VITESSE

T10/07-037-r0 SAS-2 Common Mode Generation Specification
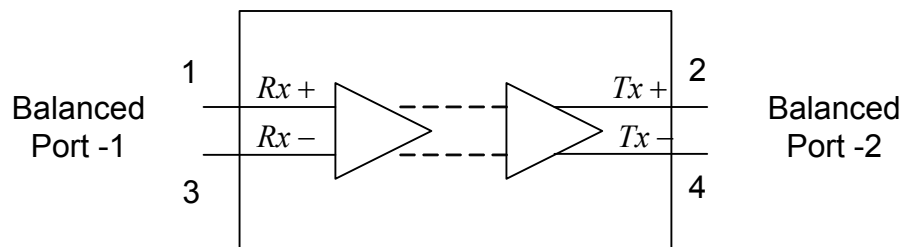
Kevin Witt, Mahbubul Bari
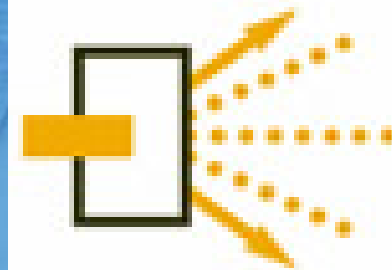
Serial Attached SCSI

YOUR PARTNER FOR SUCCESS

This Presentation Documents Laboratory Experience of Common Mode Measurements in support of T10/07-007r2

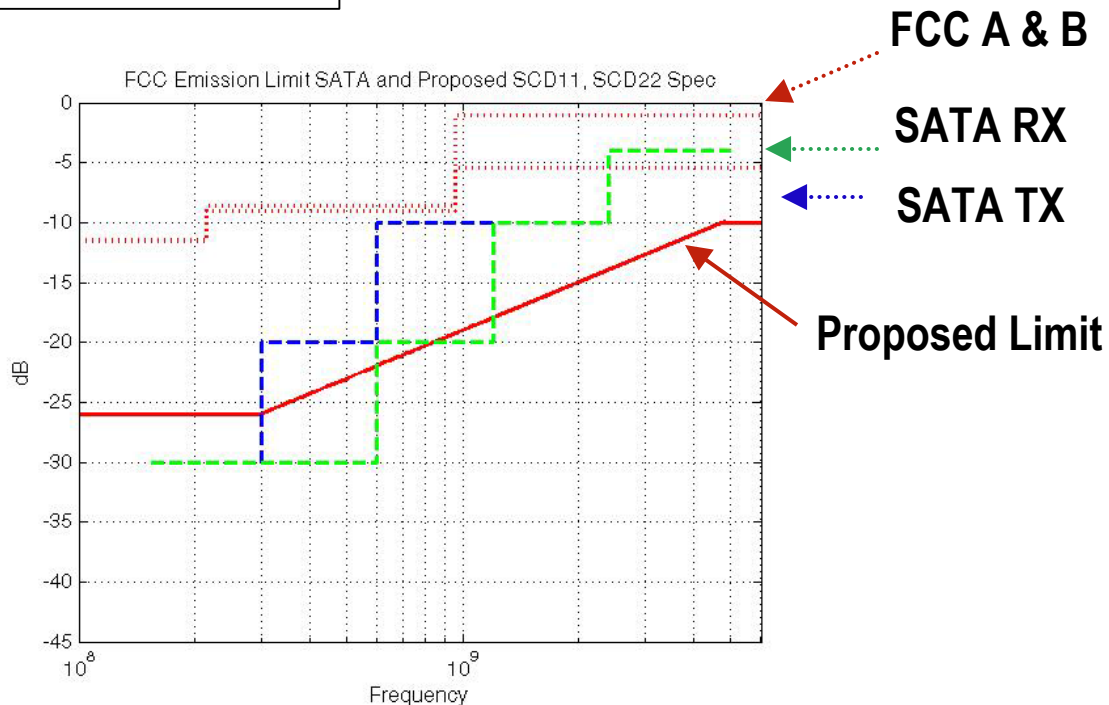# *S-Parameter Based Common Mode Generation Specification*

FCC A & B

SATA RX

SATA TX

Proposed Limit

Single Ended to Balanced Port Conversion

$$S_{cd11} = \frac{1}{2}\left(S_{11} + S_{31} - S_{13} - S_{33}\right)$$

$$S_{cd22} = \frac{1}{2}\left(S_{22} + S_{42} - S_{24} - S_{44}\right)$$

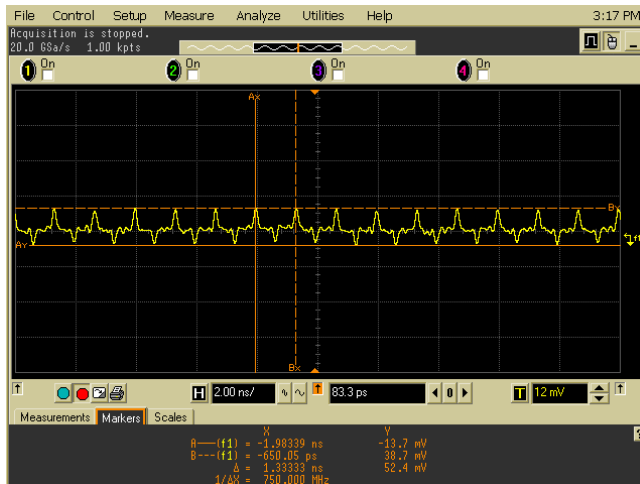$$S_{cd21} = \frac{1}{2}\left(S_{21} + S_{41} - S_{23} - S_{43}\right)$$

$$S_{cd12} = \frac{1}{2}\left(S_{12} + S_{32} - S_{14} - S_{34}\right)$$
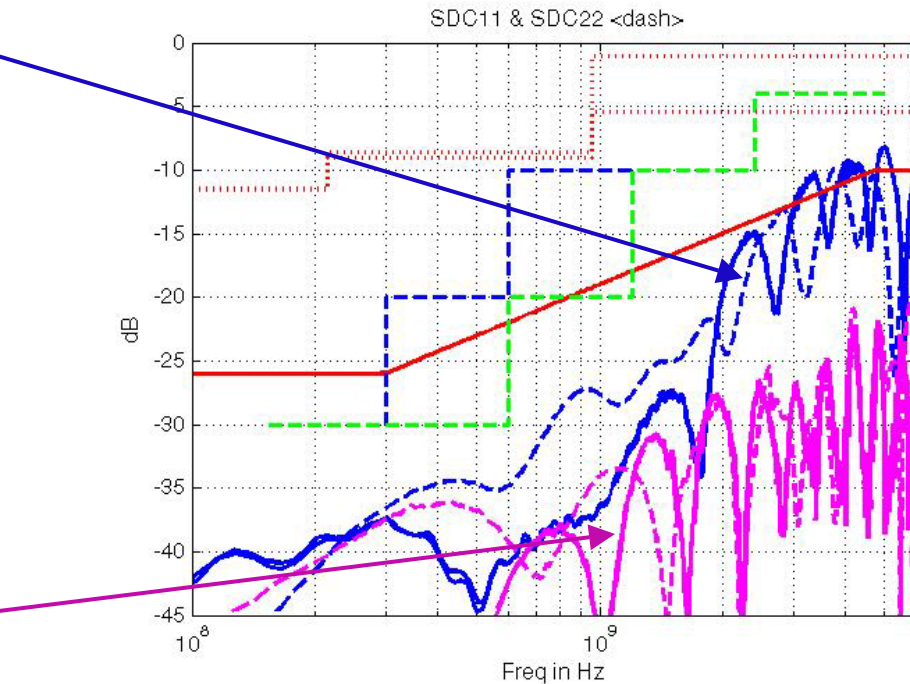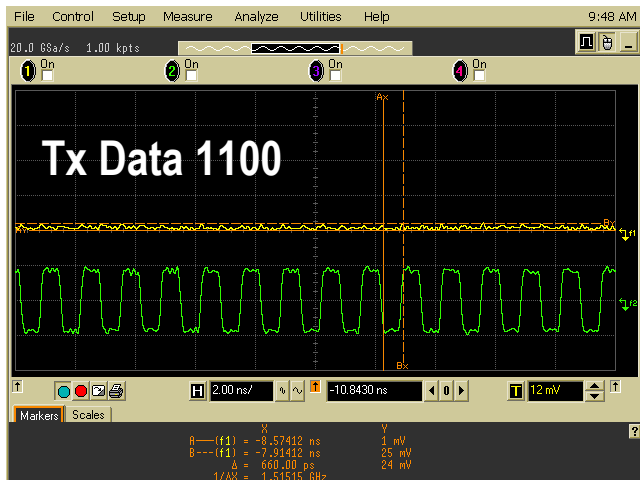
Reference: 07-007R2   Proposed 6G SAS Phy Specs for EMI Reducion (Mike Jenkins LSI)

S-Parameter vs. Time Domain Method

FR-4 Board (52.4mV pk-pk, 9.8mVrms)

**FR-4 & SMA Connectors
W/ Jumper Cap Option
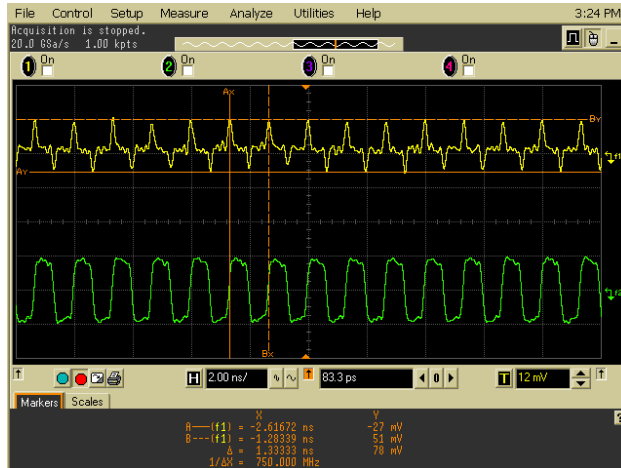Soldered Down Part
Skew on Board**

Characterization Board (24mV)

Tx Data 1100
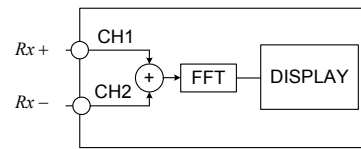
**RLON 25N
SMP Connector
Socket**

SDC11 & SDC22 <dash>
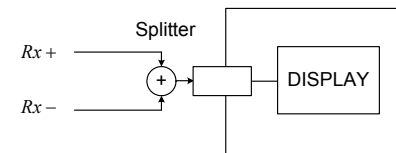
🦑 FR-4 Board @ 3G

Agilent Infiniium 54855A 6GHz 20Gsps
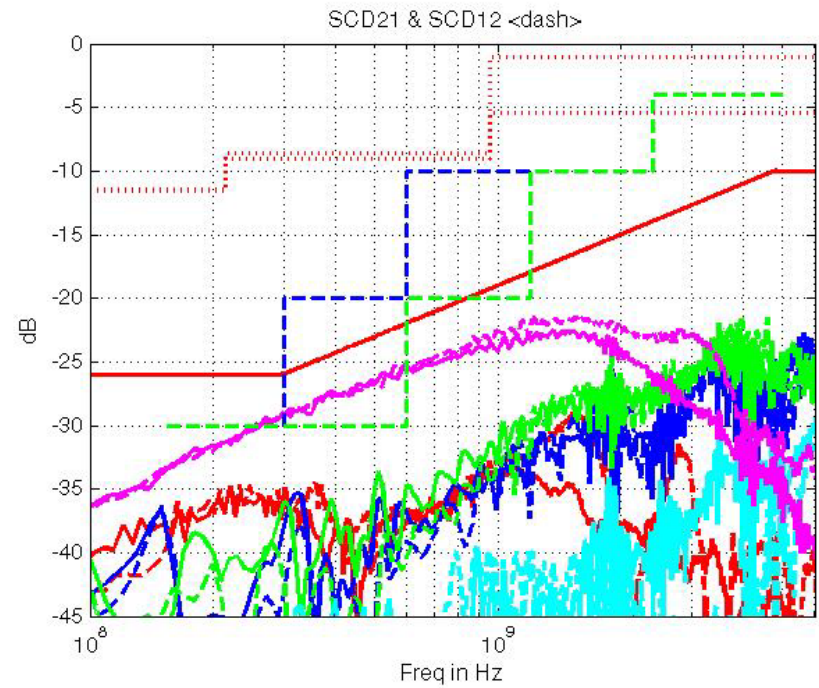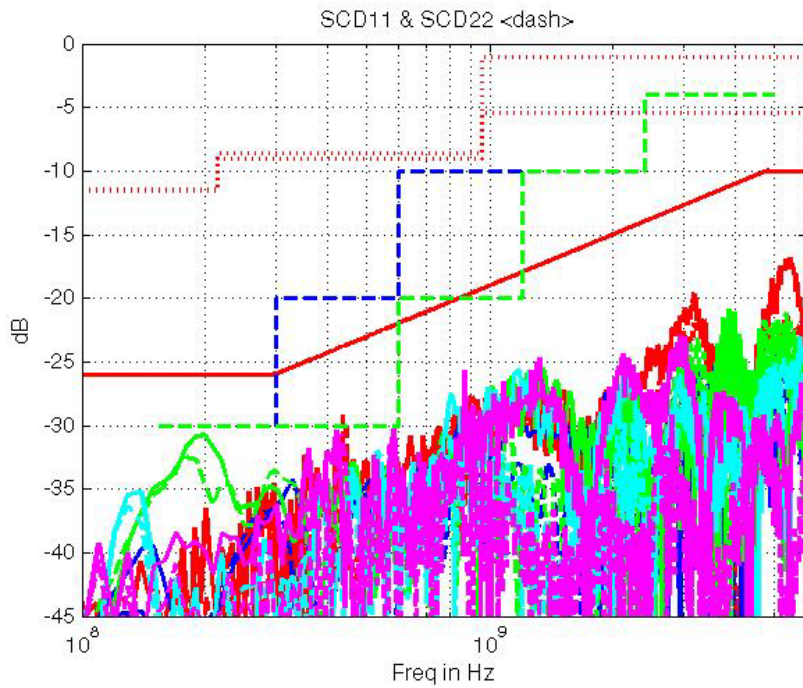
Real-Time Scope

$$FFT(Rx^+ + Rx^-)$$

Spectrum Analyzer

20Gsps Scope
Anti-aliasing
Filter around
6GHz
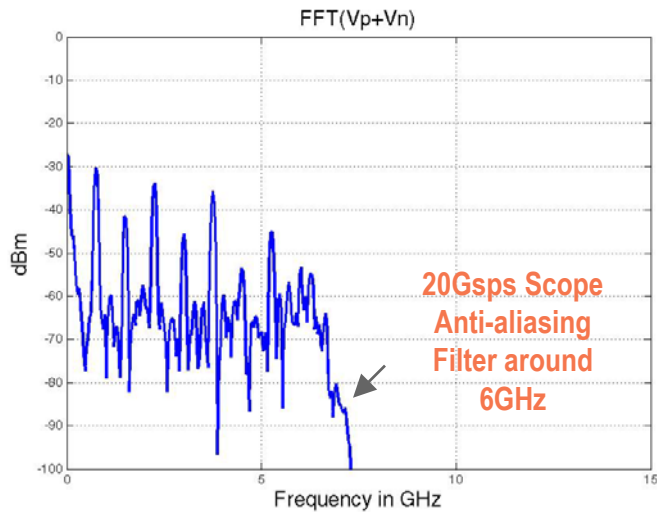
HP8563E SA 26.5GHz Bandwidth

SAS2 Cables
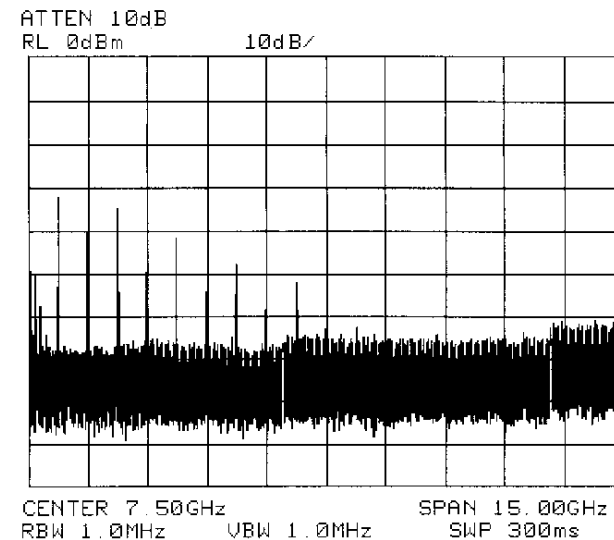
📚 MiniSAS Cables

0.5(b) ,1(g) 3(c) ,6(m) and 10 (r) meter

T10 Chassis

📚 The Chassis Alone can Violate the Specification
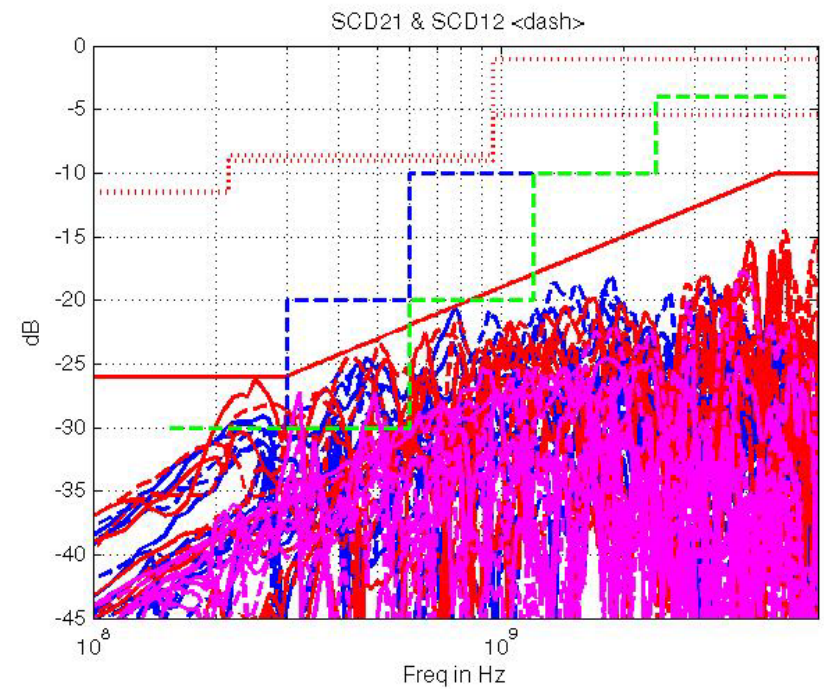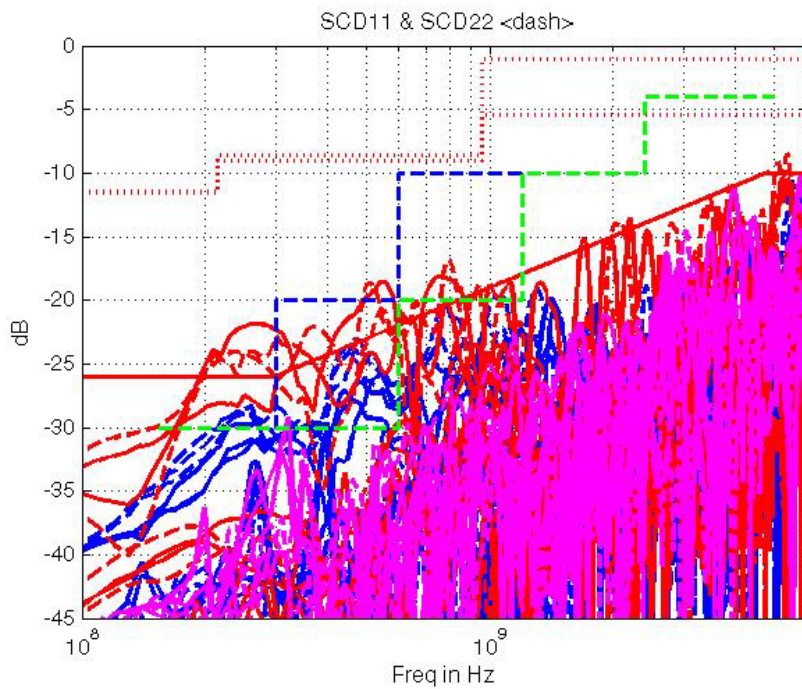
HP1→HP8, Blue
HP9→HP14 Red
HP24→HP28 Magenta

Summary

- This Presentation Documented Laboratory Experience of Common Mode Measurements in support of T10/07-007r2

- SCD11 tracks Observed Common Mode Vrms and Vpk-pk
  - Poor SCD11 $\leftrightarrow$ High Vcm

- Small Board layout changes increase SCD11 at higher frequencies
  - We may want to match the SATA slope.

- Some T10 Chassis models would not be compliant with the current specification
  - How is the channel's SCD11/12/22/21 budgeted?

- Real-time Scope Can be used for Spectrum Analysis Measurement
  - Match Spectrum Analysis Method (to within combiners loss)
  - Anti-Aliasing Filters Limit Spectral Analysis bandwidth

- More Data from Multiple Sources Could Help Refine Curve