Maximum power specifications comments 478, 488, 505, 506

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Reasons for Maximum power specifications.

- **There are only two reasons to provide maximum power specifications.**
  - **Ensure that the parts are eye safe.**
    - **This is based on Average power**
  - **Protect the receiver from signals that are too large that will overload the receiver, and keep the required dynamic range for the receiver reasonable.**
    - **See next slides**
- **Provided these are achieved the Max OMA and Max Average power specs should be as least restrictive as possible for lower cost easier testing etc.**

Receiver overload and dynamic range

- **Receivers overload performance is generally limited by peak power not average power or OMA.**
- **Designing receivers for higher peak power generally reduces sensitivity and increases power dissipation.**
- **A compromise is required between the allowed Tx power window and the receiver dynamic range**

Methods for controlling Peak power

- **Can just specify max Average power**
  - **Disadvantage - Receiver has to assume simultaneous infinite ER and maximum allowed overshoot in Tx mask. Peak power (mw) (approx) = 2*Average Power*(1+Y3) (where Y3 is overshoot limit in mask).**
- **Can specify max Average power and max OMA.**
  - **Disadvantage – Receiver has to assume simultaneous Maximum Average power, Maximum OMA, and maximum allowed overshoot in Tx mask. Peak power (mW) = Average Power + (0.5+Y3)*(OMA) (see next slide)**
- **Can specify Peak power directly.**
  - **Advantage Average power (max) can be relaxed to eye safety limit, OMA (max) can be not specified or relaxed. Tx Vendors can optimize the Tx performance for their specific technology while still being interoperable with any receiver.**

Calculation for Peak power based on max average power and max OMA.

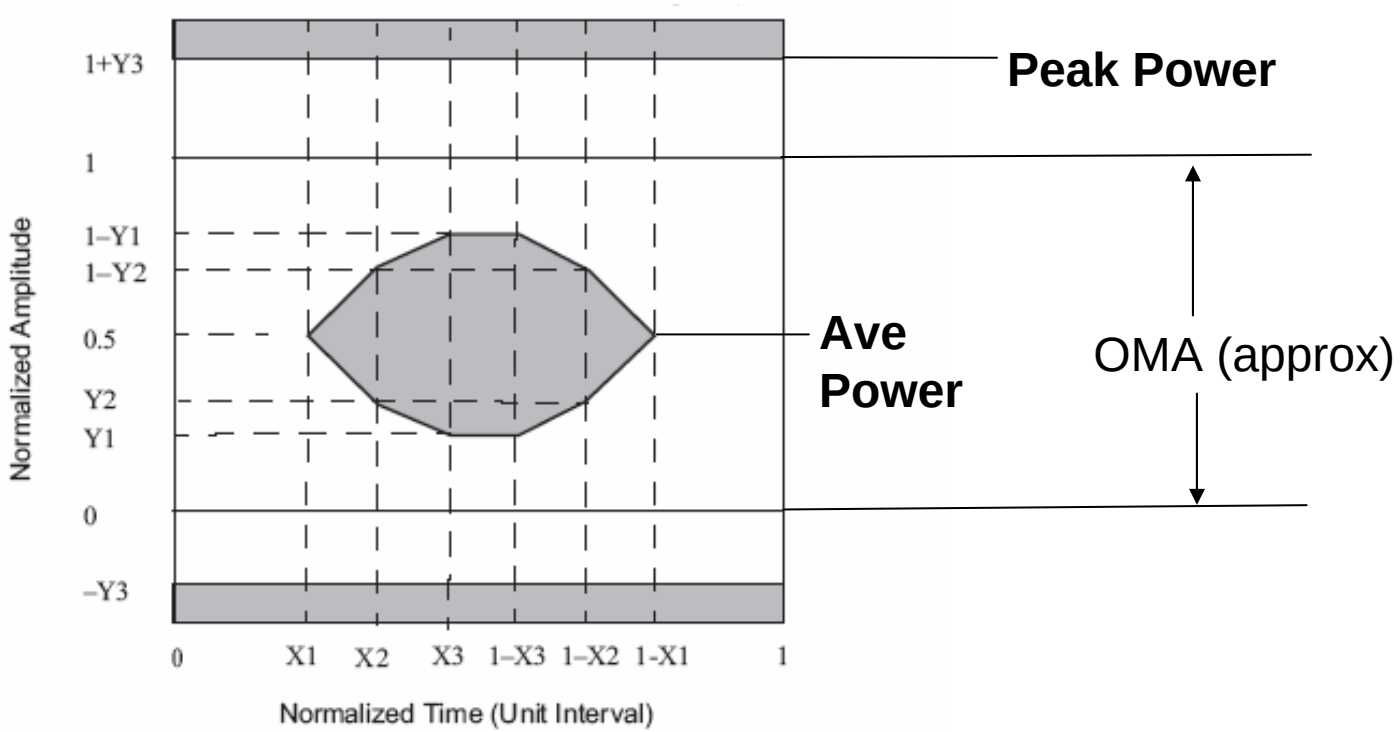

Figure 52–8—Transmitter eye mask definition

- **Peak power (mw) = Average Power (mW)+(0.5+Y3)OMA(mW)**

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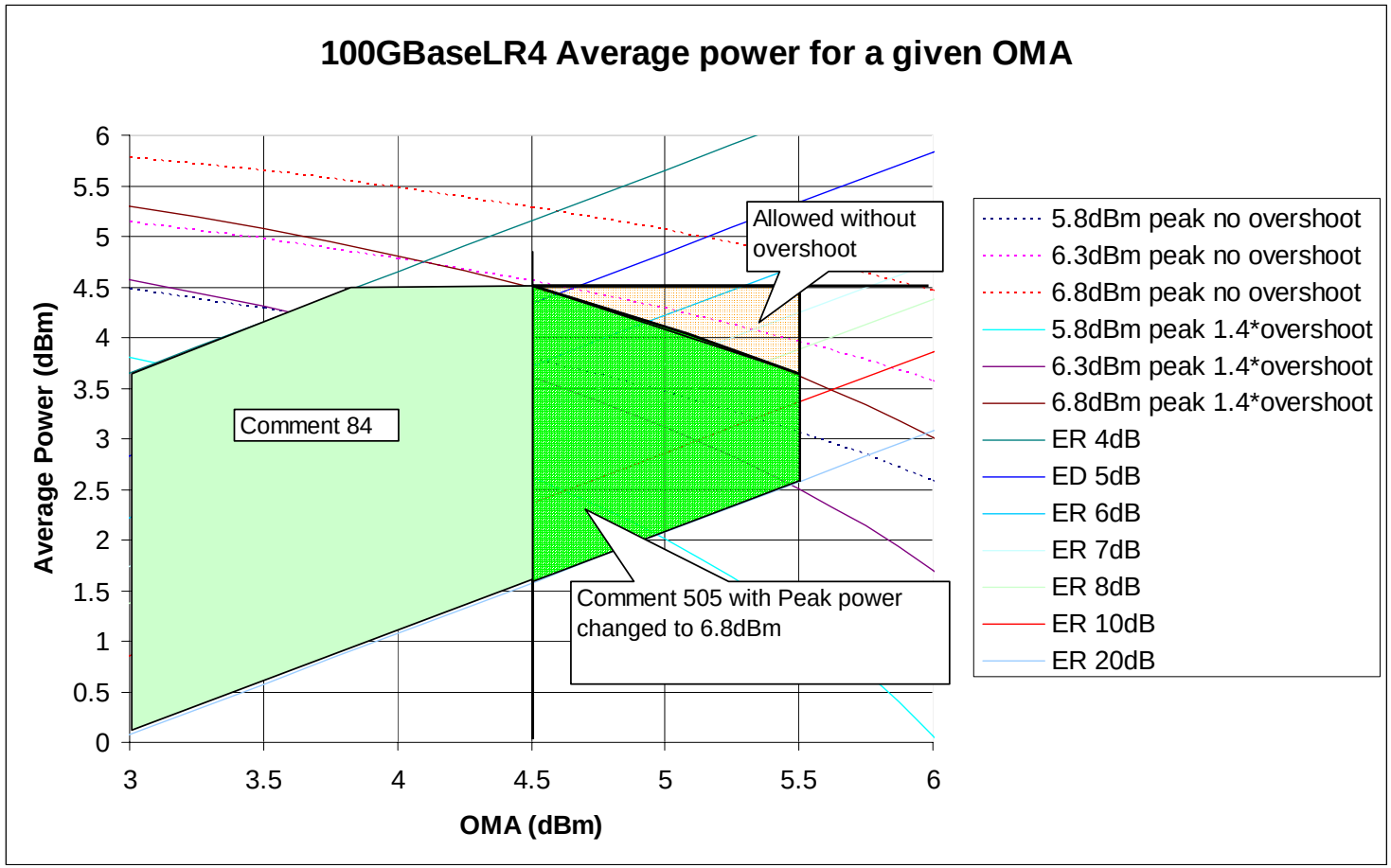
Situation for 100GBASE-LR4

- **Draft 1.0**
  - **Max average power** **4.0dBm**
  - **Max OMA** **4.0dBm**
  - **Eye mask** **TBD**
  - **Assume eye mask from 10GBASE LR (Y3=0.4) gives peak that Rx must tolerate of 6.8dBm.**
- **Comment 84 changes to**
  - **Max average power** **4.5dBm**
  - **Max OMA** **4.5dBm.**
  - **Assuming Y3=0.4 gives peak that Rx must tolerate of 7.3dBm.**
- **Comment 505 suggested adding peak power spec of 6.3dBm and relaxing max OMA to 5.5dBm. On further reflection a peak power spec of 6.8dBm with the same relaxation to 5.5dBm max OMA seems better.**

Comment 505 for 100GBaseLR4 with peak power changed to 6.8dBm



Situation for 100GBASE-ER4

- **Draft 1.0**
  - **Max average power 2.4dBm**
  - **Max OMA 4.0dBm**
  - **Eye mask TBD**
  - **Assume eye mask Y3=0.4 gives peak that Rx must tolerate of 6.0dBm.**
- **Comment 506 suggested adding peak power spec of 4.8dBm and relaxing max OMA to 5.0dBm. On further reflection a relaxation to the same suggested specs as 100GBASE LR4 would seem beneficial unless it causes problems for the SOA**

Situation for 40GBASE-LR4

- **Draft 1.0**
  - **Max average power 2.3dBm**
  - **Max OMA No spec**
  - **Eye mask TBD**
  - **Assume eye mask Y3=0.4 gives peak that Rx must tolerate of 6.8dBm.**
- **Comment 488 suggests adding peak power spec of 4.5dBm. This is equivalent to the Max average power at 6.9dB ER with no overshoot. On further reflection a peak power specification of 4.8dBm which is equivalent to 2.3dB average power with 9dB ER and no overshoot may be a better value.**

Situation for 40/100GBASE-SR4/10

- **Draft 1.0**
  - **Max average power** **1dBm (subject to further study)**
  - **Max OMA** **No spec**
  - **Eye mask** **TBD**
  - **Assume eye mask Y3=0.4 gives peak that Rx must tolerate of 5.5dBm.**
- **Comment 478 suggests adding peak power spec of 3.0dBm. This is equivalent to the Max average power at 5.8dB ER with no overshoot. On further reflection a peak power spec of 3.5dBm which is equivalent to an average power of 1dBm at 9dB ER with no overshoot may be a better number**

Conclusions.

- **Directly specifying the peak power from the Tx enables optimal design of receivers with the most relaxed specifications for the Tx.**
- **The exact values specified for the peak power should be a compromise between the required dynamic range of the Rx and the Tx operating window.**