

# 25G power budget: 2<sup>nd</sup> iteration, downstream

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# 10G EPON PR30 downstream (from [harstead\\_3ca\\_1a\\_0516.pdf](#))

$AVP_{min} = 2 \text{ dBm}$   
 $OMA_{min} = 3.91 \text{ dBm}$

Loss budget = 29 dB

**Receiver sensitivity  
specified at ER=9 dB**

$Rx \text{ Sens}_{max} = -28.5 \text{ dBm}$   
 $OMA \text{ Rx Sens}_{max} = -26.59 \text{ dBm}$

TDP = 1.5 dB

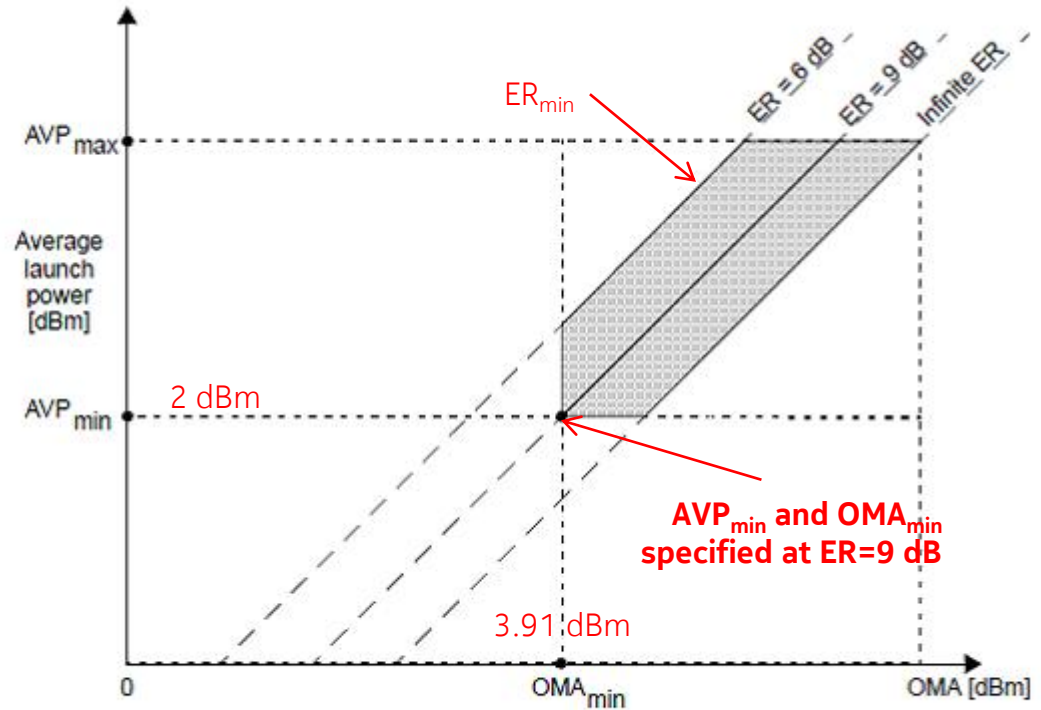


Figure 75-4—Graphical representation of region of PR-D type transmitter compliance

## Preliminary values for 25G EPON AVP<sub>min</sub> and ER

- Summary of vendor input on 25G EML and DML performance (harstead\_3ca\_1\_0716)

AVPmin (dBm)	number	mean	$\sigma$
EML	6	4.5	0.8
cooled DML	8	7.0	1.2
uncooled DML	6	4.7	1.5
ER (dB)			
EML	6	7.5	0.8
cooled DML	8	5.3	0.9
uncooled DML	6	4.7	1.0

(mostly conservative values)

- Proposed values, mean + one  $\sigma$ , rounded to nearest dB.

	AVP <sub>min</sub> (dBm)	ER (dB)	OMA <sub>min</sub> (dBm)
EML	5	8	6.62
cooled DML	8	6	8.78
uncooled DML	6	6	6.78

➤ Note: the cooled DML has the best OMA performance, followed by the EML and uncooled DML, both about 2 dB worse.

# 25G EPON PR30 downstream: EML

## PR30 25G: EML

### PR30 10G (EML)

$AVP_{\min} = 2 \text{ dBm}$ ,  $ER=9$   
 $OMA_{\min} = 3.91 \text{ dBm}$

Loss budget = 29 dB

$OMA \text{ Rx Sens}_{\max} = -26.59 \text{ dBm}$

TDP = 1.5 dB

Rx Sens<sub>max</sub> improvement = 1 dB  
(harstead\_3ca\_1a\_0516)

25G vs. 10G penalty = 5 dB

25G FEC improvement t.b.d.

**Required FEC improvement (dB)**  
**= TDP<sub>EML</sub> + (-22.59 - -22.38)**  
**= TDP<sub>EML</sub> - 0.21**

$AVP_{\min} = 5 \text{ dBm}$ ,  $ER = 8 \text{ dB}$   
 $\rightarrow OMA_{\min} = 6.62 \text{ dBm}$

Loss budget = 29 dB

-22.59 dBm

-22.38 dBm

**25G EML TDP = t.b.d.**

25G OMA Rx Sens<sub>max</sub>

# 25G EPON PR30 downstream: cooled DML

## PR30 10G (EML)

AVP<sub>min</sub> = 2 dBm, ER=9  
 OMA<sub>min</sub> = 3.91 dBm

Loss budget = 29 dB

OMA Rx Sens<sub>max</sub>  
 = -26.59 dBm

TDP = 1.5 dB

Rx Sens<sub>max</sub> improvement = 1 dB  
 (harstead\_3ca\_1a\_0516)

25G vs. 10G penalty = 5 dB

25G FEC improvement t.b.d.

**Required FEC improvement (dB)**  
 = TDP<sub>cooled DML</sub> + (-22.59 - -20.22)  
 = TDP<sub>cooled DML</sub> - 2.37

-22.59 dBm

OMA Rx Sens<sub>max</sub> for DML might need to be adjusted ~  
 +2 dB, e.g. tanaka\_3ca\_1\_0716.pdf, t.b.c.

## PR30 25G: cooled DML

AVP<sub>min</sub> = 8 dBm, ER = 6 dB  
 → OMA<sub>min</sub> = 8.78 dBm

Loss budget = 29 dB

-20.22 dBm

**25G cooled DML TDP = t.b.d.**

25G OMA Rx Sens<sub>max</sub>

# Conclusions

- Based on vendor input, preliminary unamplified launch power and extinction ratio values are proposed for EML and cooled DML transmitters in the OLT.
- Next step: the 25G downstream wavelength needs to be selected before the downstream TDP can be quantified.
- The value of the TDP will then drive the amount of FEC coding gain improvement required.
- Or conversely, the realizable FEC improvement can be quantified, and then a downstream wavelength selected with a supportable TDP.
- The relationships between required FEC improvement and TDP are:

$$\text{Required FEC improvement (dB)} = \text{TDP}_{\text{EML}} - 0.21$$

$$\text{Required FEC improvement (dB)} = \text{TDP}_{\text{cooled DML}} - 2.37$$

— Might need to be adjusted ~2 dB less, t.b.c.

- The same process needs to be replicated for upstream, with the possible inclusion of an uncooled DML ONU transmitter.

**NOKIA**