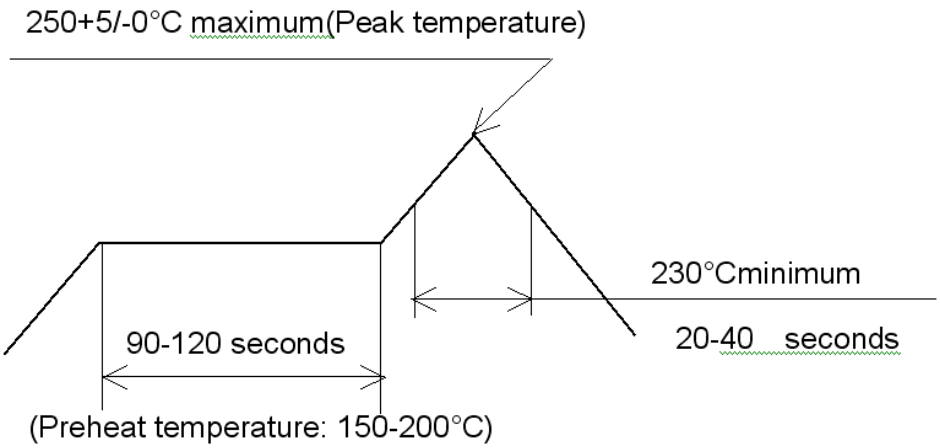
DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.3.1	Temperature Shock	Mate connectors and subject to the following conditions for 10 cycles. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. 1cycle -55±3°C for 30 minutes +85±3°C for 30 minutes (Transit time shall be with in 3 minutes) (ANSI/EIA-364-32, Condition 1)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm Max. Shell: 50 milliohm Max.
5.3.2	Humidity	A) Mate connectors together and perform the test as follows. Temperature : +25 to +85°C Relative Humidity : 80% to 95% Duration : 4 cycles (96 hours) Upon completion of the test, specimens shall be conditioned at ambient room conditions for 24 hours, after which the specified measurements shall be performed. (ANSI/EIA-364-31)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact:30 milliohm Max. Shell:50 milliohm Max.
		B) Unmated connectors and perform the test as follows. Temperature : +25 to +85°C Relative Humidity : 80 to 95% Duration : 4 cycles (96 hours) Upon completion of the test, specimens shall be conditioned at ambient room conditions for 24 hours, after which the specified measurements shall be performed. (ANSI/EIA-364-31)	Appearance	No Damage
			Dielectric Withstanding Voltage and Insulation Resistance	Conform to item of Dielectric Withstanding Voltage and Insulation Resistance

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.3.3	Mixed flowing gas	Mated connectors and expose to mixed flowing gas. Per EIA-364-65 Environmental classes IIA 96 hour exposure	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm Max. Shell: 50 milliohm Max.
5.3.4	Heat Resistance	Mate connectors and expose to 105±2°C for 250 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. (ANSI/EIA-364-17, Condition 4, Method A)	Appearance	No Damage
			Contact Resistance	Change from initial requirement : Contact: 30 milliohm Max. Shell: 50 milliohm Max.
5.3.5	Solder-ability	Dip solder tails into the molten solder(held at 245±3°C) up to 1.2 mm from the bottom of the housing for 3~5 seconds.	Solder Wetting	95% of immersed area must show no voids, pin holes
5.3.6	Resistance to Soldering Heat	Refer soldering method The conditions specified on paragraph 7 shall be repeated twice.	No Damage	
		Soldering iron method Soldering Time : 5 sec. Solder Temperature : 370-400°C 0.5mm from terminal tip		

6. HUMIDITY CONDITION



7. RECOMMENDED INFRARED REFLOW CONDITION



TEMPERATURE CONDITION GRAPH
(TEMPERATURE ON TRANSITION AREA)

8. TEST SEQUENCE

Item(Item NO.)		Group									
		1	2	3	4	5	6	7	8	9	10
1	Appearance	1,4, 7	1,5, 9	1,5, 8	1,3		1,4		1,4		1,4
2	Low level Contact Resistance (5.1.1)	2,5, 8	2,6, 10	6,9			2,5		2,5		
3	Dielectric Withstanding Voltage (5.1.2)			2							
4	Insulation Resistance (5.1.3)			3							
5	Contact Current Rating (5.1.4)				4						
6	Applied Voltage Rating (5.1.5)				2						
7	Electrostatic Discharge (5.1.6)							1			
8	Differential Impedance (5.1.7)									1	
9	Cross Talk (For High-bit-rate Cable Assembly) (5.1.8)									2	
10	Insertion Loss & Return Loss (5.1.9/5.1.10)									3	
11	Insertion Force/ Withdrawal Force (w/o latch type) (5.2.1)		3,7, 11								
12	Latch Strength (w/ latch type) (5.2.2)		(6)								
13	Terminal Pull-out Force (5.2.3)					1					
14	Durability (5.2.4)		4,8								
15	Vibration (5.2.5)	3									
16	Shock (5.2.6)	6									
17	Temperature Shock (5.3.1)			4							

Item(Item NO.)		Group									
		1	2	3	4	5	6	7	8	9	10
18	Humidity (5.3.2)			7							
19	Mixed Flowing Gas (5.3.3)						3				
20	Heat Resistance (5.3.4)								3		
21	Solder-ability (5.3.5)										2
22	Resistance to Soldering Heat (5.3.6)										3
Number of Sample (SETS)		2	2	2	2	2	2	2	2	2	2

10. PACKING

Refer to the Molex related packaging drawings.