



TX/RX characteristics Proposed changes

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Objective



- This contribution proposes changes to TX and RX characteristics with several objectives:
 - Be consistent with new TDFOM proposed in [1]
 - Extend upper limit of TDFOM to allow larger implementation penalties
 - Reduce max AOP and max OMA to be consistent with more realistic TX implementation (i.e. reduced current in low temperature) and to relax RX implementation (i.e. min trans-impedance)
- Proposed changes do not affect link budget and are consistent with the objectives of the project

Current TX characteristics



Table 166-9— BASE-AU PMD transmitter optical characteristics

Parameter	2.5GBASE-AU	5GBASE-AU	10GBASE-AU	25GBASE-AU	50GBASE-AU	Units
Signaling rate (range)	2.65625 ±100 ppm	5.3125 ±100 ppm	10.625 ±100 ppm	26.5625 ±100 ppm		Gbd
Modulation format	NRZ				PAM4	
Center wavelength (range)	970 to 990					nm
RMS spectral width ^a (max)	0.7					nm
Average launch power (max)	5.2				6.2	dBm
Average launch power ^b (min)	-4.3	-3.3	-2.4	-1.4	-0.3	dBm
Optical Modulation Amplitude (OMA _{outer}) (max)	4.5				5.5	dBm
Optical Modulation Amplitude (OMA _{outer}) (min)	max (A, TDFOM + B)					dBm
A	-5.0	-4.0	-3.1	-2.1	-1	dBm
B	-5.0	-3.9	-2.7	-1.4	-0.2	dBm
Transmitter and distortion figure of merit (TDFOM) (max)	0.3	0.4	0.6	1.5	1.4	dB
Transmitter and distortion figure of merit (TDFOM) (min)	-0.3	-0.4	-1.0	-1.6	-1.9	dB
Average launch power of OFF transmitter (max)	-30					dBm
Extinction ratio (min)	4					dB
RIN ₁₂ OMA (max)	-120			-124	-131	dB/Hz
Optical return loss tolerance (max)	12					dB
Uncorrelated random jitter (t _j) (max)	0.020				0.008	UI
Encircled flux ^c	≥ 86% at 19 μm ≤ 30% at 4.5μm					

Changes to TX characteristics



Table 166-9— BASE-AU PMD transmitter optical characteristics

Parameter	2.5GBASE-AU	5GBASE-AU	10GBASE-AU	25GBASE-AU	50GBASE-AU	Units
Signaling rate (range)	2.65625 ±100 ppm	5.3125 ±100 ppm	10.625 ±100 ppm	26.5625 ±100 ppm		Gbd
Modulation format	NRZ				PAM4	
Center wavelength (range)	970 to 990					nm
RMS spectral width ^a (max)	0.7					nm
Average launch power (max)	3.9				5.0	dBm
Average launch power ^b (min)	-4.3	-3.3	-2.4	-1.4	-0.3	dBm
Optical Modulation Amplitude (OMA _{outer}) (max)	3.2				4.3	dBm
Optical Modulation Amplitude (OMA _{outer}) (min)	max (A, TDFOM + B)					dBm
A	-5.0	-4.0	-3.1	-2.1	-1	dBm
B	-5.0	-3.9	-2.7	-1.5	-0.4	dBm
Transmitter and distortion figure of merit (TDFOM) (max)	1.0	1.0	2.0	2.5	3.0	dB
Transmitter and distortion figure of merit (TDFOM) (min)	-0.3	-0.4	-1.0	-1.5	-1.7	dB
Average launch power of OFF transmitter (max)	-30					dBm
Extinction ratio (min)	4					dB
RIN ₁₂ OMA (max)	-120			-124	-131	dB/Hz
Optical return loss tolerance (max)	12					dB
Uncorrelated random jitter (t _j) (max)	0.020				0.008	UI
Encircled flux ^c	≥ 86% at 19 μm ≤ 30% at 4.5μm					

Current RX characteristics



Table 166–10— BASE-AU PMD receiver optical characteristics

Parameter	2.5GBASE-AU	5GBASE-AU	10GBASE-AU	25GBASE-AU	50GBASE-AU	Units
Signaling rate (range)	2.65625 ±100 ppm	5.3125 ±100 ppm	10.625 ±100 ppm	26.5625 ±100 ppm		Gbd
Modulation format	NRZ			PAM4		
Center wavelength (range)	970 to 990					nm
Damage threshold ^a (max)	6.2			7.2		dBm
Average receive power (max)	5.2			6.2		dBm
Average receive power ^b (min)	-19.9	-17.9	-15.7	-12.7	-7.9	dBm
Receive power (OMA _{outer}) (max)	4.5			5.5		dBm
Receiver reflectance (max)	-12					dBm
Stressed receiver sensitivity ^c (OMA _{outer}), condition 1 (max)	-17.7	-15.5	-12.8	-8.6	-3.8	dBm
Stressed receiver sensitivity ^d (OMA _{outer}), condition 2 (max)	-18.0	-16.0	-13.8	-10.8	-6.0	dBm
Receiver sensitivity (OMA _{outer}) (max)	max (C, TDFOM + D)					dBm
C	-18.0	-16.0	-13.8	-10.8	-6.0	dBm
D	-18.0	-15.9	-13.4	-10.1	-5.2	dBm
Conditions of stressed receiver sensitivity test ^e :						
Stressed TDFOM (STDFOM), condition 1	0.3	0.4	0.6	1.5	1.4	dB
Stressed TDFOM (STDFOM), condition 2	0.0	-0.1	-0.4	-0.7	-0.8	dB

Changes to RX characteristics



Table 166–10— BASE-AU PMD receiver optical characteristics

Parameter	2.5GBASE-AU	5GBASE-AU	10GBASE-AU	25GBASE-AU	50GBASE-AU	Units
Signaling rate (range)	2.65625 ±100 ppm	5.3125 ±100 ppm	10.625 ±100 ppm	26.5625 ±100 ppm		Gbd
Modulation format	NRZ			PAM4		
Center wavelength (range)	970 to 990					nm
Damage threshold ^a (max)	4.9				6.0	dBm
Average receive power (max)	3.9				5.0	dBm
Average receive power ^b (min)	-19.9	-17.9	-15.7	-12.7	-7.9	dBm
Receive power (OMA _{outer}) (max)	3.2				4.3	dBm
Receiver reflectance (max)	-12					dBm
Stressed receiver sensitivity ^c (OMA _{outer}), condition 1 (max)	-17.0	-14.9	-11.4	-7.7	-2.4	dBm
Stressed receiver sensitivity ^d (OMA _{outer}), condition 2 (max)	-18.0	-16.0	-13.8	-10.8	-6.0	dBm
Receiver sensitivity (OMA _{outer}) (max)	max (C, TDFOM + D)					dBm
C	-18.0	-16.0	-13.8	-10.8	-6.0	dBm
D	-18.0	-15.9	-13.4	-10.2	-5.4	dBm
Conditions of stressed receiver sensitivity test ^e :						
Stressed TDFOM (STDFOM), condition 1	1.0	1.0	2.0	2.5	3.0	dB
Stressed TDFOM (STDFOM), condition 2	0.0	-0.1	-0.4	-0.6	-0.6	dB

References



- [1] R. Pérez-Aranda et al., “TDFOM simplification proposal,” May 2022, [Online], Available: https://www.ieee802.org/3/cz/public/may_2022/perezaranda_3cz_01_2205_TDFOM_Simpler.pdf



Thank you