

PPI MCB and HCB Results Per of CL86

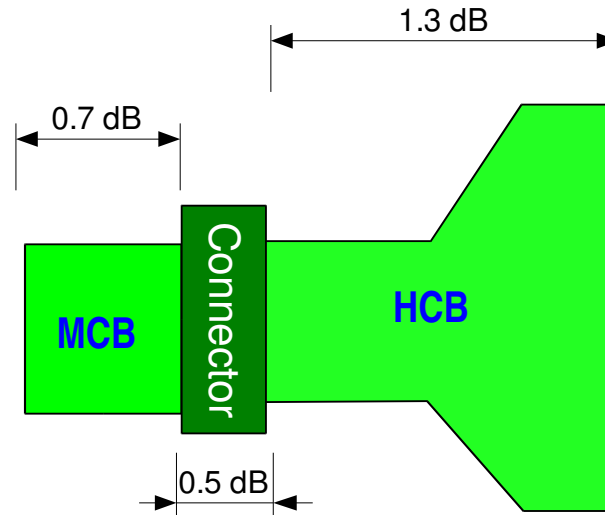
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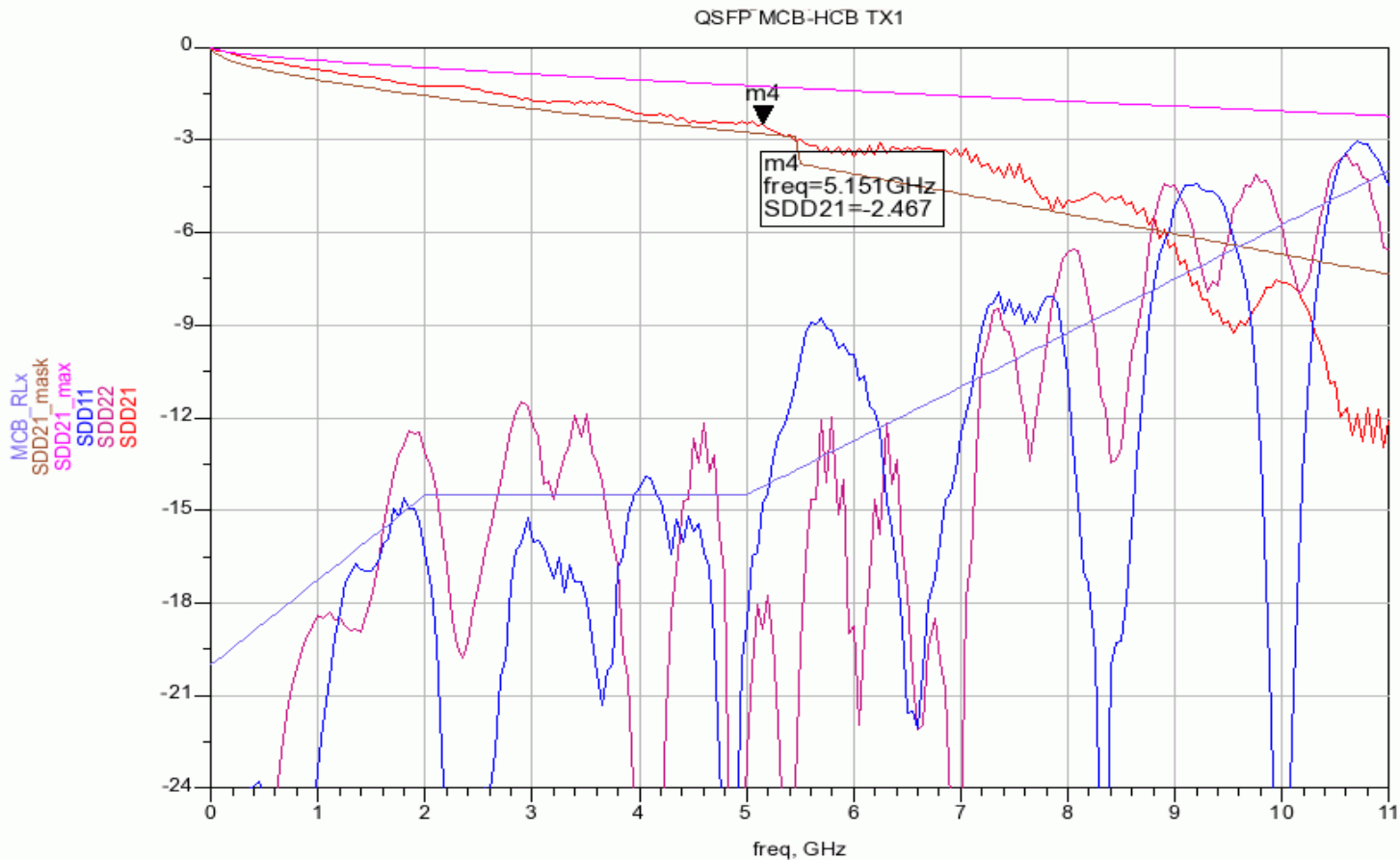
QSFP HCB and MCB Representations

- Target specifications is 86.7.1.1
 - Approximate connector loss, MCB, and HCB at 5.5 Ghz is listed on the figure.



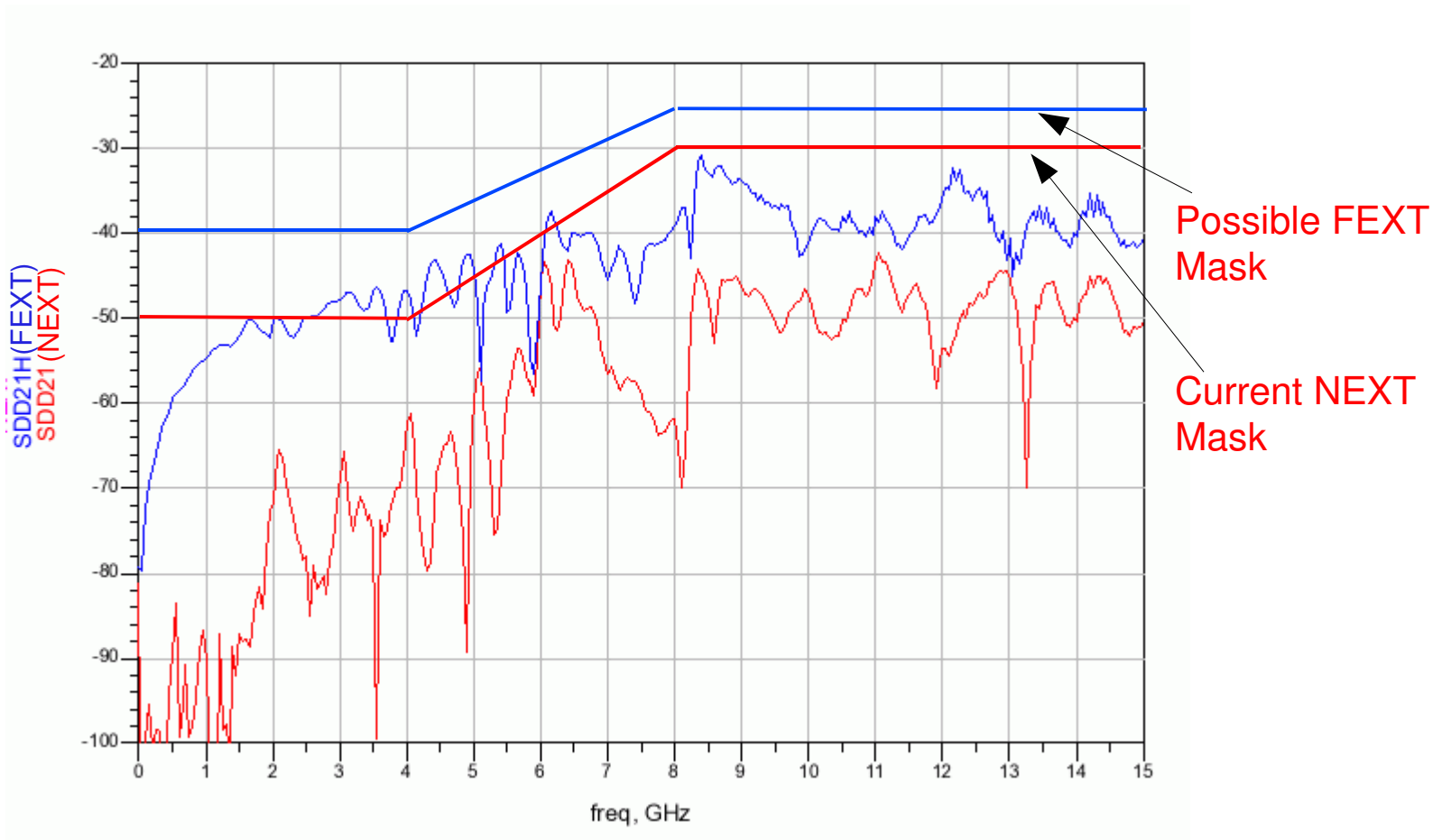
QSFP MCB-HCB Measured Results

- Reflection and high frequency loss expected to improve with back drilling



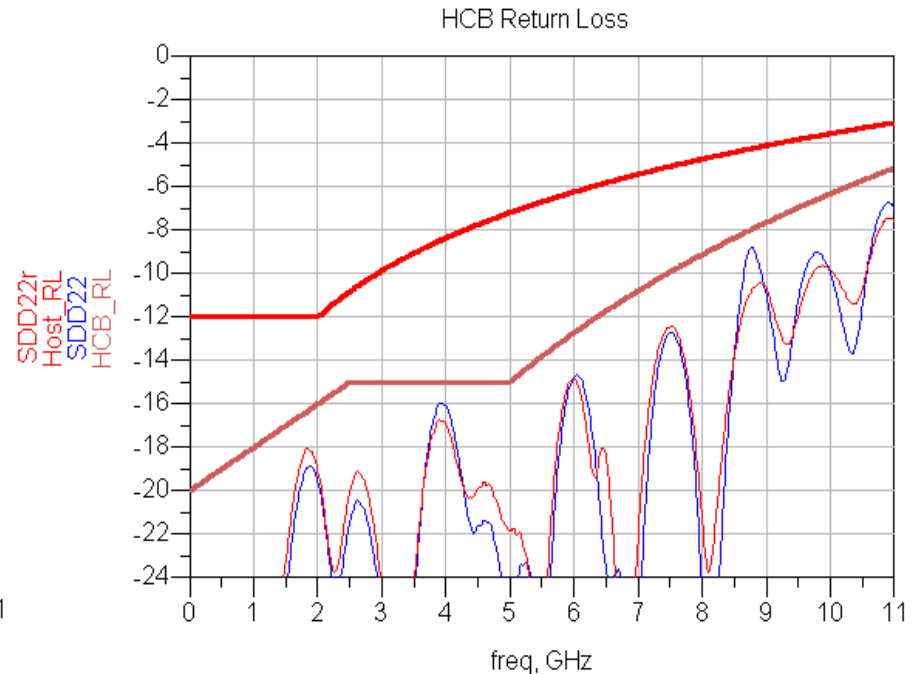
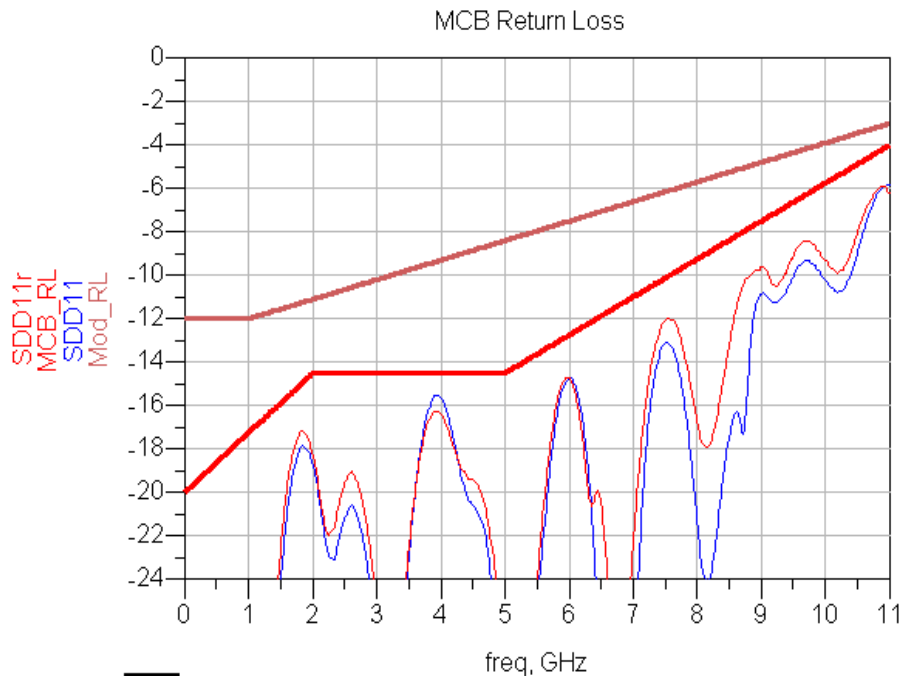
QSFP MCB-HCB Measured Results

- NEXT and FEXT shown for worst signal pair



SFP+ MCB and HCB Return Loss

- Broadcom MCB Rev-2 + Spirent Rev F HCB



```
Eqn Mod_RL=if(freq<1e9)then -12 elseif(freq>=1e9)then (-12.9 + 0.9*(freq/1e9)) else -3
```

```
Eqn MCB_RL=if(freq<2e9) then (-20+5.5/2*(freq/1e9)) elseif (freq<5e9) then -14.5 else (-23.25 + 10.5*(freq/1e9)/6) endif
```

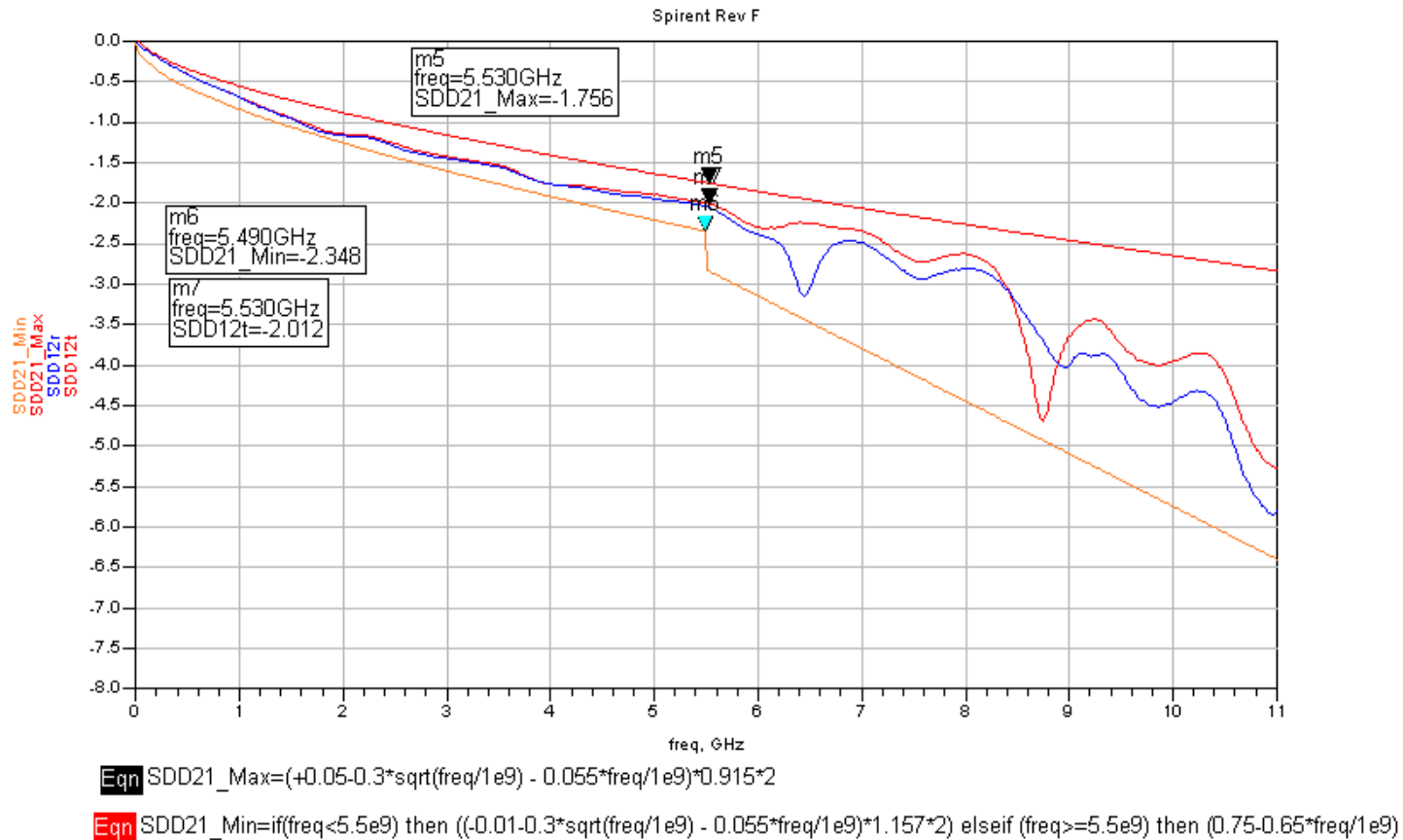
```
Eqn HCB_RL=if(freq<2.5e9) then (-20+5/2.5*(freq/1e9)) elseif (freq<5e9) then -15 else (-13.8 + 28.85*log10(freq/5.5e9)) endif
```

```
Eqn Host_RL=if(freq<2e9)then -12 elseif(freq>=2e9 AND freq<11e9) then (-6.68 + 12.1*log10(freq/5.5e9)) else -3
```

SFP+ MCB-HCB

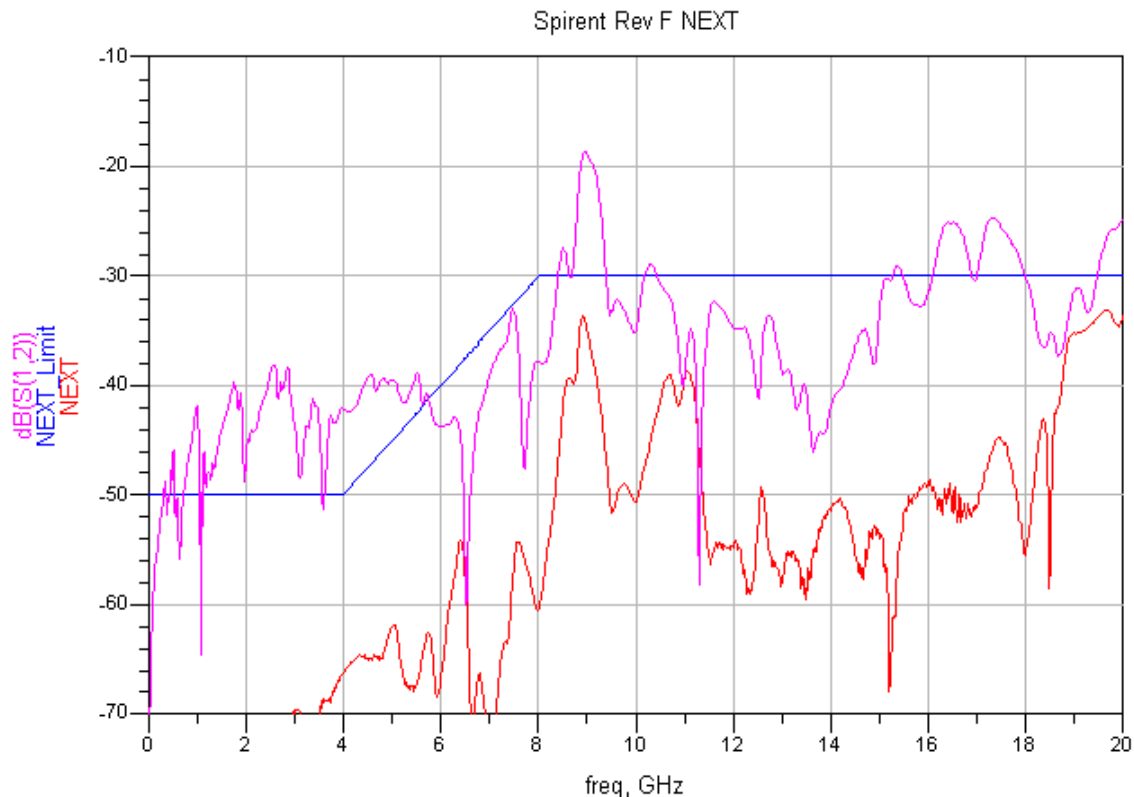
- SDD21 must be met from 0.5-11 GHz

- At 5.5 GHz the is 2 dB +0.35 dB/-0.25 dB



SFP+ MCB-HCB NEXT

- Shows the NEXT, SFP+ mask, as well as single ended S(1,2)



Eqn NEXT_Limit=if (freq<4e9) then (-50) elseif (freq<8e9) then (-70 + 20*freq/4e9) else -30

Summary

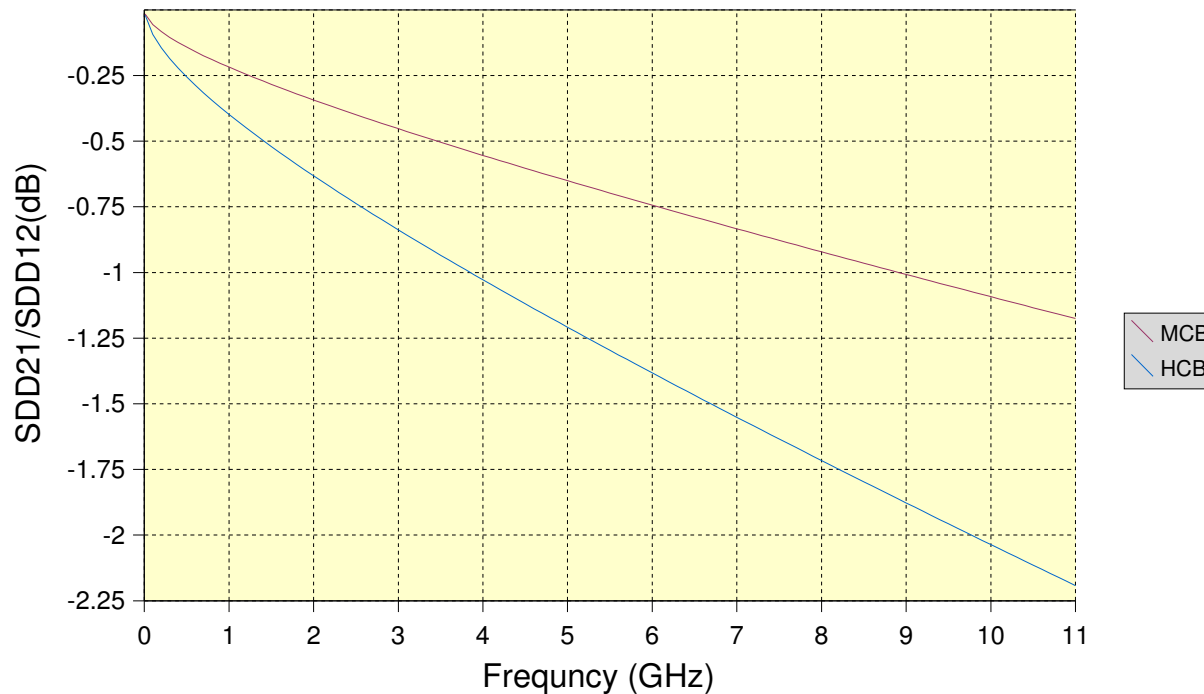
- **MCB uses RO4350B differential stripline**
- **HCB uses RO4350B differential CPW for improve isolation**
- **Due to not back drilling and one of the dimension being off slightly the board had higher return loss than the CL86 SDDxx masks.**
 - **Some of this can also be due to calibration to SMP connector and using standard grade SMA-SMP cable.**
 - **Fundamentally there is not a reason not to meet the SDDxx masks.**
- **Due to reflective loss the SDDxy high frequency loss is higher**
- **We are in process of back drilling the board and looking into SMP calibration.**
- **QSFP max NEXT has improved by about 8 dB but FEXT the FEXT is worse by about 6 dB compare to SFP+.**
 - **Using PFEXT and PNEXT might be better way to specify the (N-1)NEXT and N.FEXT.**

PPI HCB and MCB PCB Target Loss

- Current CL86 MCB and HCB loss

$$SDD21(dB)_{MCB} = (-0.0006 - 0.1600 \times \text{sqrt}(f) - 0.0587 \times f)$$

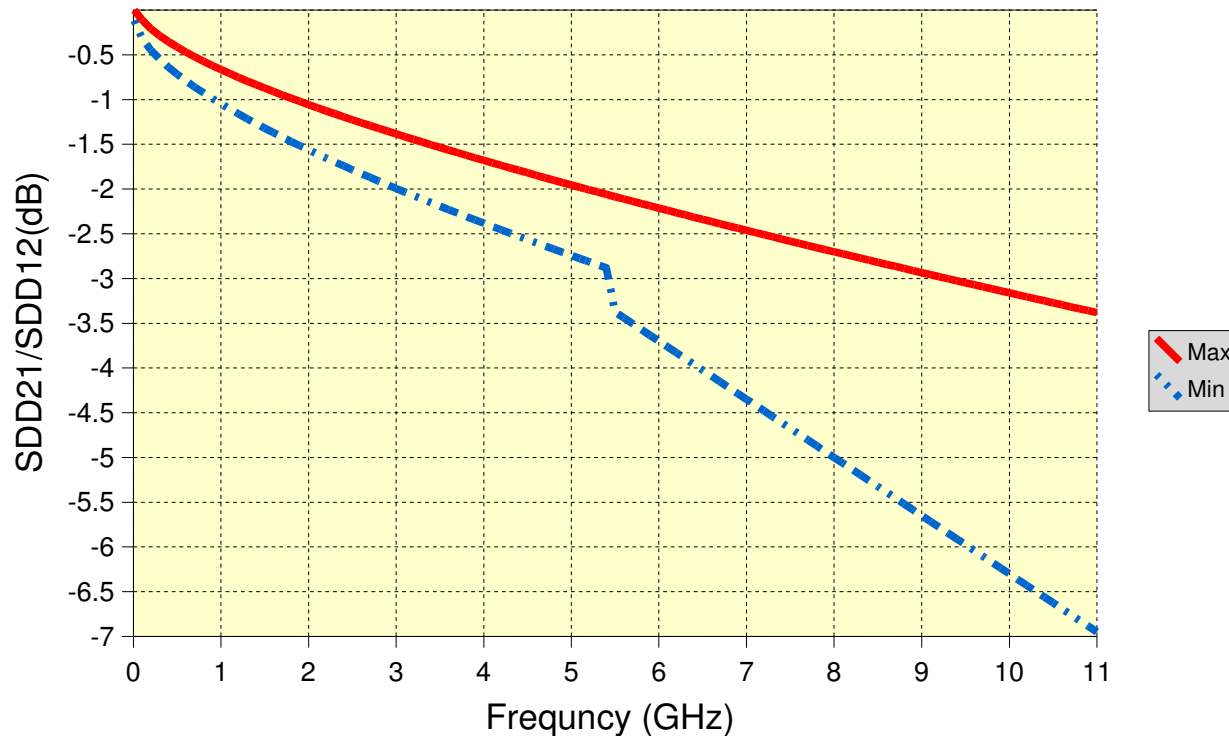
$$SDD21(dB)_{HCB} = (-0.01 - 0.30 \times \text{sqrt}(f) - 0.11 \times f)$$



PPI MCB-HCB Mated SDD21/SDD12 Response

- Current CL86 SDD12/SDD21

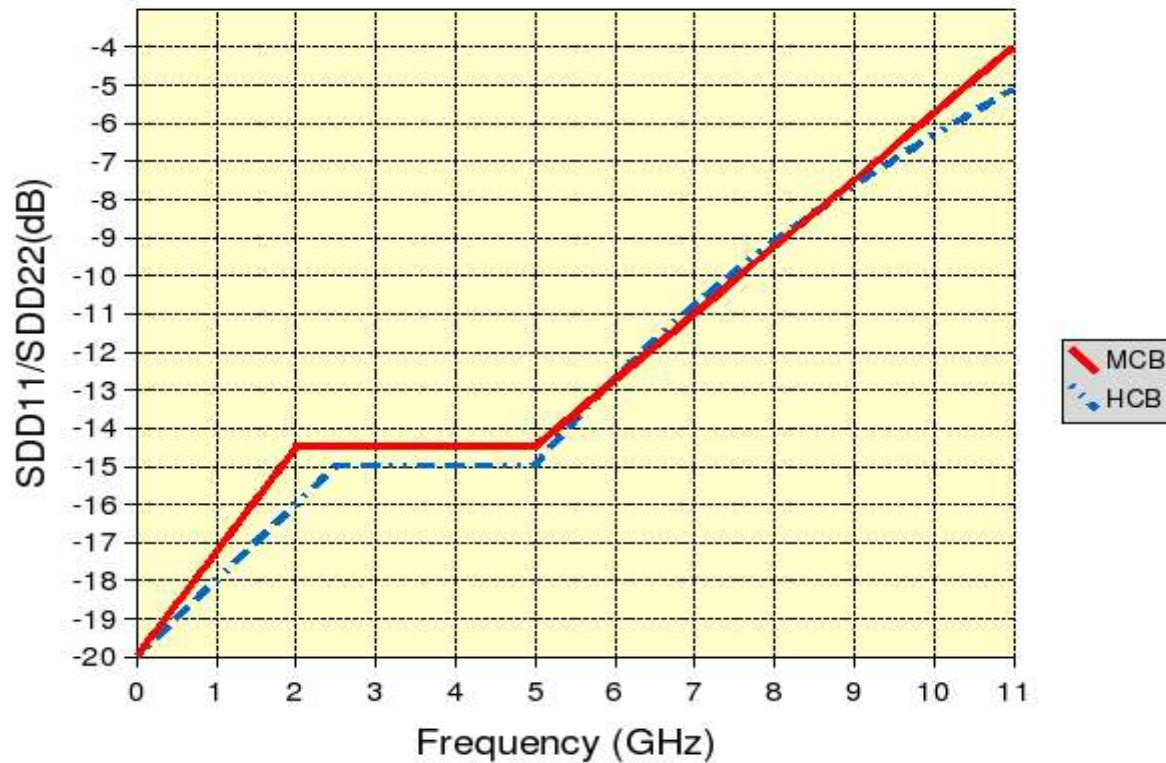
$$SDD21(dB)_{max} \geq 0.109 - 0.654 * \sqrt{f} - 0.120 * f \quad f \text{ in GHz from } 0.01 \text{ to } 11.1 \text{ GHz}$$



$$SDD21(dB)_{min} \leq -0.029 - 0.861 * \sqrt{f} - 0.158 * f \quad f \text{ in GHz from } 0.01 \text{ to } 5.5 \text{ GHz}$$
$$SDD21(dB)_{min} \leq -0.2 - 0.65 * f \quad f \text{ in GHz from } 5.5 \text{ to } 11.1 \text{ GHz}$$

Mated MCB-HCB SDD11/SDD22 Response

- Current CL86 SDD11/SDD22



MCB-Reponse

$$SDD_{xx}(dB) \leq -20 + 2.75 * f \quad f \text{ in GHz from } 0.01 \text{ to } 2 \text{ GHz}$$

$$SDD_{xx}(dB) \leq -14.5 \quad f \text{ in GHz from } 2 \text{ to } 5 \text{ GHz}$$

$$SDD_{xx}(dB) \leq -23.25 + 8.75 * (f/5) \quad f \text{ in GHz from } 5 \text{ to } 11.1 \text{ GHz}$$

HCB-Reponse

$$SDD_{xx}(dB) \leq -20 + 2 * f \quad f \text{ in GHz from } 0.01 \text{ to } 2.5 \text{ GHz}$$

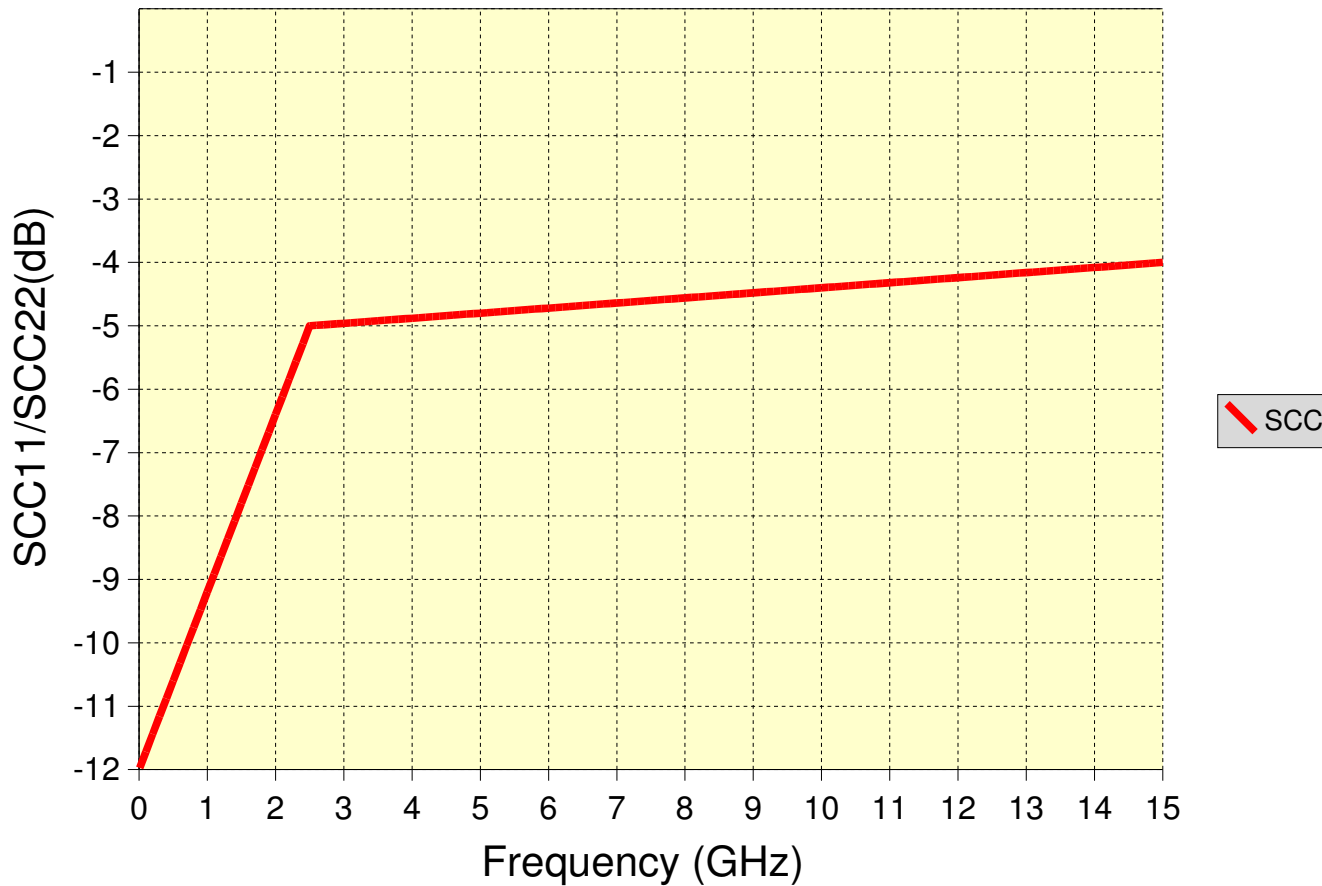
$$SDD_{xx}(dB) \leq -15 \quad f \text{ in GHz from } 2.5 \text{ to } 5 \text{ GHz}$$

$$SDD_{xx}(dB) \leq -13.8 + 28.85 * \log_{10}(f/5.5) \quad f \text{ in GHz from } 5 \text{ to } 11.1 \text{ GHz}$$

Mated MCB-HCB SCC11/SCC22 Response

- Current CL86 SCC11/SCC22

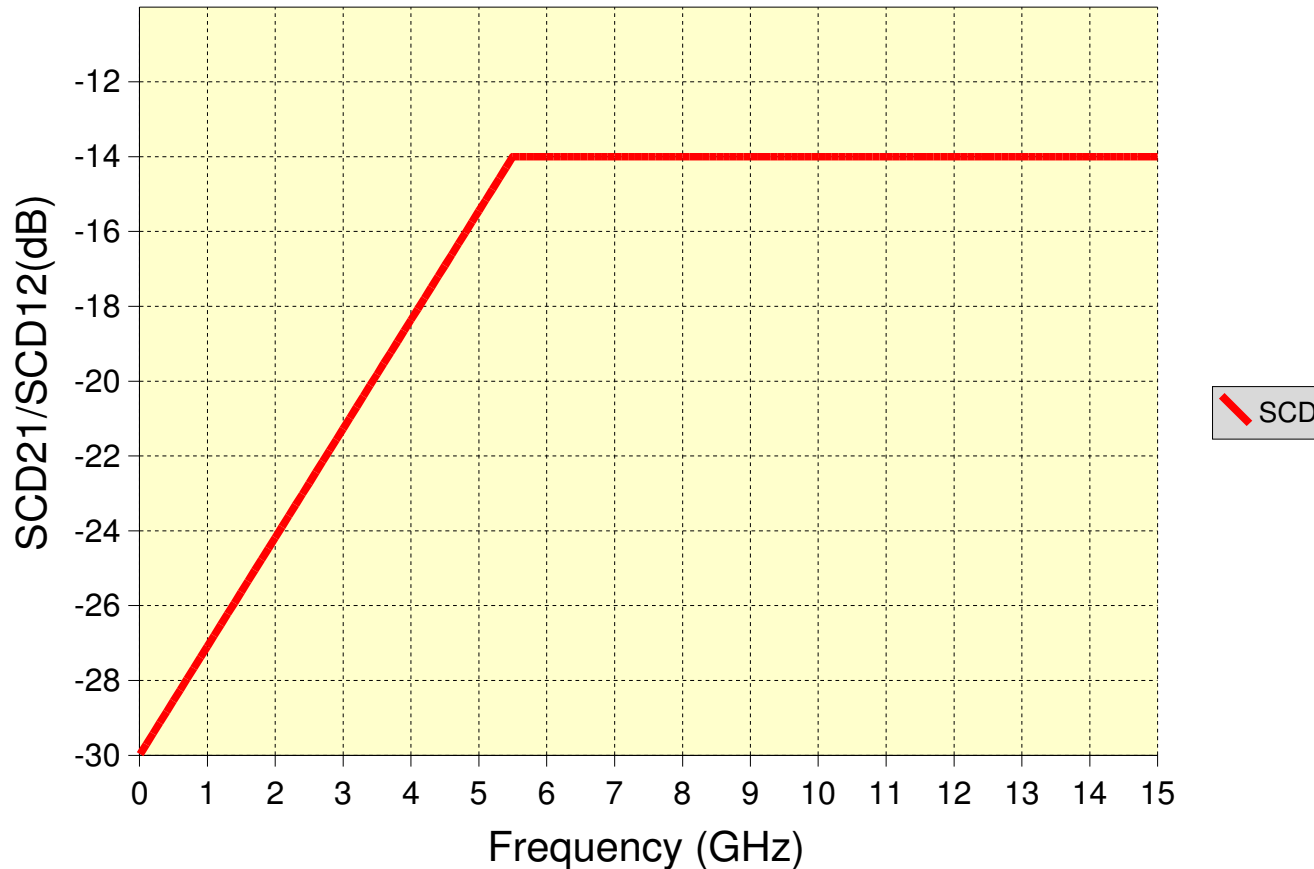
$$SCC11(dB) \leq -12 + 2.8 * f \quad f \text{ in GHz from 0.01 to 2.5 GHz}$$
$$SCC22(dB) \leq -5.2 + 0.08 * f \quad f \text{ in GHz from 2.5 to 15 GHz}$$



Mated MCB-HCB SCD21/SCD12

- Current CL86 SCD21/SCD12

$$\begin{aligned} SCD12(dB) &\leq -30 + 2.91 * f && f \text{ in GHz from 0.01 to 5.5 GHz} \\ SCD21(dB) &\leq -14 && f \text{ in GHz from 5.5 to 15 GHz} \end{aligned}$$



Mated MCB-HCB NEXT and FEXT TBD

- Current CL 86 NEXT

