



Measured Data for 112G Chip to Module Channel Analysis

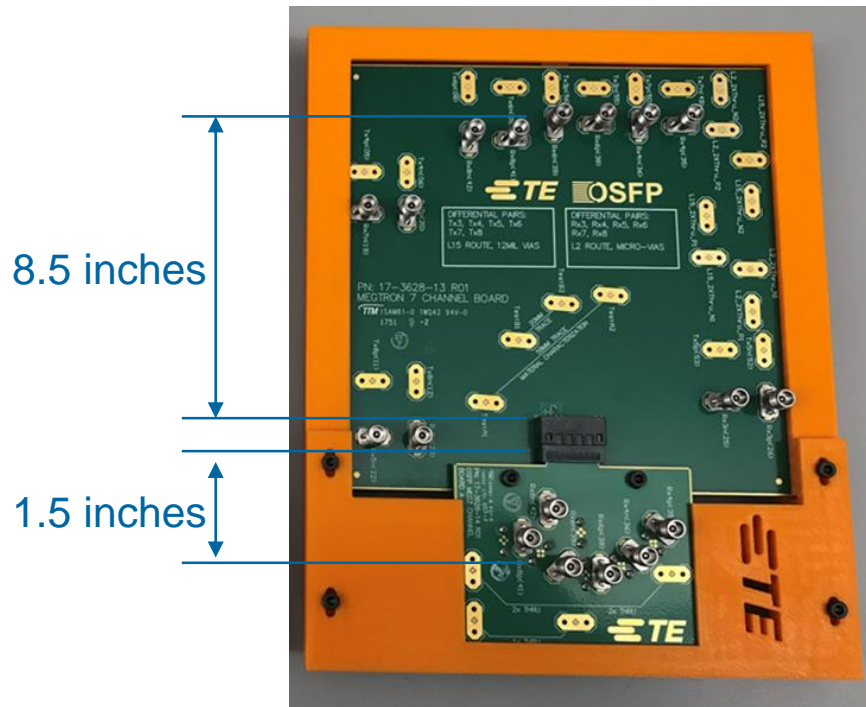
Nathan Tracy

1/18/18

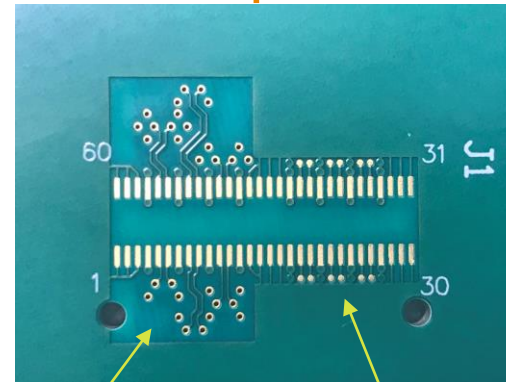


112G VSR Channels Have Been Built

10 inch overall channel



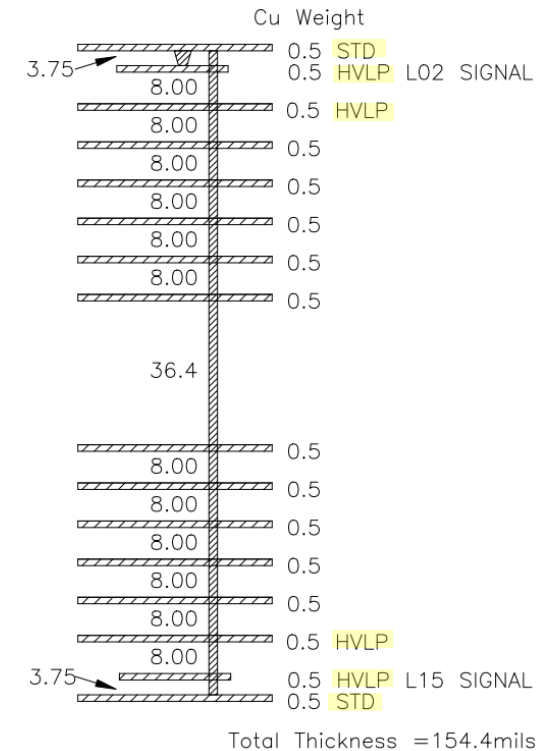
Host connector footprint



Thru vias

Microvias

Layer stack-up



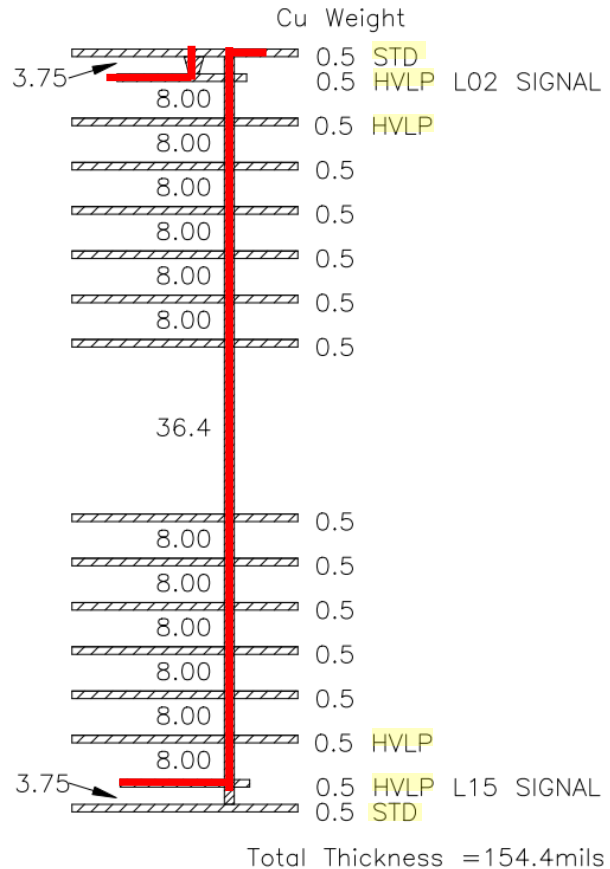
Channel Details

Channel-Board Layout

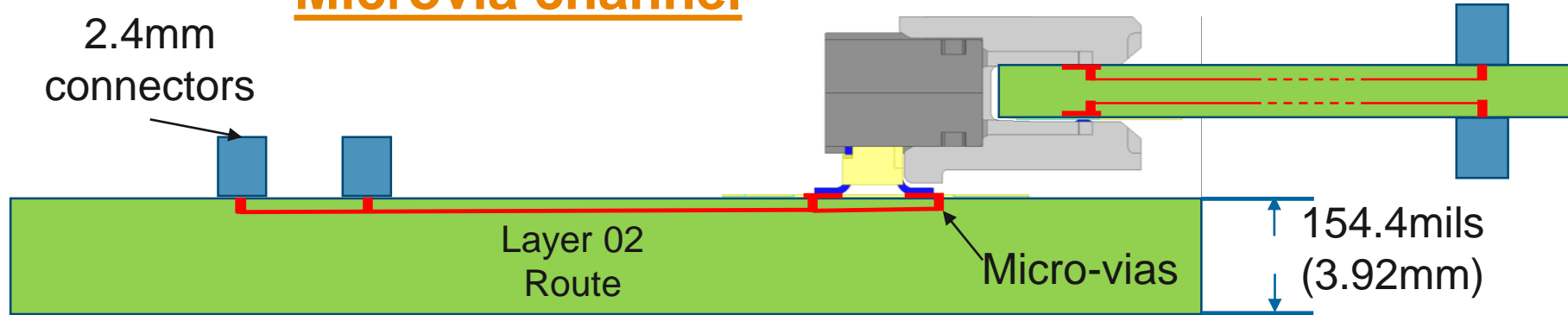
Host - 8.5" (215.9mm) 5.3-6.5-5.3 Trace

Module - 1.5" (38.1mm) 6.3mil SE Trace

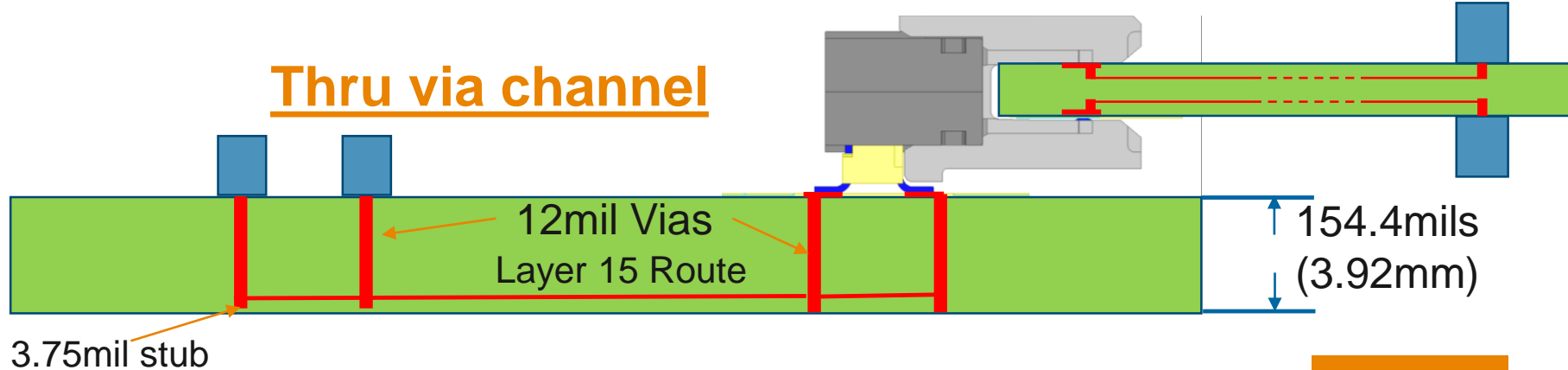
Layer stack-up



Microvia channel



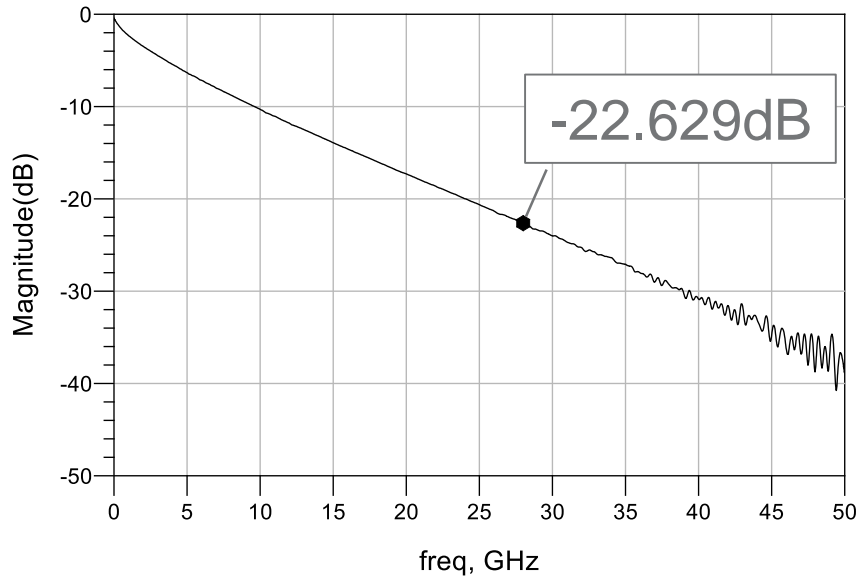
Thru via channel



Channel Details

Host 2x Thru Measurement

2X Thru Measurement Host PCB



Details

- Microvia to Layer 2 Route
- 5.3 - 6.5 - 5.3 differential route
- 17.157" of trace
- *-1.32dB/in at 28GHz

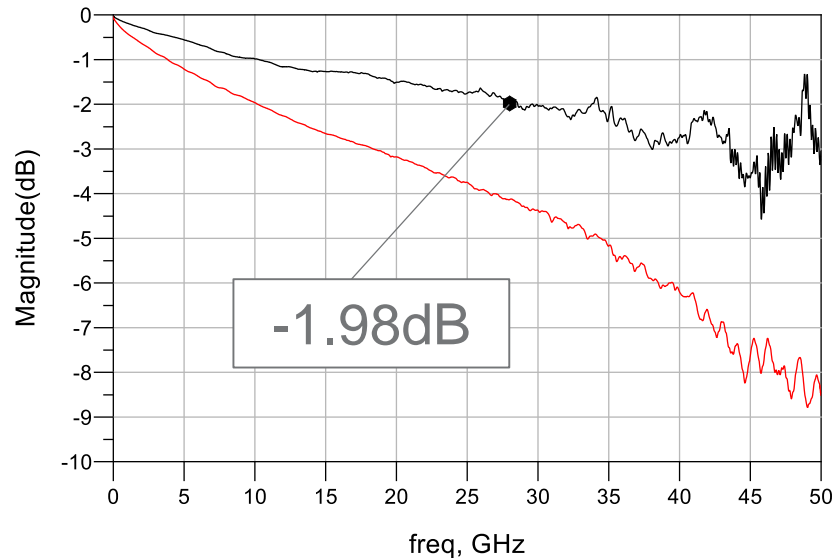


*Additional loss reductions can be realized by using HVLP Cu for L1

Channel Details

Module Thru Measurement

2x Thru & Trace After AFR



Details

- AFR used on 2x Thru to remove testpoint effects
- Microvia to Layer 2 Route
- 6.3mil SE Trace
- 1.46" of trace after AFR
- *-1.36dB/in at 28GHz

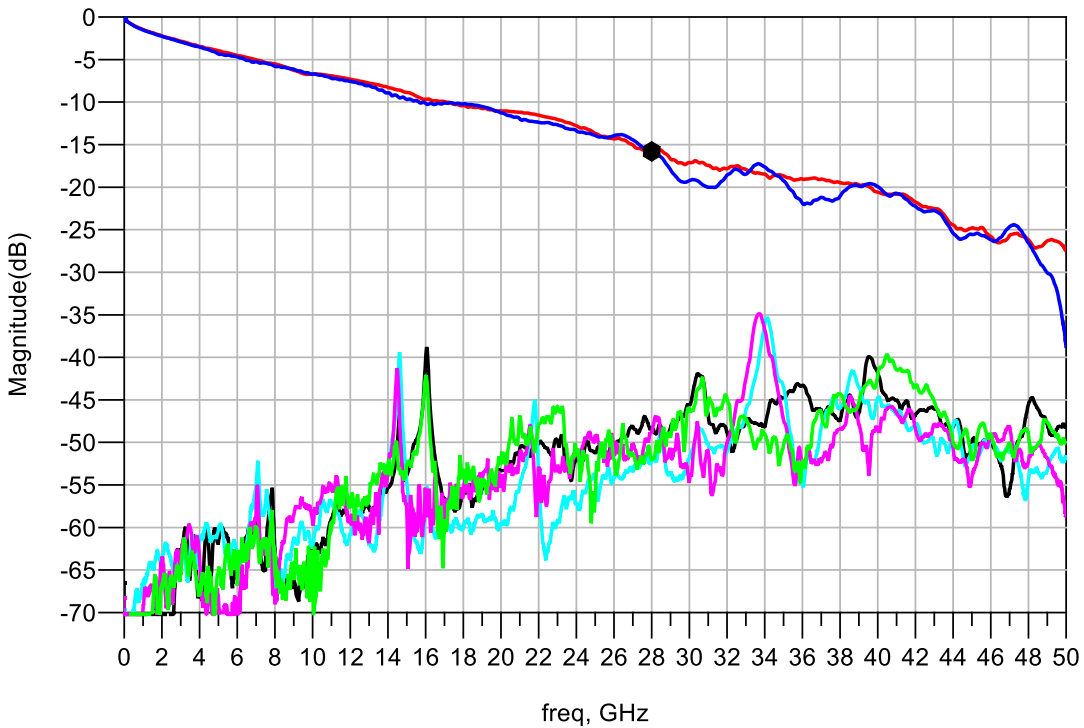


*Additional loss reductions can be realized by using HVLP Cu for L1

Channel Results

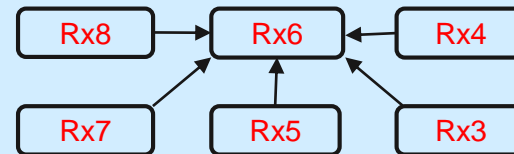
8.5 inch Host + Conn + 1.5 inch Module

IL/PSXT

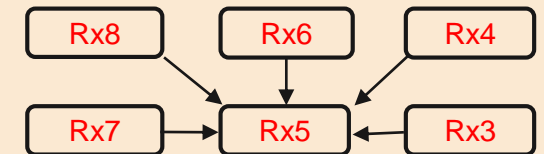


Channel using micro-vias L2 Route -15.55dB, 28GHz
Channel using 12mil vias L15 Route -15.79dB, 28GHz

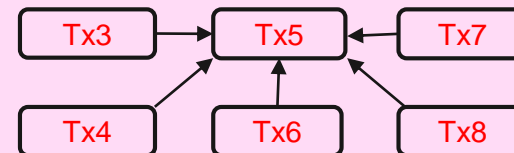
Channel using micro-vias L2 Route,
Top Row Victim



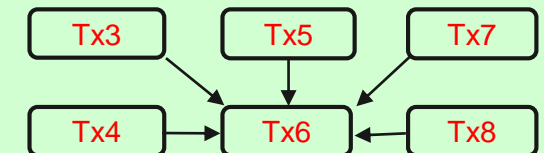
Channel using micro-vias L2 Route,
Bot Row Victim



Channel using 12mil vias L15 Route,
Top Row Victim



Channel using 12mil vias L15 Route,
Bot Row Victim



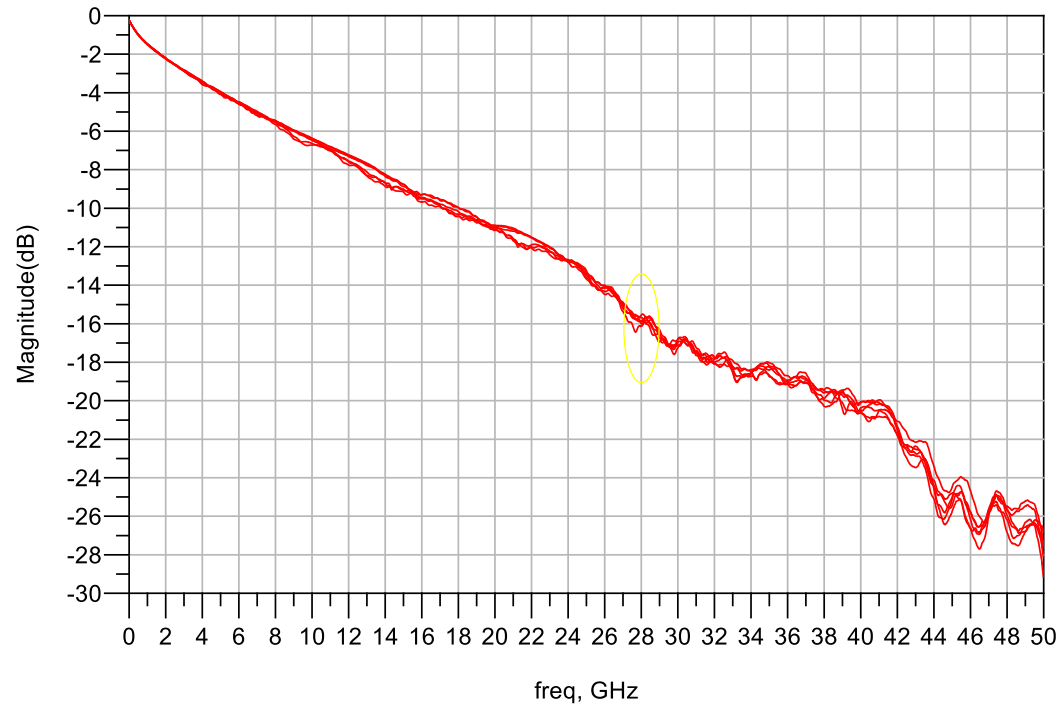
Channel Results

8.5 inch Host + Conn + 1.5 inch Module

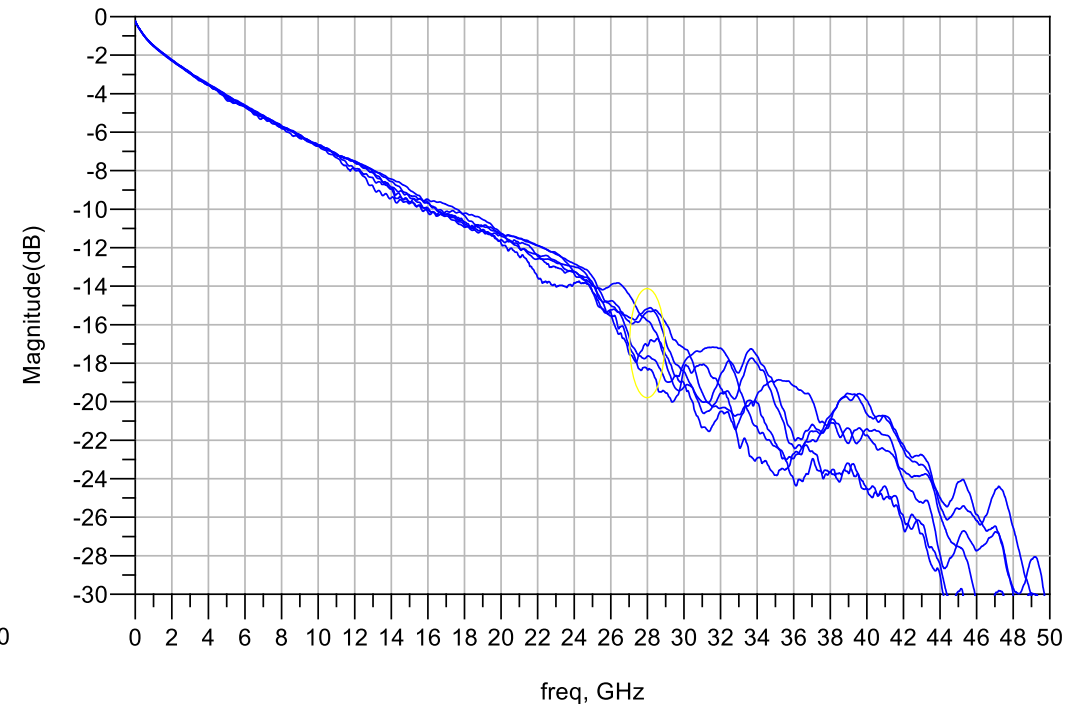
- S-Parameter files for long barrel via channels: tracy_100GEL_02_0118.zip

- S-Parameter files for micro-via channels: tracy_100GEL_06_0118.zip

IL - Layer 02, Microvia



IL - Layer 15, 12mil Vias



Channel using micro-vias L2 Route

Channel using 12mil vias L15 Route

Observations

- Microvias demonstrated improved performance over conventional vias
 - Less roll off and more uniform loss
 - Thru vias do provide a useable channel and shouldn't be ruled out
- Reasonable chip to module channel performance (15 to 18 dB) has been demonstrated over a 10 inch total length
- Layer 1 HVLP foil will improve throughput
- S-Parameter files for measurements can be found in S-Parameter files:
 - Long barrel via channels: tracy_100GEL_02_0118.zip
 - Micro-via channels: tracy_100GEL_06_0118.zip