200GHz Grid 4x25G WDM (100GE) for SMF Reach Objectives

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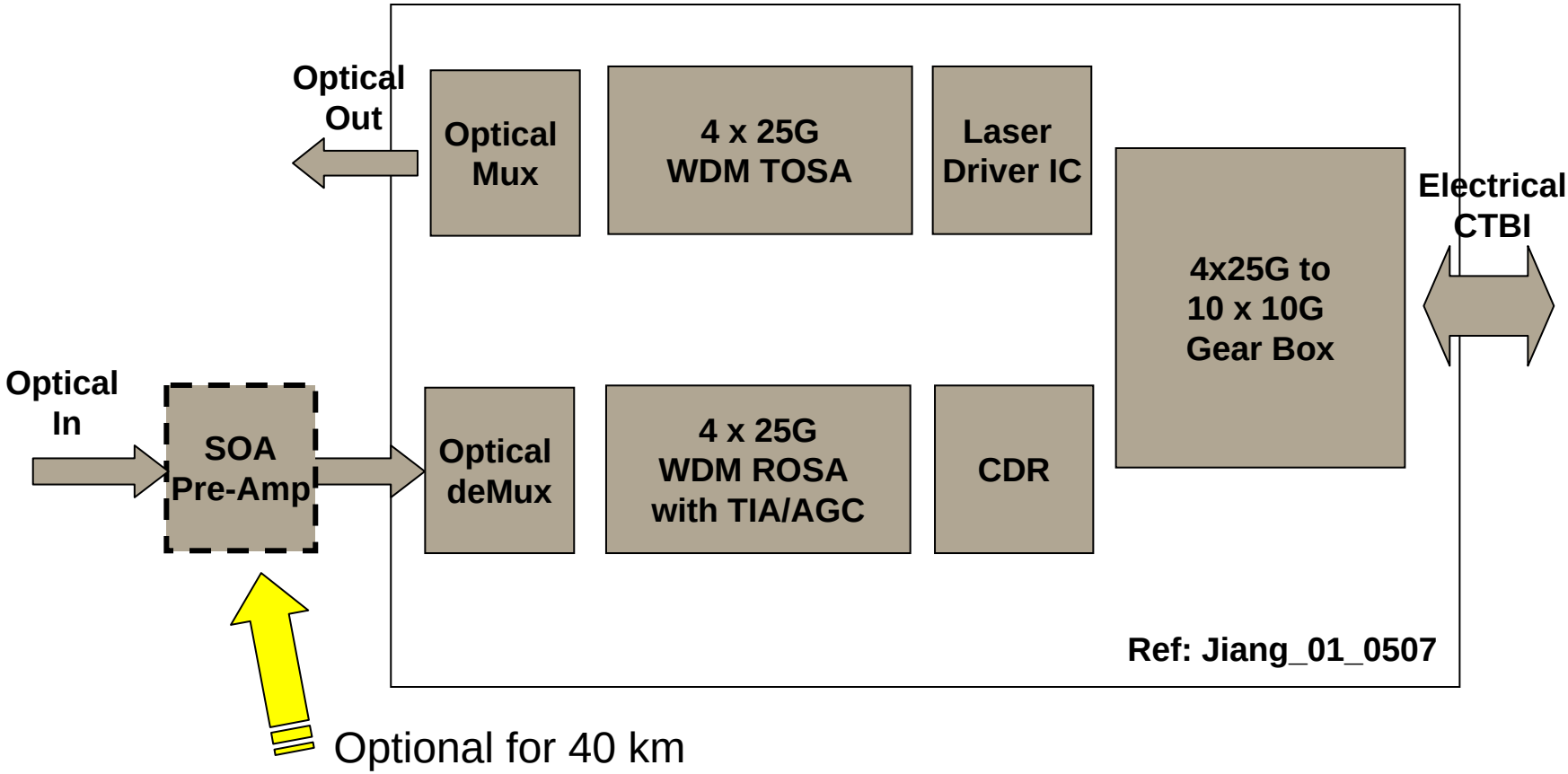
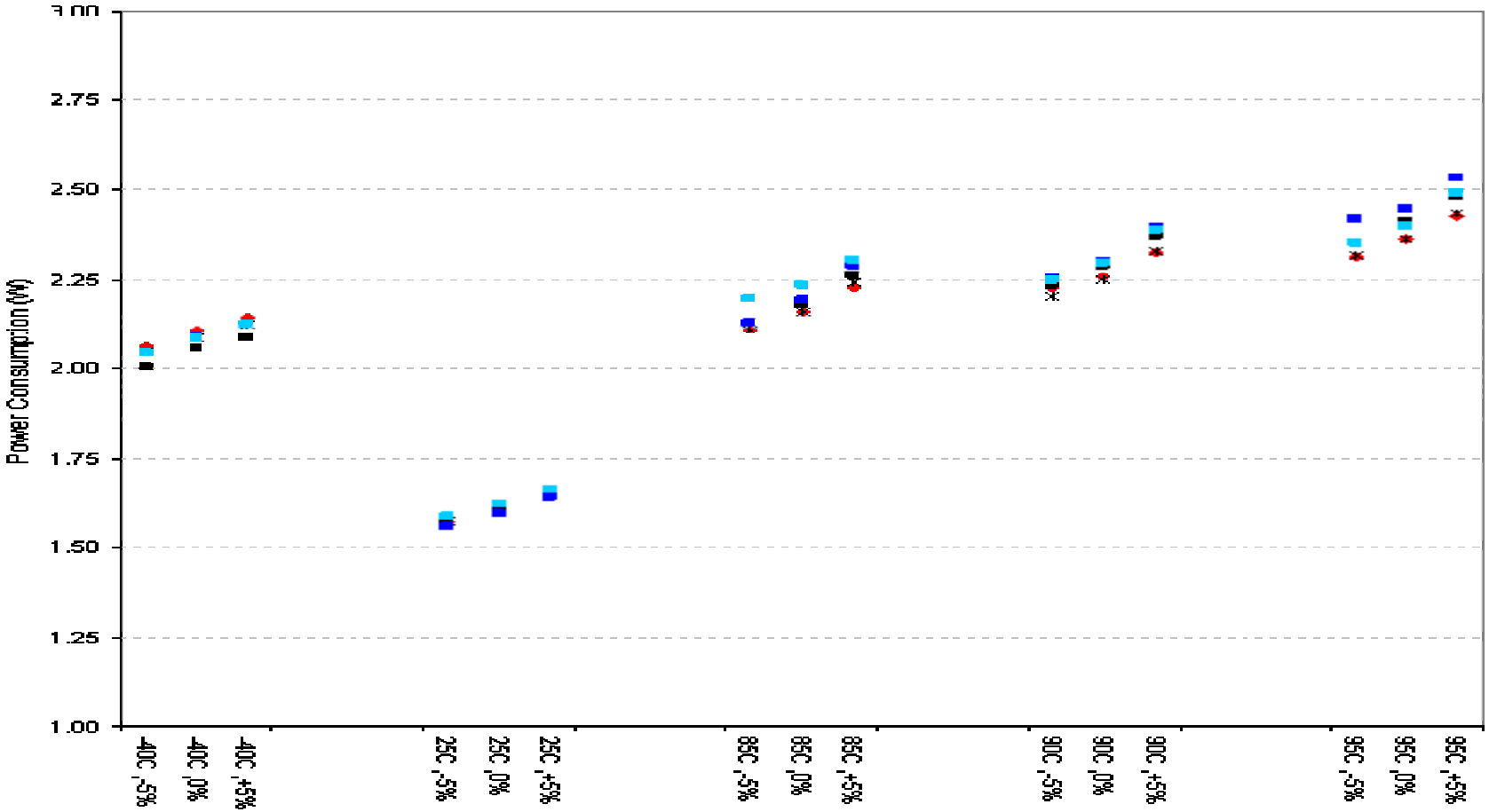
Current HSSG 100GE Distance Objectives

- At least 10 km over SMF
- At least 40 km over SMF

- **Gen-1 Form Factor: XENPAK or lager**
- **Power Consumption**
  - **15 – 20W (~ 4XFP + Gearbox)**



XFP Power Consumption over -40 to 95ºC



~2.5W or less per XFP
(10x10G to 4x25G Gearbox 4 – 8 W)

100GE (4x25G WDM) Link Power Budget

	10 km	40 km
RX Sensitivity (dB)	-10	-10
SOA Gain (dB)		18
Loss over Fiber (dB)	5	20
Optical mux/demux loss (dB)	3.5	3.5
Path penalty (dB)	1.5	3.5
Other penalty (dB)	0.5	1.5
TX Power Required (dBm)	0.5	0.5

Possible Gen-2 Module Requirements

- Lower cost
- Lower power
- CEI-25/CFBI Interface
- Smaller form factor
- Higher integration

4x25G WDM PIC

PIC (4x25G) WDM

- 200GHz grid WDM more compatible with PIC and SOA
- Integrated SOA (15 to 20 dB preAmp Gain) is used to compensate for the higher loss from the integrated mux/demux for up to 40km
- High volume application comes from data center
  - 400 m to 1 km link distance per “lee_01_0307”
- **Add 2 km distance objective** optimized for lower cost & more manufacturable PIC without SOA
  - Near term solution based on Gen-1 discrete solution

PIC Performance Targets

- PIN RX sensitivity: -10 dBm
- RX Coupling: 1 dB
- DeMux Loss: 4 dB
- Fiber loss (2km): 1 dB
- Other penalty: 1 dB
- TX Coupling: 2 dB
- MUX Loss: 4 dB
- On chip TX power: 3 dBm

Conclusions

- We propose a distance objective of 2 km optimized as a GEN-2 100GE PMD based on a low cost 4x25G PIC with 200GHz WDM grid @ around 1310 nm
- Preserving the 200GHz WDM grid for both the 2km and the 40km distance objectives will make the PMD modules compatible/interoperable between each other
- The 2km distance objective will cover the majority of the 100GE single mode fiber applications in data centers with the lowest possible cost