

ISO/IEC 14165-147:2021-02 (E)

Information technology - Fibre channel - Part 147: Physical interfaces - 7 (FC-PI-7)

Contents

Page

- 1 Scope** 1
- 2 Normative references** 1
 - 2.1 General 1
 - 2.2 Normative references 1
 - 2.2.1 Approved references 1
 - 2.2.2 References under development 2
- 3 Definitions and conventions** 3
 - 3.1 Definitions 3
 - 3.2 Editorial conventions 7
 - 3.2.1 Conventions 7
 - 3.2.2 Keywords 8
 - 3.2.3 Abbreviations, acronyms, and symbols 8
 - 3.2.3.1 Acronyms and other abbreviations 9
 - 3.2.3.2 Signaling rate abbreviations 10
- 4 FC-PI-7 functional characteristics** 11
 - 4.1 General characteristics 11
 - 4.2 Compliance test points 11
 - 4.3 FC-0 functions 13
 - 4.3.1 Transmitter functions 13
 - 4.3.2 Receiver functions 13
 - 4.4 Limitations on invalid code 14
 - 4.5 Receiver stabilization time 14
 - 4.6 Loss of signal (Rx_LOS) function 14
 - 4.7 Speed agile ports that support speed negotiation and training 14
 - 4.8 Transmission codes 14
 - 4.9 Frame scrambling and emission lowering protocol 14
 - 4.10 Forward error correction (FEC) 15
 - 4.11 Bit error ratio per link locations and segments 15
 - 4.12 FC-PI-7 variants 16
- 5 Optical interface specification** 17
 - 5.1 TxRx connections 17
 - 5.2 Laser safety issues 17
 - 5.3 Optical signal modulation format 17
 - 5.4 SM data links 18
 - 5.4.1 SM general information 18
 - 5.4.2 SM optical output interface 18
 - 5.4.3 SM optical input interface 18
 - 5.4.4 Transmitter transition time 18
 - 5.4.5 TDECQ Test 18
 - 5.4.6 SECQ Measurement 18
 - 5.4.7 SRS Test 18
 - 5.5 MM data links 20
 - 5.5.1 MM general information 20
 - 5.5.2 MM optical output interface 20
 - 5.5.3 MM optical input interface 20
 - 5.5.4 Transmitter transition time 20
 - 5.5.5 TDECQ Test 21

5.5.6	SECQ Measurement	21
5.5.7	SRS Test	21
5.6	SM Cable Plant	23
5.6.1	Cable plant overview	23
5.6.2	Optical Return Loss	23
5.6.3	Connector and Splices	24
5.7	MM Cable Plant	24
5.7.1	Cable plant overview	24
5.7.2	Optical Return Loss	24
5.7.3	Connector and Splices	24
6	Electrical interface specification - single lane segments	25
6.1	General electrical characteristics	25
6.2	Compliance test point definitions	25
6.2.1	Test method	25
6.2.2	Host test points	26
6.2.3	Module test points	26
6.2.4	Host input calibration point	27
6.2.5	Module input calibration point	28
6.3	Transmitted signal characteristics	29
6.4	Receive signal characteristics	30
6.5	Differential return loss and mode conversion requirements	31
6.5.1	Differential return loss	31
6.5.2	Common to differential-mode and differential to common-mode conversion	31
7	Backplane variant, 64GFC-EA	33
7.1	TxRx Connections	33
7.2	Test Fixtures	33
7.3	Transmitter specification	35
7.4	Receiver specification	37
7.4.1	Receiver input return loss	37
7.4.2	Receiver interference tolerance	38
7.4.3	Receiver jitter tolerance	39
7.5	Channel Specification	39
7.5.1	Channel Operating Margin	39
7.5.2	Channel Return Loss	41
7.5.3	Channel AC coupling	41
Annex A (informative)		
	Optical cable plant usage	42
Annex B (informative)		
	Structured cabling environment	44
B.1	Specification of operating distances	44
B.2	Alternate connection loss operating distances	44
Annex C (informative)		
	Electrical channel	45

List of Tables

Table 1 - ISO convention	7
Table 2 - Acronyms and other abbreviations	9
Table 3 - Signaling rate abbreviations	10
Table 4 - BER per link Location / Segment	15
Table 5 - Fibre Channel Variants in FC-PI-7	16
Table 6 - Single-mode link parameters (OS2)	19
Table 7 - Multimode link parameters	22
Table 8 - Maximum value of each discrete reflectance	23
Table 9 - General electrical characteristics	25
Table 10 - Transmitter compliance requirements at nominal signal rate of 28 900 MBd	29
Table 11 - Receiver compliance requirements	30
Table 12 - Transmitter electrical specifications at A	35
Table 13 - Summary of receiver characteristics at test point D	37
Table 14 - Receiver interference tolerance parameters	39
Table 15 - Receiver jitter tolerance parameters	39
Table 16 - Channel Operating Margin (COM) parameters	40
Table A.1 - Worst case (nominal bandwidth) multimode cable link power budget	42
Table A.2 - Worst-case single mode cable link power budget	43
Table B.1 - 64GFC-SW (MM) and 64GFC-LW (SM) max operating distance & loss budget for different connection losses	44
Table C.1 - Informative host to module channel characteristics, high loss channel	45

List of Figures

Figure 1 - Fibre Channel hierarchy	12
Figure 2 - Compliance points for 64GFC PMDs	13
Figure 3 - BER per Section	15
Figure 4 - Optical Eye Diagram of a PAM4 Signal	17
Figure 5 - Host Compliance Board	26
Figure 6 - Module Compliance Board	27
Figure 7 - Host input calibration point C"	27
Figure 8 - Module input calibration point B"	28
Figure 9 - SDD11 and SDD22 for all compliance points	31
Figure 10 - SDC22 for transmitter output and SCD11 for receiver input	32
Figure 11 - Test fixture and test points	33
Figure 12 - Test fixture reference insertion loss	34
Figure 13 - Test fixture differential return loss	34
Figure 14 - Transmitter and receiver differential return loss limit	36
Figure 15 - Transmitter common-mode return loss	37
Figure 16 - Receiver differential to common-mode return loss limit	38
Figure 17 - Channel return loss limit	41
Figure C.1 - Typical FC-PI-7 electrical channel construction	45
Figure C.2 - FC-PI-7 full channel electrical reference model, high loss channel	45