

A Study of 25 Gbps Signaling Over Complied 10G-KR Channels

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For IEEE 802.3 100Gb/s Ethernet Electrical
Backplane and Twinaxial Copper Cable
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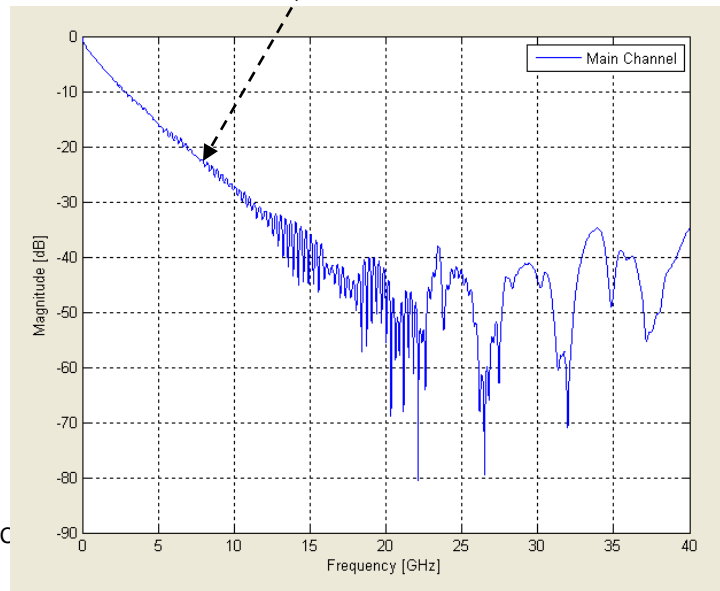
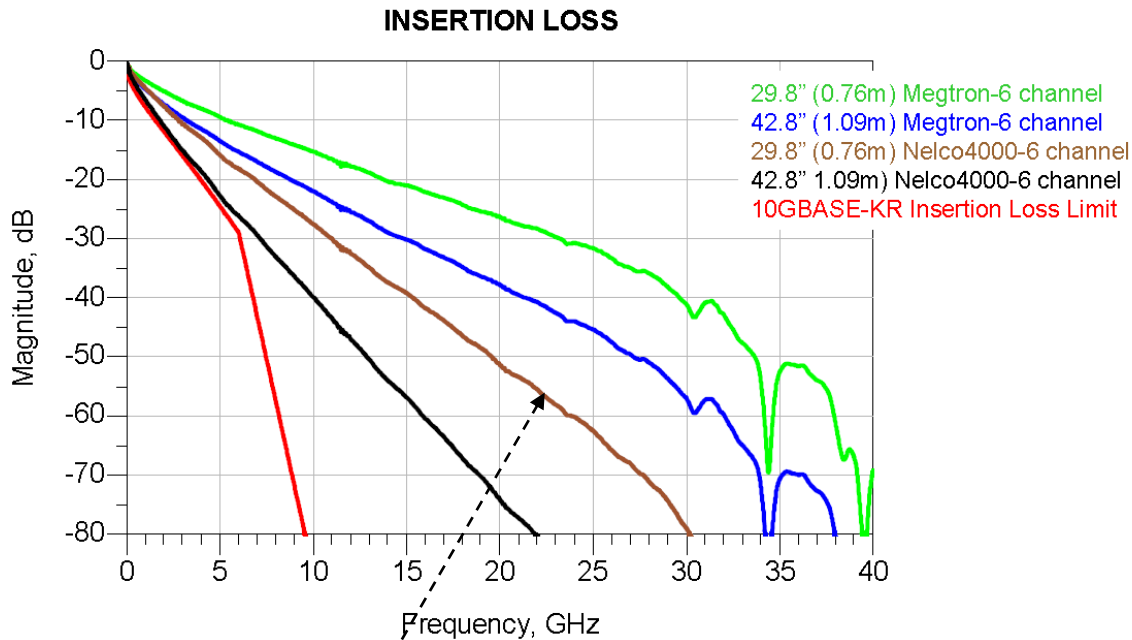
Objectives/Motivations

- This study continues the quantitative study and analysis with the newly provided complied 10G-KR BPs at 25 Gbps

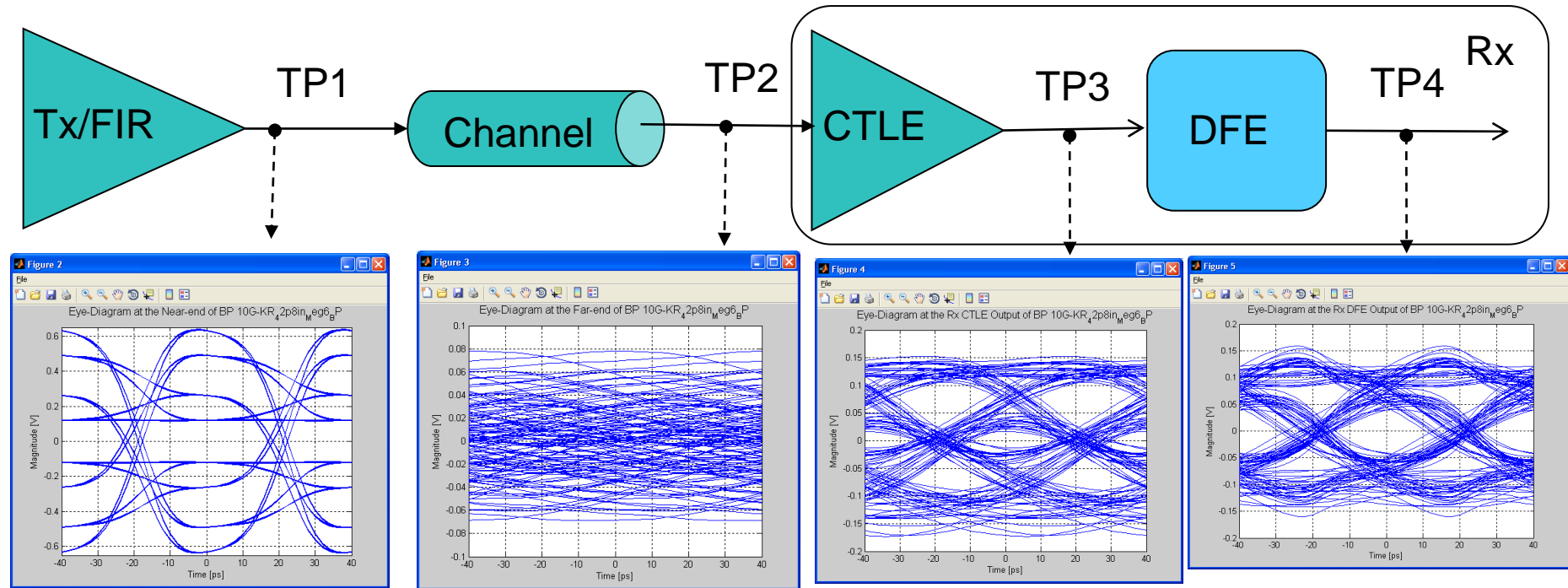
Assumptions and Scopes

- Channel
 - Complied 10G-KR BPs
- Signal data rate
 - 25 Gbps
- Tx and Rx equalization capabilities
 - Tx: FIR (5-taps)
 - Rx: CTLE (20 dB) + DFE (5-taps)
- Signal modulation
 - PAM-2
- Altera's PELE simulator
 - Data pattern: prbs2⁷-1
 - Vod: 800 mVpp

Four 10G-KR Complied Channels

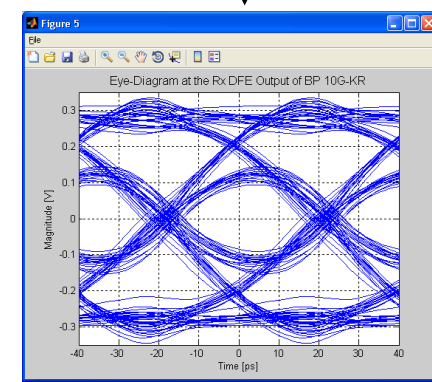
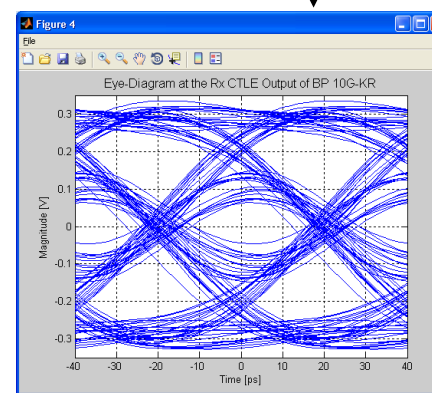
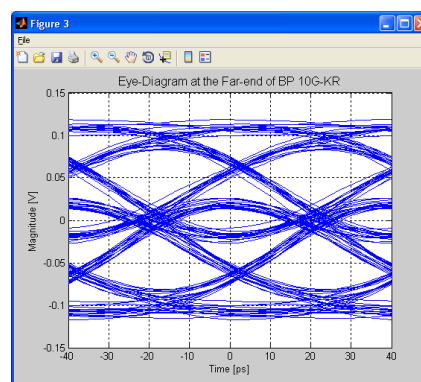
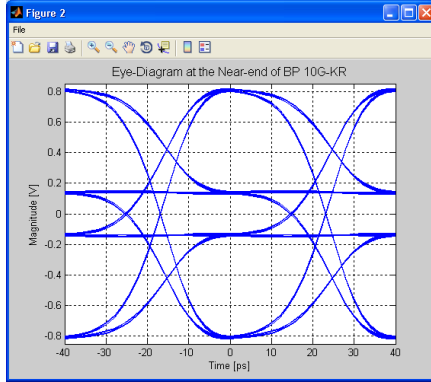
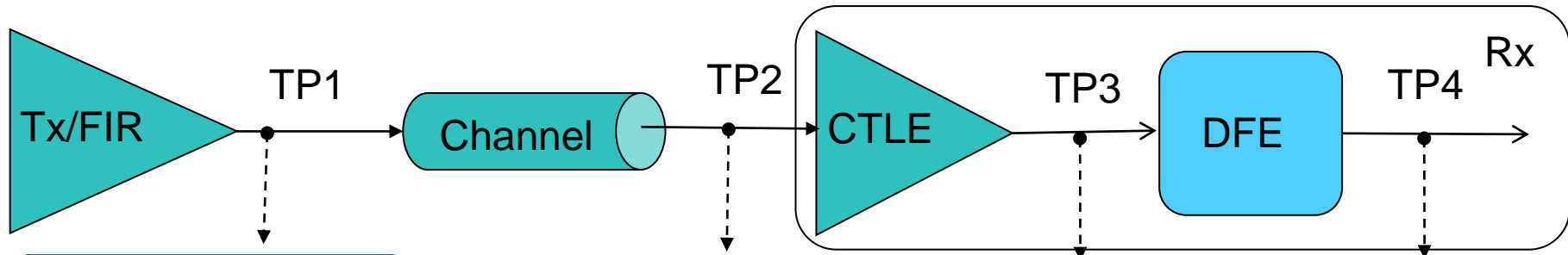


BP1 Simulation Results: Whisper42p8in_Nelco6



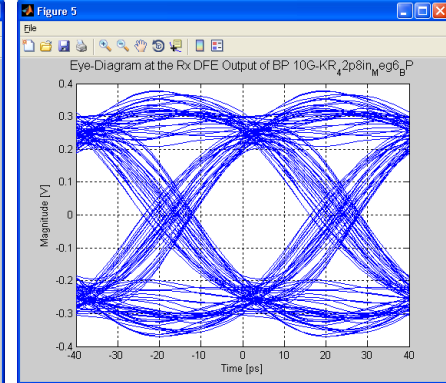
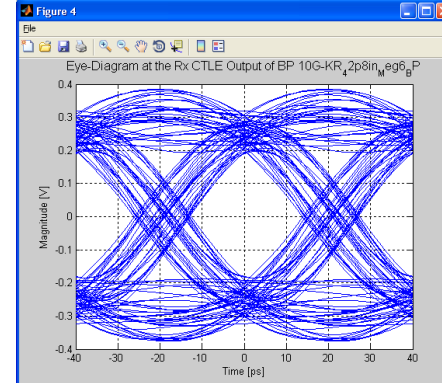
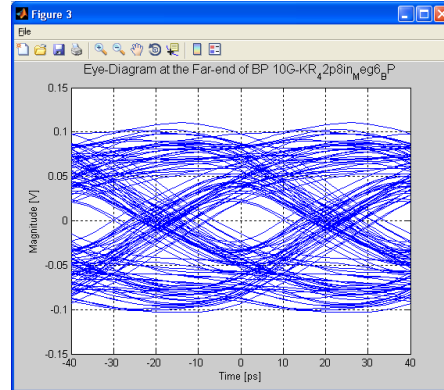
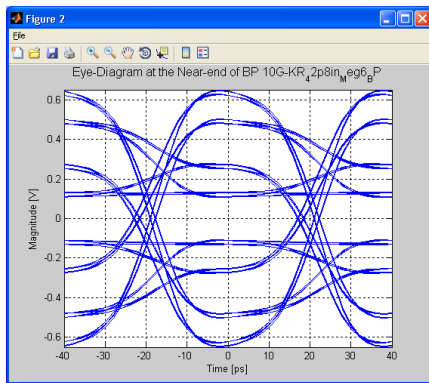
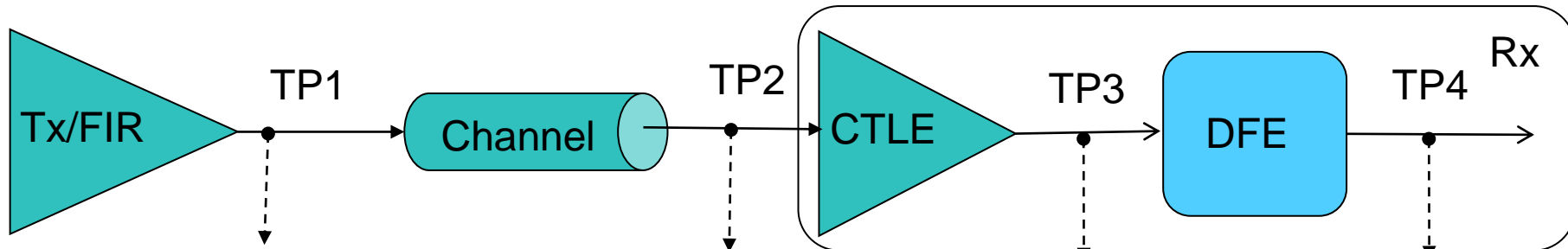
@TP4, {EW(UI), EH(v), EOA(UI*v)}=
 {0.61661, 0.08200, 0.02528}

BP2 Simulation Results: Whisper29p8in_Nelco6



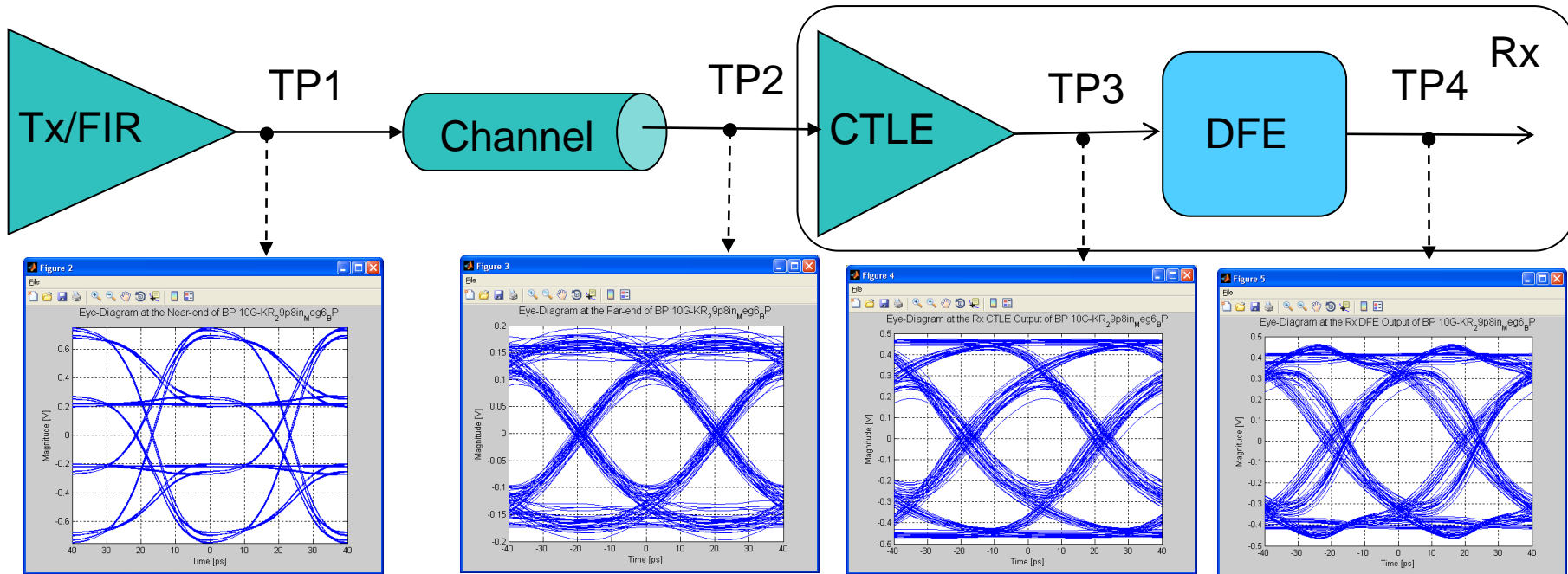
@TP4, {EW(UI), EH(v), EOA(UI*v)}=
{0.73612, 0.18400, 0.06772}

BP3 Simulation Results: Whisper42p8in_Meg6



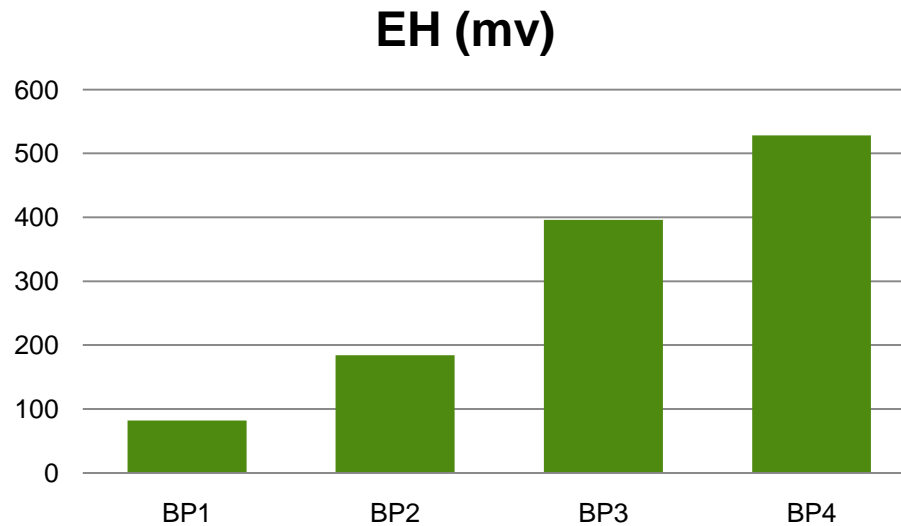
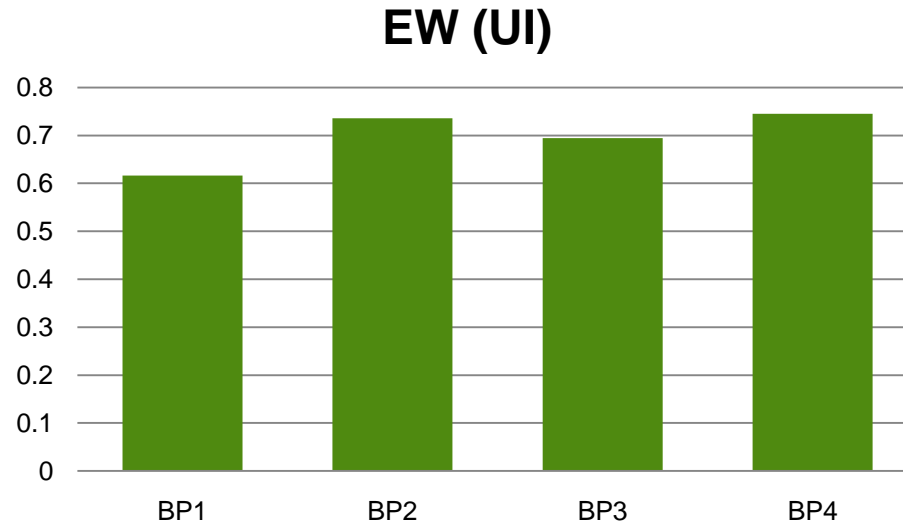
@TP4, {EW(UI), EH(v), EOA(UI*v)}=
 {0.69413, 0.39600, 0.13744}

BP4 Simulation Results: Whisper29p8in_Meg6



@TP4, {EW(UI), EH(v), EOA(UI*v)}=
 {0.74547, 0.52800, 0.19681}

EW and EH Trends



Summary

- Solutions are found for 10G-KR complied channels with PAM-2 signaling at 25 Gbps, under EQ conditions of 5-tap Tx FIR, 20dB CTLE, and 5-tap DFE
- Solution for 42.8" Nelco4000-6 channel is marginal (deterministic EW=0.62 UI, EH = 82 mV)
- PAM-2 will work for 25 G BP built with Magtron-6 to 42.8" or longer
- PAM-2 will work for 25 BP built with Nelco4000-6, with reach length possibly less than 42.8". Further studies are needed to find more precise up-limit for the channel length built with Nelco4000-6

Backup Slides

Channel Simulation Setup (Provided by Tyco)

DAUGHTER CARD x 2

- Board material = Megtron6 or Nelco4000-6
- Trace length = 5"
- Trace geometry = stripline
- Trace width = 6 mils
- Trace spacing = 9 mils

CONNECTOR x 2

- STRADA Whisper*
- Vertical Header
- Right Angled Receptacle

BACKPLANE

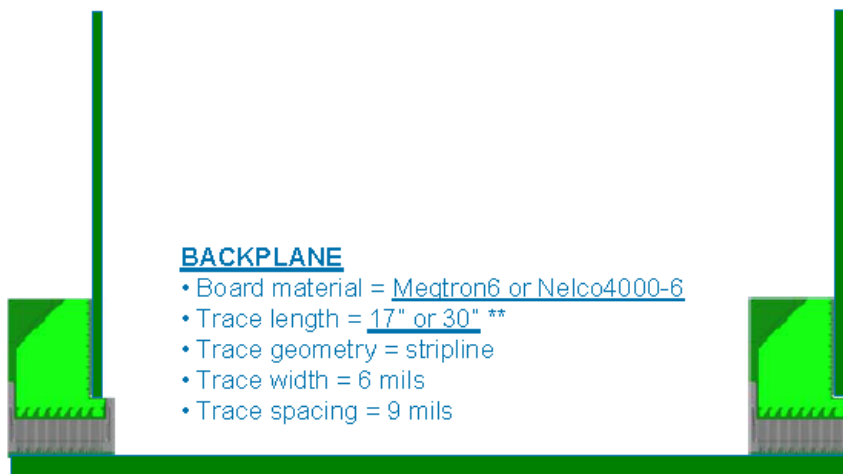
- Board material = Megtron6 or Nelco4000-6
- Trace length = 17" or 30" **
- Trace geometry = stripline
- Trace width = 6 mils
- Trace spacing = 9 mils

DAUGHTER CARD FOOTPRINT x 2

- PCB Thickness = 150 mils
- 16 layers
- Bottom Layer route, THRU via
- No Counterbore or stub

BACKPLANE FOOTPRINT x 2

- PCB Thickness = 250 mils
- 26 layers
- Bottom Layer route, THRU via
- No Counterbore or stub



0.76meters = 29.8" = 2*(5" daughtercard traces) + 2*(0.15" daughtercard footprint) + 2*(1" connector) + 2*(0.25" backplane footprint) + 17" backplane traces

1.09meters = 42.8" = 2*(5" daughtercard traces) + 2*(0.15" daughtercard footprint) + 2*(1" connector) + 2*(0.25" backplane footprint) + 30" backplane traces

**** For the two different lengths only the length of backplane traces varies**

Acknowledgements

- The channel data is kindly provided by Tyco Electronics

Thank You !