1.1.1 Cable assembly and backplane specifications

Table 50 defines requirements for internal cable assemblies using SAS Drive connectors and backplanes.

Table 50 –Requirements for internal cable assemblies using SASDrive connectors and backplanes.

Requirement [a, b]	**Units**	**1,5 Gbps**	**3Gbps**	**6 Gbps**
Bulk cable or backplane: [c, d]				
Differential impedance	ohm	100 ± 10		
Maximum differential impedance imbalance [e]	ohm	5		
Common-mode impedance	ohm	32,5 ± 7,5		
Mated connectors: [d, f]				
Differential impedance	ohm	100 ± 15		
Maximum differential impedance imbalance [e]	ohm	5		

a All measurements are made through mated connector pairs

b The equivalent maximum TDR rise time from 20 % to 80 % shall be 70 ps. Filtering may be used to obtain the equivalent rise time. The filter consists of the two-way launch/return path of the test fixture, the two-way launch/return path of the test cable, and the software or hardware filtering of the TDR scope. The equivalent rise time is the rise time of the TDR scope output after application of all filter components. When configuring software or hardware filters of the TDR scope to obtain the equivalent rise time, filtering effects of test cables and test fixtures shall be included.

c The impedance measurement identifies the impedance mismatches present in the bulk cable or backplane when terminated in its characteristic impedance. This measurement excludes mated connectors at both ends of the bulk cable or backplane, when present, but includes any intermediate connectors or splices.

d Where the bulk cable or backplane has an electrical length of > 4 ns the procedure detailed in SFF-8410, or an equivalent procedure, shall be used to determine the impedance.

e The difference in measured impedance to SIGNAL GROUND on the plus and minus terminals on the interconnect, transmitter device, or receiver device, with a differential test signal applied to those terminals.

f The mated connectors measurement applies only to the mated connector pair at each end, as applicable.

Table xx and table xx define the general characteristics and requirements for SAS 6Gbps internal cable assemblies using SAS 4i cable receptacle connectors or Mini SAS 4i cable plug connectors.

Table 51 –General characteristics for 6Gbps internal cable assemblies using SAS 4i or Mini SAS 4i

	Units	6 Gbps
Bulk cable:		
Differential impedance	ohm	100[c]
Mated connectors:		
Differential impedance	ohm	100
Cable Assembly:		
Maximum Insertion Loss	dB	6

Notes:
All measurements are made through mated connector pairs.
The equivalent maximum TDR rise time from 20 % to 80 % shall be 70 ps. Filtering may be used to obtain the equivalent rise time. The filter consists of the two-way launch/return path of the test fixture, the two-way launch/return path of the test cable, and the software or hardware filtering of the TDR scope. The equivalent rise time is the rise time of the TDR scope output after application of all filter components. When configuring software or hardware filters of the TDR scope to obtain the equivalent rise time, filtering effects of test cables and test fixtures shall be included.
The impedance measurement identifies the impedance mismatches present in the bulk cable when terminated in its characteristic impedance.
This measurement excludes mated connectors at both ends of the bulk cable, when present, but includes any intermediate connectors or splices.
Where the bulk cable has an electrical length of > 4 ns, the procedure detailed in SFF-8410, or an equivalent procedure, shall be used to determine the impedance.
The internal cable assembly is part of a TxRx connection that complies with the requirements for intra-enclosure compliance points defined in 5.3.
The range for this frequency domain measurement is 10 MHz to 6 000 MHz.
The far end of the mated cable assembly shall be terminated in its characteristic impedance. Insertion loss variations (i.e., cable length) may change the measurement result.

Table 52 – Requirements for 6Gbps internal cable assemblies using SAS 4i or Mini SAS 4i

Requirements	Fig. #	L (dB)	N (dB)	H (dB)	S (dB/decade)	F_{Min} (MHz)	F_{Max} (GHz)
SCC22 common mode return loss	120	-6,0	-5,0	0	13,3	100	6,0
SDD22 differential return loss	120	-10	-7,9	0	13,3	100	6,0
SCD22 differential to common mode conversion	121	-26	-12,7	-10	13,3	100	6,0
SCD21 differential to common mode conversion		-24	-24	-24	0	100	6.0
Maximum near-end crosstalk for each receive signal pair [a,b,c,d]		-26	-26	-26	0	100	6.0

[a] All measurements are made through mated connector pairs.

[b] Determine all valid aggressor/victim near-end crosstalk transfer modes. Over the complete frequency range of this measurement, determine the sum of the crosstalk transfer ratios, measured in the frequency domain, of all crosstalk transfer modes. To remove unwanted bias due to test fixture noise, magnitudes less than -50 dB (e.g., -60 dB) at all frequencies may be ignored. The following equation details the summation process of the four valid near-end crosstalk sources. All NEXT values expressed in dB format in a passive transfer network shall have negative dB magnitude.

$$\text{TotalNEXT}\, f() = 10 \times \log f() \sum_{1}^{4} 10^{(\text{NEXT}\, (f)/10)}$$

[c] The range for this frequency domain measurement is 10 MHz to 6 000 MHz

[d] Insertion loss variations (i.e., cable length) may change the measurement result.

Table 54 –General Characteristics for external cable assemblies

Characteristics	Units	6 Gbps
Bulk cable:		
Differential impedance	ohm	100
Mated connectors:		
Differential impedance	ohm	100
Cable Assembly:		
Maximum Insertion Loss	dB	**See 5.3.3**

Notes:
All measurements are made through mated connector pairs.
The equivalent maximum TDR rise time from 20 % to 80 % shall be 70 ps. Filtering may be used to obtain the equivalent rise time. The filter consists of the two-way launch/return path of the test fixture, the two-way launch/return path of the test cable, and the software or hardware filtering of the TDR scope. The equivalent rise time is the rise time of the TDR scope output after application of all filter components.
When configuring software or hardware filters of the TDR scope to obtain the equivalent rise time, filtering effects of test cables and test fixtures shall be included.
The impedance measurement identifies the impedance mismatches present in the bulk cable when terminated in its characteristic impedance.
This measurement excludes mated connectors at both ends of the bulk cable, when present, but includes any intermediate connectors or splices.
Where the bulk cable has an electrical length of > 4 ns, the procedure detailed in SFF-8410, or an equivalent procedure, shall be used to determine the impedance.
The internal cable assembly is part of a TxRx connection that complies with the requirements for intra-enclosure compliance points defined in 5.3.
The range for this frequency domain measurement is 10 MHz to 6 000 MHz.
The far end of the mated cable assembly shall be terminated in its characteristic impedance. Insertion loss variations (i.e., cable length) may change the measurement result.

Table 55 – Requirements for external cable assemblies using SAS 4x and Mini SAS 4x

Requirements	Fig. #	L (dB)	N (dB)	H (dB)	S (dB/decade)	F_{Min} (MHz)	F_{Max} (GHz)
SCC22 common mode return loss	120	-6,0	-5,0	0	13,3	100	6,0
SDD22 differential return loss	120	-10	-7,9	0	13,3	100	6,0
SCD22 differential to common mode conversion	121	-26	-12,7	-10	13,3	100	6,0
SCD21 differential to common mode conversion		-24	-24	-24		100	6.0
Maximum near-end crosstalk for each receive signal pair [a,b,c,d]		-26	-26	-26		100	6.0

[a] All measurements are made through mated connector pairs.

[b] Determine all valid aggressor/victim near-end crosstalk transfer modes. Over the complete frequency range of this measurement, determine the sum of the crosstalk transfer ratios, measured in the frequency domain, of all crosstalk transfer modes. To remove unwanted bias due to test fixture noise, magnitudes less than -50 dB (e.g., -60 dB) at all frequencies may be ignored. The following equation details the summation process of the four valid near-end crosstalk sources. All NEXT values expressed in dB format in a passive transfer network shall have negative dB magnitude.

$$\text{TotalNEXT } f() = 10 \times \log f() \sum_{1}^{4} 10^{(\text{NEXT } (f)/10)}$$

[c] The range for this frequency domain measurement is 10 MHz to 6 000 MHz

[d] Insertion loss variations (i.e., cable length) may change the measurement result.