

अनिवार्य आवश्यकताएँ

संख्या : TEC14761911

Essential Requirements

ER No. : TEC14761911

PON Family of Broadband Equipment

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Government of India

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Essential Requirements for:

PON Family of Broadband Equipment

Certification Scheme: **GCS**

Product Fee Group: **B**

This ER covers equipment used in all types of PON Systems

Note: Annexures referred to in this ER are Annexures as mentioned in "Annexures to ERs" No. TEC/SD/DD/TCP-222/02/June19 as updated from time to time and available on MTCTE portal.

This product has the following variants:

1. PON ONT
2. PON ONU
3. PON OLT

1. Variant 1 : PON ONT

1.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
1.1.1	Conducted And Radiated Emission - Class B	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
1.1.2	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
1.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
1.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
1.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B

1.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
1.1.7	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
1.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
1.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
1.1.10	Dual IP Layer Operation RFC 4213 - Address	RFC 4213 Cl. 2.1. Annex-P6
1.1.11	Dual IP Layer Operation RFC 4213 - DNS	RFC 4213 Cl. 2.1. Annex-P6
1.1.12	IPV4 Parameters Set-A	RFC 791. Annex-P6
1.1.13	IPV6 Extn Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
1.1.14	IPV6 Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
1.1.15	MAC Address Limitation in PON	IEEE 802.3. Annex-J3
1.1.16	Over Voltage Current Protection on 2W	K.21. Annex-D
1.1.17	Password Based Authentication in PON	ITU-T G.984.3 section 9.2.2 12. Annex-J3

1.2 Interface 1 : EPON

S.No.	Parameter Name	Standard Name
1.2.1	Line Test for EPON Int	IEEE 802.3ah. Annex-J3
1.2.2	Operating Wavelength Recv for EPON Int	IEEE 802.3ah. Annex-J2
1.2.3	Operating Wavelength Trans for EPON Int	IEEE 802.3ah. Annex-J2
1.2.4	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
1.2.5	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
1.2.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
1.2.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
1.2.8	Throughput for EPON Int	RFC 2544. Annex-J3

1.3 Interface 2 : GPON

S.No.	Parameter Name	Standard Name
1.3.1	Line Test for GPON Int	IEEE 802.3ah. Annex-J3
1.3.2	Operating Wavelength Recv for GPON Int	G.984.2. Annex-J2

1.3.3	Operating Wavelength Trans for GPON Int	G.984.2. Annex-J2
1.3.4	Opt Output Power for GPON Int at OLT	G.984.2. Annex-J2
1.3.5	Opt Output Power for GPON Int at ONT	G.984.2. Annex-J2
1.3.6	Protocol Test for GPON Int	Ethernet over GEM G.984.2. Annex-J3
1.3.7	Receiver Sensitivity for GPON Int at OLT	G.984.2. Annex-J2
1.3.8	Receiver Sensitivity for GPON Int at ONT	G.984.2. Annex-J2
1.3.9	Throughput for GPON Int	G.984.1 RFC 2544. Annex-J3

1.4 Interface 3 : NGPON2

S.No.	Parameter Name	Standard Name
1.4.1	Line Test for NGPON2 Int	IEEE 802.3ah. Annex-J3
1.4.2	Operating Wavelength Recv NGPON2 Int	G.989.2. Annex-J2
1.4.3	Operating Wavelength Trans NGPON2 Int	G.989.2. Annex-J2
1.4.4	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
1.4.5	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
1.4.6	Protocol Test for NGPON2 Int	G.989.2 RFC 2544. Annex-J3
1.4.7	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
1.4.8	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
1.4.9	Throughput for NGPON2 Int	G.989.2. Annex-J3

1.5 Interface 4 : WDMPON

S.No.	Parameter Name	Standard Name
1.5.1	Line Test for WDMPON Int	IEEE 802.3ah. Annex-J3
1.5.2	Operating Wavelength Recv WDMPON Int	G.694.1. Annex-J2
1.5.3	Operating Wavelength Trans WDMPON Int	G.694.1. Annex-J2
1.5.4	Opt Output Power WDMPON Int at OLT	G.694.1. Annex-J2
1.5.5	Opt Output Power WDMPON Int at ONT	G.694.1. Annex-J2
1.5.6	Protocol test for WDMPON Int	G.698.3. Annex-J3
1.5.7	Receiver Sensitivity WDMPON Int at OLT	G.694.1. Annex-J2
1.5.8	Receiver Sensitivity WDMPON Int at ONT	G.694.1. Annex-J2
1.5.9	Throughput for WDMPON Int	RFC 2544. Annex-J3

1.6 Interface 5 : XGPON

S.No.	Parameter Name	Standard Name
1.6.1	Line test for XGPON Int	IEEE 802.3ah. Annex-J3
1.6.2	Operating Wavelength Recv for XGPON Int	G.987.2. Annex-J2
1.6.3	Operating Wavelength Trans for XGPON Int	G.987.2. Annex-J2
1.6.4	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
1.6.5	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2
1.6.6	Protocol test for XGPON Int	G.987.2 XGEM. Annex-J3
1.6.7	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
1.6.8	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
1.6.9	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

1.7 Interface 6 : XGSPON

S.No.	Parameter Name	Standard Name
1.7.1	Line Test for XGSPON Int	IEEE 802.3ah. Annex-J3
1.7.2	Operating Wavelength Recv XGSPON Int	G.9807.1. Annex-J2
1.7.3	Operating Wavelength Trans XGSPON Int	G.9807.1. Annex-J2
1.7.4	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
1.7.5	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
1.7.6	Protocol Test for XGSPON Int	G.9807.1 XGEM. Annex-J3
1.7.7	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
1.7.8	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
1.7.9	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3

1.8 Interface 7 : 2 Wire

S.No.	Parameter Name	Standard Name
1.8.1	Idle State Current for 2 wire Int	ETSI EN 300 001 ETSI TBR-21 Cl. 4.4.1. Annex-D
1.8.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
1.8.3	Longitudinal Conversion Loss for 2W Int	Q.552 Cl. 2.2.2. Annex-D
1.8.4	Maximum Loop Current for 2W Int	ETSI EN 300 001 ETSI TBR-21 Cl.4.4.3.

		Annex-D
1.8.5	Return Loss for 2W Int	Q.552 Cl. 2.2.1.2. Annex-D

1.9 Interface 8 : 10 100 1000 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
1.9.1	Link Speed and Autonegotiation Test GE	IEEE 802.3. Annex-H

1.10 Interface 9 : 10 100 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
1.10.1	Link Speed and Autonegotiation Test FE	IEEE 802.3 Annex-H

1.11 Interface 10 : 10 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
1.11.1	Link Speed	IEEE 802.3 Annex-H

1.12 Interface 11 : WiFi

S.No.	Parameter Name	Standard Name
1.12.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
1.12.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
1.12.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
1.12.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E), 1048(E). Annex-G1

1.13 Interface 12 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
1.13.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
1.13.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
1.13.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
1.13.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I

1.13.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I
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2. Variant 2 : PON ONU

2.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
2.1.1	Conducted And Radiated Emission - Class B	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
2.1.2	Immunity to AC Voltage Dips and Short Interruptions	TEC EMI EMC Standard EN/IEC:61000-4-11. Annex-B
2.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
2.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
2.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
2.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
2.1.7	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
2.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
2.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
2.1.10	DOS Prevention SSH v1-2 for CLI in PON	ITU-T G.984.3 section V.2 SSH v2 RFC 4251. Annex-J3
2.1.11	Dual IP Layer Operation RFC 4213 - Address	RFC 4213 Cl. 2.1. Annex-P6
2.1.12	Dual IP Layer Operation RFC 4213 - DNS	RFC 4213 Cl. 2.1. Annex-P6
2.1.13	IPV4 Parameters Set-A	RFC 791. Annex-P6
2.1.14	IPV6 Extn Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
2.1.15	IPV6 Header Parameters	RFC 2460 / RFC 8200 . Annex-P7
2.1.16	MAC Address Limitation in PON	IEEE 802.3. Annex-J3
2.1.17	MAC Based 802.1x Authentication in PON	IEEE 802.1x. Annex-J3

2.1.18	Over Voltage Current Protection on 2W	K.21. Annex-D
2.1.19	Password Based Authentication in PON	ITU-T G.984.3 section 9.2.2 12. Annex-J3

2.2 Interface 1 : ADSL

S.No.	Parameter Name	Standard Name
2.2.1	Bit Rate for ADSL Int	ANSI.T1.413-2. Annex-J1
2.2.2	Impulse Noise Protection for ADSL Int	Annex-J1
2.2.3	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
2.2.4	Insulation Test for ADSL Int	Annex-J1
2.2.5	Line Port impedance for ADSLx Int	Annex-J1
2.2.6	Loop resistance for ADSLx	ETSI EN 300 001. Annex-J1
2.2.7	PSD for ADSL Int	G.992.3 G992.5. Annex-J1
2.2.8	Transmitted Power At ATU-C for ADSLx Int	Annex-J1

2.3 Interface 2 : EPON

S.No.	Parameter Name	Standard Name
2.3.1	Line Test for EPON Int	IEEE 802.3ah. Annex-J3
2.3.2	Operating Wavelength Recv for EPON Int	IEEE 802.3ah. Annex-J2
2.3.3	Operating Wavelength Trans for EPON Int	IEEE 802.3ah. Annex-J2
2.3.4	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
2.3.5	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
2.3.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
2.3.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
2.3.8	Throughput for EPON Int	RFC 2544. Annex-J3

2.4 Interface 3 : G.FAST

S.No.	Parameter Name	Standard Name
2.4.1	Impulse Noise Protection for G.FAST Int	Annex-J1
2.4.2	Insulation Test for G.FAST Int	Annex-J1
2.4.3	Loop Resistance for G.FAST IntSLx	EN 300 001. Annex-J1
2.4.4	PPPoE for G.FAST Int	RFC 2516. Annex-J1
2.4.5	Profiles for G.FAST Int	G.9700. Annex-J1

2.4.6	PVC Support for G.FAST Int	Annex-J1
2.4.7	Throughput Test for G.FAST Int	Annex-J1
2.4.8	VPI-VCI Support for G.FAST Int	Annex-J1

2.5 Interface 4 : G.HN

S.No.	Parameter Name	Standard Name
2.5.1	Profiles for G.HN Int	G.9960 Cl. 6. Annex-J1
2.5.2	PSD for G.HN	G.9964. Annex-J1

2.6 Interface 5 : GPON

S.No.	Parameter Name	Standard Name
2.6.1	Line Test for GPON Int	IEEE 802.3ah. Annex-J3
2.6.2	Operating Wavelength Recv for GPON Int	G.984.2. Annex-J2
2.6.3	Operating Wavelength Trans for GPON Int	G.984.2. Annex-J2
2.6.4	Opt Output Power for GPON Int at OLT	G.984.2. Annex-J2
2.6.5	Opt Output Power for GPON Int at ONT	G.984.2. Annex-J2
2.6.6	Protocol Test for GPON Int	Ethernet over GEM G.984.2. Annex-J3
2.6.7	Receiver Sensitivity for GPON Int at OLT	G.984.2. Annex-J2
2.6.8	Receiver Sensitivity for GPON Int at ONT	G.984.2. Annex-J2
2.6.9	Throughput for GPON Int	G.984.1 RFC 2544. Annex-J3

2.7 Interface 6 : NGPON2

S.No.	Parameter Name	Standard Name
2.7.1	Line Test for NGPON2 Int	IEEE 802.3ah. Annex-J3
2.7.2	Operating Wavelength Recv NGPON2 Int	G.989.2. Annex-J2
2.7.3	Operating Wavelength Trans NGPON2 Int	G.989.2. Annex-J2
2.7.4	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
2.7.5	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
2.7.6	Protocol Test for NGPON2 Int	G.989.2 RFC 2544. Annex-J3
2.7.7	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
2.7.8	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
2.7.9	Throughput for NGPON2 Int	G.989.2. Annex-J3

2.8 Interface 7 : VDSL

S.No.	Parameter Name	Standard Name
2.8.1	Bit Rate for VDSLx Int	G.993.1 and G993.2. Annex-J1
2.8.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
2.8.3	Line Port impedance for VDSLx Int	Annex-J1
2.8.4	Loop resistance for VDSLx	ETSI EN 300 001. Annex-J1
2.8.5	Profiles for VDSLx	G.993.2(cl 7.2). Annex-J1
2.8.6	PSD for VDSLx Int	G.993.1(cl 6.2). G.993.2(cl 7.2) Ann-A B C. Annex-J1
2.8.7	Return Loss for VDSLx	G.993.1 Cl. 6.5. Annex-J1
2.8.8	Transmitted Power At ATU-C for VDSLx Int	Annex-J1

2.9 Interface 8 : WDMPON

S.No.	Parameter Name	Standard Name
2.9.1	Line Test for WDMPON Int	IEEE 802.3ah. Annex-J3
2.9.2	Operating Wavelength Recv WDMPON Int	G.694.1. Annex-J2
2.9.3	Operating Wavelength Trans WDMPON Int	G.694.1. Annex-J2
2.9.4	Opt Output Power WDMPON Int at OLT	G.694.1. Annex-J2
2.9.5	Opt Output Power WDMPON Int at ONT	G.694.1. Annex-J2
2.9.6	Protocol test for WDMPON Int	G.698.3. Annex-J3
2.9.7	Receiver Sensitivity WDMPON Int at OLT	G.694.1. Annex-J2
2.9.8	Receiver Sensitivity WDMPON Int at ONT	G.694.1. Annex-J2
2.9.9	Throughput for WDMPON Int	RFC 2544. Annex-J3

2.10 Interface 9 : XGPON

S.No.	Parameter Name	Standard Name
2.10.1	Line test for XGPON Int	IEEE 802.3ah. Annex-J3
2.10.2	Operating Wavelength Recv for XGPON Int	G.987.2. Annex-J2
2.10.3	Operating Wavelength Trans for XGPON Int	G.987.2. Annex-J2
2.10.4	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
2.10.5	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2

2.10.6	Protocol test for XGPON Int	G.987.2 XGEM. Annex-J3
2.10.7	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
2.10.8	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
2.10.9	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

2.11 Interface 10 : XGSPON

S.No.	Parameter Name	Standard Name
2.11.1	Line Test for XGSPON Int	IEEE 802.3ah. Annex-J3
2.11.2	Operating Wavelength Recv XGSPON Int	G.9807.1. Annex-J2
2.11.3	Operating Wavelength Trans XGSPON Int	G.9807.1. Annex-J2
2.11.4	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
2.11.5	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
2.11.6	Protocol Test for XGSPON Int	G.9807.1 XGEM. Annex-J3
2.11.7	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
2.11.8	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
2.11.9	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3

2.12 Interface 11 : 2 Wire

S.No.	Parameter Name	Standard Name
2.12.1	Idle State Current for 2 wire Int	ETSI EN 300 001 ETSI TBR-21 Cl. 4.4.1. Annex-D
2.12.2	Insulation Test for 2 wire Int	ETSI EN 300 001. Annex-D
2.12.3	Longitudinal Conversion Loss for 2W Int	Q.552 Cl. 2.2.2. Annex-D
2.12.4	Maximum Loop Current for 2W Int	ETSI EN 300 001 ETSI TBR-21 Cl.4.4.3. Annex-D
2.12.5	Return Loss for 2W Int	Q.552 Cl. 2.2.1.2. Annex-D

2.13 Interface 12 : 10 100 1000 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.13.1	Link Speed and Autonegotiation Test GE	IEEE 802.3. Annex-H

2.14 Interface 13 : 10 100 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.14.1	Link Speed and Autonegotiation Test FE	IEEE 802.3 Annex-H

2.15 Interface 14 : 10 BASE-T Ethernet

S.No.	Parameter Name	Standard Name
2.15.1	Link Speed	IEEE 802.3 Annex-H

2.16 Interface 15 : WiFi

S.No.	Parameter Name	Standard Name
2.16.1	2.4 GHz WiFi Radio Conformance	ETSI EN 300 328 or FCC CFR47 pt 15.247 or FCC CFR47 pt 15.249. Annex-G3
2.16.2	5 GHz WiFi Radio Conformance	ETSI EN 301 893 or FCC CFR47 pt 15.407 or FCC CFR47 pt 15.249. Annex-G3
2.16.3	EIRP for Wifi Interface	Latest NFAP and GSRs issued by DoT WPC. Annex-G2
2.16.4	Frequency for WiFi equipments	DoT WPC GSR No. 45(E), 1048(E). Annex-G1

2.17 Interface 16 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
2.17.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
2.17.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
2.17.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
2.17.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
2.17.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

3. Variant 3 : PON OLT

3.1 Parameters Linked with Product Variant

S.No.	Parameter Name	Standard Name
3.1.1	Conducted And Radiated Emission - Class B	TEC EMI EMC Standard CISPR 22/32 EN55022/32. Annex-B
3.1.2	Immunity to AC Voltage Dips and Short	TEC EMI EMC Standard EN/IEC:61000-4-

	Interruptions	11. Annex-B
3.1.3	Immunity to DC Voltage Dips and Short Interruptions	EN/IEC:61000-4-29. Annex-B
3.1.4	Immunity to Electrostatic Discharge	TEC EMI EMC Standard EN/IEC:61000-4-2. Annex-B
3.1.5	Immunity to Fast Transients (Burst)	TEC EMI EMC Standard EN/IEC:61000-4-4. Annex-B
3.1.6	Immunity to Radiated RF	TEC EMI EMC Standard EN/IEC:61000-4-3. Annex-B
3.1.7	Immunity to RF Field Induced Conducted Disturbance	TEC EMI EMC Standard EN/IEC:61000-4-6. Annex-B
3.1.8	Immunity to Surges	TEC EMI EMC Standard EN/IEC:61000-4-5. Annex-B
3.1.9	IT Equipment Safety	IS 13252-1 or IEC:60950-1 or IEC 62368-1. Annex-A1
3.1.10	Frameloss of PON	RFC 2544. Annex-J3
3.1.11	Latency of PON	RFC 2544. Annex-J3
3.1.12	MAC Address Learning and Aging Control	G.984.1. Annex-J3
3.1.13	MAC Learning Support at OLT	G.984.1. Annex-J3
3.1.14	Maximum Bandwidth Limiting in PON	ITU-T-REC-G.984.3-200803 Section 7.5. Annex-J3
3.1.15	Minimum Guaranteed Bandwidth in PON	ITU-T-REC-G.984.3-200803 Section 7.5. Annex-J3
3.1.16	Minimum Two Classification in PON	ITU-T-REC-G.984.3-200803 Section 7.5. Annex-J3
3.1.17	Port-id Based VLAN Support at OLT	G.984.1 IEEE 802.1Q(testing procedure). Annex-J3
3.1.18	Switch Fabric Throughput Capability OLT	G.984.1. Annex-J3
3.1.19	Throughput of PON	RFC 2544. Annex-J3
3.1.20	VLAN Stacking to Network Support at OLT	G.984.1 IEEE 802.1Q(testing procedure). Annex-J3

3.2 Interface 1 : EPON

S.No.	Parameter Name	Standard Name
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3.2.1	Line Test for EPON Int	IEEE 802.3ah. Annex-J3
3.2.2	Operating Wavelength Recv for EPON Int	IEEE 802.3ah. Annex-J2
3.2.3	Operating Wavelength Trans for EPON Int	IEEE 802.3ah. Annex-J2
3.2.4	Opt Output Power for EPON Int at OLT	IEEE 802.3ah. Annex-J2
3.2.5	Opt Output Power for EPON Int at ONT	IEEE 802.3ah. Annex-J2
3.2.6	Receiver Sensitivity for EPON Int at OLT	IEEE 802.3ah. Annex-J2
3.2.7	Receiver Sensitivity for EPON Int at ONT	IEEE 802.3ah. Annex-J2
3.2.8	Throughput for EPON Int	RFC 2544. Annex-J3

3.3 Interface 2 : GPON

S.No.	Parameter Name	Standard Name
3.3.1	Line Test for GPON Int	IEEE 802.3ah. Annex-J3
3.3.2	Operating Wavelength Recv for GPON Int	G.984.2. Annex-J2
3.3.3	Operating Wavelength Trans for GPON Int	G.984.2. Annex-J2
3.3.4	Opt Output Power for GPON Int at OLT	G.984.2. Annex-J2
3.3.5	Opt Output Power for GPON Int at ONT	G.984.2. Annex-J2
3.3.6	Protocol Test for GPON Int	Ethernet over GEM G.984.2. Annex-J3
3.3.7	Receiver Sensitivity for GPON Int at OLT	G.984.2. Annex-J2
3.3.8	Receiver Sensitivity for GPON Int at ONT	G.984.2. Annex-J2
3.3.9	Throughput for GPON Int	G.984.1 RFC 2544. Annex-J3

3.4 Interface 3 : NGPON2

S.No.	Parameter Name	Standard Name
3.4.1	Line Test for NGPON2 Int	IEEE 802.3ah. Annex-J3
3.4.2	Operating Wavelength Recv NGPON2 Int	G.989.2. Annex-J2
3.4.3	Operating Wavelength Trans NGPON2 Int	G.989.2. Annex-J2
3.4.4	Opt Output Power NGPON2 Int at OLT	G.989.2. Annex-J2
3.4.5	Opt Output Power NGPON2 Int at ONT	G.989.2. Annex-J2
3.4.6	Protocol Test for NGPON2 Int	G.989.2 RFC 2544. Annex-J3
3.4.7	Receiver Sensitivity NGPON2 Int at OLT	G.989.2. Annex-J2
3.4.8	Receiver Sensitivity NGPON2 Int at ONT	G.989.2. Annex-J2
3.4.9	Throughput for NGPON2 Int	G.989.2. Annex-J3

3.5 Interface 4 : RF Video

S.No.	Parameter Name	Standard Name
3.5.1	RF Video Output Bandwidth	52 + 870 MHz. - 870 MHz. Annex-J2
3.5.2	RF Video Output Level	14 dBmV. Annex-J2
3.5.3	RF Video Output Tilt	0 dB. Annex-J2

3.6 Interface 5 : WDM PON

S.No.	Parameter Name	Standard Name
3.6.1	Line Test for WDM PON Int	IEEE 802.3ah. Annex-J3
3.6.2	Operating Wavelength Recv WDM PON Int	G.694.1. Annex-J2
3.6.3	Operating Wavelength Trans WDM PON Int	G.694.1. Annex-J2
3.6.4	Opt Output Power WDM PON Int at OLT	G.694.1. Annex-J2
3.6.5	Opt Output Power WDM PON Int at ONT	G.694.1. Annex-J2
3.6.6	Protocol test for WDM PON Int	G.698.3. Annex-J3
3.6.7	Receiver Sensitivity WDM PON Int at OLT	G.694.1. Annex-J2
3.6.8	Receiver Sensitivity WDM PON Int at ONT	G.694.1. Annex-J2
3.6.9	Throughput for WDM PON Int	RFC 2544. Annex-J3

3.7 Interface 6 : XGPON

S.No.	Parameter Name	Standard Name
3.7.1	Line test for XGPON Int	IEEE 802.3ah. Annex-J3
3.7.2	Operating Wavelength Recv for XGPON Int	G.987.2. Annex-J2
3.7.3	Operating Wavelength Trans for XGPON Int	G.987.2. Annex-J2
3.7.4	Opt Output Power XGPON Int at OLT	G.987.2. Annex-J2
3.7.5	Opt Output Power XGPON Int at ONT	G.987.2. Annex-J2
3.7.6	Protocol test for XGPON Int	G.987.2 XGEM. Annex-J3
3.7.7	Receiver Sensitivity XGPON Int at OLT	G.987.2. Annex-J2
3.7.8	Receiver Sensitivity XGPON Int at ONT	G.987.2. Annex-J2
3.7.9	Throughput for XGPON Int	G.987.1 RFC 2544. Annex-J3

3.8 Interface 7 : XGSPON

S.No.	Parameter Name	Standard Name
3.8.1	Line Test for XGSPON Int	IEEE 802.3ah. Annex-J3
3.8.2	Operating Wavelength Recv XGSPON Int	G.9807.1. Annex-J2
3.8.3	Operating Wavelength Trans XGSPON Int	G.9807.1. Annex-J2
3.8.4	Opt Output Power XGSPON Int at OLT	G.9807.1. Annex-J2
3.8.5	Opt Output Power XGSPON Int at ONT	G.9807.1. Annex-J2
3.8.6	Protocol Test for XGSPON Int	G.9807.1 XGEM. Annex-J3
3.8.7	Receiver Sensitivity XGSPON Int at OLT	G.9807.1. Annex-J2
3.8.8	Receiver Sensitivity XGSPON Int at ONT	G.9807.1. Annex-J2
3.8.9	Throughput for XGSPON Int	G.9807.1 RFC 2544. Annex-J3

3.9 Interface 8 : 1 G Optical Ethernet

S.No.	Parameter Name	Standard Name
3.9.1	Average Launch power for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
3.9.2	Receiver Sensitivity 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H
3.9.3	Wavelength for 1 GE Opt	IEEE 802.3z Cl. 38. Annex-H

3.10 Interface 9 : 10 G Optical Ethernet

S.No.	Parameter Name	Standard Name
3.10.1	Average Launch power for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
3.10.2	Receiver Sensitivity 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H
3.10.3	Wavelength for 10 GE Opt	IEEE 802.3ae Cl. 52. Annex-H

3.11 Interface 10 : 2 Mbps - E1

S.No.	Parameter Name	Standard Name
3.11.1	Input Jitter Tolerance for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.11.2	Input Return Loss for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.3.1. Annex-I
3.11.3	Nominal Bit Rate with Tolerance for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.3. Annex-I
3.11.4	Output Jitter for 2 Mbps Int	ITU-T G.823 / ETSI TBR-4. Annex-I
3.11.5	Pulse Mask for 2 Mbps Int	ITU-T G.703 / ETSI TBR-4 Cl. 9.2.1. Annex-I

3.12 Interface 11 : STM-1 Optical

S.No.	Parameter Name	Standard Name
3.12.1	Input Jitter Tolerance for STM-1 Opt	ITU-T G.825. Annex-K
3.12.2	Mean Launched Power for STM-1 Opt Int	ITU-T G.957. Annex-K
3.12.3	Nominal Bit Rate with Tolerance STM-1 Opt Int	ITU-T G.957. Annex-K
3.12.4	Operating Wavelength Range for STM-1 Opt Int	ITU-T G.957. Annex-K
3.12.5	Output Jitter for STM-1 Opt Int	ITU-T G.783 G.825 Annex-K
3.12.6	Receiver Overload for STM-1 Opt Int	ITU-T G.957. Annex-K
3.12.7	Receiver Sensitivity for STM-1 Opt Int	ITU-T G.957. Annex-K