

400G-PSM4: A Proposal for the 500m Objective using 100 Gb/s per Lane Signaling

Brian Welch (Luxtera)

Gary Nicholl (Cisco)

Keith Conroy (Multi-Phy)

Jeff Maki (Juniper Networks)

David Lewis (JDSU)

Supporters

Tom Palkert (Luxtera)
Vipul Bhatt (Inphi)
Chuang Liang (Oplink)
Alan Tipper (Semtech)
David Brown (Semtech)
Bharat Tailor (Semtech)
Mark Nowell (Cisco)
Rob Stone (Broadcom)
Neal Neslusan (Multi-Phy)
Vasu Parthasarathy
(Broadcom)
Will Bliss (Broadcom)
Tom Issenhuth (Microsoft)
Brad Booth (Microsoft)
RangChen Yu (Oplink)

Ali Ghiasi (Ghiasi Quantum)
Ryan Latchman (Macom)
Ed Ulrichs (Source Photonics)
John Abbot (Corning)
Doug Coleman (Corning)
Steven Swanson (Corning)
Pavel Zivny (Tektronix)
Scott Irwin (MoSys)
Mike Hughes (USCONEC)
Tom Mitcheltree (USCONEC)
Scott Summers (Molex)
Chris Roth (Molex)
Christophe Metivier (Arista)
Dan Dove (Dove Networking)
Jan Filip (Maxim)

Mark Gustlin (Xilinx)
Faisal Dada (Xilinx)
Dave Stauffer (Kandou)
Brian Holden (Kandou)
Atsushi Takai (Oclaro)
Kohichi Tamura (Oclaro)
Greg Lecheminant (Keysight)
Winston Way (NeoPhotonics)
Matt Brown (Applied Micro)
Ian Dedic (Socionext)
Nobuhiko Kikuchi (Hitachi)
Riu Hirai (Hitachi)
Mike Li (Altera)
Rick Rabinovich (Alcatel
Lucent Enterprise)

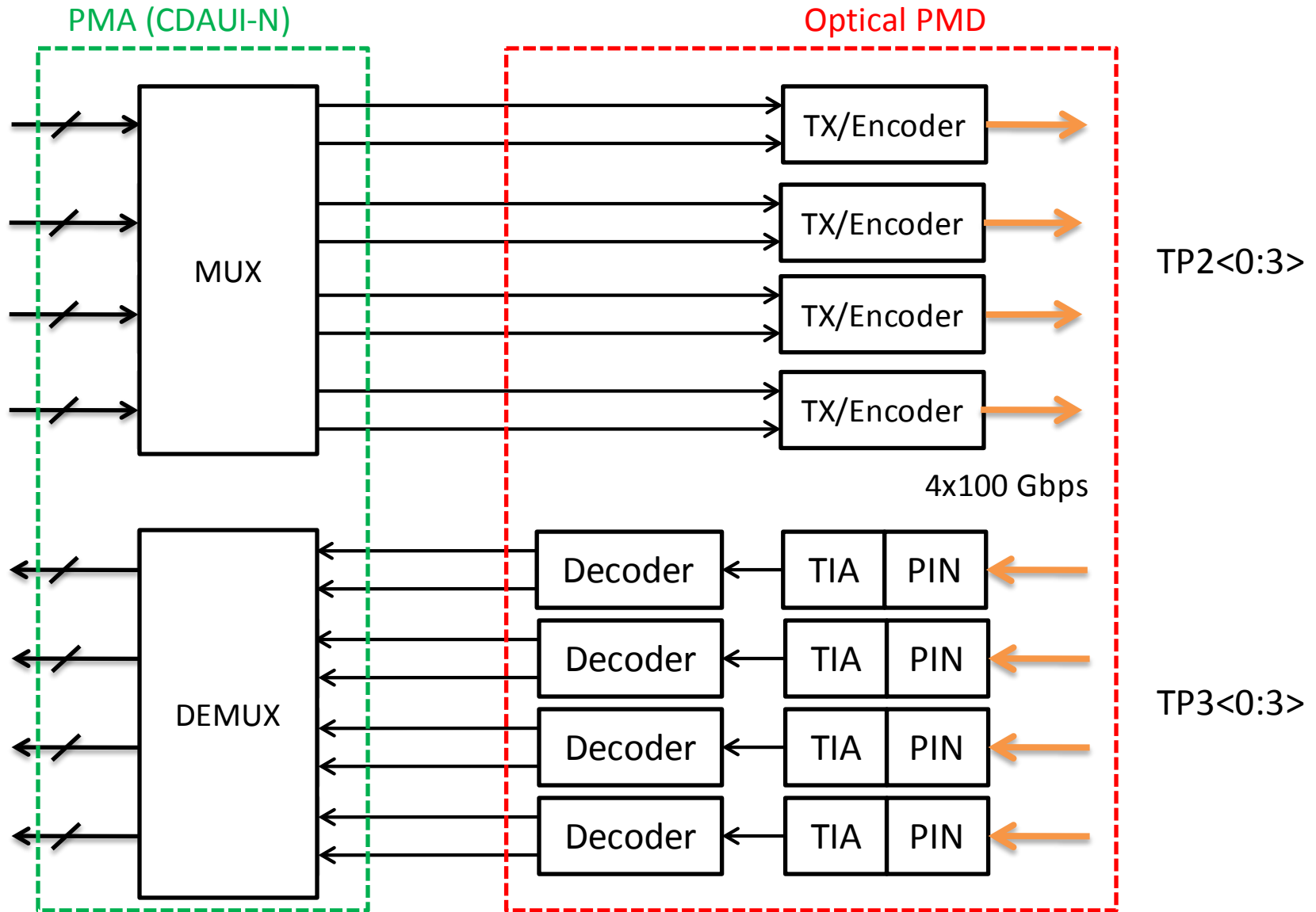
400G-PSM4

- Proposal: A 4x100 Gb/s parallel SMF interconnect to satisfy the 500m objective.
- Lane Speed: 100 Gb/s per lane using 50 GBaud-PAM4 optical signaling
- Corrected BER < 1e-15
- Single wavelength solution

Updates Since Last Meeting

- “Reach (m)” replaced with “Reach, min (m)”
- Added “All Parameters Subject to Change in Task Force Review” to spec tables

400G-PSM4 Block Diagram



400G-PSM4 : Link Parameters

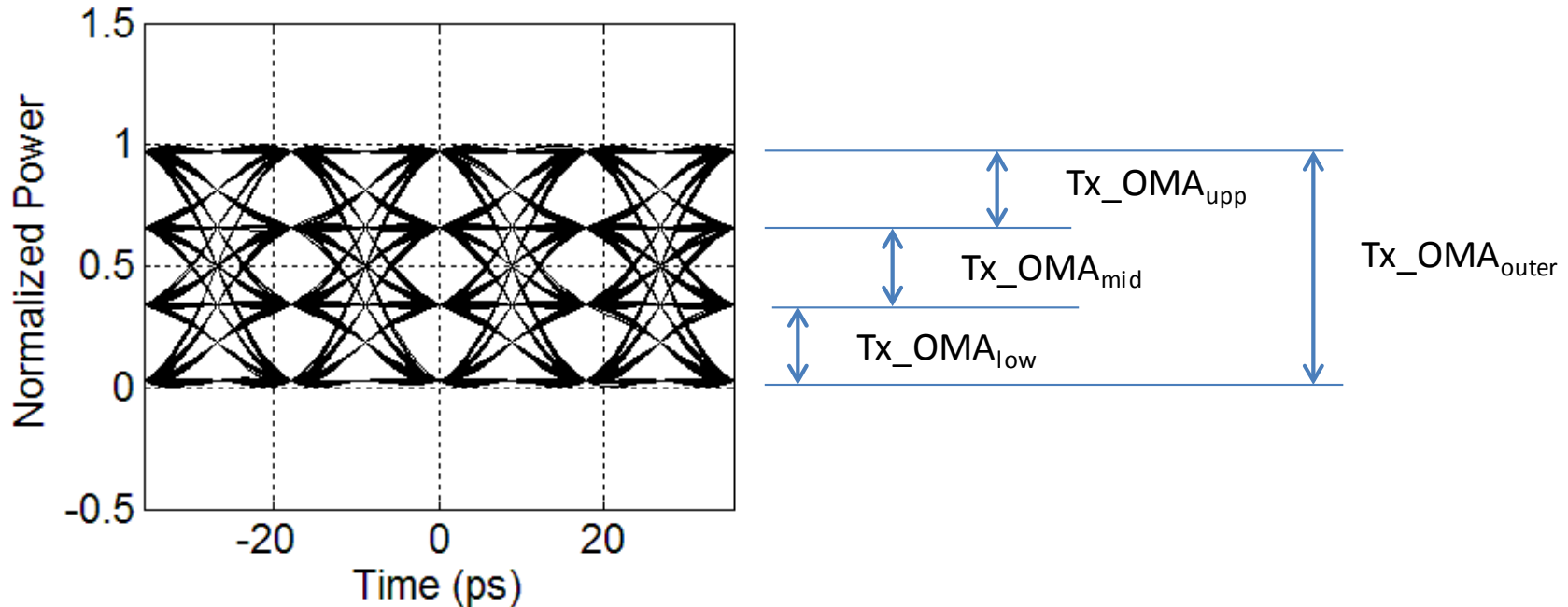
400G-PSM4	
Reach, min (m)	500
Signaling rate, each lane (Range)	53.125 ± 100 ppm GBd
Encoding type	PAM4
Wavelength(s)	1297 to 1323 nm
Uncorrected BER	< 2.3e-4
Corrected BER	< 1e-15
802.3bs Objective BER	< 1e-13
Channel insertion loss, max (dB) [†]	3
Allocation for penalties, at max TDP (dB) [‡]	4.0
Power margin, at min TDP (dB)	9.25
Maximum discrete reflectance (dB)	-35

[†] From http://www.ieee802.org/3/bs/public/14_05/kolesar_3bs_01_0514.pdf

[‡] Sum of Max TDP (3.5 dB) and MPI penalty (0.5 dB)

All Parameters Subject to Change in Task Force Review

Transmitter Specifications



- Max OMA and ER specified based on outer Tx_OMA_{outer}
- Sensitivity and link budget based on inner Tx_OMA_{low/mid/upp}
 - Spec applies to minimum of 3 inner eye transitions

400G-PSM4: Transmitter Specifications (TP2)

400G-PSM4	
Signaling rate, each lane (Range)	53.125 ± 100 ppm GBd
Encoding type	PAM4
Wavelength(s)	1297 to 1323 nm
OMA_{outer} , each lane, max (dBm)	$MAX(3.8+(\lambda-1310)^2/70,4.3)$
OMA_{outer} , each lane, min (dBm)	$MAX(-1.3+(\lambda-1310)^2/70,-0.8)+MAX(TDP,0.8)$
$OMA_{low/mid/uppr}$, each lane, min (dBm)	$MAX(-6.07+(\lambda-1310)^2/70,-5.57)+MAX(TDP,0.8)$
ER_{outer} , each lane, min (dB)	5
Average launch power, each lane max (dBm)	5
Average launch power, each lane min (dBm)	$MAX(-3.4+(\lambda-1310)^2/70,-2.9)+0.8$
TDP, each lane, max (dB)	3.5
Transmitter RIN_{ave} , max (dB/Hz)	-142
Transmitter reflectance, max (dB)	-20
Transmitter Eye Mask	TBD

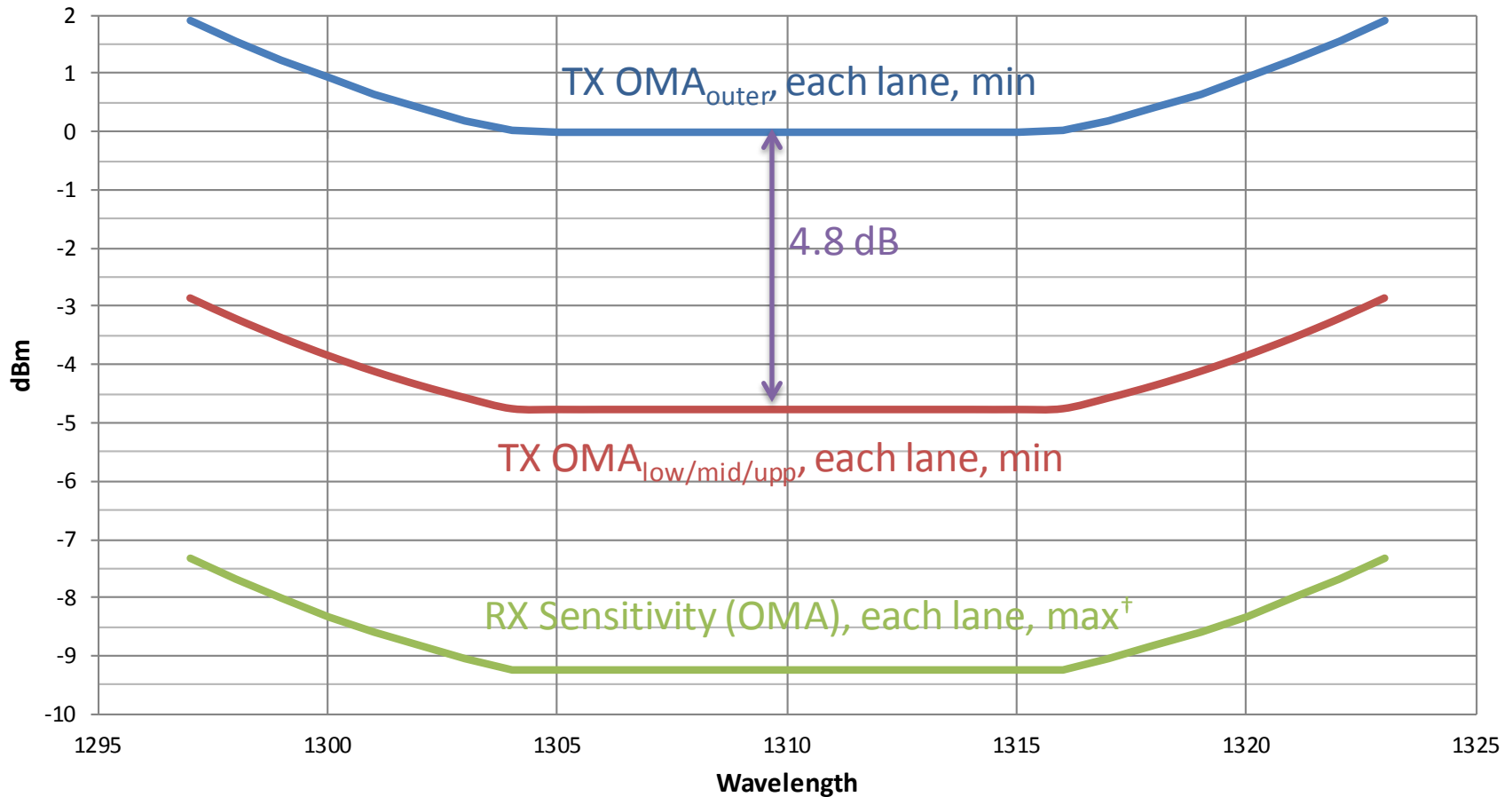
All Parameters Subject to Change in Task Force Review

400G-PSM4: Receiver Specifications (TP3)

400G-PSM4	
Signaling rate, each lane (Range)	53.125 ± 100 ppm GBd
Encoding type	PAM4
Wavelength(s)	1297 to 1323 nm
Receiver sensitivity (OMA), each lane max (dBm) [†]	MAX(-9.75+(λ-1310) ² /70,-9.25)
Average receive power, each lane max (dBm)	5.0
Average receive power, each lane min (dBm)	-5.1
Damage threshold (dBm)	6.5
Receiver reflectance, max (dB)	-26
Stressed receiver sensitivity (OMA), each lane max (dBm)	TBD
Conditions of stressed receiver sensitivity test:	
Vertical eye closure penalty, each lane (dB)	TBD
Stressed eye J2 Jitter, each lane (UI)	TBD
Stressed eye J4 Jitter, each lane (UI)	TBD
Stressed eye mask definition	TBD

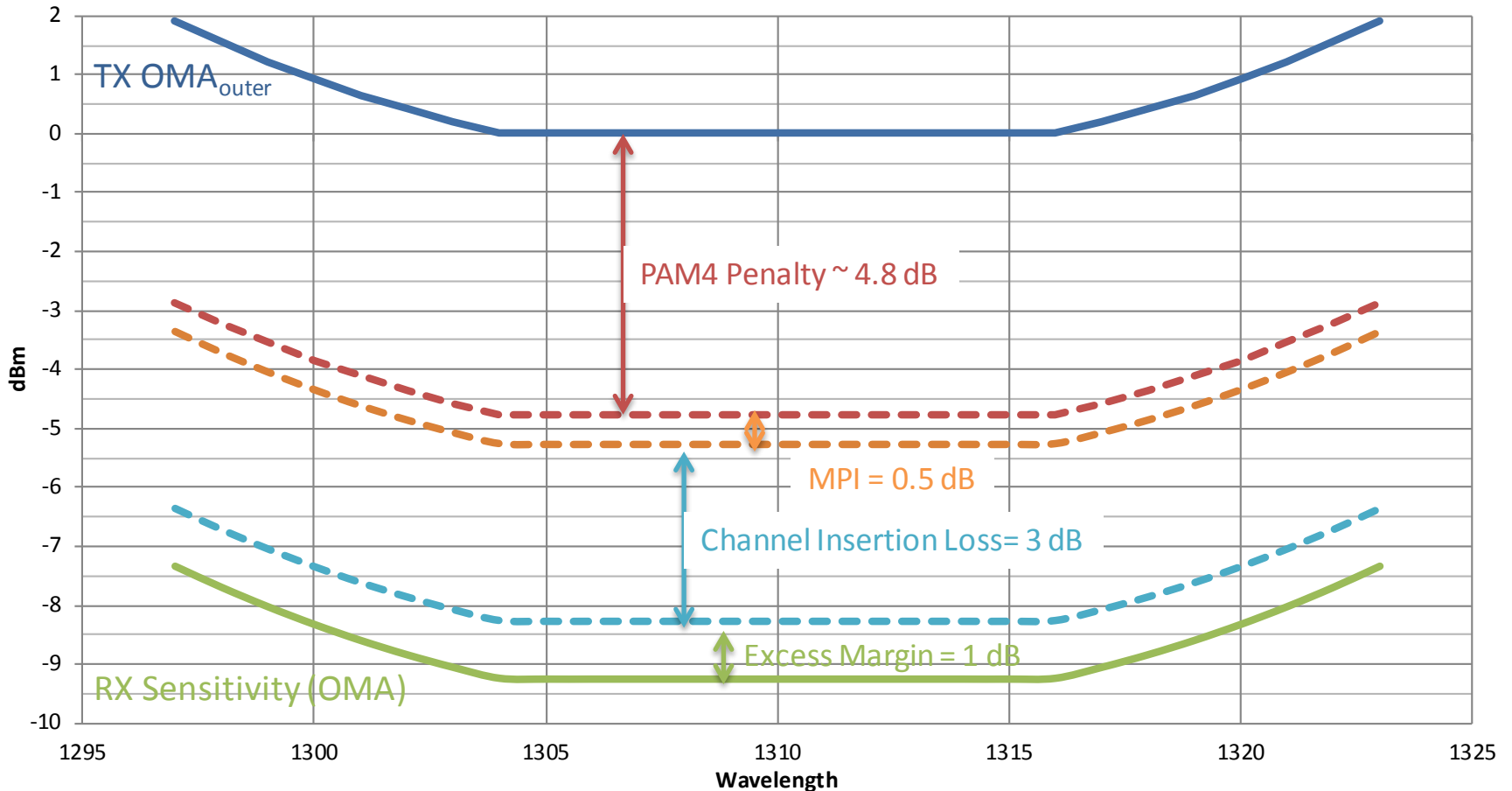
*† Received sensitivity reported in 'NRZ mode' and uncorrected BER, equivalent to sensitivity for any sub-eye low/mid/upp
All Parameters Subject to Change in Task Force Review*

400G-PSM4 Specifications



† Received sensitivity reported in 'NRZ mode' and uncorrected BER, equivalent to sensitivity for any sub-eye low/mid/upp
All Parameters Subject to Change in Task Force Review

400G-PSM4 Link Budget (at TDP = 0.8 dB)



† Received sensitivity reported in 'NRZ mode' and uncorrected BER, equivalent to sensitivity for any sub-eye low/mid/upp
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Thank You