

# **400Gb/s 2km & 10km duplex SMF PAM-4 PMD Nominal Specifications**

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400 Gb/s Ethernet Task Force  
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# Introduction

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- Nominal specifications from:

[http://www.ieee802.org/3/bs/public/adhoc/smf/14\\_10\\_14/cole\\_01a\\_1014\\_smf.pdf](http://www.ieee802.org/3/bs/public/adhoc/smf/14_10_14/cole_01a_1014_smf.pdf)

- These specifications are not a final proposal because insufficient measurements are available
- The 10km RX specifications are challenging

# Transmit Characteristics (duplex SMF)

Description (Outer Eye 11-00)	2km PAM-4	10km PAM-4	Unit
Signaling Rate, each lane	26.6	28.0	GBd
Operating BER	2.0E-04	1.0E-03	
Total average launch power (max)	13.2	13.2	dBm
OMA, each lane (max)	4.0	4.0	dBm
OMA, each lane (min)	-0.5	-0.5	dBm
Launch Power in OMA – TDP, each lane (min)	-1.5	-1.5	dBm
Transmitter and dispersion penalty, (TDP) each lane (max)	1.0	1.5	dB
Extinction ratio (ER) (min)	4.5	4.5	dB
RIN OMA (max)	TBD	TBD	dB/Hz
Transmitter 3dB frequency (min)	21	21	GHz
Optical return loss tolerance (max)	TBD	TBD	dB

# Receive Characteristics (duplex SMF)

Description (Inner Eye 01-00)	2km PAM-4	10km PAM-4	Unit
Signaling Rate, each lane	26.6	28.0	GBd
Operating BER	2.0E-04	1.0E-03	
Receiver reflectance (max)	TBD	TBD	dB
Receiver Sensitivity (OMA), each lane (max)	-11.5	-13.5	dBm
Receiver 3 dB electrical upper cutoff frequency, each lane (max)	31	31	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)

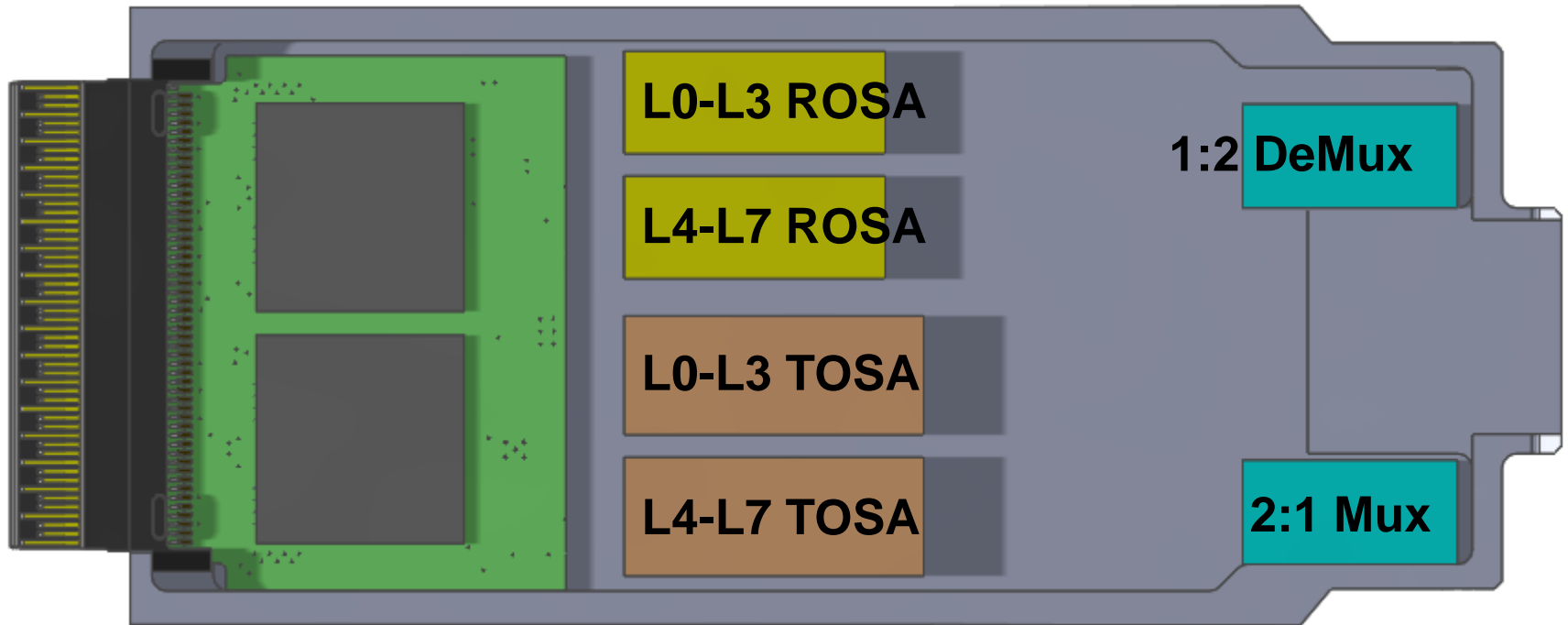
Parameter	2km PAM-4	10km PAM-4	Unit
Power Budget (for maximum TDP)	11.0	13.5	dB
Operating Distance	2.0	10.0	km
Channel Insertion Loss	5.0	7.0	dB
Maximum Discrete Reflectance	TBD	TBD	dB
Allocation for Penalties (for maximum TDP)	1.0	1.5	dB
Allocation for Modulation Penalties	5.0	5.0	dB

# WDM Lane Assignments

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

# Appendix: Example CFP2 Layout

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# 2km & 10km PAM-4 PMD Nominal Specs

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Thank you

