

TBD specs of 100G BR20

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999.5.4 PMD global signal detect function

Table 999-4—SIGNAL_DETECT value definition

Receive conditions	SIGNAL_DETECT value
Average optical power at TP3 \leq TBD dBm -20	FAIL
[(Optical power at TP3 average receive power (min) Table 999-7) AND (compliant 100GBASE-BRx signal input)]	OK
All other conditions	Unspecified

References:

	Value (dBm)	Average receive power (min)
Clause 140	-15	-5.9(100G DR) -7.1(100G FR1) -8.2(100G LR1)
Clause 160	-20	-10.8(50G BR10) -17.6(50G BR20/40)
Clause 999	TBD	-8.2(100G BR10) -15.3(100G BR40)
3dk_takahara_2404_1a	-15	/
3dk_jackson_2406_1	-20	/

999.6 PMD to MDI optical specifications for 100GBASE-BRx

Table 999–6—100GBASE-BRx transmit characteristics

Description	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	Unit	BR20 justification
Signaling rate (range)	53.125 ± 100 ppm			GBd	
Modulation format	PAM4			—	
100GBASE-BRx-D center wavelengths (range)	1308.1 to 1310.1			nm	
100GBASE-BRx-U center wavelengths (range)	1303.6 to 1305.6			nm	
Side-mode suppression ratio (SMSR), (min)	30	30	30	dB	Consistent with other IEEE standards (802.3cu, 802.3cp)
Average launch power (max)	4.8	-0.2	8.5	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Average launch power ^a (min)	-1.9	-5.3	2.7	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Outer Optical Modulation Amplitude (OMA _{outer}) (max)	5	0	8.7	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Outer Optical Modulation Amplitude (OMA _{outer}) (min) ^b : for TDECQ < 1.4 dB for 1.4 dB ≤ TDECQ ≤ 3.4 dB	1.1 -0.3 + TDECQ	-2.3 -3.7+TDECQ	5.7 4.3 + TDECQ	dBm dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	3.4	3.4	3.9	dB	From G.9806 Amd.3 (Class S _L 0~10dB)
TECQ (max)	3.4	3.4	3.9	dB	TECQ max= TDECQ max
TDECQ – TECQ (max)	2.5	2.5	2.7	dB	From G.9806 Amd.3 (Class S _L 0~10dB)
Transmitter over/under -shoot (max)	22	22	22	%	Same as P802.3cu, 100Gb/s per wavelength
Transmitter power excursion (max)	2.8	3.9	TBD	dBm	From 3dk_Effenberger_2309_1
Average launch power of OFF transmitter (max)	-15	-20	-15	dBm	Consistent with 802.3cp (50G BR20), G.9806 Amd.3 (Class S _L 0~10dB)
Extinction ratio (min)	3.5	5.0	5.0	dB	From 3dk_Effenberger_2309_1, G.9806 Amd.3 (Class S _L 0~10dB)

999.6 PMD to MDI optical specifications for 100GBASE-BRx

Table 999-6—100GBASE-BRx transmit characteristics (continued)

Description	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	Unit
Transmitter transition time (max)	17	17	17	ps
RIN _x OMA (max) ^c	-136	-136	-136	dB/Hz
Optical return loss tolerance (max)	15.6	15	15.6	dB
Transmitter reflectance ^d (max)	-26	-26	-26	dB

^a Average launch power (min) is not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
^b The OMA_{outer} (min) requirement holds even if the TDECQ < 1.4 dB. Even though the representation of the OMA_{outer} requirement is different from that in Clause 139, they are consistent.
^c In RIN_xOMA, “x” is the optical return loss tolerance (max) for the PHY under test.
^d Transmitter reflectance is defined looking into the transmitter.

BR20 justification
Consistent with IEEE 802.3cu
Consistent with IEEE 802.3cu
Consistent with IEEE 802.3cp (50G BR20)
Consistent with other IEEE standards (802.3cu, 802.3cp)

999.6 PMD to MDI optical specifications for 100GBASE-BRx

Table 999–7—100GBASE-BRx receive characteristics

Description	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	Unit	BR20 justification
Signaling rate (range)	53.125 ± 100 ppm			GBd	
Modulation format	PAM4			—	
100GBASE-BRx-D center wavelengths (range)	1303.6 to 1305.6			nm	
100GBASE-BRx-U center wavelengths (range)	1308.1 to 1310.1			nm	
Damage threshold ^a	5.8	1.0	TBD	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Average receive power (max)	4.8	-0.2	TBD	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Average receive power ^b (min)	-8.2	-15.3	-15.3	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Receive power (OMA _{outer}) (max)	5	0	TBD	dBm	From 3dk_effenberger_2401_1, 3dk_effenberger_2403_1
Receiver reflectance (max)	-26	-26	-26	dB	Consistent with other IEEE standards (802.3cu, 802.3cp)
Receiver sensitivity (OMA _{outer}) ^c (max) for TECQ < 1.4 dB for 1.4 dB ≤ TECQ ≤ 3.4 dB	-6.1 -7.5 + TECQ	TBD	-12.8 -14.2 + TECQ	dBm dBm	To be aligned with BR40
Stressed receiver sensitivity (OMA _{outer}) ^d (max)	-4.1	TBD	TBD	dBm	To be aligned with BR40
Conditions of stressed receiver sensitivity test: ^e					
Stressed eye closure for PAM4 (SECQ)	3.4	3.4	3.9	dB	SECQ=TECQ

999.6 PMD to MDI optical specifications for 100GBASE-BRx

Table 999–8—100GBASE-BRx illustrative link power budgets

Parameter	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	Unit
Power budget (for maximum TDECQ)	10.6	13.9	22.4	dB
Operating distance	10	20	40	km
Channel insertion loss	6.3 ^a	10 ^a	18 ^a	dB
Maximum discrete reflectance	-35	-35	-35	dB
Allocation for penalties ^b (for maximum TDECQ)	4.3	3.9	4.4	dB

BR20 justification
= IL + TDECQ + (MPI+DGD) = 10+3.4+0.5=13.9
Consistent with IEEE 802.3cu
= TDECQ + (MPI+DGD) = 3.4+0.5

^a The channel insertion loss is calculated using the maximum distance specified in Table 999–5 for 100GBASE-BR10, ~~100GBASE-BR20~~ and 100GBASE-BR40 and fiber attenuation of 0.4 dB/km plus an allocation for connection and splice loss given in 999.10.2.1.

^b Link penalties are used for link budget calculations. They are not requirements and are not meant to be tested.

999.7.5.2 Channel requirements

Table 999–11—Transmitter compliance channel specifications

PMD type	Dispersion ^a (ps/nm)		Insertion loss ^b	Optical return loss ^c	Max mean DGD
	Minimum	Maximum			
100GBASE-BR10	$0.23 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.23 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	15.6	5
100GBASE-BR20	$0.46 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.46 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	TBD 15	TBD 0.8
100GBASE-BR40	$0.92 \times \lambda \times [1 - (1324 / \lambda)^4]$	$0.92 \times \lambda \times [1 - (1300 / \lambda)^4]$	Minimum	TBD	TBD

= Tx optical return loss tolerance

Consistent with other IEEE standards

Definitions in other IEEE 802.3 clauses:

Clause No.	PMD type	Optical return loss	Max mean DGD
140	100GBASE-LR1	15.6 dB	0.8 ps
160	50GBASE-BR10	15.6 dB	0.8 ps
	50GBASE-BR20	15 dB	0.8 ps
	50GBASE-BR40	15 dB	0.8 ps

999.9 Fiber optic cabling model

Table 999–12—Fiber optic cabling (channel) characteristics

Description	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	Unit
Operating distance (max)	10	20	40	km
Channel insertion loss ^{a, b} (max)	6.3	<u>10</u>	18	dB
Channel insertion loss (min)	0	<u>0</u>	10	dB
Positive dispersion ^b (max)	TBD/3.3	TBD	<u>37</u>	ps/nm
Negative dispersion ^b (min)	TBD/-12.1	TBD	<u>-77</u>	ps/nm
DGD_max ^c	5	10.3	<u>TBD</u>	ps
Optical return loss (min)	22	22	<u>22</u>	dB

BR20 justification
To be determined by updates in 802.3dj
To be determined by updates in 802.3dj
Consistent with IEEE 802.3cp (50G BR20)
Aligned with 100G BR10

999.10.2.2 Maximum discrete reflectance

Table 999–13—Maximum value of each discrete reflectance

Number of discrete reflectances above -55 dB	Maximum value for each discrete reflectance			Unit
	100GBASE-BR10	100GBASE-BR20	100GBASE-BR40	
1	-22	TBD	TBD -19	dB
2	-29	TBD	TBD -27	dB
4	-33	TBD	TBD -32	dB
6	-35	TBD	TBD -35	dB
8	-37	TBD	TBD -37	dB
10	-39	TBD	TBD -39	dB

802.3 cu 100G-LR1

3dk_jackson_2406_1
400G-ER4-30 MSA

Thank you

Any questions?