200 Gb/s PAM4 Channel sweep designs for “Near Package Connector (NPC) KR cabled managed crosstalk backplane” and “C2C with 1 connector” topologies with crosstalk update

Richard Mellitz, Samtec
Brandon Gore, Samtec

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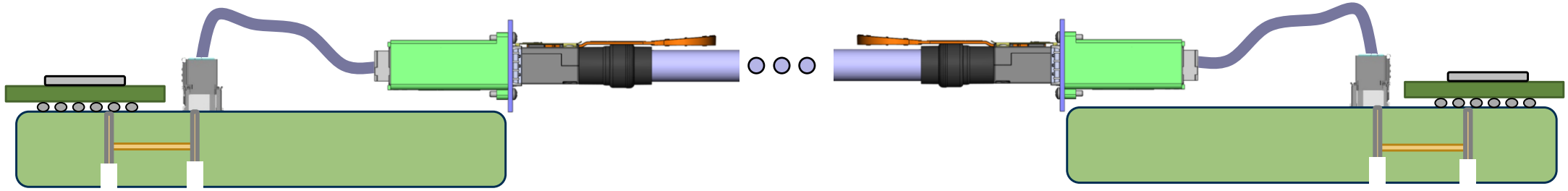
Contents

- KR NPC Cabled managed crosstalk backplane channels
- Chip to Chip (C2C) Mezzanine with crosstalk channels
- Modeling details
- File lists (s4p’s) and keys
- TP0-TP5 loss
- Summary

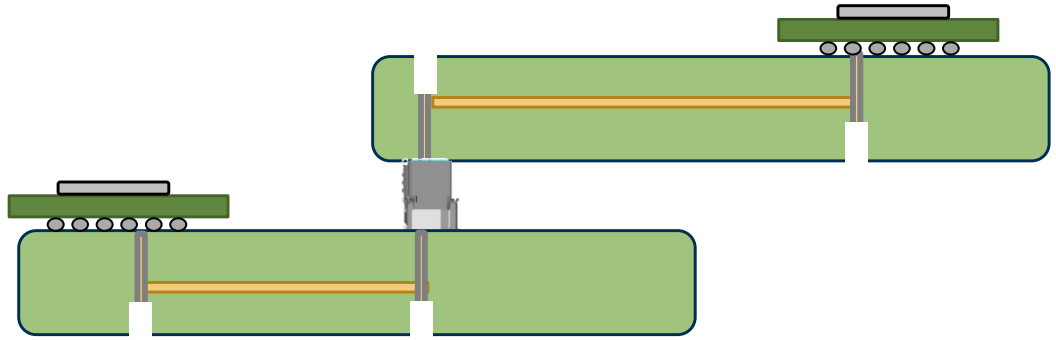
200 Gb/s PAM4 Channel Topologies

Length variations provide an amalgamation of products a with range of losses

KR NPC Cabled Backplane



Chip to Chip (C2C) Mezzanine



KR Cabled TP0 to TP5 topology

Flyover Cabled Line Cards with Cabled Backplane

Twin Ax
Length: 100mm, 200mm, 300 mm
AWG: 33 Zo: 92.5 Ω

Twin Ax
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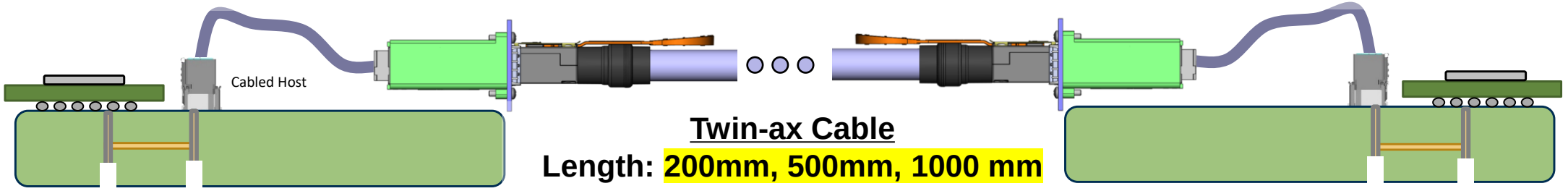

Twin-ax Cable
Length: 200mm, 500mm, 1000 mm
AWG: 27
Zo : 92.5 Ω

PCB Trace
Layer Count: 30
Routing Layer: 11
Routing Depth: 1.6 mm
1.5 dB per inch @ 53.125 GHz
Length: 25 mm, 50mm, 75 mm
***Via Stub: 6 mil (4mil +/- 2mil)**

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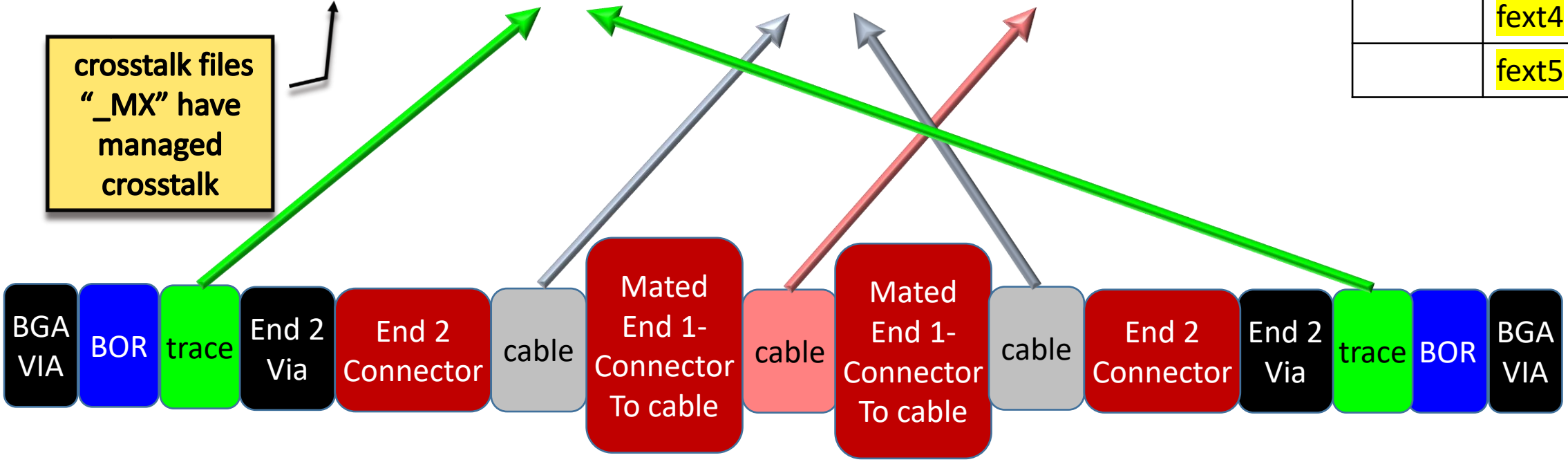
**Via structures include actual breakout and escape routing.*

KR Channel List Key for Tp0-Tp5

KRCA_wXTALK_MX_1_PCB-25-25_mm_FO-100-100_mm_CA-200_mm_thru.s4p

next1	fext1
next2	fext2
next3	fext3
	fext4
	fext5

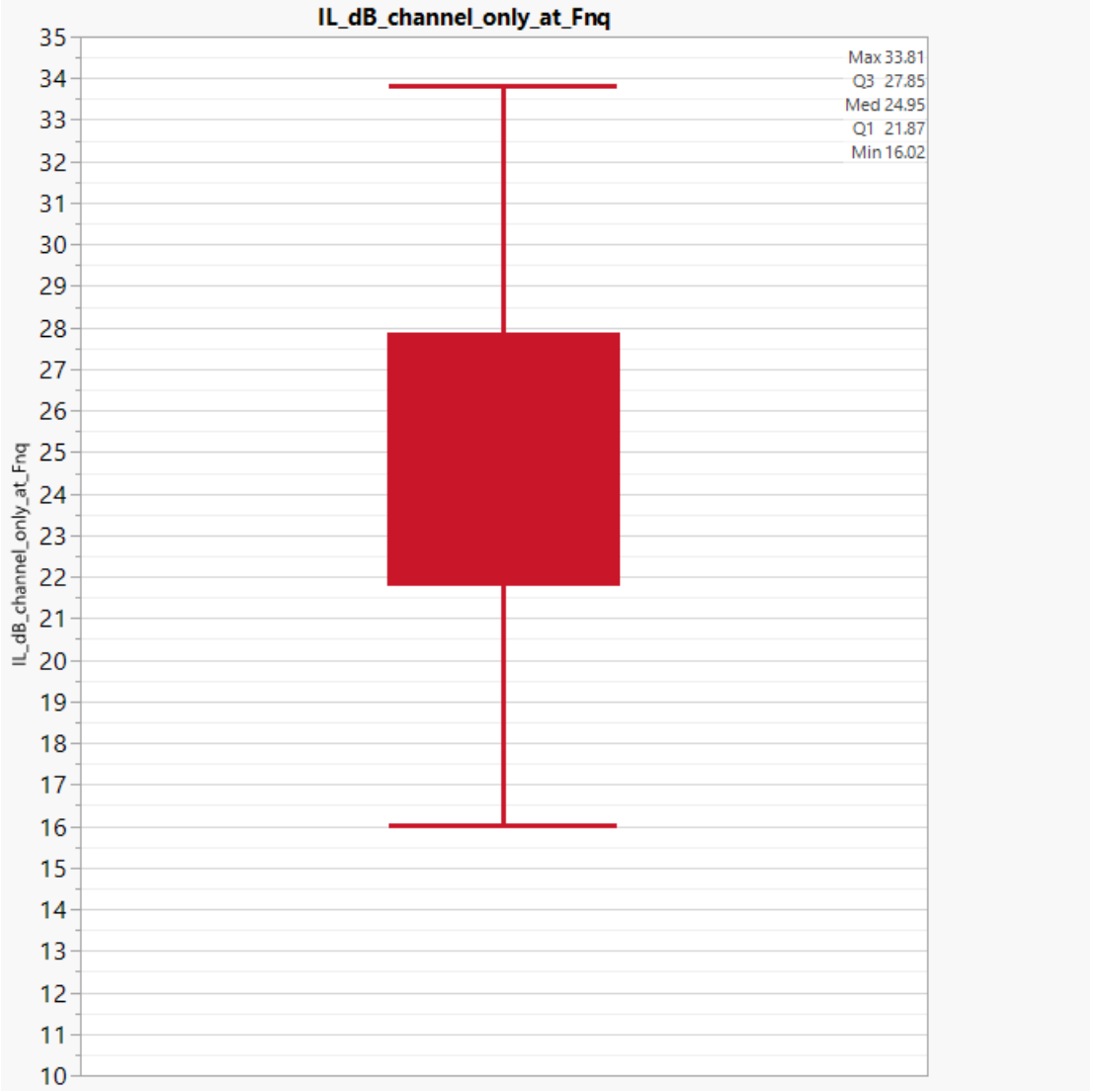
crosstalk files "_MX" have managed crosstalk



KR Cabled MX Backplane loss vs channel (TP0 - TP5)

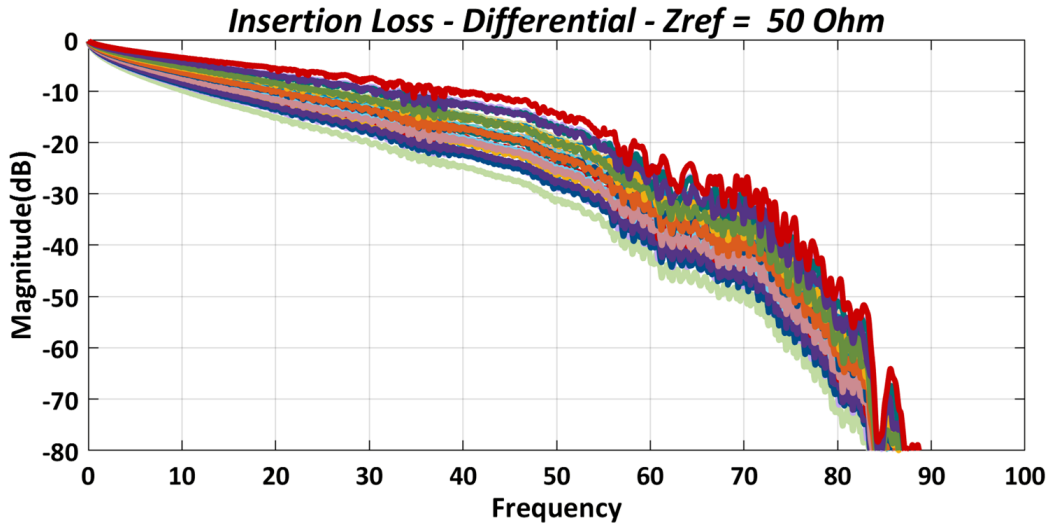
IL Range: 16.2 dB to 33.8 dB

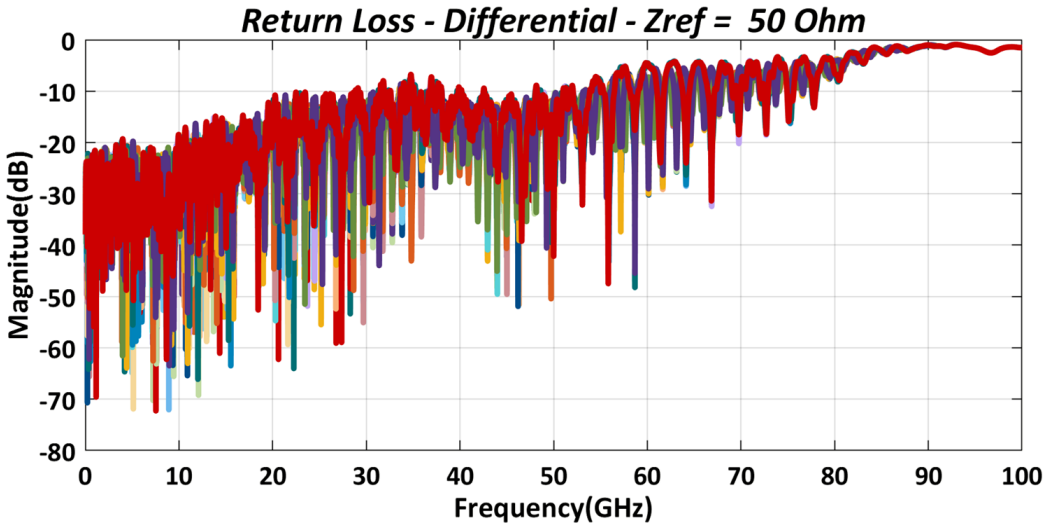
Channel	TP0-TP5 Loss (dB)
KRCA_wXTALK_MX_1_PCB-25-25_mm_FO-100-100_mm_CA-200_mm_thru	16.0
KRCA_wXTALK_MX_2_PCB-50-50_mm_FO-100-100_mm_CA-200_mm_thru	20.1
KRCA_wXTALK_MX_3_PCB-75-75_mm_FO-100-100_mm_CA-200_mm_thru	22.8
KRCA_wXTALK_MX_4_PCB-25-25_mm_FO-200-200_mm_CA-200_mm_thru	18.6
KRCA_wXTALK_MX_5_PCB-50-50_mm_FO-200-200_mm_CA-200_mm_thru	22.3
KRCA_wXTALK_MX_6_PCB-75-75_mm_FO-200-200_mm_CA-200_mm_thru	25.1
KRCA_wXTALK_MX_7_PCB-25-25_mm_FO-300-300_mm_CA-200_mm_thru	21.2
KRCA_wXTALK_MX_8_PCB-50-50_mm_FO-300-300_mm_CA-200_mm_thru	25.0
KRCA_wXTALK_MX_9_PCB-75-75_mm_FO-300-300_mm_CA-200_mm_thru	27.8
KRCA_wXTALK_MX_10_PCB-25-25_mm_FO-100-100_mm_CA-500_mm_thru	18.2
KRCA_wXTALK_MX_11_PCB-50-50_mm_FO-100-100_mm_CA-500_mm_thru	22.3
KRCA_wXTALK_MX_12_PCB-75-75_mm_FO-100-100_mm_CA-500_mm_thru	25.0
KRCA_wXTALK_MX_13_PCB-25-25_mm_FO-200-200_mm_CA-500_mm_thru	20.9
KRCA_wXTALK_MX_14_PCB-50-50_mm_FO-200-200_mm_CA-500_mm_thru	24.6
KRCA_wXTALK_MX_15_PCB-75-75_mm_FO-200-200_mm_CA-500_mm_thru	27.4
KRCA_wXTALK_MX_16_PCB-25-25_mm_FO-300-300_mm_CA-500_mm_thru	23.5
KRCA_wXTALK_MX_17_PCB-50-50_mm_FO-300-300_mm_CA-500_mm_thru	27.2
KRCA_wXTALK_MX_18_PCB-75-75_mm_FO-300-300_mm_CA-500_mm_thru	30.1
KRCA_wXTALK_MX_19_PCB-25-25_mm_FO-100-100_mm_CA-1000_mm_thru	21.9
KRCA_wXTALK_MX_20_PCB-50-50_mm_FO-100-100_mm_CA-1000_mm_thru	25.8
KRCA_wXTALK_MX_21_PCB-75-75_mm_FO-100-100_mm_CA-1000_mm_thru	28.5
KRCA_wXTALK_MX_22_PCB-25-25_mm_FO-200-200_mm_CA-1000_mm_thru	24.5
KRCA_wXTALK_MX_23_PCB-50-50_mm_FO-200-200_mm_CA-1000_mm_thru	28.3
KRCA_wXTALK_MX_24_PCB-75-75_mm_FO-200-200_mm_CA-1000_mm_thru	31.0
KRCA_wXTALK_MX_25_PCB-25-25_mm_FO-300-300_mm_CA-1000_mm_thru	27.2
KRCA_wXTALK_MX_26_PCB-50-50_mm_FO-300-300_mm_CA-1000_mm_thru	30.9
KRCA_wXTALK_MX_27_PCB-75-75_mm_FO-300-300_mm_CA-1000_mm_thru	33.8

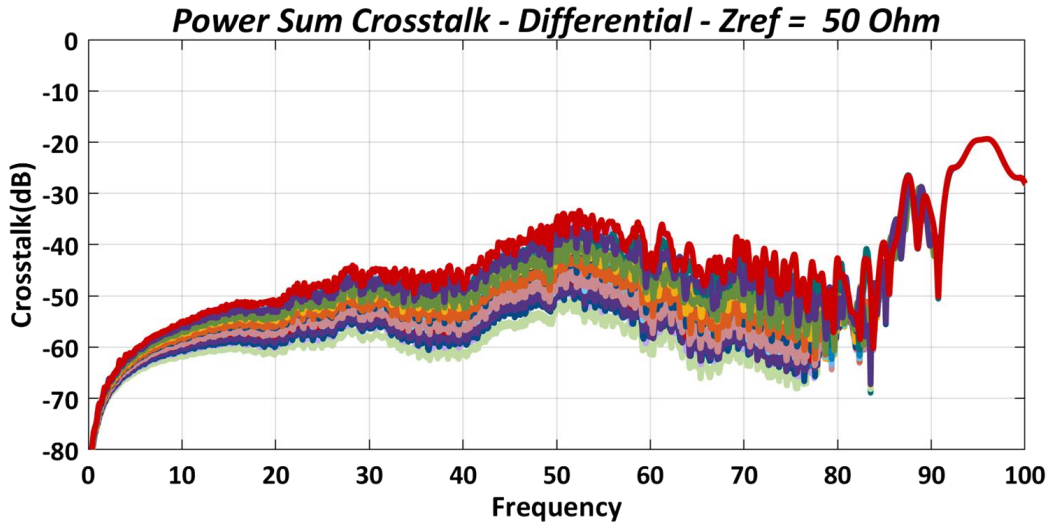


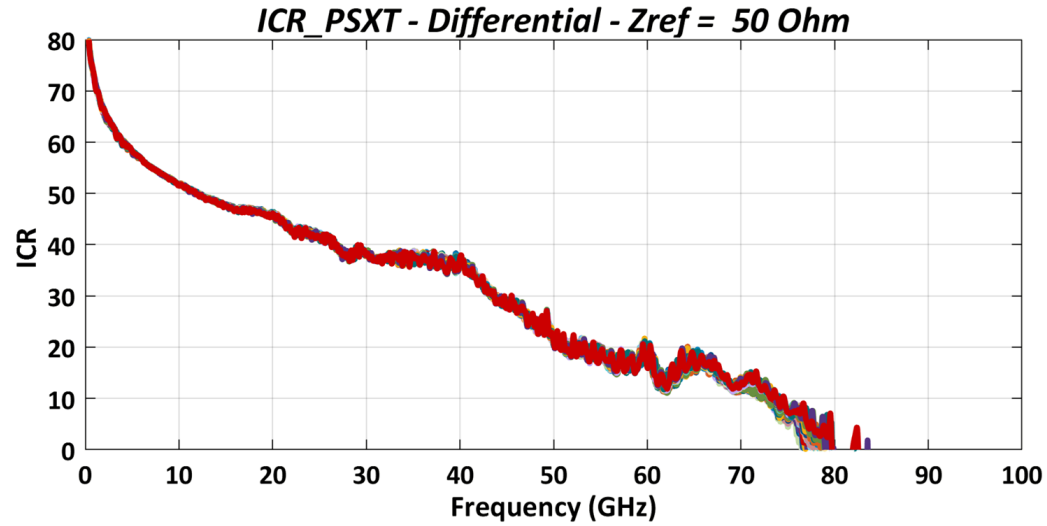
KR Cabled MX Backplane Responses

IL, RL, PST, ICR



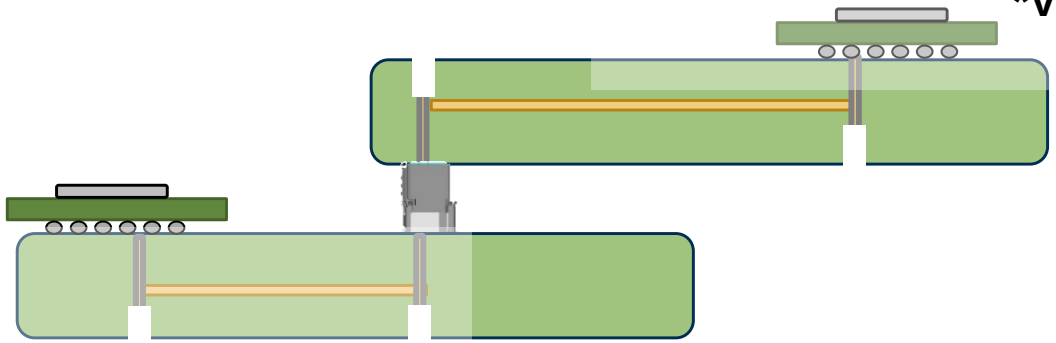






Chip 2 Chip (C2C) Mezzanine

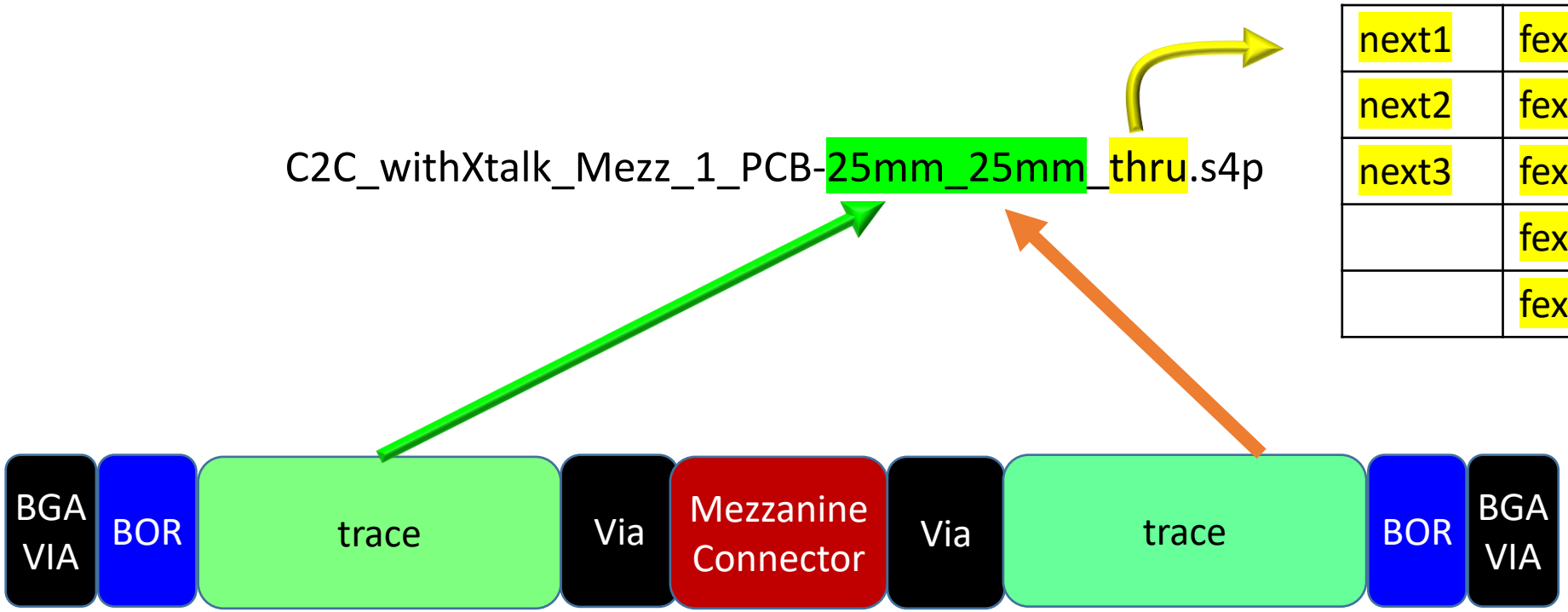
PCB Trace
Layer Count: 22
Routing Layer: 11
Routing Depth: 1.6 mm
1.5 dB per inch @ 53.125 GHz
Length: 25 mm, 60mm, 95 mm, 130 mm, 200 mm
***Via Stub: 6 mil (4mil +/- 2mil)**



PCB Trace
Layer Count: 30
Routing Layer: 11
Routing Depth: 1.6 mm
1.5 dB per inch @ 53.125 GHz
Length: 25 mm, 60mm, 95 mm, 130 mm, 200 mm
***Via Stub: 6 mil (4mil +/- 2mil)**

**Via structures include actual breakout and escape routing.*

C2C File Syntax Key



next1	fext1
next2	fext2
next3	fext3
	fext4
	fext5

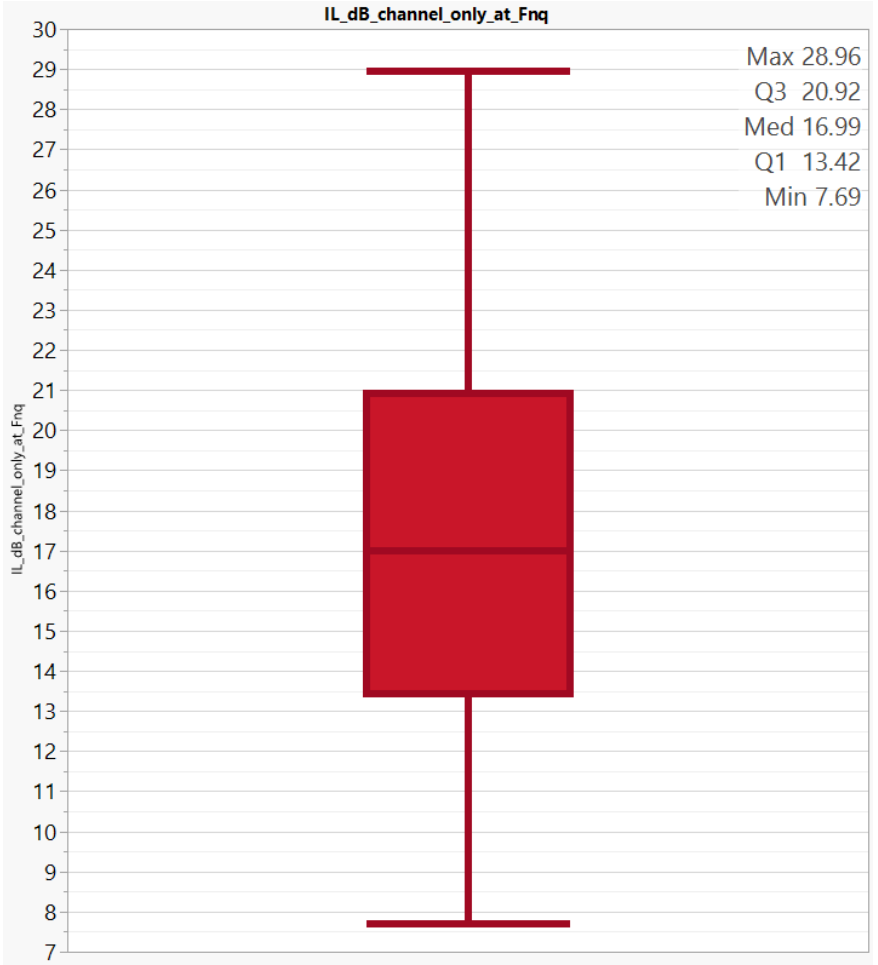
C2C Channel List (thru) for Tp0-Tp5

C2C_withXtalk_Mezz_9_PCB-130mm_60mm_thru.s4p
C2C_withXtalk_Mezz_10_PCB-200mm_60mm_thru.s4p
C2C_withXtalk_Mezz_11_PCB-25mm_95mm_thru.s4p
C2C_withXtalk_Mezz_12_PCB-60mm_95mm_thru.s4p
C2C_withXtalk_Mezz_13_PCB-95mm_95mm_thru.s4p
C2C_withXtalk_Mezz_14_PCB-130mm_95mm_thru.s4p
C2C_withXtalk_Mezz_15_PCB-200mm_95mm_thru.s4p
C2C_withXtalk_Mezz_16_PCB-25mm_130mm_thru.s4p
C2C_withXtalk_Mezz_17_PCB-60mm_130mm_thru.s4p
C2C_withXtalk_Mezz_18_PCB-95mm_130mm_thru.s4p
C2C_withXtalk_Mezz_19_PCB-130mm_130mm_thru.s4p
C2C_withXtalk_Mezz_20_PCB-200mm_130mm_thru.s4p
C2C_withXtalk_Mezz_21_PCB-25mm_200mm_thru.s4p
C2C_withXtalk_Mezz_22_PCB-60mm_200mm_thru.s4p
C2C_withXtalk_Mezz_23_PCB-95mm_200mm_thru.s4p
C2C_withXtalk_Mezz_24_PCB-130mm_200mm_thru.s4p
C2C_withXtalk_Mezz_25_PCB-200mm_200mm_thru.s4p
C2C_withXtalk_Mezz_1_PCB-25mm_25mm_thru.m4p
C2C_withXtalk_Mezz_1_PCB-25mm_25mm_thru.s4p
C2C_withXtalk_Mezz_2_PCB-60mm_25mm_thru.s4p
C2C_withXtalk_Mezz_3_PCB-95mm_25mm_thru.s4p
C2C_withXtalk_Mezz_4_PCB-130mm_25mm_thru.s4p
C2C_withXtalk_Mezz_5_PCB-200mm_25mm_thru.s4p
C2C_withXtalk_Mezz_6_PCB-25mm_60mm_thru.s4p
C2C_withXtalk_Mezz_7_PCB-60mm_60mm_thru.s4p
C2C_withXtalk_Mezz_8_PCB-95mm_60mm_thru.s4p

C2C Loss vs channel (TP0 TP5)

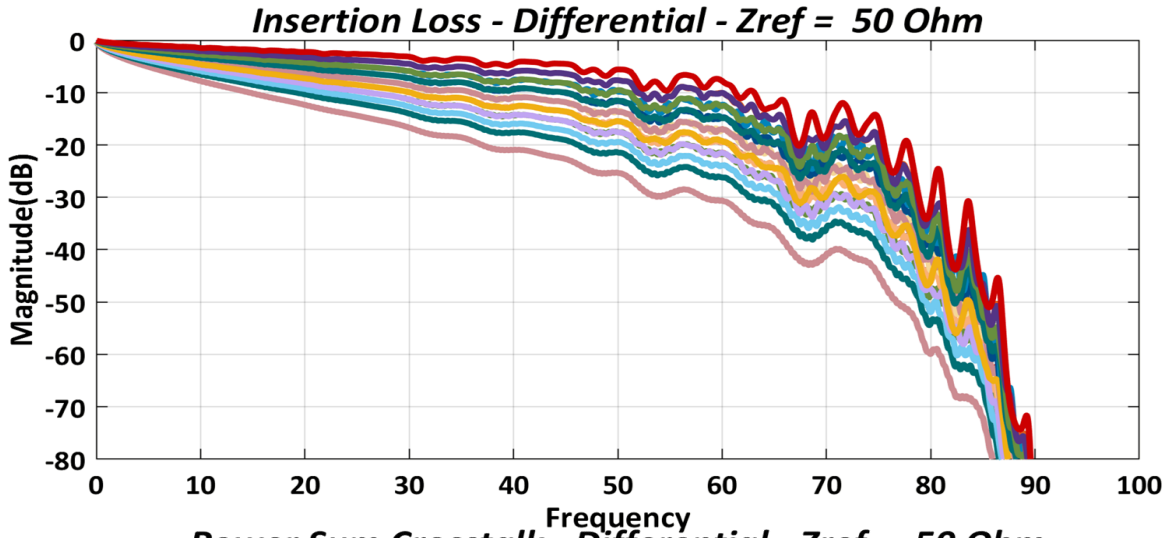
IL: 7.7 dB and 29 dB

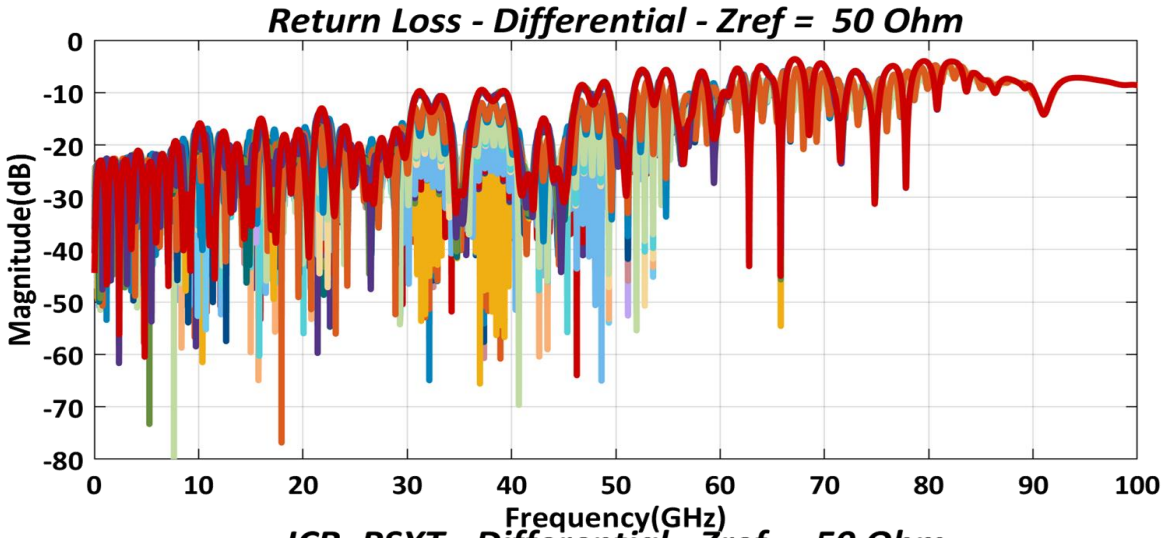
Channel	TP0-TP5 Loss (dB)
C2C_withXtalk_Mezz_9_PCB-130mm_60mm_thru.s4p	7.7
C2C_withXtalk_Mezz_10_PCB-200mm_60mm_thru.s4p	10.2
C2C_withXtalk_Mezz_11_PCB-25mm_95mm_thru.s4p	12.3
C2C_withXtalk_Mezz_12_PCB-60mm_95mm_thru.s4p	14.3
C2C_withXtalk_Mezz_13_PCB-95mm_95mm_thru.s4p	18.3
C2C_withXtalk_Mezz_14_PCB-130mm_95mm_thru.s4p	10.0
C2C_withXtalk_Mezz_15_PCB-200mm_95mm_thru.s4p	12.5
C2C_withXtalk_Mezz_16_PCB-25mm_130mm_thru.s4p	14.7
C2C_withXtalk_Mezz_17_PCB-60mm_130mm_thru.s4p	16.7
C2C_withXtalk_Mezz_18_PCB-95mm_130mm_thru.s4p	20.7
C2C_withXtalk_Mezz_19_PCB-130mm_130mm_thru.s4p	12.3
C2C_withXtalk_Mezz_20_PCB-200mm_130mm_thru.s4p	14.8
C2C_withXtalk_Mezz_21_PCB-25mm_200mm_thru.s4p	17.0
C2C_withXtalk_Mezz_22_PCB-60mm_200mm_thru.s4p	19.0
C2C_withXtalk_Mezz_23_PCB-95mm_200mm_thru.s4p	22.9
C2C_withXtalk_Mezz_24_PCB-130mm_200mm_thru.s4p	14.3
C2C_withXtalk_Mezz_25_PCB-200mm_200mm_thru.s4p	16.8
C2C_withXtalk_Mezz_1_PCB-25mm_25mm_thru.m4p	19.1
C2C_withXtalk_Mezz_1_PCB-25mm_25mm_thru.s4p	21.0
C2C_withXtalk_Mezz_2_PCB-60mm_25mm_thru.s4p	25.0
C2C_withXtalk_Mezz_3_PCB-95mm_25mm_thru.s4p	18.3
C2C_withXtalk_Mezz_4_PCB-130mm_25mm_thru.s4p	20.8
C2C_withXtalk_Mezz_5_PCB-200mm_25mm_thru.s4p	23.0
C2C_withXtalk_Mezz_6_PCB-25mm_60mm_thru.s4p	25.0
C2C_withXtalk_Mezz_7_PCB-60mm_60mm_thru.s4p	29.0

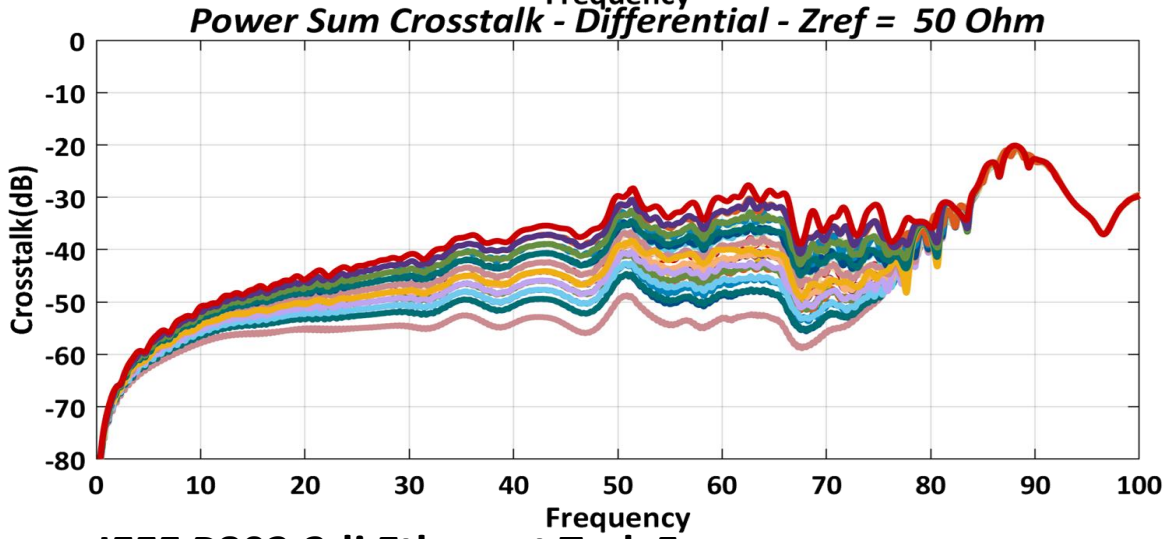


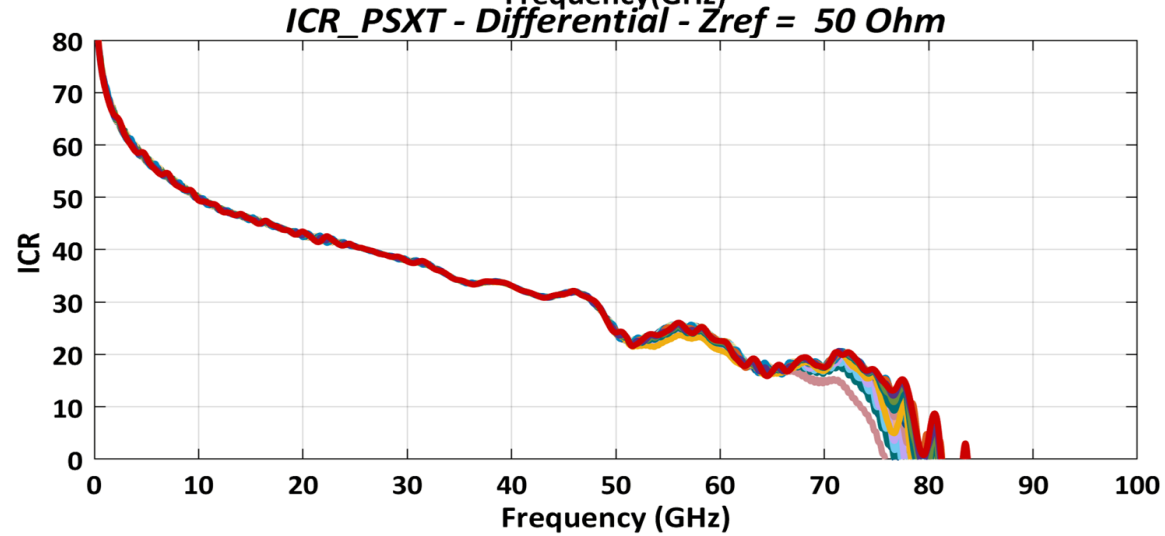
C2C Channels Responses

IL, RL, PST, ICR









Summary: KR & C2C Topologies

- Provide a wide range of losses
- KR NPC Cabled Backplane … 27 channels
  - 16.2 dB to 33.8 dB @ 53.125 GHz
  - Managed crosstalk update to mellitz_3dj_03_2303
    - New Through channels too
- Chip to Chip (C2C) Mezzanine … 25 channels
  - 7.7 dB and 29 dB @ 53.125 GHz
  - Crosstalk update to mellitz_3dj_04_2303
    - New Through channels too

Thank You!