

# **400Gb/s 2km & 10km duplex SMF NRZ PMD Nominal Specifications**

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400 Gb/s Ethernet Task Force  
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# Introduction

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- Channel insertion loss

	2km NRZ	2km PAM-4	10km NRZ	10km PAM-4
Channel Loss	4.0	4.0	6.0	6.0
MPI Penalty	0.5	1.0	0.5	1.0
Total Insertion Loss	4.5	5.0	6.5	7.0

- MPI penalty is under investigation; see below SMF Ad Hoc presentation for details:

[http://www.ieee802.org/3/bs/public/adhoc/smf/14\\_12\\_09/cole\\_01\\_1214\\_smf.pdf](http://www.ieee802.org/3/bs/public/adhoc/smf/14_12_09/cole_01_1214_smf.pdf)

- KP4 FEC in the host ASIC is assumed for both 2km and 10km PMDs
- These are nominal baseline specifications which require supporting measurements

# Transmit Characteristics (duplex SMF)

Description	2km NRZ	10km NRZ	Unit
Signaling Rate, each lane	53.2	53.2	GBd
Operating BER	2.0E-04	2.0E-04	
Total average launch power (max)	11.7	12.2	dBm
OMA, each lane (max)	2.5	3.0	dBm
OMA, each lane (min)	-2.8	-2.5	dBm
Launch Power in OMA – TDP, each lane (min)	-3.8	-3.5	dBm
Transmitter and dispersion penalty, (TDP) each lane (max)	1.8	2.5	dB
Extinction ratio (ER) (min)	4.5	4.5	dB
RIN OMA (max)	-130.0	-130.0	dB/Hz
Optical return loss tolerance (max)	20.0	20.0	dB
Transmitter 3dB frequency (min)	21	21	GHz

# Receive Characteristics (duplex SMF)

Description	2km NRZ	10km NRZ	Unit
Signaling Rate, each lane	53.2	53.2	GBd
Operating BER	2.0E-04	2.0E-04	
Receiver reflectance (max)	-26.0	-26.0	dB
Receiver Sensitivity (OMA), each lane (max)	-8.3	-10.0	dBm
Receiver 3 dB electrical upper cutoff frequency, each lane (max)	42.0	42.0	GHz
Stressed receiver sensitivity (OMA), each lane (max)	TBD	TBD	dBm
Conditions of stressed receiver sensitivity test	TBD	TBD	

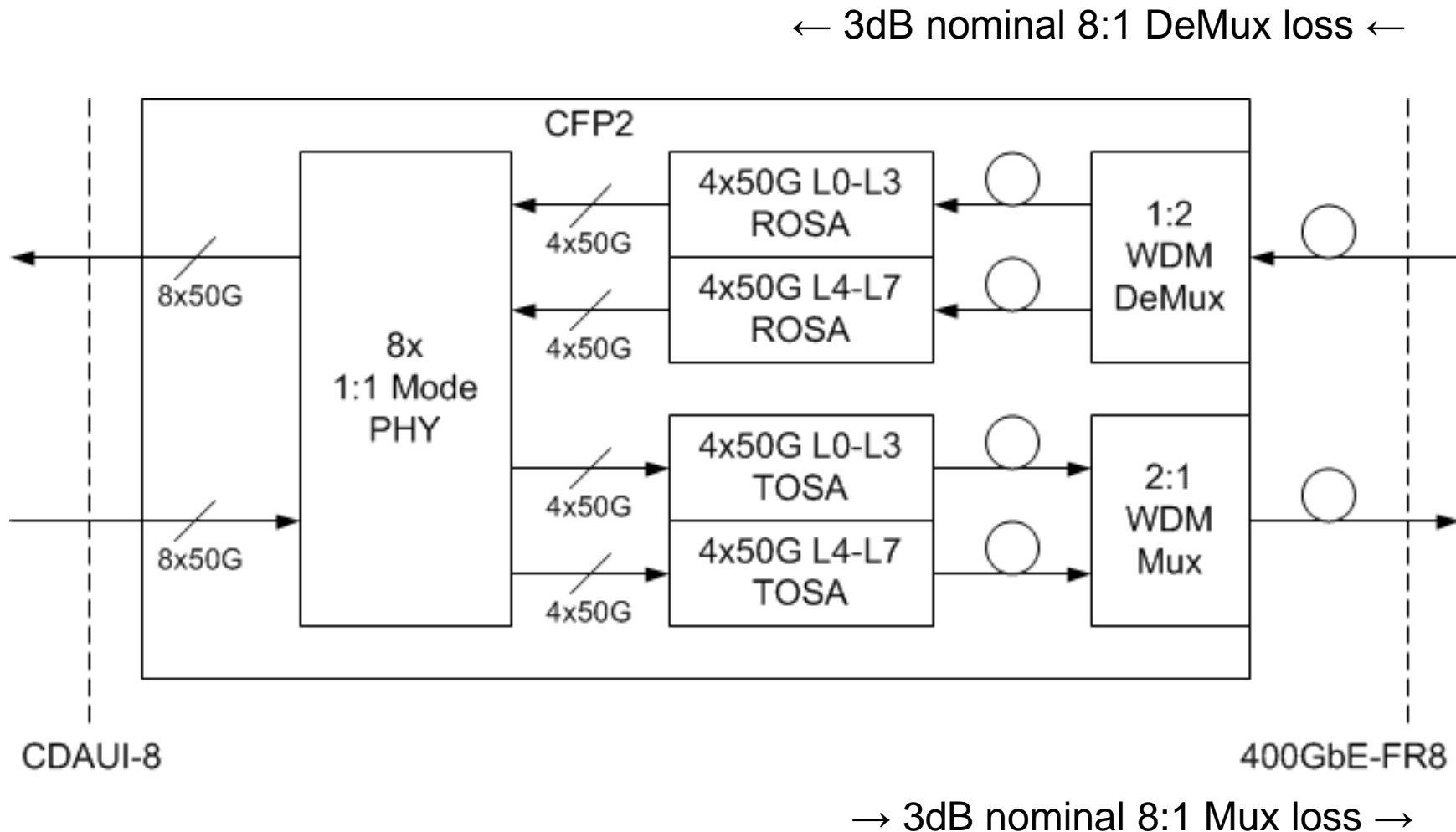
# Illustrative Link Power Budgets (duplex SMF)

Parameter	2km NRZ	10km NRZ	Unit
Power Budget (for maximum TDP)	6.3	9.0	dB
Operating Distance	2.0	10.0	km
Channel Insertion Loss	4.5	6.5	dB
Maximum Discrete Reflectance	-26.0	-26.0	dB
Allocation for Penalties (for maximum TDP)	1.8	2.5	dB
Allocation for Modulation Penalties	0.0	0.0	dB

# WDM Lane Assignments

Lane	Center Frequency THz	Center Wavelength nm	Wavelength Range nm
L0	235.4	1273.55	1272.55 to 1274.54
L1	234.6	1277.89	1276.89 to 1278.89
L2	233.8	1282.26	1281.25 to 1283.28
L3	233.0	1286.66	1285.65 to 1287.69
L4	231.4	1295.56	1294.53 to 1296.59
L5	230.6	1300.05	1299.02 to 1301.09
L6	229.8	1304.58	1303.54 to 1305.63
L7	229.0	1309.14	1308.09 to 1310.19

# Appendix 1: 2km PMD Block Diagram Example



# 2km & 10km NRZ PMD Nominal Specs

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Thank you