MOLEX HK/CHINA LTD.

PRODUCT SPECIFICAION

Title S-ATA DATA Cable Assy

		TITLE : S-ATA DATA CABLE ASSY	
C	Rewrite Spec.		
B	UPDATE PAGE 6 ADDED ITEM 8	**PRODUCT SPECIFICATION**	
A	NEW RELEASE	THIS DOCUMENT CONTAINS INFORMATIOON THAT IS PROPRIETARY TO	
REV.	DESCRIPTION	MOLEX AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION	

DOCUMENT NO.	Prepared By :	Bentz Lau	Date 03/02/20	Sheet No.
PS - 887505*-xx	Checked By :	Bentz Lau	Date 03/02/20	
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1.0 SCOPE

This specification covers the requirements for the S-ATA data cable assembly .

2.0 PRODUCT DESCRIPTION

2.1 The part number series covered in this specification are as follow :

Part Number	Product Description
887-5053-00	S-ATA data cable assy, 0.5m, Red, Amphenol cable
887-5053-10	S-ATA data cable assy, 0.5m, Grey, Der An cable
887-5053-18	S-ATA data cable assy, 0.5m, Red, Der An cable
887-5054-00	S-ATA data cable assy, 1.0m, Red, Amphenol cable
887-5054-10	S-ATA data cable assy, 1.0m, Grey, Der An's cable
887-5054-18	S-ATA data cable assy, 1.0m, Red, Der An's cable

2.2 S-ATA data cable plug connector pin definition.

Pin	Signal Assignment	
1	Gnd	2nd mate
2	A+	differential signal
3	A-	pair A from Phy
4	Gnd	2nd mate
5	B-	differential signal
6	B+	pair B from Phy
7	Gnd	2nd mate

NOTE All pins are in a single row, with a 1.27mm(0.50") pitch;

* There are two identical receptacles at the two ends of the Serial ATA cable assembly. The cable receptacle m with either the signal segment of the device plug connector on the device, or the host plug connector on the h
* The two differential pin pairs are terminated with the corresponding differential cable pairs;
* The ground pins are terminated with the cable drain wires, if it applies;
* The choice of cable termination methods, such as crimping or soldering is up to each connector vendor.

3.0 APPLICABLE DOCUMENTS

See the Sales Drawings, and the other sections of this specification for the necessary referenced documents and specifications.

4.0 RATINGS

4.1 Voltage

40V AC (rms)

4.2 Temperature

Operating: 0 deg. C to +60 deg. C

Non-Operating: -20 deg. C to +70 deg. C

5.0 Connector and cable assembly requirements and test procedure

Unless otherwise specified, all measurements shall be performed within the following lab. conditions:

* Mated;
* Temperature: 15 deg. C to 35 deg. C
* Relative Humidity: 20% to 80%;
* Atmospheric Pressure: 650mm to 800 mm of Hg.

If an EIA(Electronic Industry Association) test is specified without a letter suffix in the test procedures, the latest approved version of that test shall be used.

5.1 Signal

The test board shall consist of differential traces(100+/-5 ohm) over a ground plane(single ended 50ohm+/-2.5oh).

Open or shorted traces with the same length as the input signal traces shall be provided to measure the system inp risetime and to synchronize pulses. Traces for crosstalk measurements will diverge from each other. Provisions for attenuation reference measurement shall also be provided.

Unless otherwise specified, the requirements are for the entire signal path from the host connector to the device plu but not including PCB traces.

A cable assembly shall meet table 1 electrical signaling parameters and requirements when tested with the above specfied test fixture or equivalent.

Table 1-Signal integrity requirements and test procedures

Item	Parameter	Procedure	Requirements
1	Mated connector impedance	1. Minimize skew(see Note1). 2. Set the Time Domain Reflectometer(TDR)pulsers in differential mode with a positive going pulse(V+) and a negative going pulse(V-). Define a reflected differential trace: Vdiff=V+-V-. 3. With the TDR connected to the resetime reference trace, verify an input risetime of 70 ps(measured 20%-80% Vp). Filtering may be used to slow the system down(see Note 2). 4. Connect the TDR to the sample measurement traces. Calibrate the instrument and system(see Note 3) 5. Measure and record the Maximum and minimum values of the near end connector impedance.	100 ohm+/-15%
2	Cable absolute impedance	1. Minimize skew(see Note1). 2. Set the Time Domain Reflectometer(TDR)pulsers in differential mode with a positive going pulse(V+) and a negative going pulse(V-). Define a reflected differential trace: Vdiff=V+-V-. 3. With the TDR connected to the resetime reference trace, verify an input risetime of 70 ps(measured 20%-80% Vp). Filtering may be used to slow the system down(see Note 2). 4. Connect the TDR to the sample measurement traces. Calibrate the instrument and system(see Note 3) 5. Measure and record the Maximum and minimum cable impedance values in the first 500 ps of cable response following any vestige of the connector response.	100 ohm+/-10%
3	Cable pair matching	1. Set the TDR to differential mode. 2. With the TDR connected to the risetime reference traces verify an input risetime of 70ps(measured 20% -80% Vp). Filtering may be used to slow the system	+/-5 ohm

		down(see Note 2). 3. Connected the TDR to the sample measurement traces. Calibrate the instrument and system(see Note3) 4. Measure and record the single ended cable impedance of each cable within a pair Measure and record Max. and Min. cable impedance values in the first 500 ps of cable response following any vestige of the connector response. 5. The parameter them equals Li imp - Line2 imp	
4	Common mode impedance	1. Set two TDR pulsers to produce a differnetial signal. 2. Minimize skew(see Note 1). 3. With the TDR connected to the risetime reference trace verify an input risetime of 70 ps(measured 20%-80% Vp) Filtering may be used to slow the system down (see Note 2) 4. Calibrate the TDR(see Nore 3). 5. Set both TDR pulsers to produce positive going pulses. 6. Measure the even mode impedance of the first pulsers. Divide this by 2 to get the common mode impetance. 7. Do the same for the other pulser. Both values shall meet the requirement.	25 to 40 ohms
5	Insertion loss	1. Produce a differential signal with the signal source(see Note4). 2. Assure that skew between the pairs is minimized(see Note1). 3. Measure and store the insertion loss(IL) of the fixturing, using the IL reference traces provided on the board, over a frequency range of 10 to 4500 MHz. 4. Measure and record the IL of the sample, which includes fix-turing IL, over a frequency range of 10 to 4500 MHz. 5. The IL of the sample is then the results of procedure 4 minus the results of procedure 3.	6dB max.
6	Crosstalk: NEXT	1. Produce a differential signal with the signal source(see Note1) 2. Connect the source to the risetime reference traces. Assure that skew between the pairs is minimized.(see Note 1). 3. Terminate the far ends of the reference trace with loads of	-26dB

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		characteristic impedance. 4. Measure and record the system and fixturing crosstalk. This is the noise floor. 5. Terminate the far ends of the drive and listen lines with loads of characteristic impedance. 6. Connect the source to the drive pair and the receiver to the near end of the listen pair. 7. Measure the NEXT over a frequency range of 10 to 4500MHz. 8. Verify that the sample crosstalk is out of noise floor.	
7	Intra-Pair Skew	1. Set one of the TDR pulsers in differential mode with a positive going pulse(V+) and a negative going pulse(V-) 2. With the TDR connected to the risetime reference trace verify an input risetime of 70 ps(measured 20%-80% Vp). Filtering may be used to slow the system down(see Note 2) 3. Measure propagation delay(50% of Vp) of each line in a pair single endedly. The skew equals the difference between each single ended propagation delay.	Generation 1: Transmit & receive :10 ps; Generation 2: Transmit & receive :20 ps.
8	Rise Time	1. Minimize skew(see Note 1.). 2. Set the Time Domain Reflectomer(TDR) pulsers in differential mode with a positive going pulse(V+) and a negative going pulse(V-) . Define a reflected differential trace on the receive channels as :Vdiff=V+ - V-. 3. With the TDR connected to the risetime reference trace measure and record the input risetime. Verify that the input risetimeis between 25--35ps(measured 20%--80% Vp) see note 2. 4. Remove the refected trace definition. 5. Connect the TDR to the sample measurement traces. 6. Define a differential trace on the recieve channels as : Vdiff= V+ - V-. 7. Measure (measured 20%--80% Vp) and record the output risetime.	Generation 1: Transmit & Recieve:85ps Max. Genaration 2: Transmit & Recieve:100ps Max

Note:

1. Skew must be minimized. Time domain measurement equipment allows for delay adjustment of the pulses so launch ti be synchronized. Frequency domain equipment will require the use of phase matched fixturing. The fixturing skew shoul verified to be <1 ps on a TDR.
2. The system risetime is to be set via equipment filtering techniques. The filter risetime is significantly close to the stimulu Therefore the filter programmed equals the square root ol r(observed)) squared - (t r(stimulus))squared. After filtering, verify the risetime is achieved using the risetime reference traces on the PCB fixture.

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3. Calibrate the system by substitutingeither precision 50 ohm loads or precision air lines(also terminated in 50 ohm loads test fixture. This places the calibration plane directly at the input interface of the tet fixture.
4. A network analyzer is preferred. If greater dynamic range is required a signal generator/spectrum analyzer may be used Differential measurements require the use of a four port network analyzer although baluns or hybrid couplers may be use

5.2 Housing and contact electrical requirements. (see table 2.)

Table 2- Housing and contact electrical parameters, test procedures, and requirements

1	Insulation resistance	1. EIA 364-21 After 500 VDC for minute, measure the insulation resistance between the adjacent contacts of mated and unmated connector assemblies.	1000M ohm Min.
2	Dielectric withstanding voltage	EIA364-20 method B Test between adjacent contacts of mated and unmated connector assemblies.	The dielectric shall withstand 500 VAC for 1 minute at sea level
3	Low level contact resistance(LLCR)	EIA 364-23 Subject mated contacts assembled in housing to 20 mV maximum open circuit at 100 mA maximum	* Initially 30m ohm Max. * Resistance increase 15 m ohm maximum after stress
4	Contact current rating(power segment)	1. Mount the connector to a test PCB 2. wire power pins P1,P2,P8 and P9 in parallel for power 3. Wire ground pins P4,P5,P6,P10 and P12 in parallel for return. 4. Supply 6 A total DC current to the power pins in parallel ground pins(P4, P5, P6, P10 and P12). 5. Record temperatur rise when thermal equilibruim is reached	1.5 A per pin minimum. The temperature rise above ambient shall not exceed 30 C deg. at any point in the connector when contact positions are powered.The ambient condition is still air at 25 C deg.

5.3 Mechanical and environmental requirements (see Table 3, Table 4)

Table 3- Mechanical test procedures, and requirements

1	Visual and Dimensional inspections	EIA 364-18 Visual, dimensional and functional per applicable quality inspection plan	Meets product drawing requirements
2	Cable pull-out	EIA364-38 Condition A Subject a Serial ATA cable asembly to a 40 N axial load for a min of one minute while clamping one end of the cable plug.	No physical damage
3	Cable flexing	EIA 364-41 condition II 250 cycles using either Method 1 or 2	No physical damage. No discontinuit over 1 us during flexing.
4	Insertion force voltage	EIA364-13 Measure the force necessary to mate the connector assemblies at a max. rate of 12.5mm(0.492") per minute.	45 N maximum
5	Removal force	EIA 364-13 Measure the force necessary to unmate the connector assemblie at maximum rate of 12.5mm(0.492") per minute.	10 N minimum
6	Durability	EIA 364-09 50 cycles for internal cabled application; 500 cycles for backplan blindmate application. Test done at a maximum rate of 200 cycle per hour.	No physical damage. Meet requirem of additional tests as specified in the test sequence

Table 4-Environment parameters, test procedures, and requirements

1	Physical shock	EIA 364-27 Condition H Subject mated connectors to 30 g's halfsine shocks pulses of 11 msec duration. Three shocks in each direction applied along thre mutually perpendicular planes for a total of 18 shocks. see Note 2	No discontinuities of 1 us or longer duration. No physical damage.
2	Humidity	EIA364-31 Method II Condition A. Subject mated connectors to 96 hours at 40 C deg. with 90% to 95%RH.	See Note1.
3	Temperature life	EIA 364-17 Test Condition III Method A Subject mated connectors to temperature life at +85 C deg. for 500 hours	See Note 1.
4	Thermal shock	EIA 364-32 Test Condition I Subject mated connectors to 10 cycles between -55 C deg. and +85 C deg.	See Note 1.
5	Mixed Flowing Gas	EIA 364-65, class 2AI Half of the samples are exposed unmated for seven days. then mated for remaining seven days. Other half of the samples are mated during entire testing.	See Note 1.

Note:

1. Shall meet EIA384-18 Visual Examination requirements, show no physical damage, and shall meet requirements of adj tests as specified in the test sequence .

Additional requirement

1	Flammability	UL 94V-0	Material certification or certificae of compliance required with each lot to satify the Underwriters Laboratories follow-up service requirements

5.5 Test Sequence

Table 4-Environment parameters, test procedures, and requirements

Test Group	A	B	C	D	E
Test or examination					
Examination of the connector(s)	1,5	1,9	1,8	1,8	1,7
Low-Level Contact Resistance(LLCR)	2,4	3,7	2,4,6		4,6
Insulation resistacne				2,6	
Dielectric withstanding voltage				3,7	
Current rating			7		
Insertion force		2			
Removal force		8			
Durability	3	4 (a)			2 (a)
Humidity					
Temperature life			3		
Mixed Flowing Gas					3
Thermal Shock				4	

Note:

(a) Preconditioning, 20 cycles for the 50-durability cycle requirement, 50 cycles for the 500-durability cycle requirement. The insertion and removal cycle is at the maximum rate of 200 cycles per hour.

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