ISI generator impulse responses for 10GBASE-LRM comprehensive stressed receiver test

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Channel responses for 10GBASE-LRM comprehensive stressed receiver test

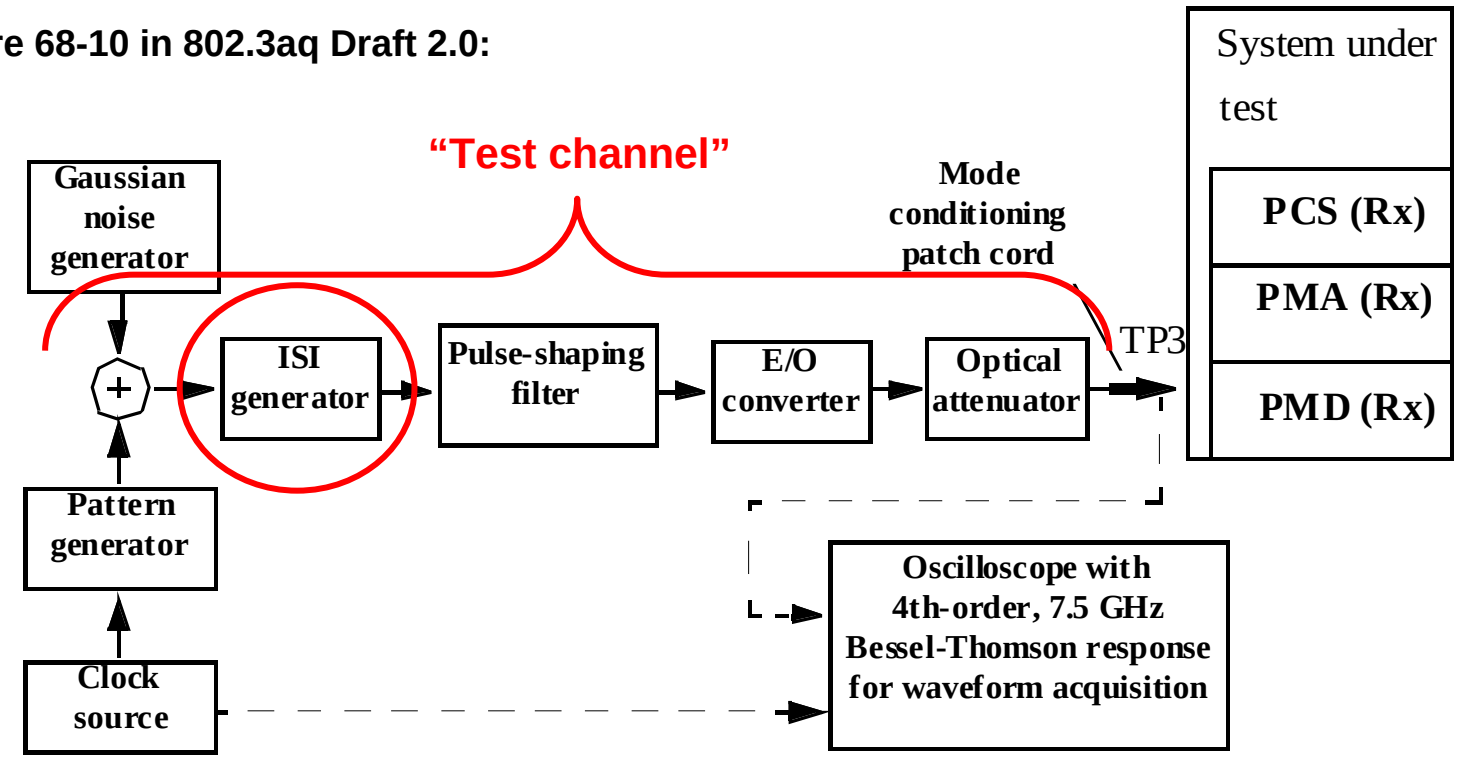
In this presentation we (EDC chip suppliers) propose three "ISI generator" impulse responses for the 10GBASE-LRM comprehensive stressed receiver test.

The resulting receiver test will facilitate low cost, low power 10GBASE-LRM implementations – Supporting 10GBASE-LRM, XFP Class 1 (1.5W), modules.

Together with the other 10GBASE-LRM compliance tests, the resulting receiver test will ensure robust performance of 10GBASE-LRM in the field.

“ISI generator” for comprehensive stressed receiver tests

Figure 68-10 in 802.3aq Draft 2.0:



Measurement configuration for comprehensive stressed receiver sensitivity and overload test

Analysis considerations (1)

Objectives for 10GBASE-LRM

- Support for 300m, OM1 links (amongst others);
- Low cost - PAR is very specific about this;
- Low power - PAR is specific about requirement for support of serial form-factor modules. Presenters consider target to be 1.5W for complete 10GBASE-LRM XFP module (XFP Class 1);
- Need for manufacturing margin (for high yield, volume, manufacturing). This is a cost consideration;
- Time to market imperative.

Analysis considerations (2)

Dispersion penalty budget:

- Dispersion penalty budget for 10GBASE-LRM is 6.5dB.

Dispersion penalty required to remain within this budget across samples during volume manufacture. i.e.:

- Over manufacturing spreads (photo detector, TIA as well as equalizer);
- Over variations in performance with temperature and voltage;
- Considering implementation limitations.

Results

In the following four slides we present our proposed "ISI generator" impulse response, selected from the candidates provided by John Ewen on 7th April 2005.

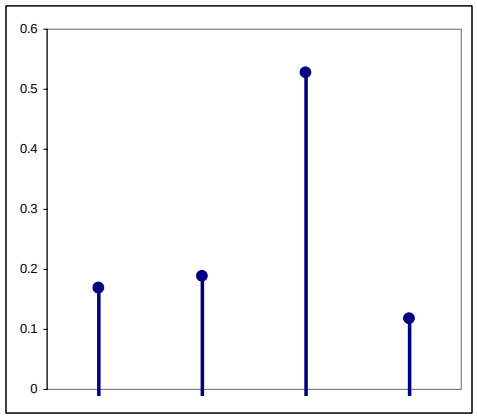
In the time available we did not quite complete the process of selecting a recommended precursor response. We present two alternatives.

For each we show:

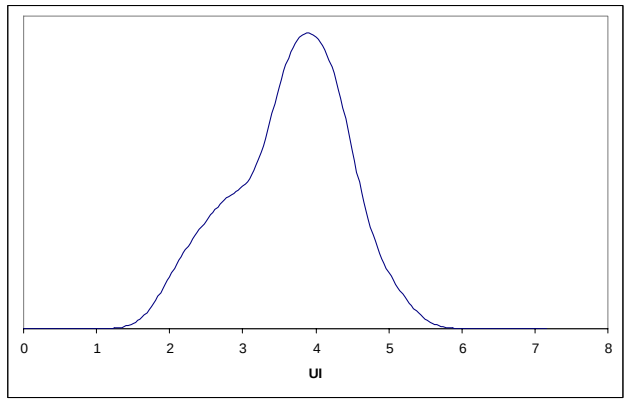
- The four numerical values;
- Test channel impulse response;
- Sample TP3 waveform;
- PRBS7 eye diagram at TP3.

Precursor response

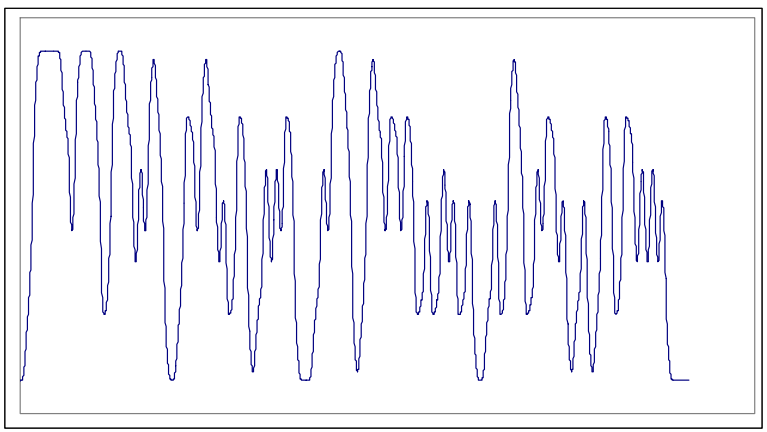
Response 10: 0.168 0.188 0.527 0.117



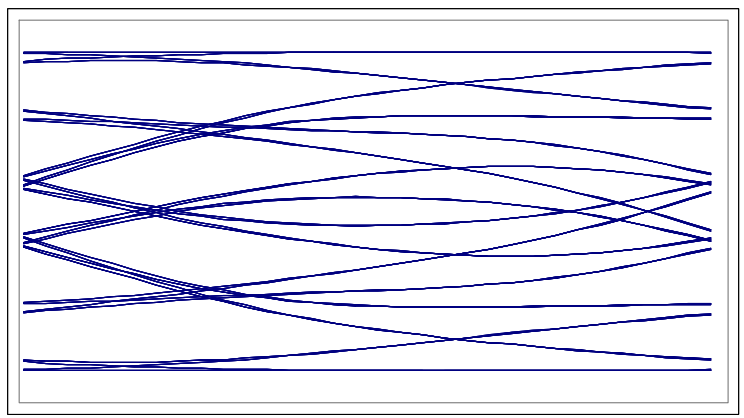
“ISI generator” impulse response



Test channel impulse response



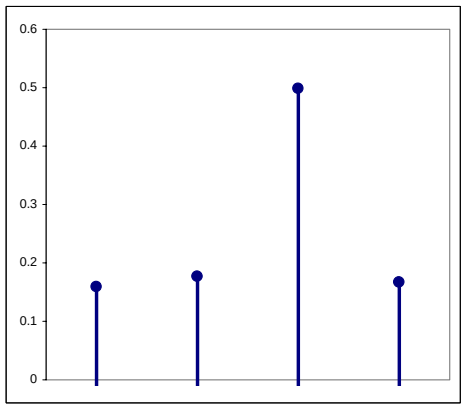
Sample TP3 waveform



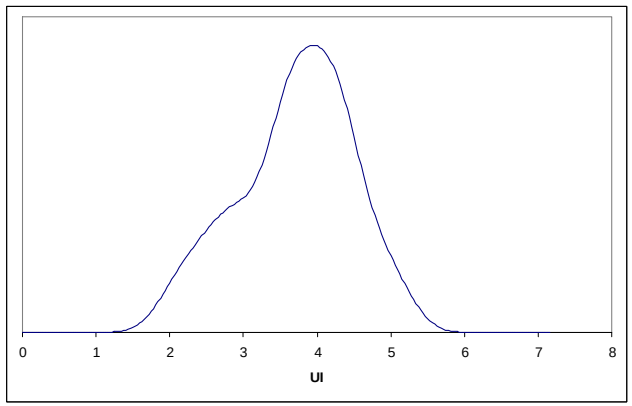
PRBS7 eye diagram at TP3

Precursor response

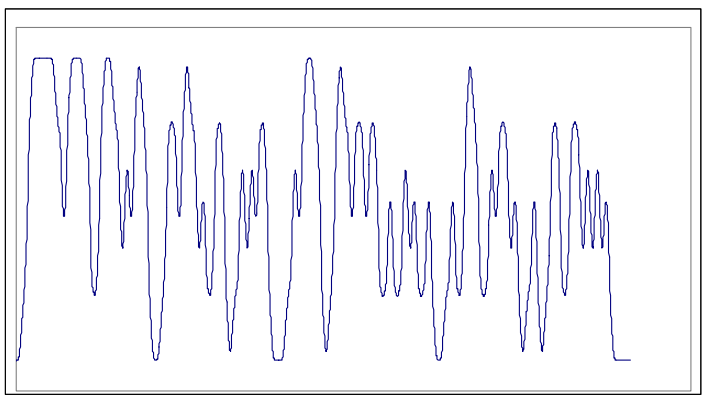
Response 14: 0.158 0.176 0.499 0.167



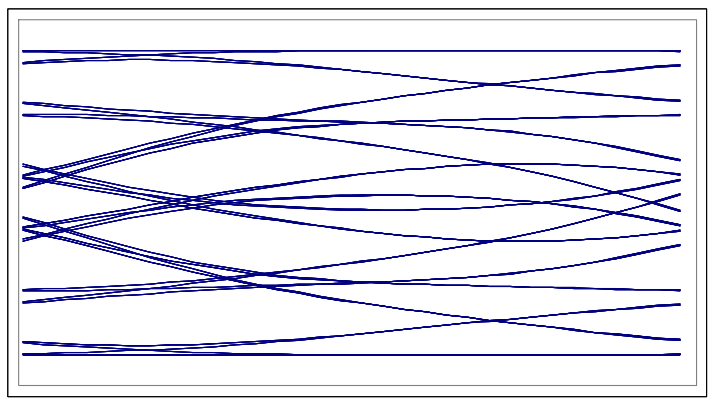
“ISI generator” impulse response



Test channel impulse response



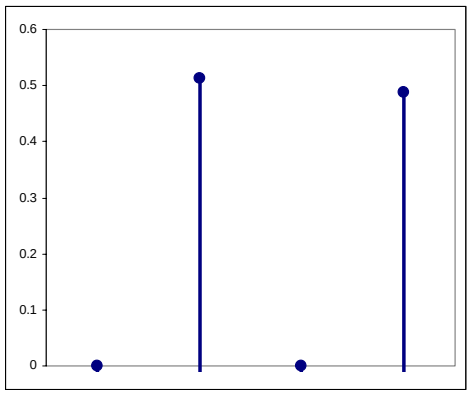
Sample TP3 waveform



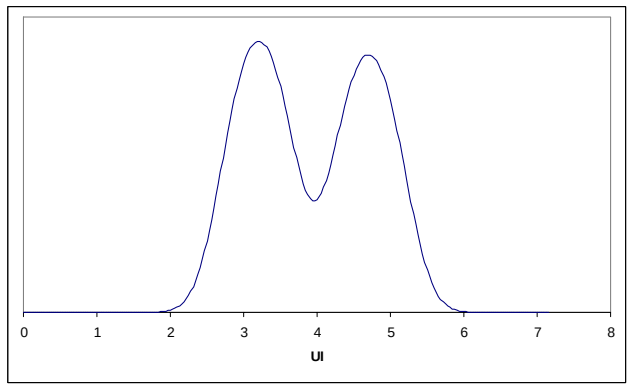
PRBS7 eye diagram at TP3

Split-Symmetric response

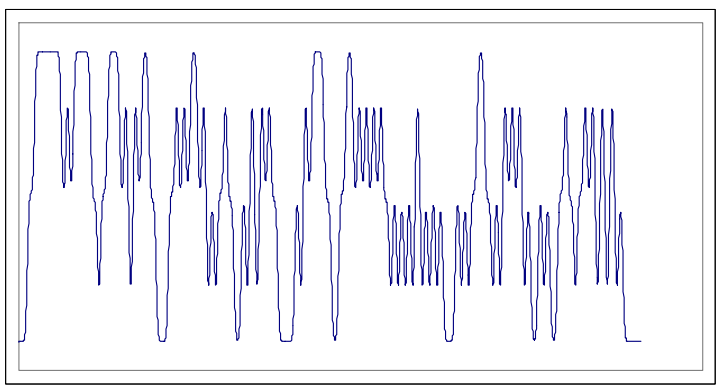
Response 5: 0.000 0.513 0.000 0.487



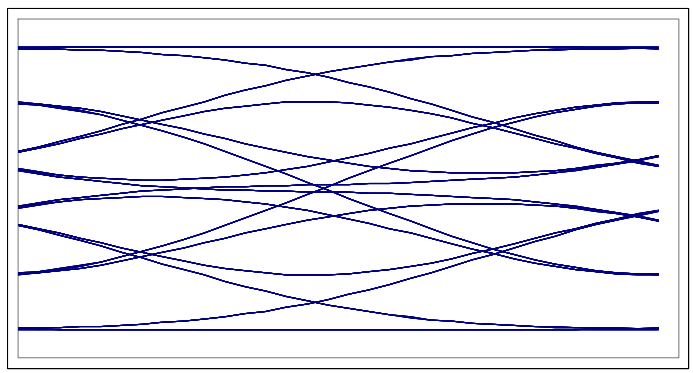
“ISI generator” impulse response



Test channel impulse response



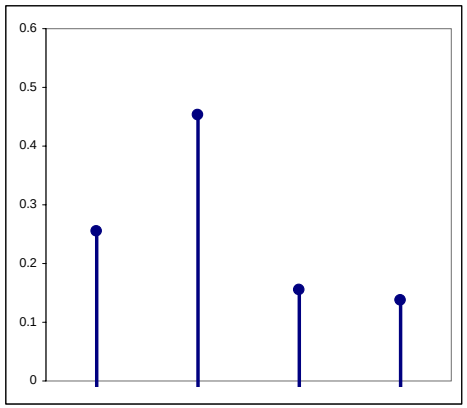
Sample TP3 waveform



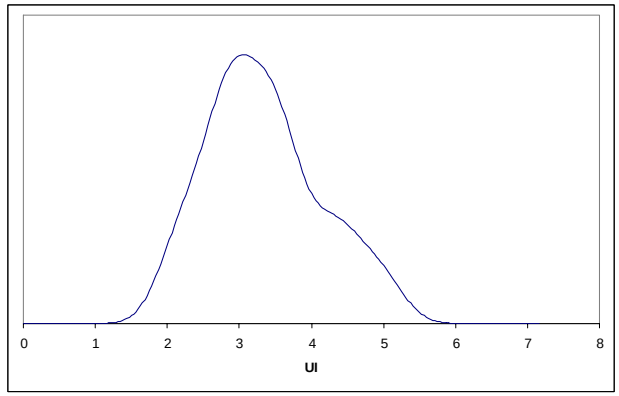
PRBS7 eye diagram at TP3

Post-cursor response

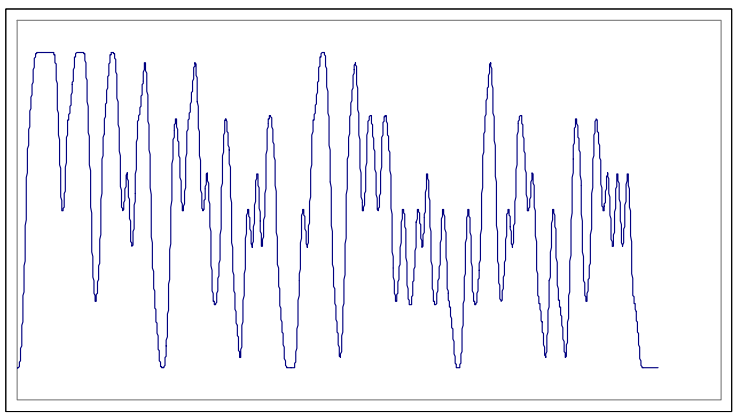
Response 15: 0.254 0.453 0.155 0.138



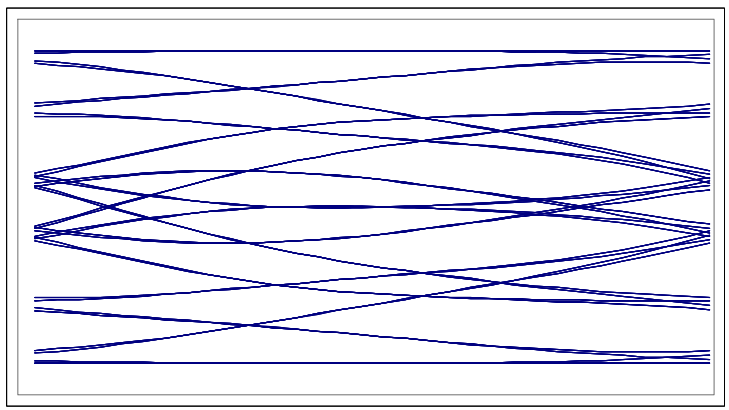
“ISI generator” impulse response



Test channel impulse response



Sample TP3 waveform



PRBS7 eye diagram at TP3

Conclusion

We have considered

- the requirements of 10GBASE-LRM, including the need for a rapidly available, low power, low cost solution (Class 1 XFP),
- together with real world implementation factors,

and recommend the ISI generator impulse responses for the 10GBASE-LRM comprehensive stressed receiver test.