

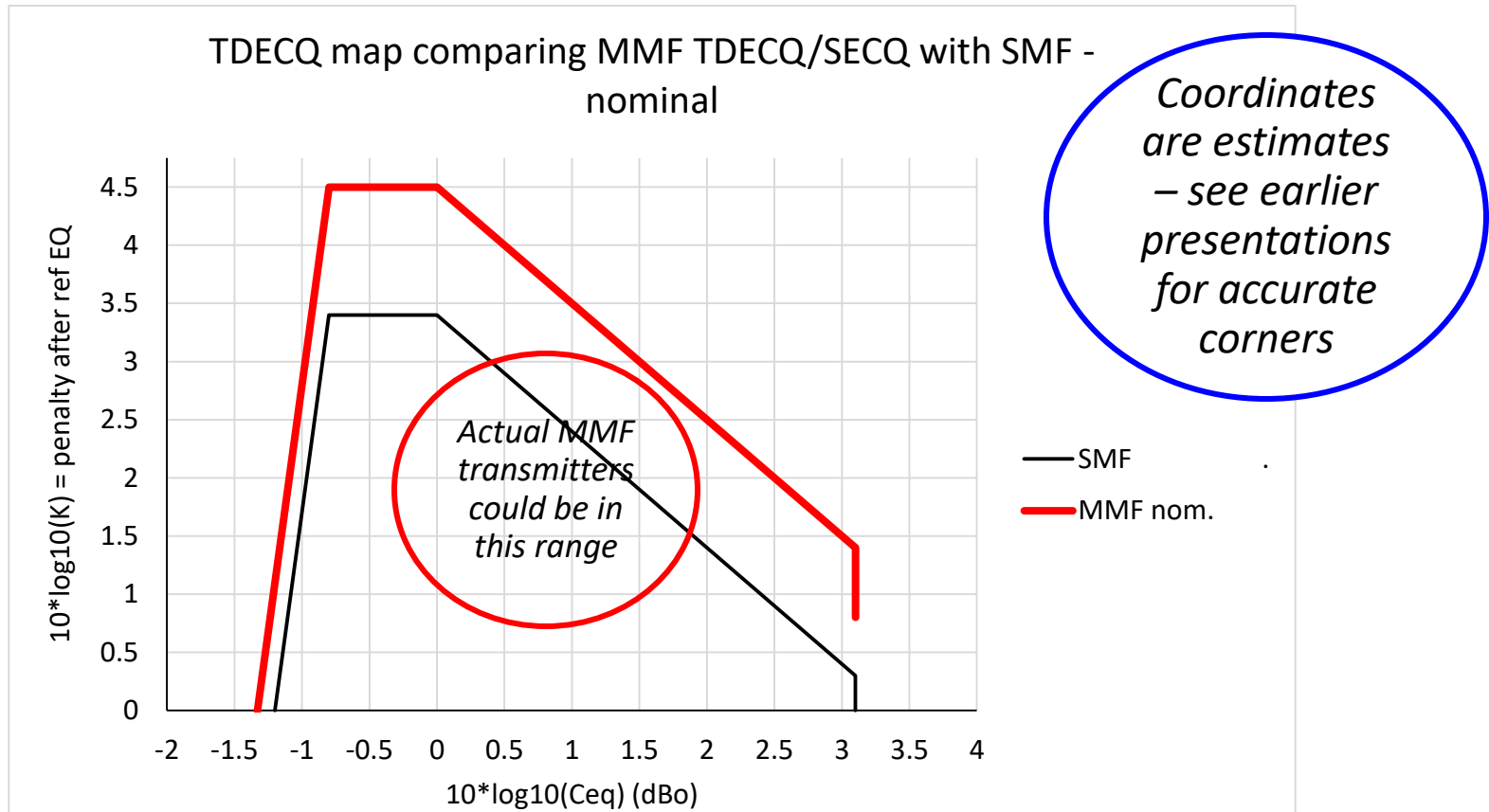
# MMF TDECQ / SECQ discrepancies and corner cases

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*New material about transition time on slides 6 and 7 (D1.1 comments 8 and 9)  
New material about over-emphasis on slides 6 and 8 (D1.1 comments 5 and 6)*

# TDECQ map comparing MMF TDECQ/SECQ with SMF - nominal

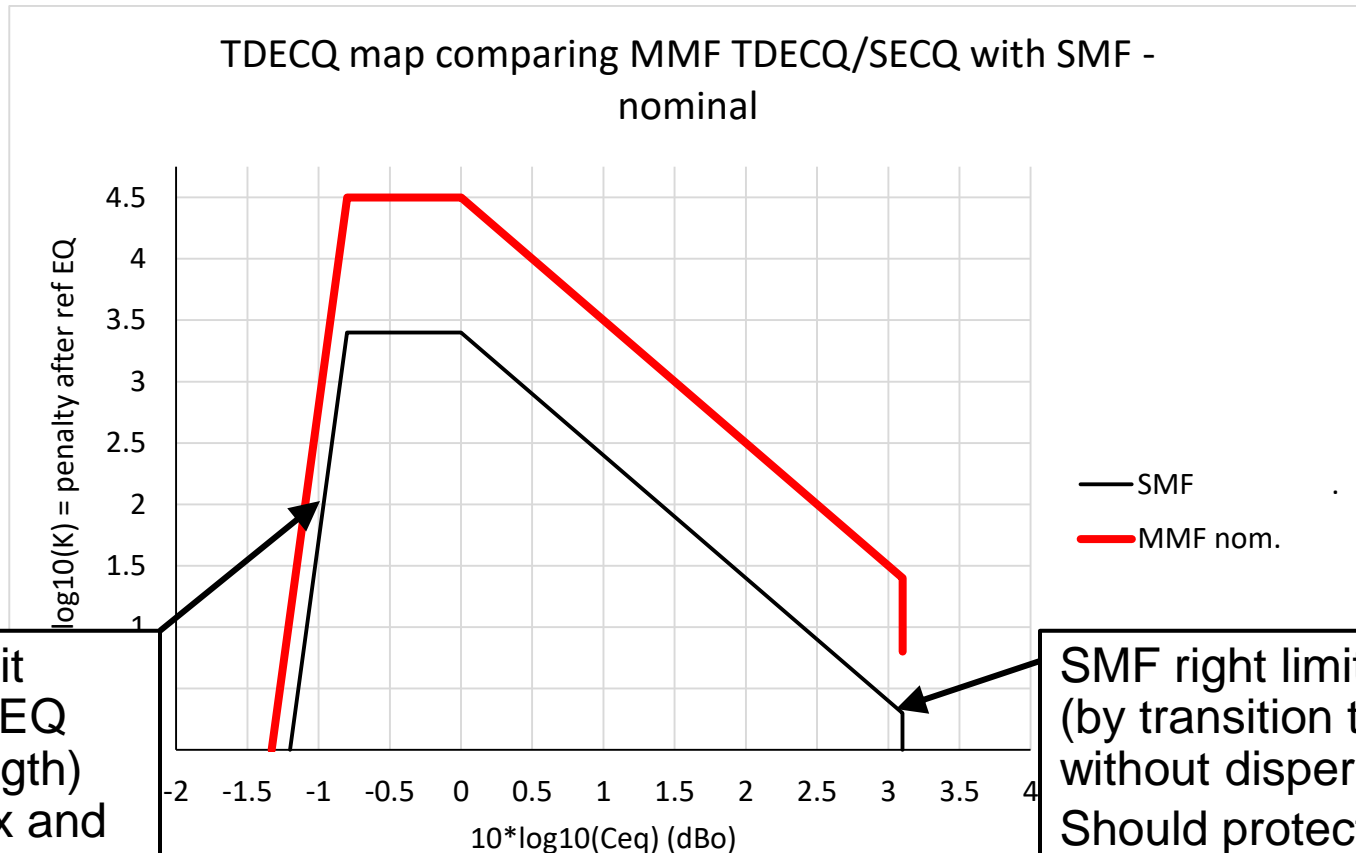


MMF TDECQ limit (4.5 dB) is much higher than highest SMF (3.4 dB)

Determines top and diagonal limits

Nominal left and right limits are also the same – but it's not that simple

# TDECQ map comparing MMF TDECQ/SECQ with SMF - nominal



SMF left limit defined (by EQ cursor strength) for both max and min dispersion  
Protects receiver from range of possible signals

limit (4.5 dB) is much higher than high  
mines top and diagonal limits  
and right limits are also the same – bu

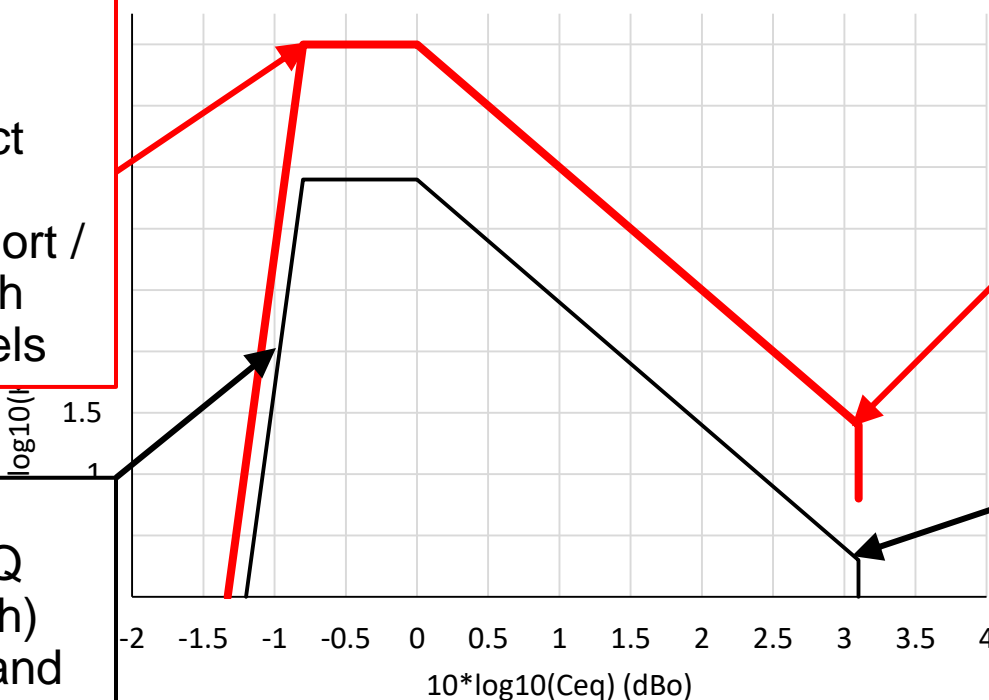
SMF right limit defined (by transition time) without dispersion  
Should protect receiver because effect of chromatic dispersion will be small for slowest signal

# TDECQ map comparing MMF TDECQ/SECQ with SMF - nominal

TDECQ map comparing MMF TDECQ/SECQ with nominal

MMF left limit defined (by EQ cursor strength) for 11.2 GHz reference Rx  
Doesn't protect receiver from signal after short / high bandwidth optical channels

MMF right limit defined (by transition time) for 13.28... GHz reference Rx  
Doesn't protect receiver from signal after long / low bandwidth optical channels



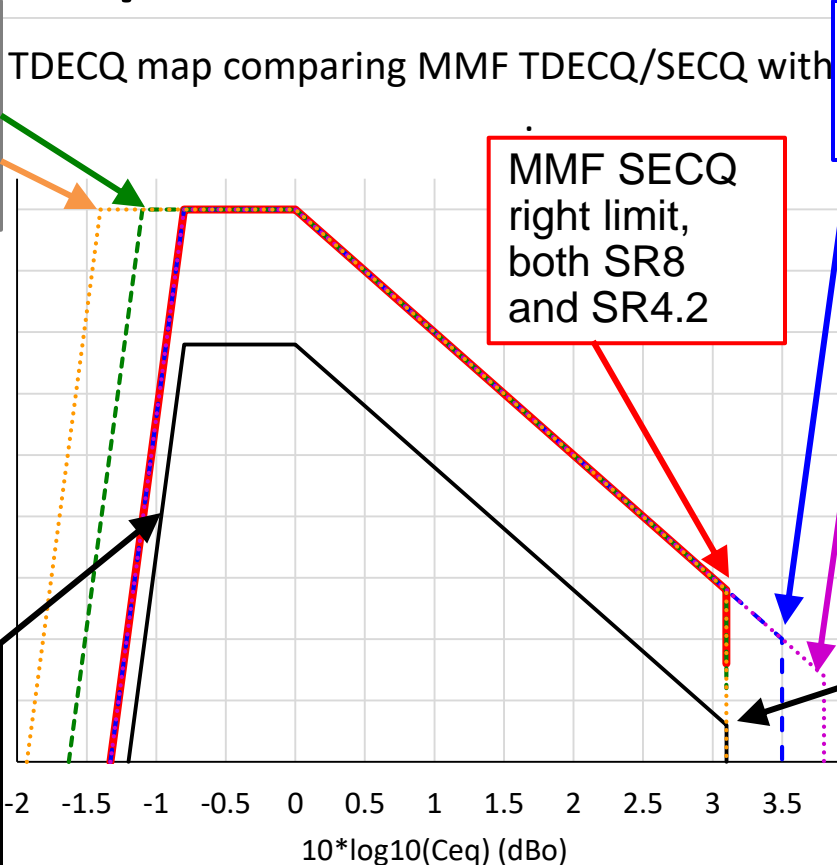
SMF left limit defined (by EQ cursor strength) for both max and min dispersion  
Protects receiver from range of possible signals

SMF right limit defined (by transition time) without dispersion  
Should protect receiver because effect of chromatic dispersion will be small for slowest signal

limit (4.5 dB) is much higher than high  
mines top and diagonal limits  
and right limits are also the same – bu

# TDECQ map comparing MMF TDECQ/SECQ with SMF - actual

Implied MMF left limits for short / high bandwidth optical channels



Implied MMF right limit for long / low bandwidth SR8 channel (11.2 GHz overall BW)

Implied MMF right limit for long / low bandwidth SR4.2 channel (9 GHz overall BW)

- SMF
- MMF nom.
- - MMF 11.2 GHz
- - SR8 13.28...
- ... MMF 9 GHz

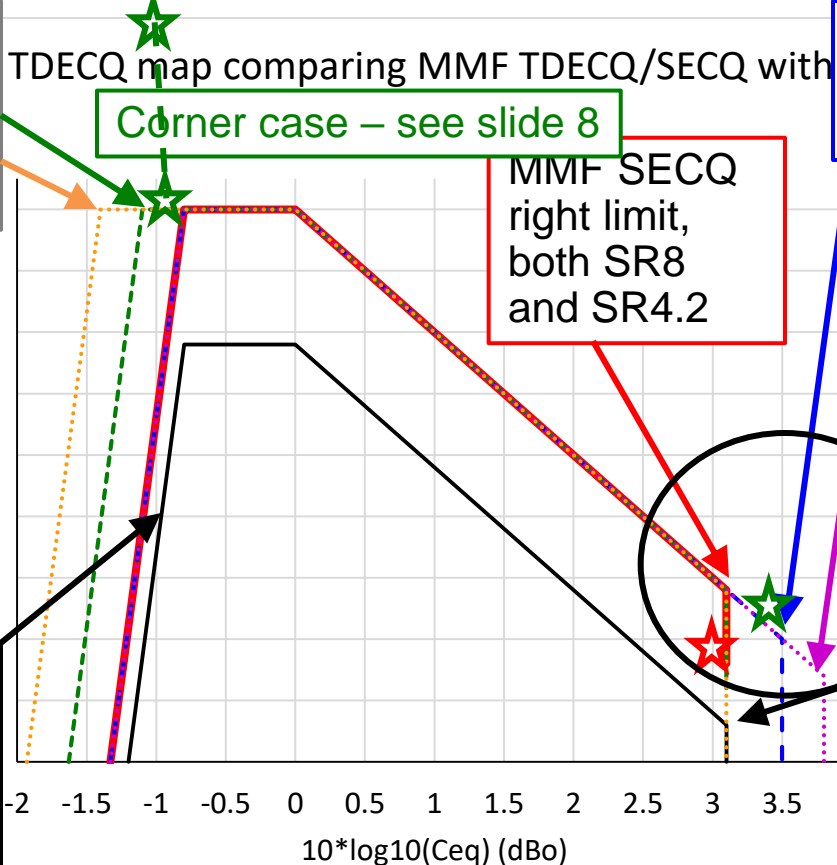
SMF left limit defined (by EQ cursor strength) for both max and min dispersion  
Protects receiver from range of possible signals

SMF right limit defined (by transition time) without dispersion  
Should protect receiver because effect of chromatic dispersion will be small for slowest signal

limit (4.5 dB) is much higher than high  
mines top and diagonal limits  
and right limits are also the same – but it's not that simple

# TDECQ map comparing MMF TDECQ/SECQ with SMF – corner cases

Implied MMF left limits for short / high bandwidth optical channels



Implied MMF right limit for long / low bandwidth SR8 channel (11.2 GHz overall BW)

Implied MMF right limit for long / low bandwidth SR4.2 channel (9 GHz overall BW)

Three stars for clean signals at transition time limit

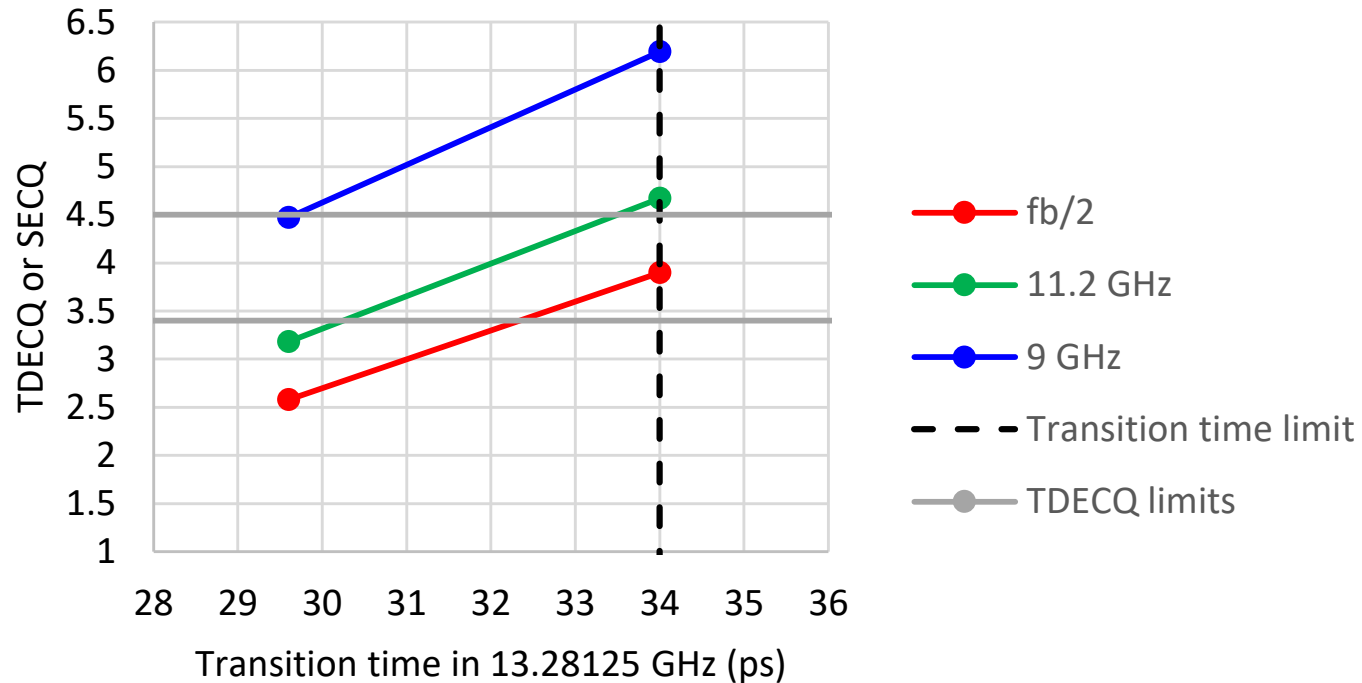
- - MMF 11.2 GHz  
 - - SR8 13.28...  
 - - MMF 9 GHz

SMF left limit defined (by EQ cursor strength) for both max and min dispersion  
 Protects receiver from range of possible signals

limit (4.5 dB) is much higher than high  
 mines top and diagonal limits  
 and right limits are also the same – but it's not that simple

SMF right limit defined (by transition time) without dispersion  
 Should protect receiver because effect of chromatic dispersion will be small for slowest signal

## TDECQ or SECQ vs. transition time



The slowest BT4 signals that satisfies the TDECQ limit, if measured in 13.28125 GHz, if there is no sinusoidal jitter, are:

32 to 33 ps for 3.4 dB (SMF)

33 to 34 ps for 100 m MMF

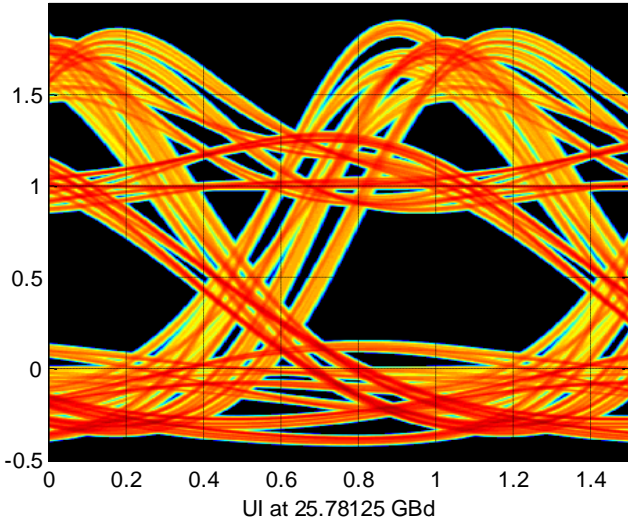
29 to 30 ps for 150 m MMF **Comment 8: This limit should be tightened, or the transition time measured in the same bandwidth as TDECQ**

Note that the SRS signal is faster than this because part of the penalty is provided by SJ (**27.5 ps** in fb/2 for 150 m MMF)

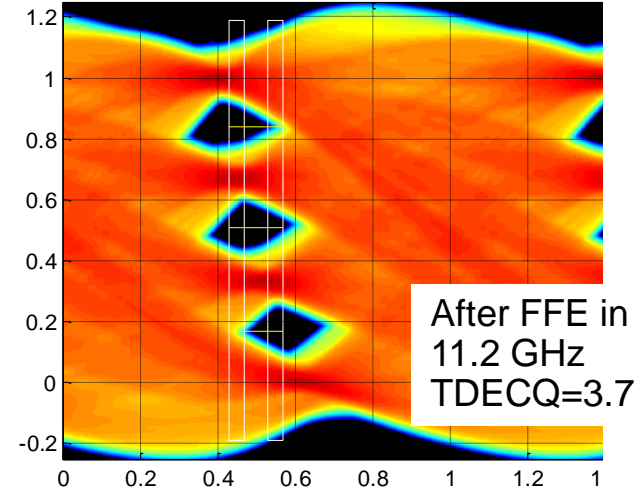
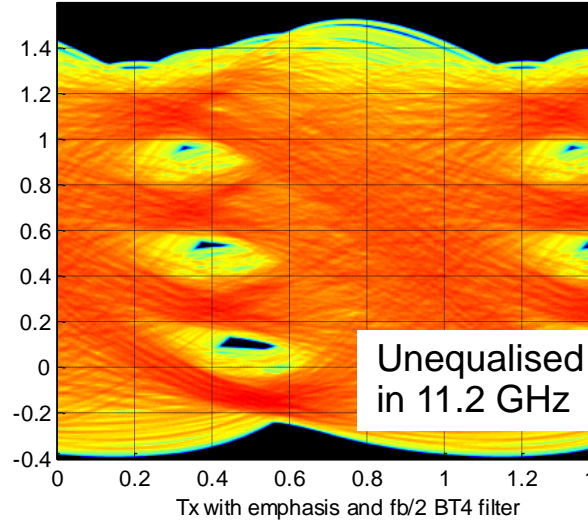
If the transition times were measured in the same bandwidth as the associated TDECQ, the lines would be close to each other, where the red line is

# Example over-emphasised signal (top left green stars on slide 6)

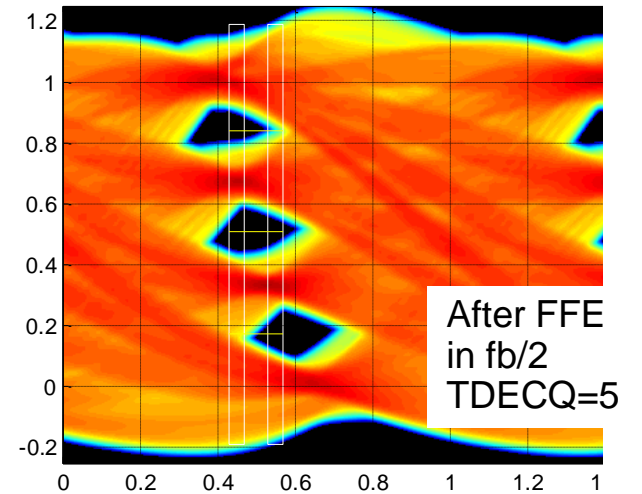
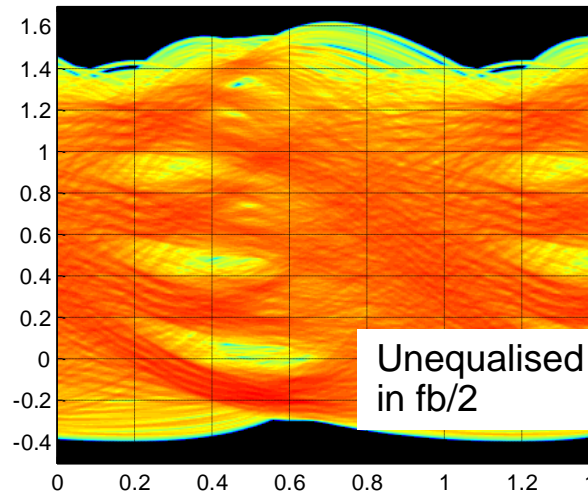
Same transmitter in 25G PAM2 mode, 19.34 GHz BT4



Tx with emphasis and 11.2 GHz BT4 filter



Tx with emphasis and fb/2 BT4 filter



- Top left: transmitter with PAM2 signal
- 0 and 1 are OMA's zeros and threes
- Note different y scales
- This over-emphasised signal benefits from the low bandwidth in MMF TDECQ
- Fails back-to-back

**Should either measure TDECQ in fb/s as well as 11.2 or 9 GHz, or increase minimum cursor tap, or both**