PRODUCT SPECIFICATION

TITLE

1.0 HDMI connector and cable assembly

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances requirements and test methods for 1.0mm HDMI CONNECTOR series products.

2.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

The following documents form 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.

2.1 EIA 364 Test Methods for Electronic and Electrical Component Parts
2.2 HDMI CONNECTOR AND CABLE ASSEMBLY Serialized at Attachment Specification

3.0 MATERIAL SPECIFICATIONS

3.1 Design and Construction

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

3.2 Materials

a) Contacts: Refer to respective Molex sales & engineering drawings
b) Housing: Refer to respective Molex sales & engineering drawings
c) Metal Can: Refer to respective Molex sales & engineering drawings
d) Plating: Refer to respective Molex sales & 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 5.0

4.2 VOLTAGE:

40V DC

4.3 CURRENT:

0.5A DC

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.

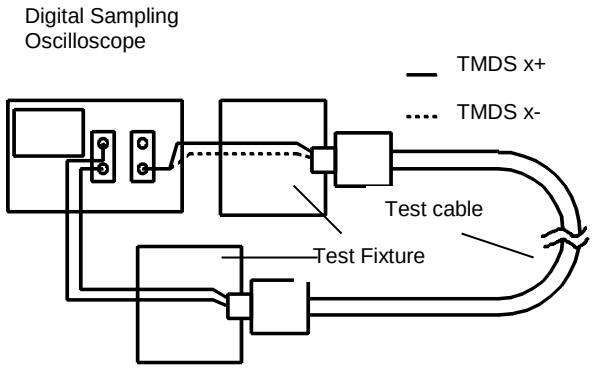
Method of measuring resistance should be used connector and harness with 50.8mm cable.

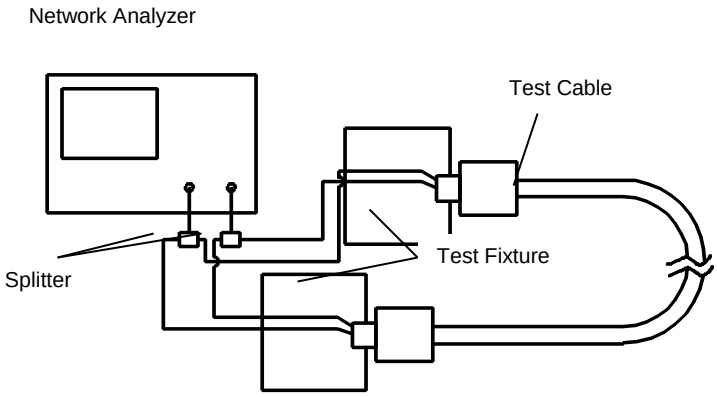
But, Requirement of contact resistance is expect resistance of cable.

5.1 ELECTRICAL REQUIREMENTS

	DESCRIPTION	TEST CONDITION	REQUIREMENT	
5.1.1	Contact Resistance	Mate connectors, Contact : measure by dry circuit, 20 mV MAXIMUM, 10 mA (ANSI/EIA-364-23) Shell: measure by dry circuit, 5V MAXIMUM, 10 mA (ANSI/EIA-364-06A-83)	Contact	30 milliohm MAXIMUM
			Shell	50 milliohm MAXIMUM
5.1.2	Dielectric Withstanding Voltage	Unmated: Unmated connector, apply 500V AC (rms.) for 1 minute between adjacent terminal or ground. (ANSI/EIA 364-20) Mated: Mated connectors, apply 300V AC (rms.) for 1 minute between adjacent terminal or ground.	No Breakdown	
5.1.3	Insulation Resistance	Unmated: Unmated connector, apply 500V DC between adjacent terminal or ground. (ANSI/EIA 364-21) Mated: Mated connectors, apply 150V DC between adjacent terminal or ground.	Unmated	100megohm MINIMUM
			Mated	10megohm MINIMUM
5.1.4	Contact Current Rating	Initial ambient temperature: 55°C Maximum After temperature changed: 85°C Maximum	0.5A MINIMUM	
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 connectors from 1 kV to 8 kV in 1 kV steps using 8 mm ball probe. (IEC -801-2)	No evidence of discharge to contacts at 8 kV	

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.1.7	T.M.D.S. Signals Time Domain Impedance	Rise time : 200 psec. (10%-90%) Signal to ground pin ratio per HDMI designation. Differential measurement specimen environment impedance :100 ohms differential Source-side receptacle connector mounted on a controlled impedance PCB fixture.	Contact area	100Ω ±15% 100 ohms ±15%
			Transition area	100Ω ±15% 100 ohms ±15%
			Cable area	100Ω ±10% 100 ohms ±10%
5.1.8	T.M.D.S. Signals Time Domain Cross talk FEXT	Rise time : 200 psec.(10%-90%) Signal to ground pin ratio per HDMI designation. Differential measurement specimen environment impedance :100 ohms differential Source-side receptacle connector mounted on a controlled impedance PCB fixture. Driven pair and victim pair.	5% MAXIMUM {-26 dB MAXIMUM}	
5.1.9	T.M.D.S Signals Skew	Skew= |TIME(TMDS x+)-TIME(TMDS x-)| (Cable area only) HDMI designation. Differential measurement specimen environment impedance :100 ohms differential Source-side receptacle connector mounted on a controlled impedance PCB fixture. (See fig. Below)	Intra-Pair Skew : 151 picoseconds Maximum Inter-Pair Skew : 2.42 nanoseconds Maximum	
5.1.10	Attenuation	Connect cable to connector on test fixture, Measure by Network Analyzer. (See fig. Below)	Frequency	Attenuation
			- 825MHz	-8 dB
			825MHz -2.475GHz	-21 dB
			2.475-4.125 GHz	-30 dB





T.M.D.S Signal Time Domain Impedance
T.M.D.S Signal Skew Measurement Configuration

Cross talk FEXT
Attenuation Measurement configuration

5.2 MECHANICAL REQUIREMENTS

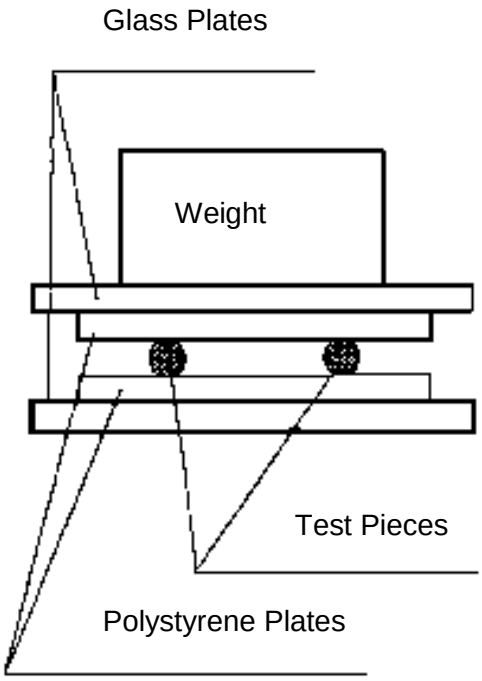
	DESCRIPTION	TEST CONDITION			REQUIREMENT	
5.2.1	Insertion Force/ Withdrawal Force	Insert and withdraw connectors, at a rate of 25±3mm per minute.	Insertion Force		44.1N {4.5 kgf} MAXIMUM	
			Withdraw Force	After 2,000 times insert/withdraw	9.8N {1.0 kgf} MINIIMUM 39.2N {4.0 kgf} MAXIMUM	
				After 2,001-10,000 times insert/withdraw	4.9N {0.5 kgf} MINIIMUM 39.2N {4.0 kgf} MAXIMUM	
5.2.2	Terminal Pull-out Force	assembled in the housing at a rate of 25 ±3 mm per minute.			2.94N {0.3 kgf }MINIMUM	
5.2.3	Cable Flex	Rotate the specimen up to 100 cycles in each of 2 planes at the speed of 12 to 14 complete cycles (of 180 total traverse) per minute, see paragraph 5 Mandrel Diameter : X =3.7 x Cable Diameter. (ANSI/EIA-364-41, Condition A)			Appearance	No Damage
					Discontinuity	1 microsecond MAXIMUM
					Dielectric Strength	Must meet 5-1-2
					Insulation Resistance	Must meet 5-1-3

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.2.4	Screw Tightening Torque (For 47151-***2 Only)	Put the connector to P.C.Board, then tighten the screw at Following torque. (Use M3 screw with metric pitch thread) 0.392N-m{4 kgf-cm} MAXIMUM. (Working torque 0.295N・m {3.5 kgf-cm})	Appearance	No Damage

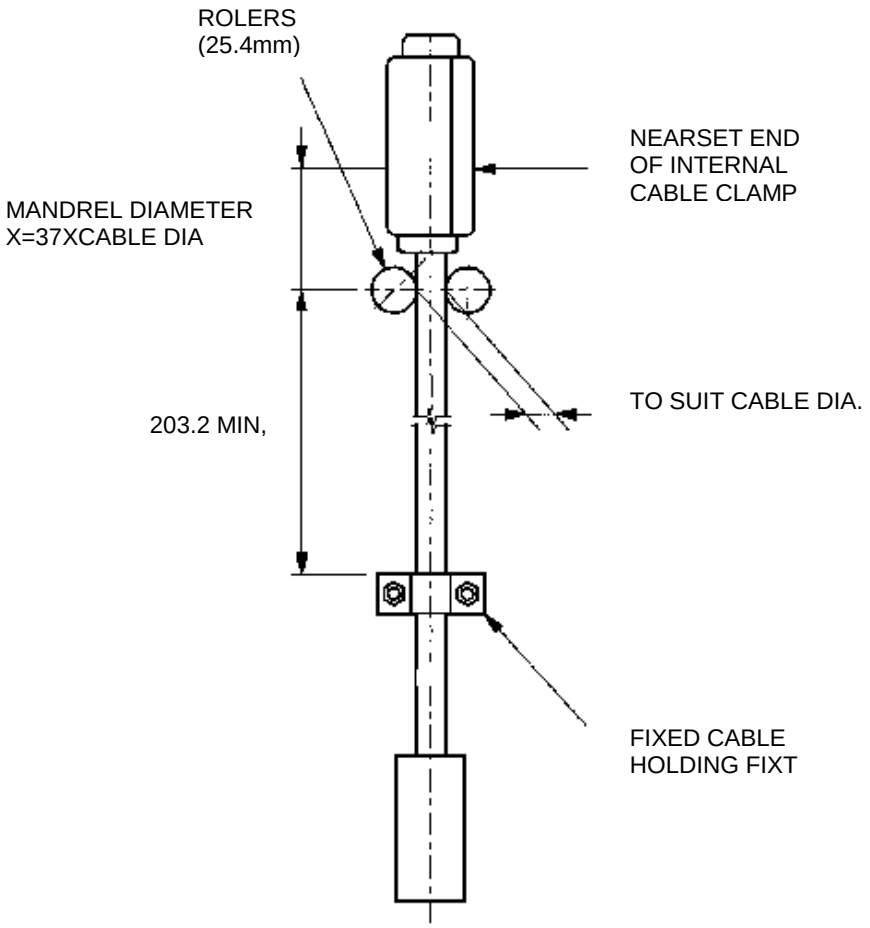
5.3 ENVIRONMENTAL REQUIREMENTS

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.3.1	Durability	Automatic cycling : 10,000 cycles at 100±50 cycles per hour.	Contact Resistance	Change form initial requirement : Contact:30 milliohm MAXIMUM Shell:50 milliohm MAXIMUM
5.3.2	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 Method 5A)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm MAXIMUM Shell:50 milliohm MAXIMUM
			Discontinuity	1 microseconds MAXIMUM.
5.3.3	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
			Contact Resistance	Change form initial requirement : Contact:30 milliohm MAXIMUM Shell:50 milliohm MAXIMUM
			Discontinuity	1 microseconds MAXIMUM

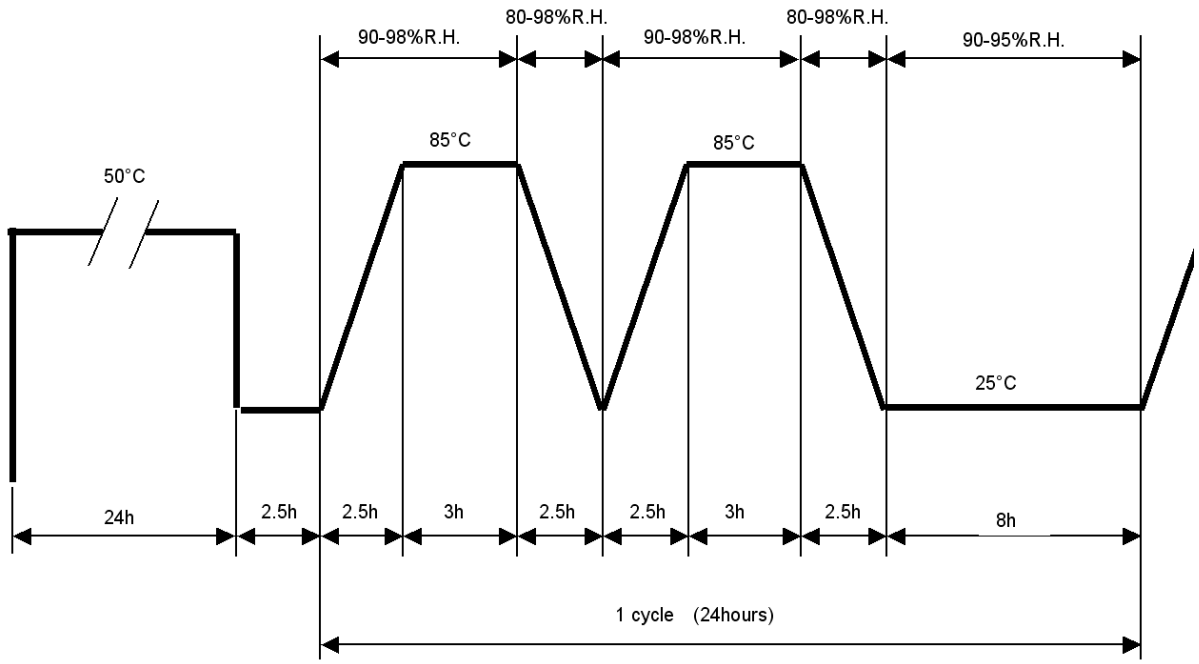
DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.3.4	Temperature Cycling	Mate connectors and subject to the following conditions for 10 cycles. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours, after which the specified measurements shall be performed. 1cycle -55±3°C 30 minutes +85±3°C 30 minutes (Transit time shall be with in 3 minutes) (ANSI/EIA-364-32,Conditon 1)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm MAXIMUM Shell: 50 milliohm MAXIMUM
5.3.5	Humidity	Mate connectors together and repeat The test specified in paragraph 6 up to 4 cycles. Upon completion of the test specimens shall be conditioned at ambient room conditions for 24 hours, after which the specified measurements shall be performed. Temperature : +25°C-+85°C Relative humidity : 80-95% Duration : 4 cycles (96 hours) (ANSI/EIA-364-31)	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact:30 milliohm MAXIMUM Shell:50 milliohm MAXIMUM
			Dielectric Strength	Must meet 5-1-2
			Insulation Resistance	Must meet 5-1-3
5.3.6	SO_2 gas	Mate connectors and expose to 50±5 ppm SO_2gas, ambient temperature 40±2°C for 24 hours.	Appearance	No Damage
			Contact Resistance	Change form initial requirement : Contact: 30 milliohm MAXIMUM Shell: 50 milliohm MAXIMUM
5.3.7	Heat Resistance	Mate connectors and expose to 105±2°C for 96 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 MAXIMUM Shell: 50 milliohm MAXIMUM

DESCRIPTION		TEST CONDITION	REQUIREMENT	
5.3.8	Polystyrene Migration	Place test pieces between two polystyrene plates. Then place two glass plates outside of each polystyrene plate, and apply a weight of 5 ± 0.25N {500 ± 25gf} as shown below. The assembly shall be stored at a temperature of 50 ± 1°C for a duration of 24 ± 1hours.Inspect visually any staining of the area of the polystyrene that was in contact with the test pieces  	When visually inspected, any staining of the area of the polystyrene that was in contact with the test pieces shall hardly be recognized.	
5.3.9	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 2-3 seconds.	Solder Wetting	95% of immersed area must show no voids, pin holes
5.3.10	Resistance to Soldering Heat	Refer soldering method The conditions specified on paragraph 7 shall be repeated twice. Soldering iron method Soldering Time : 5 sec. Solder Temperature : 370-400°C 0.5mm from terminal tip	No Damage	

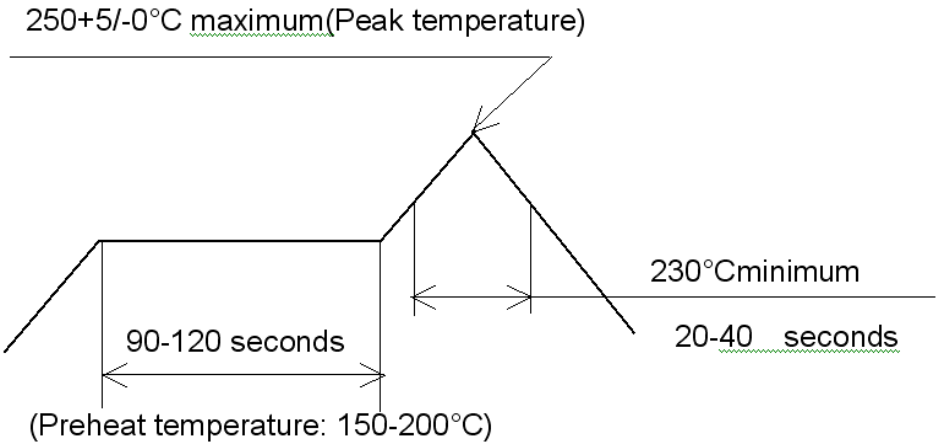
[6. CABLE FLEXING TEST DIAGRAM]



[7. HUMIDITY CONDITION]



[8. RECOMMENDED INFRARED REFLOW CONDITION]



TEMPERATURE CONDITION GRAPH
(TEMPERATURE ON TRANSITION AREA)

[9. TEST SEQUENCE]

Item(Item NO.)		Group						
		1	**2**	**3**	**4**	**5**	**6**	**7**
1	Appearance	**1,9**	**1,9**	**1,7**	**1,10**	**1,7**	**1,5**	**1**
2	Contact and SHELL Resistance (5-1-1)	**2,4,6,8**	**2,4,6,8**	**2,4,6**				
3	Temperature Cycle (5-3-4)	**3**	**5**			**3**		
4	Heat Resistance (5-3-7)	**5**	**7**		**7**			
5	Humidity (5-3-5)	**7**				**5**		
6	Vibration (5-3-2)			**3**				
7	Mechanical Shock (5-3-3)			**5**				
8	Insertion Force (5-2-1)				**2,5,8**			
9	Withdrawal Force (5-2-2)				**3,6,9**			
10	Dielectric Resistance (5-1-2)					**2**	**3**	
11	Insulation Resistance (5-1-3)					**4,6**	**4**	
12	Cable Flexing (5-2-3)						**2**	
13	Electrostatic Discharge							**2**
14	Durability (5-3-1)		**3**		**4**			
Number of Sample		**2 SET**	**2 SET**	**2 SET**	**2 SET**	**2 SET**	**2 SET**	**2 SET**

[10. PRODUCT SHAPE, DIMENSIONS AND MATERIALS]

Refer to the drawing.