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# Considerations for 802.3ck Test Fixture Specifications

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# Purpose

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- IL considerations for 802.3ck test fixture specifications

# Host Test Fixture IL - HCB

- Host Compliance Board Insertion Loss Target 2.5 dB @ 25.56 GHz

IL host connector @ 26.56 GHz =  $11.5 - 7 - 2.5 = 2$  dB

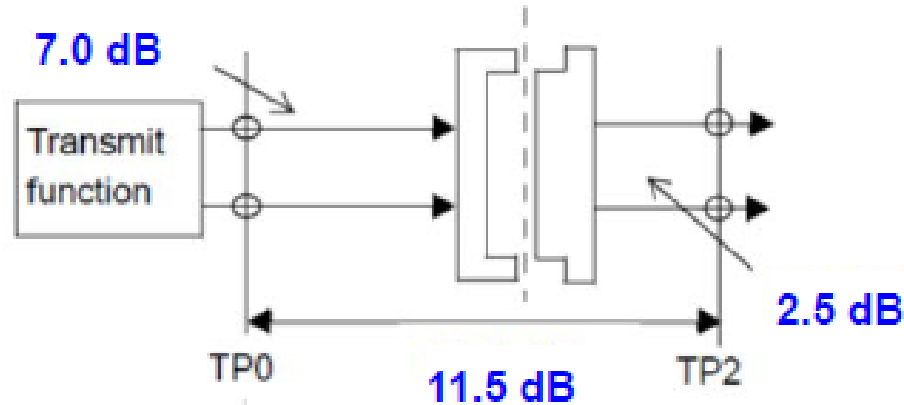


Figure 2: 100GEL CR TP0-TP2 insertion loss budget at 26.56 GHz

Figure source: [http://www.ieee802.org/3/ck/public/18\\_07/lim\\_3ck\\_01b\\_0718.pdf](http://www.ieee802.org/3/ck/public/18_07/lim_3ck_01b_0718.pdf)

# Cable assembly test fixture IL - MCB

$$IL_{\text{catf}}(f) = -0.00125 + 0.12\sqrt{f} + 0.0575f \quad (\text{dB}) \quad \text{TBD}$$

for  $0.01 \text{ GHz} \leq f \leq 25 \text{ GHz}$

where

$f$  is the frequency in GHz

$IL_{\text{catf}}(f)$  is the reference test fixture printed circuit board insertion loss at frequency  $f$

IL @ 12.89 GHz = 1.17 dB

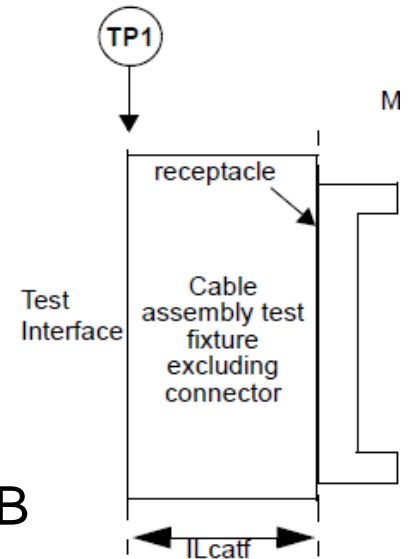
IL @ 13.28 GHz = 1.20 dB

**IL @ 26.56 GHz = 2.14 dB**

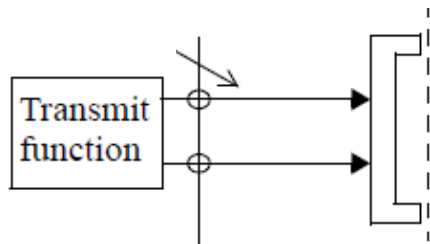
$$IL_{\text{catf}}(f) = 1.073 * (-0.00125 + 0.12 * \text{SQRT}(26.56) + 0.0575 * 26.56) = 2.30 \text{ dB}$$

## Transmitter and receiver differential PCB IL

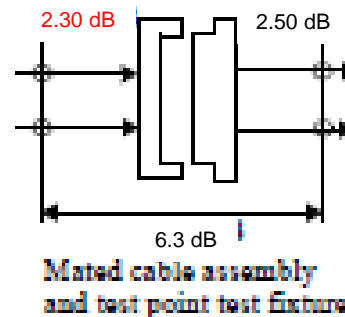
$$IL_{\text{pcb}}(\text{min}) = (0.76 \text{ in} * 1.24 \text{ dB/in}) + (0.73 + 0.61) \text{ dB} = \sim 2.3 \text{ dB}$$



IL @ 26.56 GHz = Min 2.3 dB

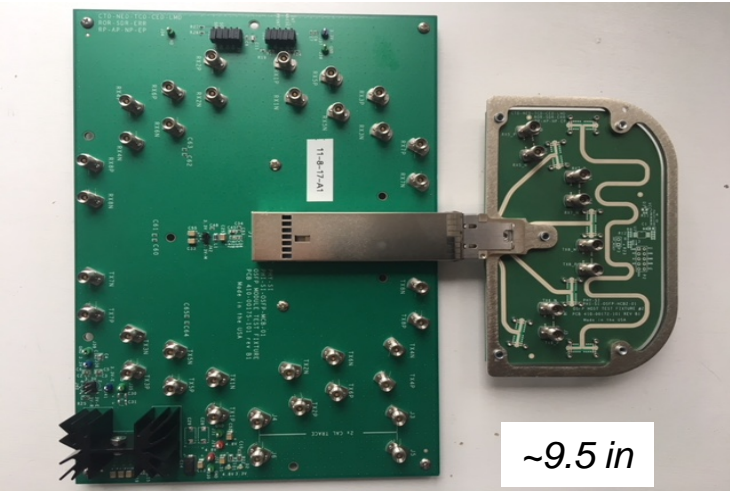


IL @ 26.56 GHz

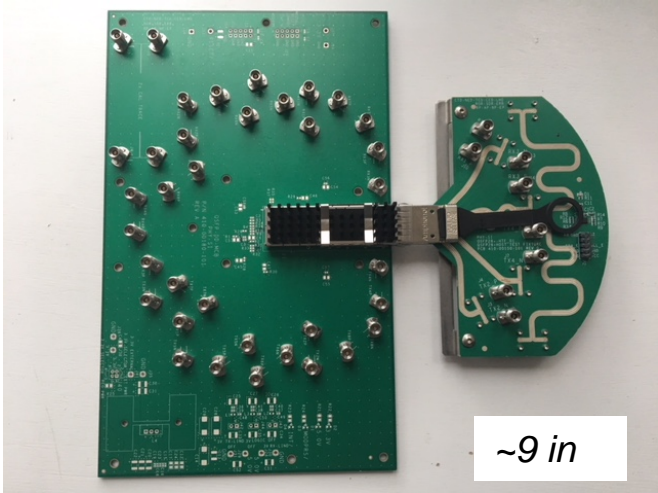


Note: The connector insertion loss is 1.5 dB for the mated test fixture. The host connector is allocated 0.5 dB for implementation allowance.

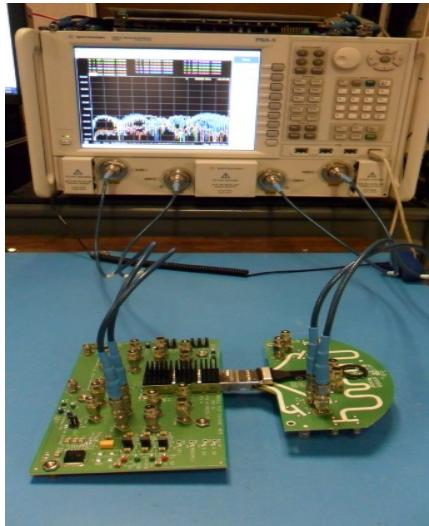
# Mated Test Fixtures



OSFP

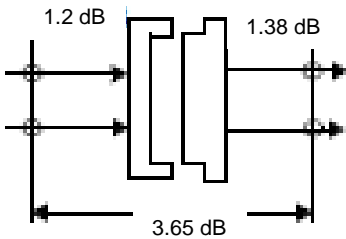


QSFP-DD



QSFP

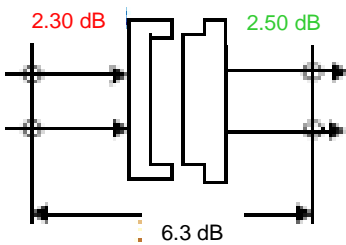
802.3cd  
IL @ 13.28 GHz



Mated cable assembly and test point test fixture

Note: The connector insertion loss is 1.07 dB for the mated test fixture. The host connector is allocated 0.62 dB of additional margin.

802.3ck proposed  
IL @ 26.56 GHz

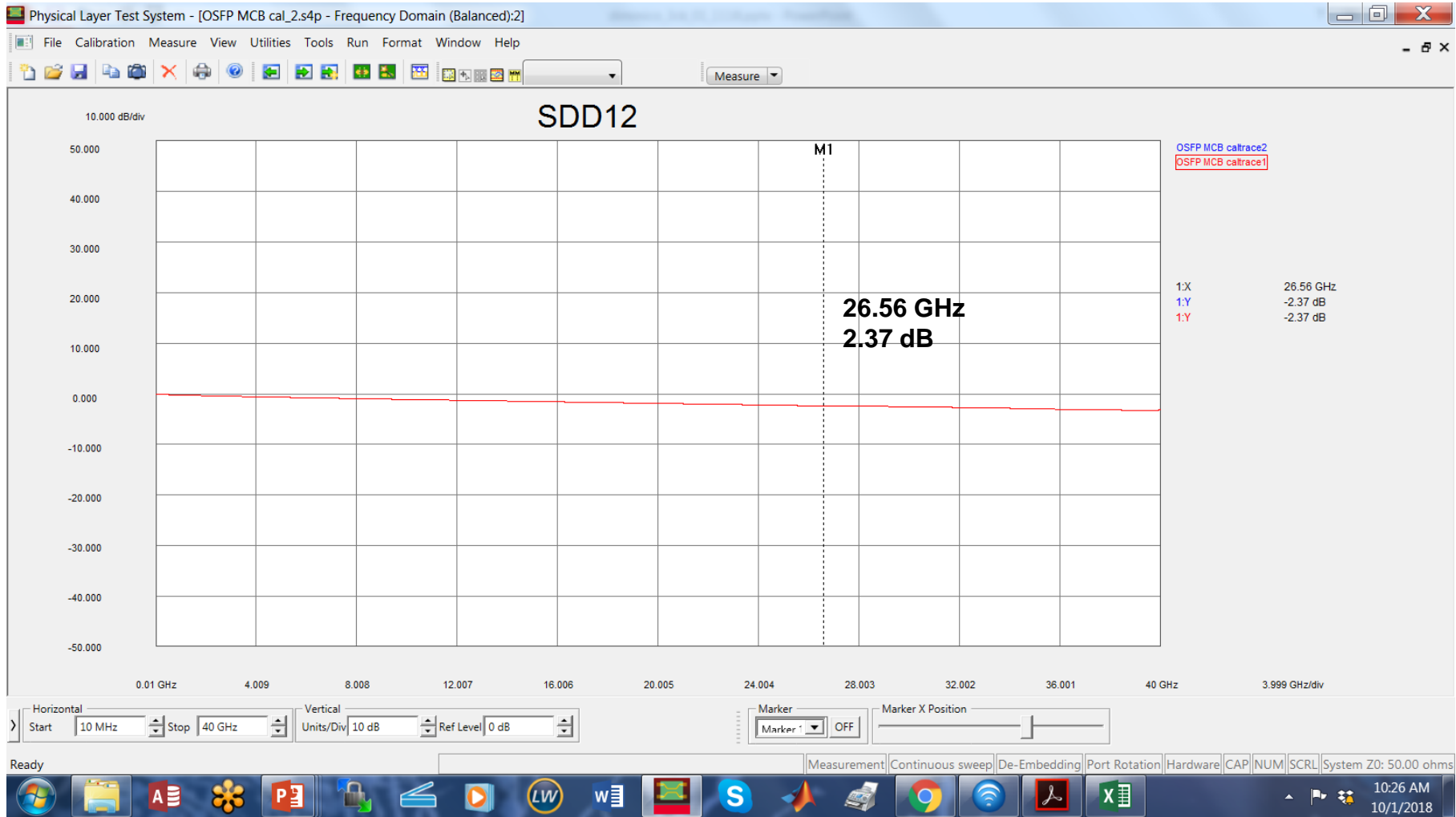


Mated cable assembly and test point test fixture

Note: The connector insertion loss is 1.5 dB for the mated test fixture. The host connector is allocated 0.5 dB for implementation allowance.

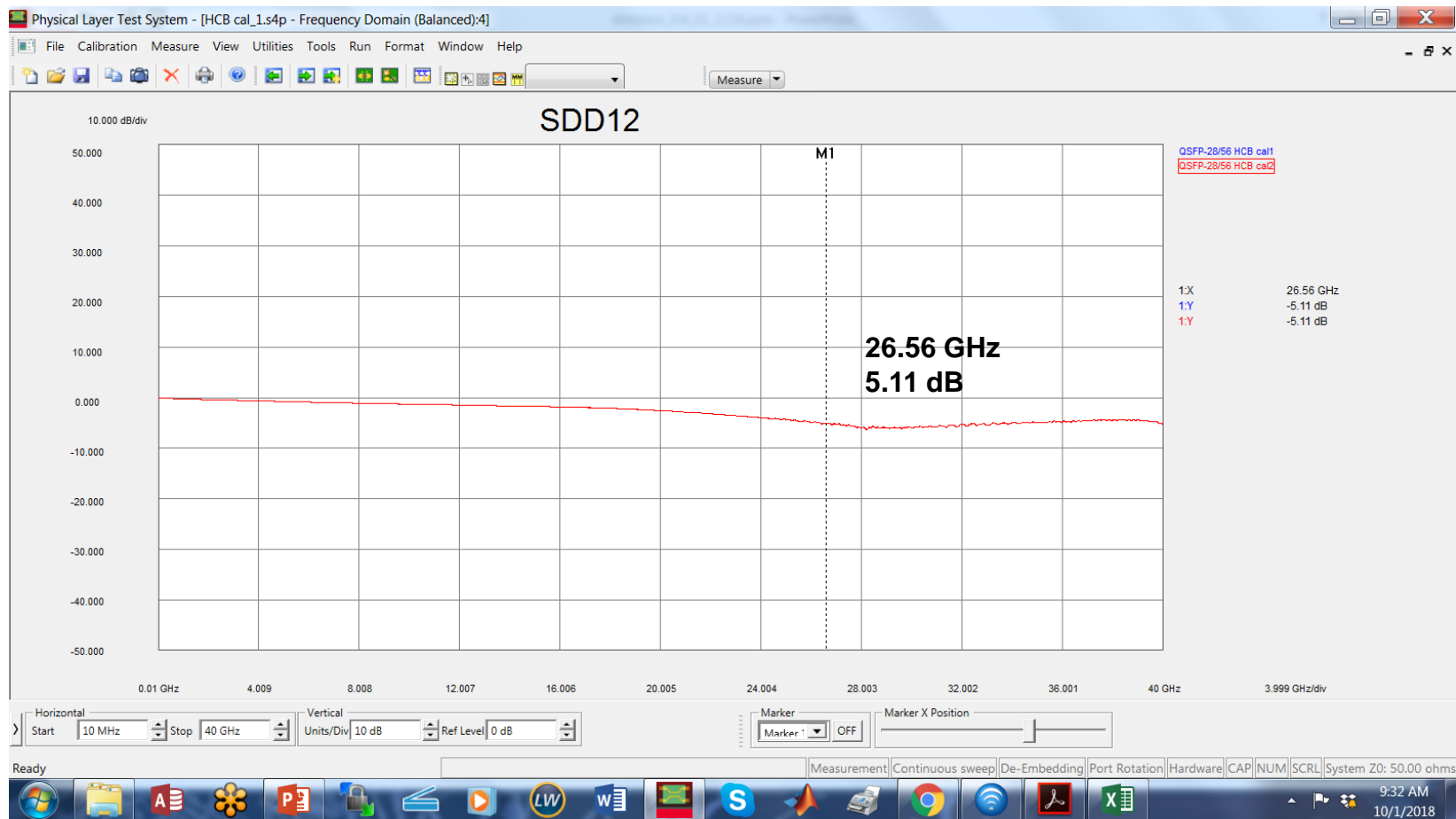
# OSFP28/56- cable assembly test fixture (MCB) – calibration traces with SMA @26.56 GHz

- MCB reference IL 2.3 dB @ 26.56 GHz achievable with PCB<>SMA



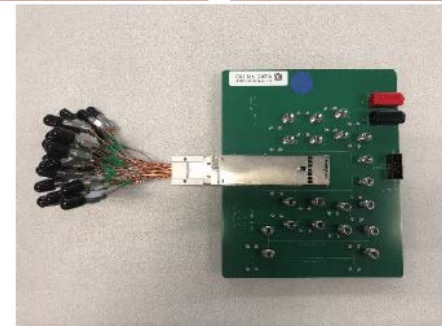
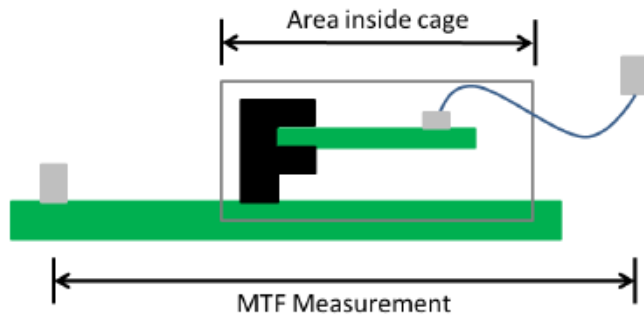
# QSFP28/56- TP0-TP2 test fixture (HCB) – calibration traces with SMA @26.56 GHz

- HCB reference IL 2.5 dB @ 26.56 GHz with PCB<>SMA unrealistic



# HCB with PCB and Cable

- PCB + Cable IL 2.5 dB @26.56 GHz Achievable
- Breakout all 16 lanes for QSFP-DD and OSFP testing (32 single ended).
- No de-embedding

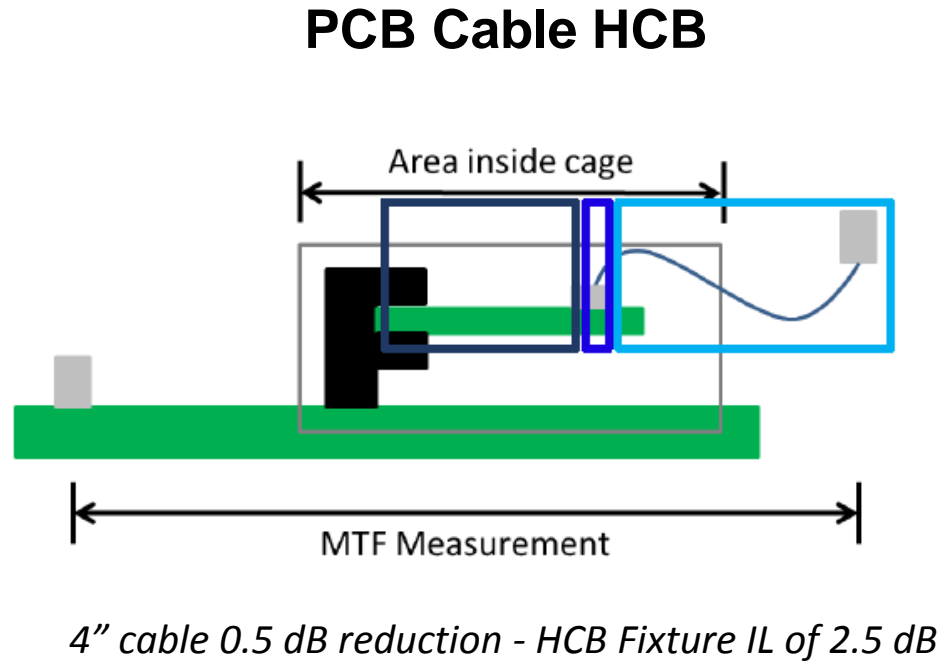


Content Source: *OIF\_Presentation\_OIF2018\_249\_03.pdf, Sam Kocsis, Amphenol*



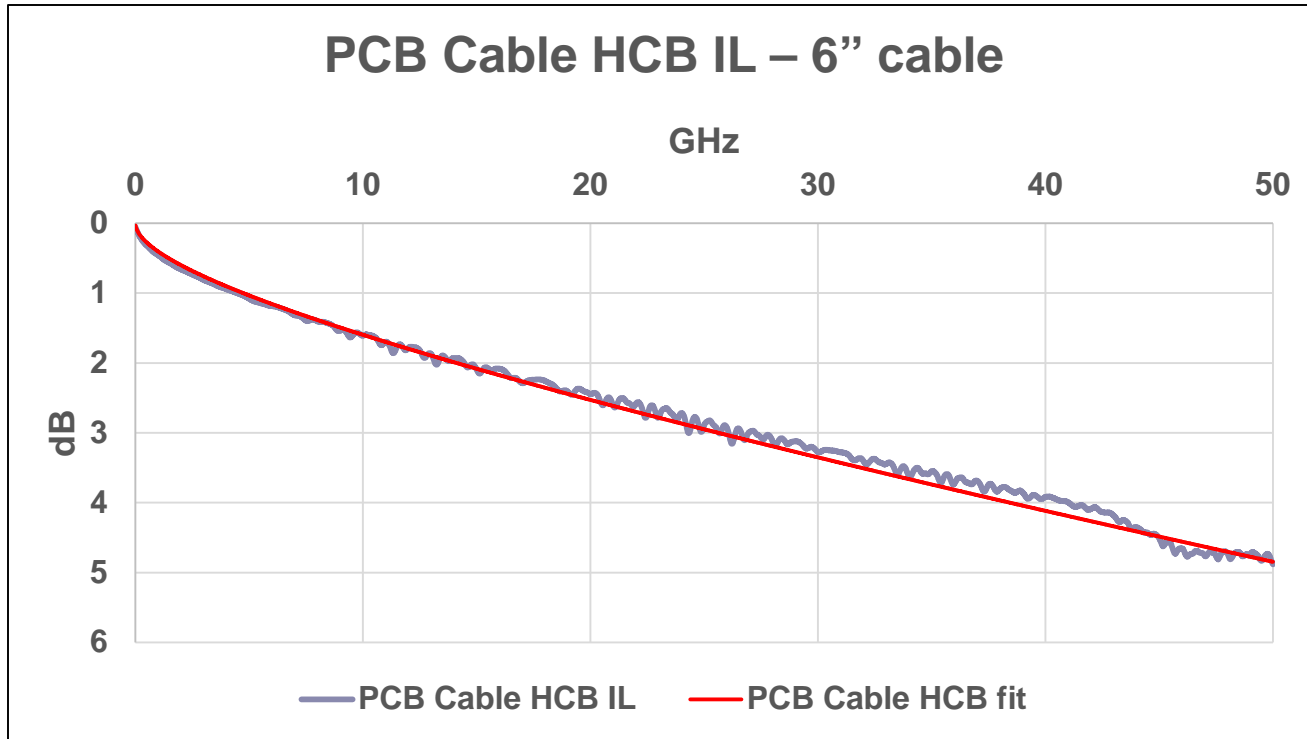
# PCB Cable HCB Budget Allocation

- **PCB Routing**
  - Matched lengths <1" total
  - 1.15dB
- **Cable Attachment**
  - Both Microvias and PTH
  - 0.25dB
- **Bulk Wire**
  - 6" to escape and route to hub
  - 1.50dB
- Total ~2.9dB



Content Source: OIF\_Presentation\_OIF2018\_249\_03.pdf, Sam Kocsis, Amphenol

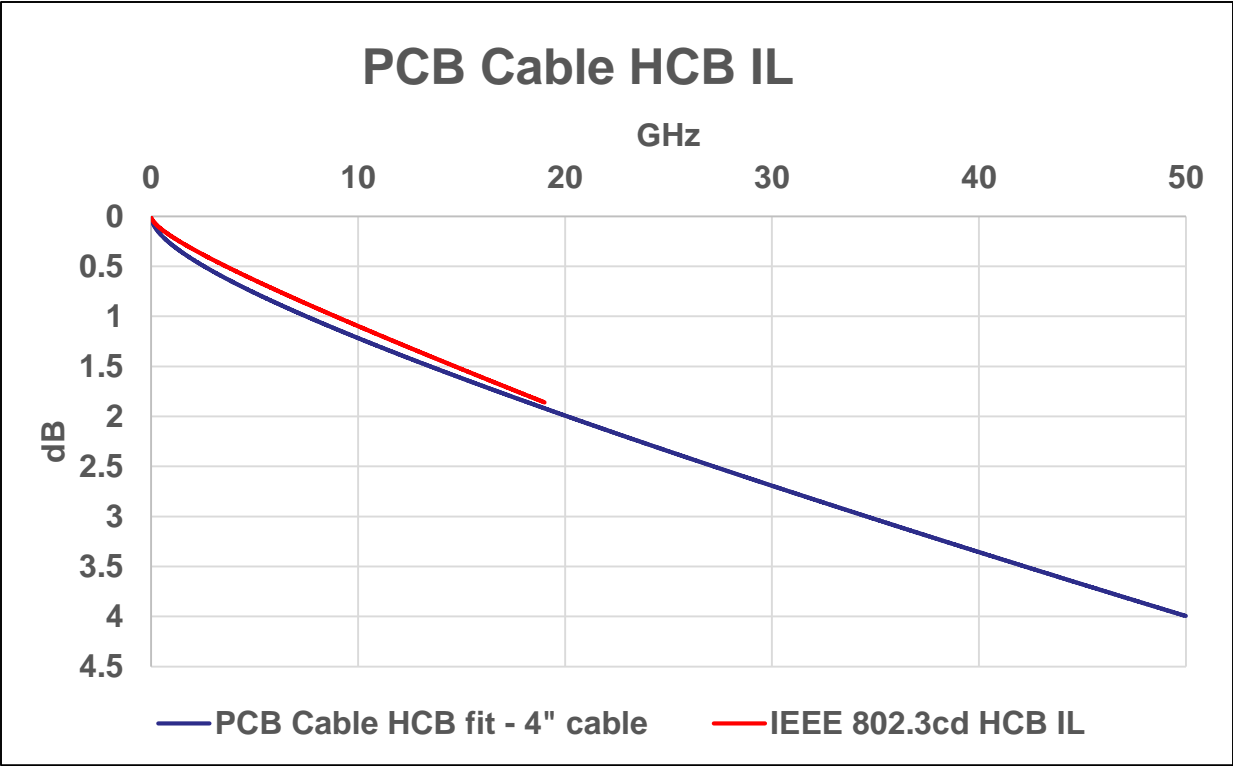
# PCB Cable HCB IL



$$HCB\ IL\ (f_{GHz}) = 1.00 * (0.001 + 0.360 * SQRT(f_{GHz}) - 0.046 * f_{GHz}) \sim 3.0\ dB \quad 6''\ cable$$

Content Source: OIF\_Presentation\_OIF2018\_249\_03.pdf, Sam Kocsis, Amphenol

# PCB Cable HCB IL



$$HCB\ IL\ (f_{GHz}) = 1.00 * (0.001 + 0.360 * SQRT(f_{GHz}) - 0.046 * f_{GHz}) \sim 2.5\ dB \quad 4''\ cable$$

Content Source: OIF\_Presentation\_OIF2018\_249\_03.pdf, Sam Kocsis, Amphenol

# Summary

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- MCB reference IL 2.3 dB @ 26.56 GHz achievable with PCB<>SMA
- HCB reference IL 2.5 dB @ 26.56 GHz achievable with PCB Cable HCB