EXPERT DISCUSSION: HOW WILL AI APPLICATIONS AFFECT HIGH SPEED LINK DESIGN?
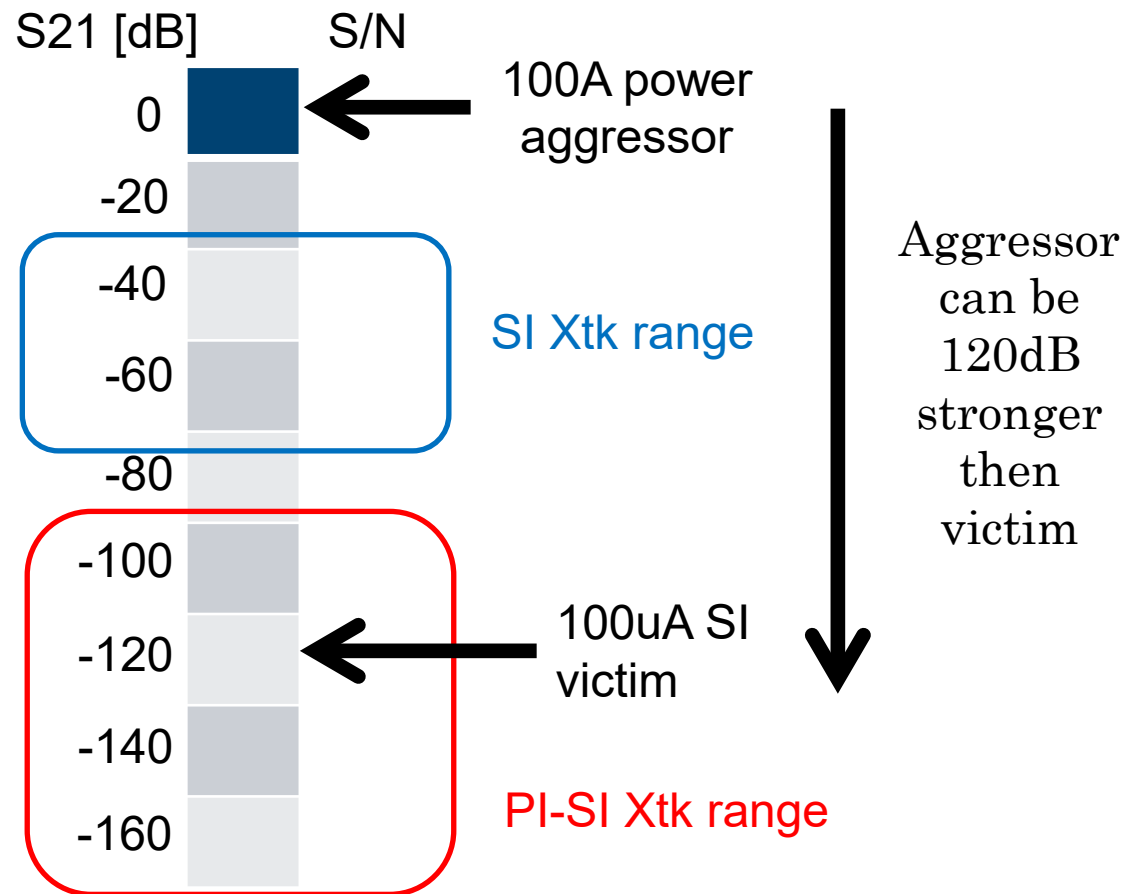
DesignCon 2025 panel

Istvan Novak, Samtec
Presented by Steve Sandler, Picotest
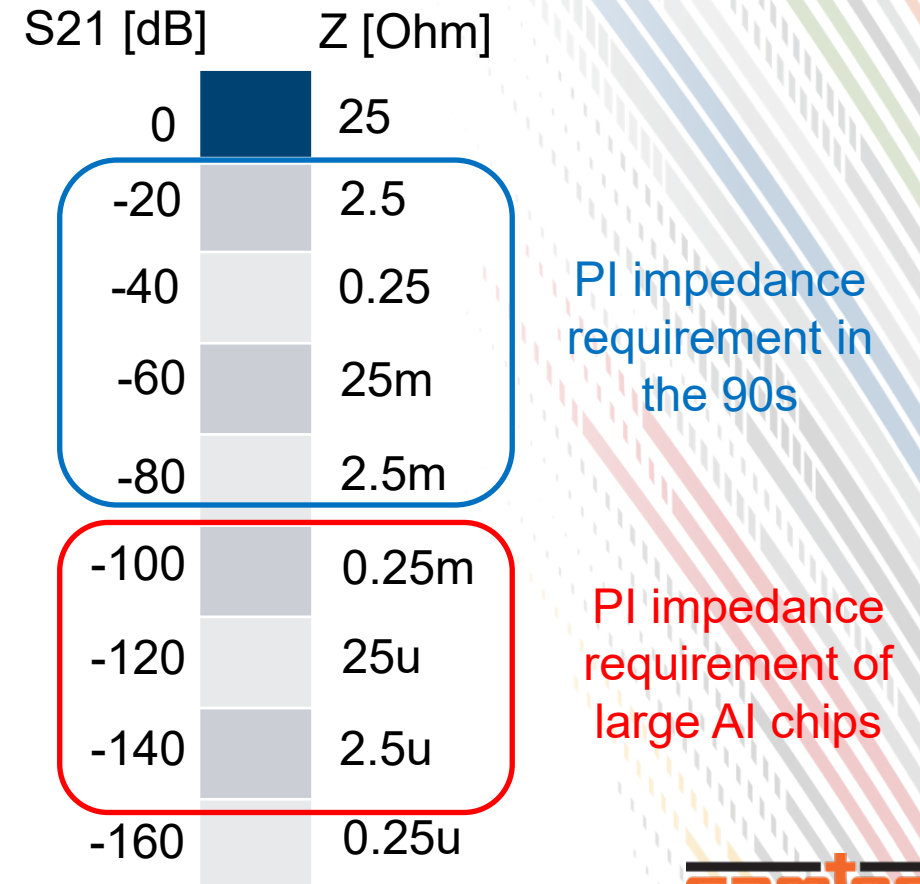
SIGNAL INTEGRITY VS. POWER INTEGRITY IN THE AI AGE

Without proper power integrity there is no signal integrity!

Xtk: SI-PI signal ratio

S21 [dB]   S/N

0	← 100A power aggressor
-20	
-40	SI Xtk range
-60	
-80	
-100	
-120	← 100uA SI victim
-140	
-160	PI-SI Xtk range

Aggressor can be 120dB stronger then victim

Self impedance

S21 [dB]   Z [Ohm]

0	25
-20	2.5
-40	0.25
-60	25m
-80	2.5m
-100	0.25m
-120	25u
-140	2.5u
-160	0.25u

PI impedance requirement in the 90s

PI impedance requirement of large AI chips
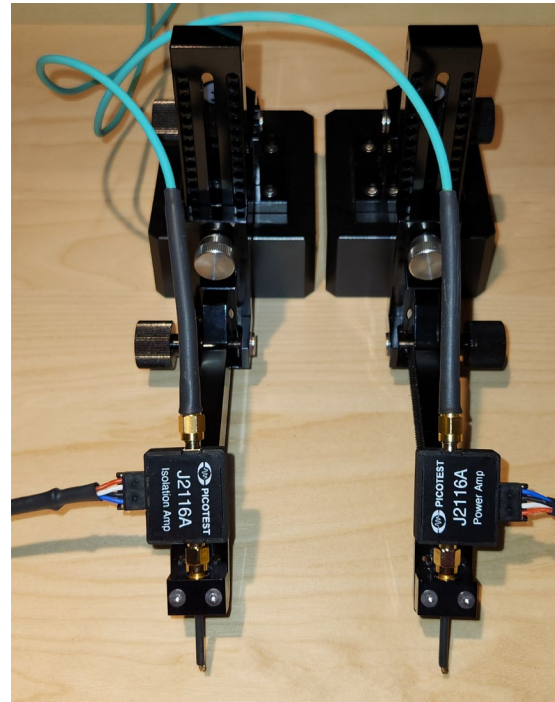
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NEED IMPROVED DYNAMIC RANGE

Dynamic range can be improved by (among others) any combination of

❖ Increased test current (power amplifier on Port1), and/or

❖ Low-noise preamplifier (on Port2)

Picotest battery-powered low-noise 20dB preamplifier J2116A Isolation amp
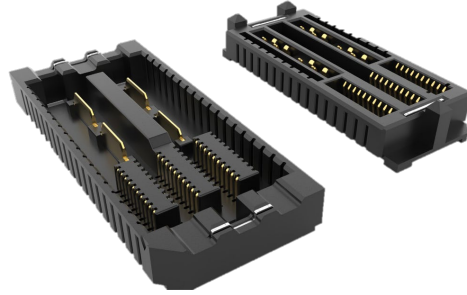
Active devices attached directly to wafer probes

Picotest 20dB-gain +20dBm power booster J2116A Power amp
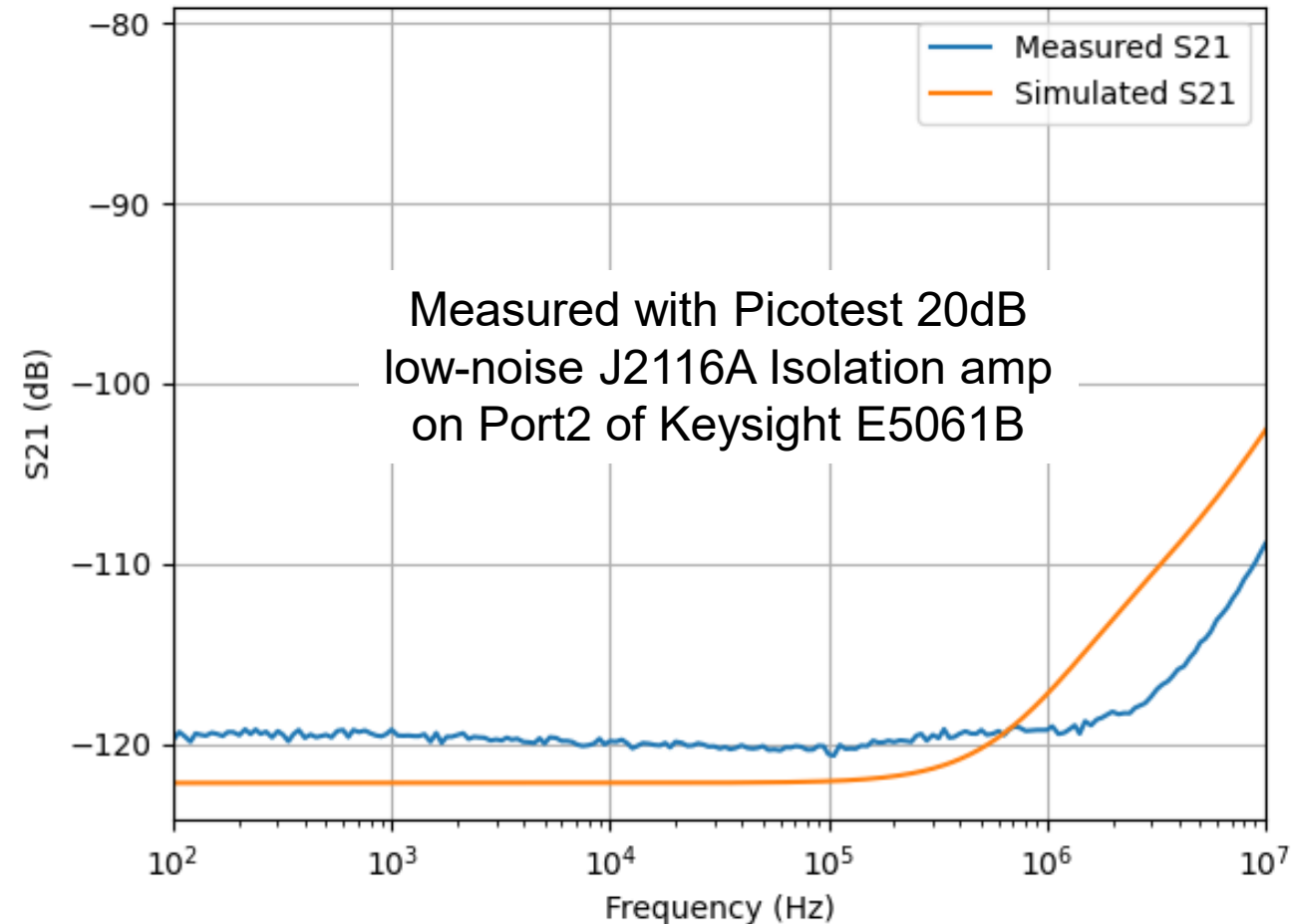
POWER-TO-SIGNAL CROSSTALK IN UDX CONNECTOR

Samtec UDx6 male and female connectors with four power blades and 60 signal pins.
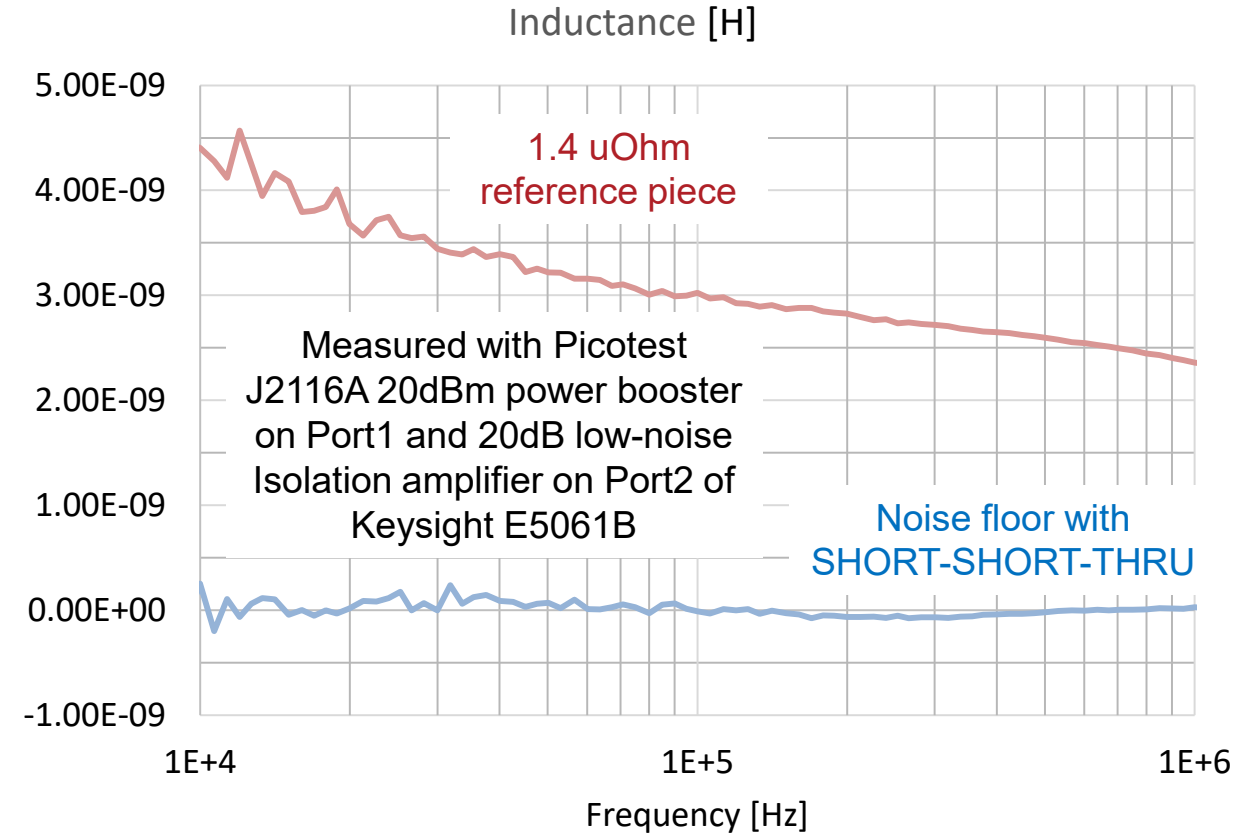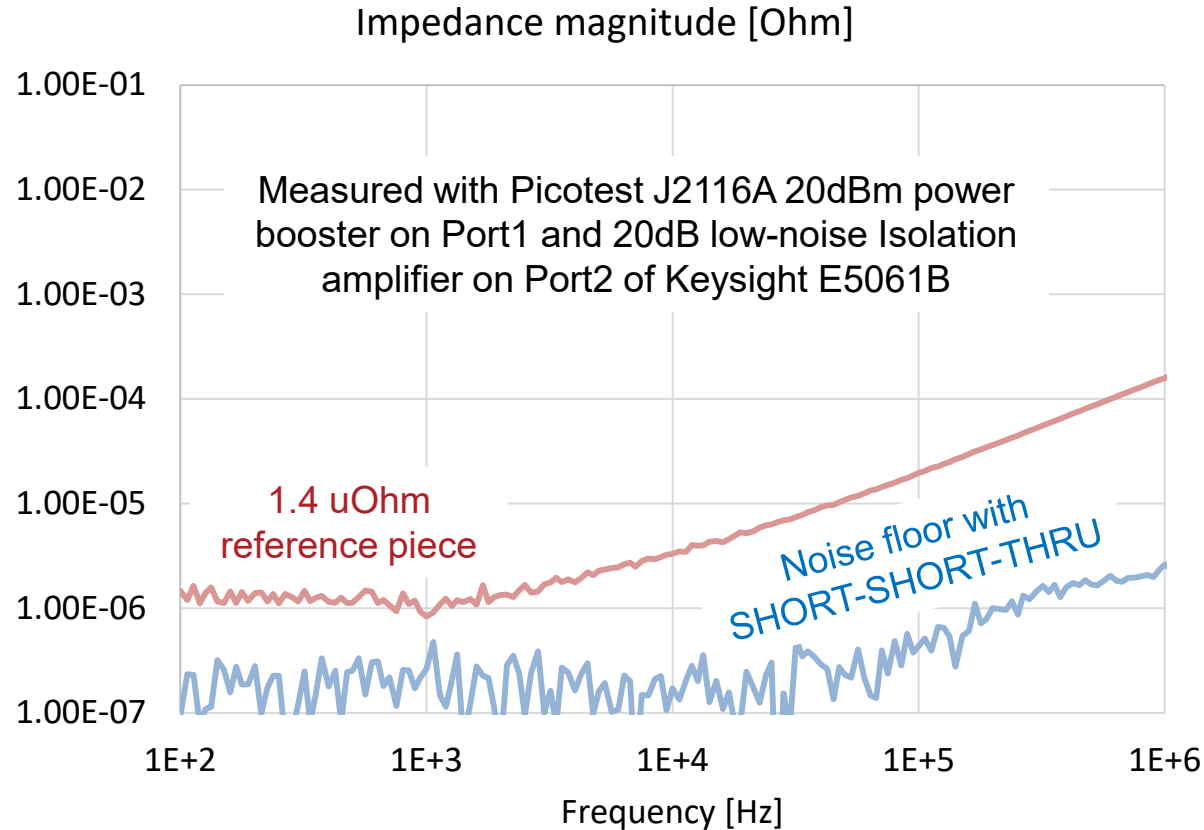
PI evaluation board for UDx6 connectors

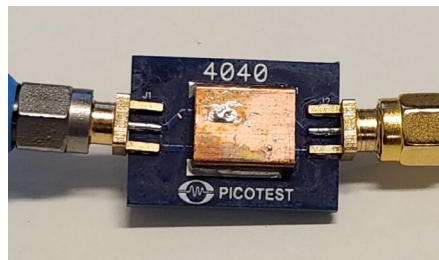Measured and simulated power-to-signal crosstalk [dB]

Measured with Picotest 20dB low-noise J2116A Isolation amp on Port2 of Keysight E5061B

IMPEDANCE MEASUREMENT NOISE FLOOR

Impedance magnitude [Ohm]

Measured with Picotest J2116A 20dBm power booster on Port1 and 20dB low-noise Isolation amplifier on Port2 of Keysight E5061B

1.4 uOhm reference piece

Noise floor with SHORT-SHORT-THRU

Frequency [Hz]

Inductance [H]

1.4 uOhm reference piece

Measured with Picotest J2116A 20dBm power booster on Port1 and 20dB low-noise Isolation amplifier on Port2 of Keysight E5061B

Noise floor with SHORT-SHORT-THRU

Frequency [Hz]

Picotest 1.4uOhm reference

Home-made SHORT-SHORT-THRU

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THANK YOU