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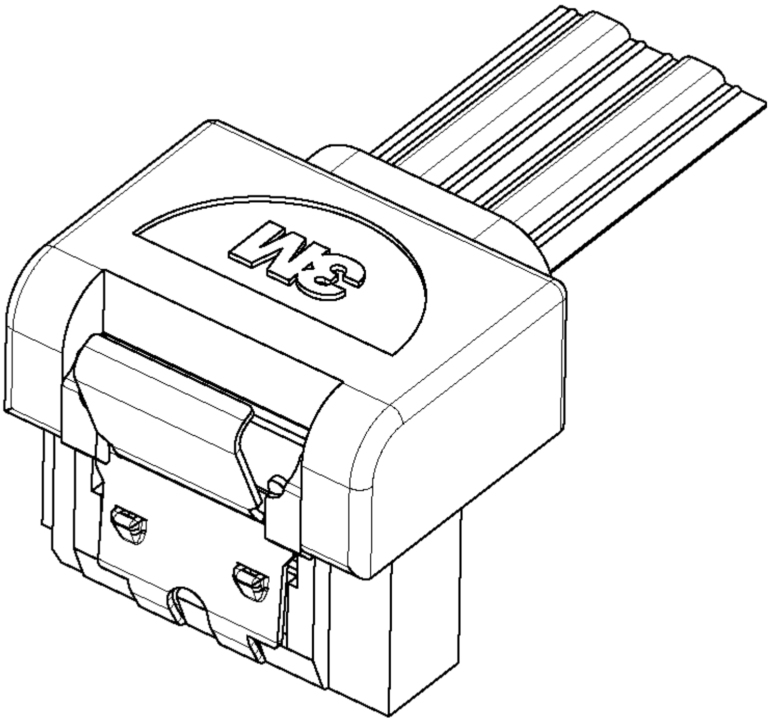
Product Data Sheet

3M™ High Routability Internal SATA Cable Assembly



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1. SCOPE

1.1. Contents

This specification defines the physical interface of the serial ATA connector. The serial ATA connector is compatible with Serial ATA cable, consisting of two parallel pair, available in 30 AWG with flat twin axial configuration.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, latest edition of the specification applies. In the event of conflict between requirements of this specification and product drawing, product drawing shall take precedence.

2.1. Commercial standards, specifications and report

2.1.1. EIA-364, Electrical Connector test procedure.
2.1.2. Serial ATA high speed Serialized AT Attachment , Revision 3.0
2.1.3. 3M SATA cable assembly drawings

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of design, construction and physical dimensions specified on applicable product drawing.

3.2. Materials and Finish

3.2.1. SATA Connector.

Contact: Phosphor Bronze
T=0.25 mm
Finish: (a) Contact Area: 15µ” gold plated all over
(b) Under-plate: 100µ" min. Nickel all over
Housing: PBT 30%GF, UL94V-0, Color: Black.
Over mould: PVC, Black.

3.2.2. Twin axial cable

Signal: Silver plated solid conductor.
Ground wire: Tin plated solid conductor AWG30.
Insulation: polyolefin.

3.3. Ratings

3.3.1. Voltage: 30 Volts DC.
3.3.2. Current: 500 Milliamp (per pin)
3.3.3. Operating Temperature: -20°C to +85 °C

3.4. Performance and Test Description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in section 4.0. All tests are performed at ambient environmental conditions per EIA-364 unless otherwise specified.

3.5 Part number scheme

SATA Cable Assembly
5602 - XX-0142-XXX

Length in mm.
Max 000 is 1000mm.

Product Series

1 – RIGHT ANGLE CONNECTOR.
2 – STRAIGHT CONNECTOR
3 - R/A CONNECTOR WITH LATCH.
4 – STRAIGHT CONNECTOR WITH LATCH.

4.0 Test Requirements and Procedures Summary

Parameter	Procedure	Requirement
Examination of Product	Visual Defect	Visual Inspection of Product for abnormality / defects
Critical Dimension Measurement	Product shall meet requirements of applicable product drawing.	Refer to FAI Report
Signal Integrity Requirements and Test Procedures.		
Mated Connector Impedance	1. Minimize skew. (See Note 1.) 2. Set the time domain reflectometer (TDR) pulses in differential mode with a positive going pulse(V+) and negative going pulse (V-). Define a reflected differential trace: Vdiff =V+ - V-. 3. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps.(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 near end connector impedance.	100Ω ±15%
Cable Absolute Impedance	1. Minimize skew. (See Note 1.) 2. Set the time domain reflectometer (TDR) pulses in differential mode with a positive going pulse(V+) and negative going pulse (V-). Define a reflected differential trace: Vdiff =V+ - V-. 3. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps.(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 maximum and minimum cable impedance values in the first 500 ps of cable response following any vestige of the connector response.	100Ω ±15%

Cable Pair Matching	1. Set the time domain reflectometer (TDR) pulses in differential mode with a positive going pulse(V+) and negative going pulse (V-). Define a reflected differential trace: Vdiff =V+ - V-. 2. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps. (measured 20%-80% Vp). Filtering may be used to slow the system down. (See Note 2.) 3. Connect the TDR to the sample measurement traces. Calibrate the instrument and system. (See Note 3.) 5. Measure and record single ended cable impedance of each cable within a pair. Measure and record maximum and minimum cable impedance values in the first 500 ps of cable response following any vestige of the connector response. 5. The parameter then equals Line 1imp – Line 2imp.	±5 Ω
Common mode impedance.	1. Set two TDR pulsers to produce a differential signal. 2. Minimize skew. (See Note 1.) 3. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps. (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. Set both TDR pulsers to positive going pulses. 6. Measure the even mode impedance of the first pulser. Divide this by 2 to get the common mode impedance. 7. Do the same for the other pulser. Both values shall meet the requirement.	32.5±7.5Ω
Insertion loss	1. Produce a differential signal with the signal source. 2. Assure that the skew between the pairs is minimized. 3. Measure and store the insertion loss (IL) of the fixturing, using IL reference traces provided on board, over the frequency range of 10 to 4500MHz. 4. Measure and record the IL of the sample, which include fixturing IL, over a frequency range of 10 to 4500MHz. 5. The insertion loss of the sample is then the results of procedure 4 minus the results of procedure 3.	-6db up to 4.5GHz.

Cross talk: NEXT	1. Produce a differential signal with the signal source. (See Note 1.) 2. Connect the source to the risetime reference traces. Assure that skew is between the pairs is minimized. 3. Terminate the far ends of reference trace with loads of 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 receiver to the near end of the listen pair. 7. Measure the NEXT over a frequency range of 10 to 4500MHz. 8. Verify the sample crosstalk is out of the noise floor.	-26db up to 4.5GHz.
Rise Time	1. Minimize the skew. (See Note 1.) 2. Set the time domain reflectometer (TDR) pulses in differential mode with a positive going pulse(V+) and negative going pulse (V-). Define a reflected differential trace: Vdiff =V+ - V-. 3. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps. (measured 20%-80% Vp). Filtering may be used to slow the system down. (See Note 2.) 4. Remove the reflected trace definition. 5. Connect the TDR to the sample measurement traces. 6. Define a reflected differential trace on the receive channels as: Vdiff =V+ - V-. 7. Measure (measured 20%-80%Vp) and record output risetime.	≤85ps
Inter-Symbol interface	1. K – 28.5 signal source running at 1.5 Gbps sec. The average position of zero crossing should not move more than specified value.	50ps maximum
Intra-Pair Skew	1. Set one of the time domain reflectometer (TDR) pulsers in differential mode with a positive going pulse (V+) and negative going pulse(V-). 2. With the TDR connected to the rise time reference trace, verify an input risetime of 70ps. (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.	10 ps max.

ELECTRICAL		
Insulation resistance	EIA 364-21 After 500VDC for 1 minute. Measure the insulation resistance between the adjacent contacts of the mated and unmated connector Connector assemblies.	1000MΩ Minimum.
Dielectric withstanding voltage	EIA 364-20 Method B, Test between adjacent contacts of mated and unmated connector assemblies.	Dielectric shall withstand 500VDC for I minute at sea level.
Low level contact Resistance (LLCR).	EIA-364-23 Subject mated contacts assembled and in housing to 20 mV maximum open circuit at 100Ma maximum.	Initially 30mΩ maximum. Resistance increase 15mΩ maximum after stress per mated connector system.
MECHANICAL		
Cable pull out	EIA 364-38 Condition A Subject a Serial ATA cable assembly to a 40N axial load for a minimum of 1 minute while clamping one end of the cable plug.	No physical damage.
Cable Flexing	EIA 364-41Condition II 250 cycles.	No physical damage. No discontinuity over 1μs during flexing.
Insertion Force.	EIA 364-13 Measure the force necessary to mate the connector assemblies at maximum rate of 12.5 mm (0.492”) per min.	45N maximum.
Removal Force	EIA 364-13 Measure the force necessary to mate the connector assemblies at maximum rate of 12.5 mm (0.492”) per min.	10N Minimum.

Durability	EIA 364-09 50 cycles for internal cabled application; 500 cycles for backplane/blind mate application. Test done at a maximum rate of 200 cycles per hour.	No physical damage. Meet requirements of additional tests as specified in the test sequence.
ENVIRONMENTAL		
Physical shock	EIA 364-27 Condition H Subject mated connectors to 30 g's half sine shock pulses of 11msec. duration. Three shocks in each direction applied along three mutually perpendicular planes for a total of 18 shocks.	No discontinuities of 1µs or longer duration. No physical damage.
Random Vibration	EIA 364-28 Condition V, Test Letter A. Subject mated connectors to 5.35g's RMS. 30minutes in each of three mutual perpendicular planes.	No discontinuities of 1µs or longer duration. No physical damage.
Humidity	EIA 364-31 Method II, Test Condition A. Subject mated connectors to 96 hours at 40°C with 90%RH	See Note A.
Temperature Life	EIA 364-17 Test Condition III, Method A. Subjected mated connectors to temperature life at +85°C for 500hours.	See Note A.
Thermal Shock	EIA 364-32 Test Condition I. Subjected mated connectors to cycles between -55° C & 85°C.	See Note A.
Mixed Flowing Gas	EIA 364-65, Class 2A 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 A.

Note:

(a) Shall meet visual requirements as per EIA 364-18, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence, Figure 1.

5.0 Test Sequence:

Samples shall be prepared in accordance with applicable manufacturer's instructions and shall be selected at random from current production.

Table 5.1 Test Sequence Table

Numbers indicate sequence in which the tests are performed.

Test or Examination	**Test Group**			
	A	**B**	**C**	**D**
Examination of Product	1, 5	1,9	1,8	1, 8
Low level contact resistance	2,4	3,7	2,4,6	
Insulation Resistance				2,6
Dielectric Withstanding Voltage				3,7
Current rating			7	
Insertion force		2		
Removal force		8		
Durability	3	4		
Physical Shock		6		
Vibration		5		
Humidity				5
Temperature Life.			3	
Reseating (Manually unplug/plug three times)			5	
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 the maximum rate of 200 cycles per hour.

"RoHS Compliant 2002/95/EC" means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC, unless the substance is in an application that is exempt under EU RoHS. This information represents 3M's knowledge and belief, which may be based in whole or in part on information provided by third party suppliers to 3M.

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