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1.0 SCOPE

This specification is applicable to the performance characteristics of the Mini SAS/Mini SATA cable to board connector system.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER(S)

Product	Serial P/N
Mini SAS 2.0 / SATA	10084749
Mini SAS/SATA SMT Board Connector	10098870
Mini SAS/SATA Single Port Cage	10098871
Mini SAS/SATA 1X2 Ganged Cage	10098872
Mini SAS 2.1 Trained	10111837
Mini-SAS 2.1 Untrained	10114976

2.2 DIMENSIONS, MATERIALS, PLATING AND MARKINGS

See the applicable customer drawing in section 2.1 for the related dimensional, material, plating, and marking information.

2.3 PIN ASSIGNMENTS

Refer to the appropriate customer drawing for the correct pin assignments.


2.4 ADDITIONAL GENERAL SPECIFICATIONS

Plug PCB:

- Material: FR4
- Overall thickness: 1mm (over pads)
- Mating interface plating: Hard Gold over Nickel

Bulk Cable:

- 8 Pairs
- High Speed Twin Ax

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3.0 REFERENCE DOCUMENTS

3.1 FCI DOCUMENTS

GS-14-1272	Cable Assembly Packaging Specification
GS-14-1398	Board Connector and Cage Packaging Specification
GS-20-124	Board Connector and Cage Application Specification
SI-2009-10-006	Customer Signal Integrity Test Report for SAS 2.0 Requirements
SI-2009-10-007	Customer Signal Integrity Test Report for SAS 2.1 Requirements

3.2 INDUSTRY DOCUMENTS

FIT, FORM AND FUNCTION

SAS-2	Serial Attached SCSI – 2
SAS-2.1	Serial Attached SCSI – 2.1
SATA	Serial ATA Revision 2.6
SFF-8086	Mini-Multilane Series, Common Elements 2.2
SFF-8088	Mini-Multilane Series, Shielded Revision 3.0

TEST SPECIFICATON(S)

EIA 364 Series	Electrical Connector Test Procedures Including Environmental Classifications with Test Procedure
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4.0 QUALIFICATION

Connectors and cable assemblies furnished under this specification shall be capable of meeting the qualification test requirements specified herein and shall be uniform in quality, and void of all defects that would adversely affect life or serviceability

5.0 RATINGS

5.1 VOLTAGE

30 Volts AC (RMS)/DC Max.

5.2 CURRENT


0.5 Amps Max (per contact)

5.3 TEMPERATURE

Operating:	-40°C to +80°C
Non-operating:	-55°C to +80°C

5.4 DURABILITY


250 Cycles

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6.0 PERFORMANCE


6.1 ELECTRICAL CHARACTERISTICS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	LLCR	Mate connectors: apply a maximum voltage of 320 mV and a current of 10 mA . (EIA 364-6)	Initial resistance not to exceed 80 milliohms with a 20 milliohm maximum change in resistance after environmental exposure.
2	Insulation Resistance	After 100 VDC for 1 minute, measure the insulation resistance between adjacent mated contacts. (EIA 364-21)	1000 megohms MIN.
3	Dielectric Withstanding Voltage	Apply a voltage of 300 VDC for 1 minute between adjacent mated terminals. (EIA 364-20, method B)	No breakdown; current leakage < 5 mA
4	Temperature Rise (via Current Cycling)	Mate connectors: measure the temperature rise at the rated current after 96 hours (45 minutes ON and 15 minutes OFF per hour). Testing as required	Temperature rise: +30°C MAX.
5	Differential Impedance	Rise time of 70 ps (20% - 80%) (EIA 364-108)	100 ± 10 ohms mated cable

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6.2 MECHANICAL CHARACTERISTICS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Durability	Cycle Life: 250 mating cycles minimum Test condition: 10 cycles per minute max. (EIA 364-09, 364-23)	1. Max. 20 milliohm change from initial readings 2. No visual damage
2	Pre-conditioning	Mate and un-mate connectors 25 times. Test Condition: 10 cycles per minute max. (EIA 364-09, 364-23)	1. Max. 20 milliohm change from initial readings 2. No visual damage
3	Mechanical Shock	Mated samples subject to 30G, half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied in 3 mutually perpendicular planes (18 total) EIA 364-27, Method H	No Physical Damage
4	Random Vibration	Subject mated samples to 3.10G rms between 20 and 500 Hz for 15 minutes in each of 3 mutually perpendicular planes EIA 364-28, Test Condition: VII	1. Max. 20 milliohm change from initial readings 2. No visual damage
5	Mating & Un-mating Forces	Mate and un-mate samples 5 times. Test Condition: 10mm per minute max. (EIA 364-13)	1. 55.5N max mating force 2. 49N max un-mating force
6	Cable Strain Relief	Apply an axial load on the cable. Test Condition: 25mm/min head speed	1. 88N Min. 2. No physical damage. 3. Differential Impedance 100 ± 10Ω
7	Wire Flex	Cable flex 180° - 15 Cycles (See Figure 1) Test Condition : 63.5mm (2.5in.) from back of shell to the top of the roller. Test Condition According Table 1 for minimum bend Radius	1. Differential Impedance 100 ± 10Ω 2. No physical damage 3. No loss of continuity during test.
8	Cable Minimum Bend Radius	The cable is bent one time over the correct mandrel of size specified in Table 1 in each of 4 perpendicular directions. (See Figure 2)	1. Differential Impedance 100 ± 10Ω 2. No physical damage
9	Unlatching Force	Mate connectors and place an axial load on the cable's pull tab to unlatch the plug.	25N Maximum
10	Latch Pull Tab Strength	Place axial load on the cable's pull tab with 6.35mm diameter pin	1. 25N Minimum 2. No Physical Damage


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Raw Cable AWG	Minimum Bending Radius
30AWG	1.3" (33.0mm)
28AWG	1.6" (40.6mm)
26AWG	1.8" (45.7mm)
24AWG	2.0" (50.8mm)

Table 1 – Cable Minimum Bend Radius

6.3 ENVIRONMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Thermal Shock	Test Condition: -55°C to +85°C (25 cycles) (EIA 364-32C, condition I)	Max. 20 milliohm change from initial readings
2	Temperature Life	Cable assemblies and connectors should be mated and subjected to 70°C for 500 hours EIA 364-17, Method A, Condition 2, Time Condition C	Max. 20 milliohm change from initial readings
3	Humidity Temperature Cycling	Unmated cables and connectors subjected to 10 cycles between 25°C and 65°C at 80% to 100% relative humidity EIA 364-31, Method III excluding steps 7a & 7b	Max. 20 milliohm change from initial readings
4	Mixed Flowing Gas	Subject the board mounted receptacle to environmental Class IIA for 7 days unmated followed by 7 days mated (14 days total). EIA 364-65, Class IIA	Max. 20 milliohm change from initial readings
5	Thermal Disturbance	Cables and connectors are cycled between 15±3 and 85±3°C as measured on the part. Ramps at 2°C/minute minimum and dwells ensuring that contacts reach extreme temps for 5 minutes minimum. Humidity not controlled. 10 cycles	Max. 20 milliohm change from initial readings

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7.0 QUALITY ASSURANCE PROVISIONS

7.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with MIL-C-45662.

7.2 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

- a. Temperature: 25 +/- 5 degrees Celsius
- b. Barometric Pressure: Local ambient

7.3 Sample Quantity And Description

Test Group	Number of Cables	Cable Description	Number of Board Connectors
1	3	28 AWG, single ended, 0.5 meter	1
	3	26 AWG, single ended , 0.5 meter	
	3	24 AWG, single ended , 0.5 meter	
2	3	Any AWG, single ended, 0.5 meter	3
3	3	Any AWG, single ended, 0.5 meter	3
4	3	Any AWG, single ended, 0.5 meter	3
5	3	24 AWG, single ended, 0.5 meter	3
6	3	Any AWG, single ended, 0.5 meter	3

7.4 Acceptance

7.4.1 Electrical and mechanical requirements placed on test samples as indicated in section 6.0 shall be established from test data using appropriate statistical techniques. All samples tested in accordance with this product specification shall meet the stated requirements.


7.4.2 Failures attributed to equipment, test set-up, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

7.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequence shall be as shown in Table 2.

7.6 Requalification Testing


If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix, Table 2.

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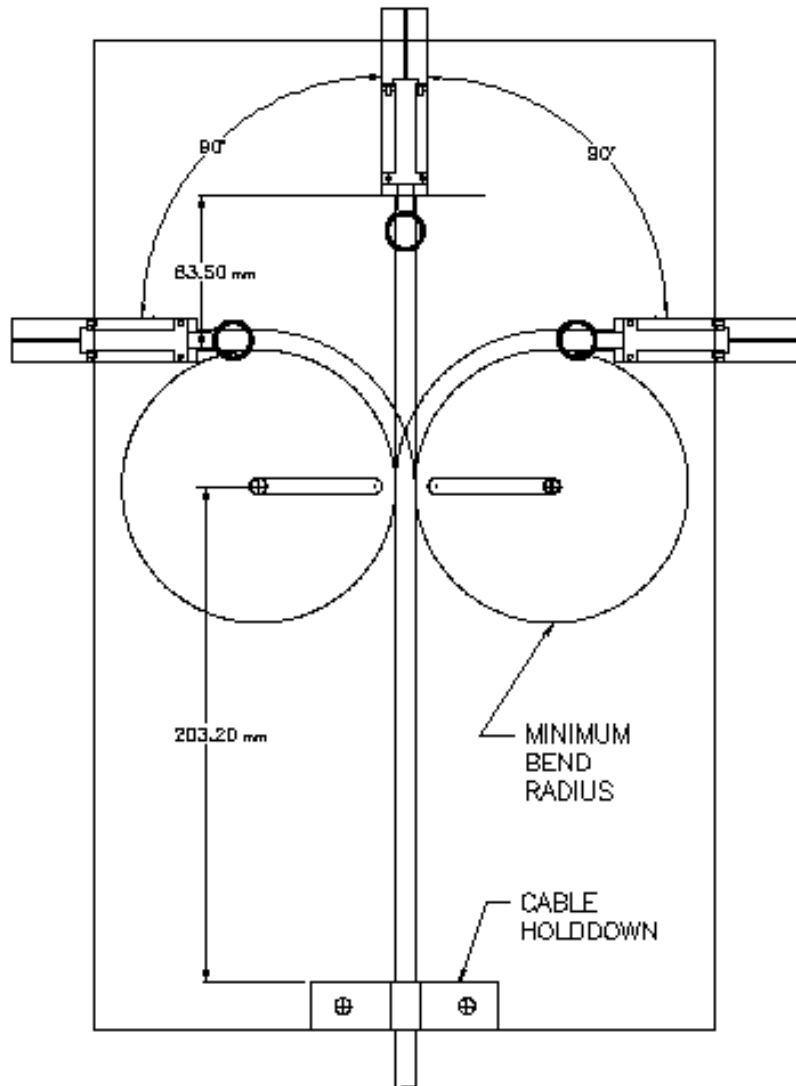
- a. A significant design change is made to the existing product, which impacts the product form, fit or function.
- b. A significant change is made to the manufacturing process, which impacts the product form, fit or function.
- c. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

TABLE 2 - QUALIFICATION TESTING MATRIX


TEST	PARA	TEST GROUP					
		1	2	3	4	5	6
		TEST SEQUENCE					
Examination of Product		1,9	1,4	1,8	1,5	1,11	1,12
LLCR	6.1.1				2,4	2,5,7,9	2,5,7,9,11
Insulation Resistance (IR)	6.1.2			2,6			
Dielectric Withstanding Voltage	6.1.3			3,7			
Differential Impedance	6.1.5	2,4,6,8					
Durability	6.2.1					4	
Pre-conditioning	6.2.2						4
Mechanical Shock	6.2.3					6	
Random Vibration	6.2.4					8	
Mating/Un-mating Force	6.2.5					3,10	3,10
Cable Strain Relief	6.2.6	7					
Wire Flex	6.2.7	5					
Cable Minimum Bend Radius	6.2.8	3					
Unlatching Force	6.2.9		2				
Latch Pull Tab Strength	6.2.10		3				
Thermal Shock	6.3.1			4			
Temperature Life	6.3.2				3		
Humidity Temperate Cycling	6.3.3			5			
Mixed Flowing Gas	6.3.4						6
Thermal Disturbance	6.3.5						8

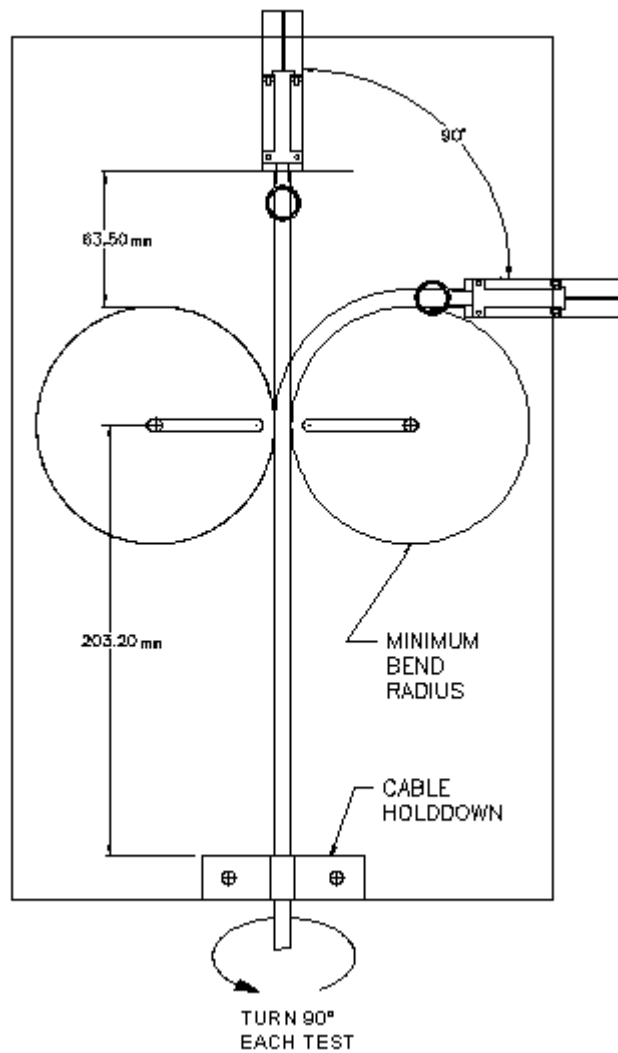
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8.0 GAGES AND FIXTURES




**Figure 1 – Repeated Minimum Bending Radius
(Reference Section 6.2.7)**

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**Figure 2- Single Minimum Bend Test
Reference Section 6.2.8**

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9.0 REVISION RECORD

REV.	PAGE	DESCRIPTION	ECR	DATE
A	All	Release from preliminary	V10-0095	3-8-10
B	All	Changed Section 2.1, Mini SAS Untrained to 2.0 / SATA, Mini SAS Trained to 2.1 Trained, Added Mini SAS 2.1 Untrained and P/N 10114976, Change Guardian from Charlie Gross to Think Nguyen	V10-0384	10-11-10