PPI MCB-HCB Detail Specifications and Connector Pinout

IEEE P802.3ba

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Key Items Require Further Work

- PMA to TP1 and TP4 to PMA loss
- Test point definition
- Channel loss budget
- MCB-HCB response
SR4/SR10 Loss Budget

- SerDes test board driving MCB

- SerDes driving channel
Updated SR4/SR10 Channel Loss

- 5.3 dB loss at Nyquist include HCB loss assuming 1.3 dB
  - Host PCB Loss = 5.3 dB – 1.3 dB (HCB loss) – 0.5 (Connector loss) = 3.5 dB
- Supports 3 to 6” of PCB trace

\[
SDD21\, (dB) = -0.56 \quad \text{from 0.01 to 0.2 GHz}
\]

\[
SDD21\, (dB) = 0.5 - 0.5 \times f
\]

\[
SDD21\, (dB) = -0.0929 - 0.7267 \times \sqrt{f} - 0.6897 \times f
\]

\[
SDD21\, (dB) = 29.39 - 5.16 \times f
\]

from 0.2 to 7 GHz
MCB and HCB recommended PCB Loss

- MCB and HCB PCB loss is increased by about 0.2 dB from SFP+ loss at Nyquist to allow longer PCB traces.

\[
SDD21 \text{ (dB) } MCB = (-0.0006 - 0.1600 \sqrt{f}) - 0.0587 f \]
\[
SDD21 \text{ (dB) } HCB = (-0.01 - 0.30 \sqrt{f}) - 0.11 f
\]
**SFP+ MCB-HCB Mated SDD21/SDD12 Response**

- **PPI MCB-HCB will have 0.4 dB nominal higher loss**

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Equation:

```
SDD21_Max = (-0.05 - 0.3 * sqrt(freq/1e9) - 0.055 * freq/1e9) * 1.0515 * 2
```

```
SDD21_Min = if(freq<5.5e9) then ((-0.01 - 0.3 * sqrt(freq/1e9) - 0.055 * freq/1e9) * 1.157 * 2) else if(freq>=5.5e9) then (0.75 - 0.65 * freq/1e9)
```
PPI MCB-HCB Mated SDD21/SDD12 Response

- PPI MCB-HCB has ~0.4 dB higher nominal loss at Nyquist than SFP+ MCB-HCB response

\[ SDD21|dB|_{\text{max}} \geq 0.109 - 0.654 \sqrt{f} - 0.120 f \]
\[ \text{f in GHz from 0.01 to 11.1 GHz} \]

\[ SDD21|dB|_{\text{min}} \leq -0.29 - 0.861 \sqrt{f} - 0.158 f \]
\[ \text{f in GHz from 0.01 to 5.5 GHz} \]

\[ SDD21|dB|_{\text{min}} \leq -0.2 - 0.65 f \]
\[ \text{f in GHz from 5.5 to 11.1 GHz} \]
Mated MCB-HCB SDD11/SDD22 Response

- MCB response is slightly worse due to higher loss

\[ SDD_{xx} \leq -20 + 2.75 \times f \]
\[ SDD_{xx} \leq -14.5 \]
\[ SDD_{xx} \leq -23.25 + 8.75 \times \log_{10}(f/5.5) \]

MCB-Response

\[ f \text{ in GHz from 0.01 to 2 GHz} \]
\[ f \text{ in GHz from 2 to 5 GHz} \]
\[ f \text{ in GHz from 5 to 11.1 GHz} \]

HCB-Response

\[ f \text{ in GHz from 0.01 to 2.5 GHz} \]
\[ f \text{ in GHz from 2.5 to 5 GHz} \]
\[ f \text{ in GHz from 5 to 11.1 GHz} \]
Mated MCB-HCB SCC11/SCC22 Response

- The same as SFP+

\[ SCC11 \text{ (dB)} \leq -12 + 2.8 \times f \]
\[ SCC22 \text{ (dB)} \leq -5.2 + 0.08 \times f \]

f in GHz from 0.01 to 2.5 GHz
f in GHz from 2.5 to 15 GHz
Mated MCB-HCB SCD21/SCD12

- The same as SFP+

\[
\begin{align*}
SCD_{12}(dB) & \leq -30 + 2.91 \times f \\
SCD_{21}(dB) & \leq -14
\end{align*}
\]

f in GHz from 0.01 to 5.5 GHz
f in GHz from 5.5 to 15 GHz

SCD

Frequency (GHz)

SCD21/SCD12 (dB)
Mated MCB-HCB NEXT and FEXT TBD

- SFP+ differential NEXT shown below for reference

![Graph showing differential NEXT vs Frequency](image-url)
40GBase-SR4 Optical Lane Assignment

- Figure 86-2 need to be updated to show fibre position as shown below and in addition a connector diagram with TX/RX lanes as well as fibre position is required.

Optical Transceiver

Optical Receptacle and Optical Connector, single MPO

Fiber Optic Cable, containing 8 or 12 fibers, 4 used per direction.

Optical Receptacle and Optical Connector, single MPO

Fiber Position

Transmit Lane number

Receive Lane number

Optical Transceiver
40GBase-SR10 Optical Lane Assignment

- Figure 86-2 need to be updated to show fibre position as shown below for SR10.
Connector Lane Assignment

- Assumes Table 85-9 pin assignment and without crossover in cable.
  - Not consistent with the SR4 definition!
  - We may want to consider reordering the table pin out 85-9 or just let MLD take care of the rotation.

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Transmitter

Receiver
Summary

- PPI defines electrical specifications for the host and modules
  - The test fixture to test host “HCB” and fixture to test module “MCB” are required to accuracy, consistency, and compliance.

- SFF-8431 MCB and HCB definition which was also adopted by FC-Pl-4 can be used here with few minor adjustment:
  - The MCB and HCB loss each are increased by about 0.2 dB at Nyquist to accommodated longer PCB traces.
  - The differential, common mode, and differential to common mode s-parameters can be adopted with no change.
  - Differential NEXT and FEXT should have a place holder with TBD as these can be very different.