Improved QSFP and SFP+ Connectors

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Amphenol Corp
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Current QSFP

QSFP Receptacle Measurement Fixture
Measurement: Insertion Loss (TX3) and TX3 to TX1 Crosstalk (includes fixture)
QSFP NEXT Full Cable Assembly

Ansoft Corporation

QSFP NEXT Tx1Tx3

Curve Info
- dB20(SDD21)
- LinearFrequency
- dB20(SDD11)
- LinearFrequency
- dB20(SDD22)
- LinearFrequency

1/21/2010
Current vs. Enhanced QSFP against SFF-8431 (SFP) spec lines
Differential Insertion Loss

*(amplitude fixture corrected – SFF-8431 C.1.1 & C.1.2)*
Differential Return Loss

Current production QSFP socket SDD11

Enhanced QSFP socket SDD11

Current

Enhanced

1/21/2010
Common mode return loss

Current production QSFP socket SCC11

Enhanced QSFP socket SCC11

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<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Magnitude (dB)</th>
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Current production QSFP socket SCC11

Enhanced QSFP socket SCC11

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Current

Enhanced

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Mode conversion

Current production QSFP socket SCD_{12}

- long row mode conversion
- short row mode conversion
- SFF-8431 spec line

Enhanced QSFP socket SCD_{12}

- long row mode conversion
- short row mode conversion
- SFF-8431 spec line

Current production QSFP socket SDC_{12}

- long row mode conversion
- short row mode conversion
- SFF-8431 spec line

Enhanced QSFP socket SDC_{12}

- long row mode conversion
- short row mode conversion
- SFF-8431 spec line

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Individual near-end crosstalk sources

**Current**

- Current production QSFP socket differential long row NEXT
  - Long row-long row
  - Long row - short row (1)
  - Long row - short row (2)
  - SFF-8431 spec line

**Enhanced**

- Enhanced QSFP socket differential long row NEXT
  - Long row-long row
  - Long row - short row (1)
  - Long row - short row (2)
  - SFF-8431 spec line

**Short row**

- Short row-long row (1)
  - Short row - long row (2)
  - Short row - short row
  - SFF-8431 spec line

1/21/2010
Individual near-end crosstalk sources

Current
- Current production QSFP socket differential long row NEXT
- Long row-long row
- Long row - short row (1)
- Long row - short row (2)
- SFF-8431 spec line

Enhanced
- Enhanced QSFP socket differential long row NEXT
- Long row-long row
- Long row - short row (1)
- Long row - short row (2)
- SFF-8431 spec line

Current production QSFP socket differential short row NEXT
- Short row-long row (1)
- Short row - long row (2)
- Short row - short row
- SFF-8431 spec line

Enhanced QSFP socket differential short row NEXT
- Short row-long row (1)
- Short row - long row (2)
- Short row - short row
- SFF-8431 spec line

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SFP+ Stacked
Compliance Board measurements

End of the cable SOLT

Return Loss for SFP+ on Broadcom Board (Compliance)

- Aph New
- #1
- #2
- SFF Compliance Boards Spec. Page 69

Frequency (GHz)

Magnitude (dB)
Effect of Spirent Host Compliance Card

Diagram showing the effect of Spirent Host Compliance Card with labels for Host PCB Trace, Paddle Card PCB Trace, Amphenol Spirent, Connector, and Mating Interface Area.
Receptacle Comparison (12ps)

SFP+ Receptacle

- Blue: New Aph
- Green: #1
- Red: #2

Improved Impedance

Time (ps)

Ohms

500 550 600 650 700 750 800 850 900
Stacked SFP Comparison Measurements

- TDR – Top port
- Via on Motherboard
- Mating Interface
- Amphenol Blue
- Older component
- Footprint has been improved in new release
Top port Stacked Sfp+

SFP+ Comparison: Differential Insertion Loss

- Frequency (GHz)
- Sdd_{12} Magnitude in dB

Other Supplier: TX Pair
Amphenol: TX Pair
Common Mode Return Loss

Stacked SFP Comparison - Common Mode Return Loss (Top Ports)

Stacked SFP Comparison - Common Mode Return Loss (Bottom Ports)
Differential Return Loss

Stacked SFP Comparison - Differential Return Loss (Top Ports)

Stacked SFP Comparison - Differential Return Loss (Bottom Ports)
NEXT Crosstalk

Stacked SFP Comparison - NEXT (Top Ports)

Stacked SFP Comparison - NEXT (Bottom Ports)
Mode Conversion

Stacked SFP Comparison - Mode Conversion (Sdc) (Top Ports)

Stacked SFP Comparison - Mode Conversion (Scd) (Top Ports)

Stacked SFP Comparison - Mode Conversion (Sdc) (Bottom Ports)

Stacked SFP Comparison - Mode Conversion (Scd) (Bottom Ports)

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Insertion loss

SFP+ Comparison: Differential Insertion Loss

-12 -10 -8 -6 -4 -2 0

Frequency (GHz)

Sdd_{12} Magnitude in dB

Other Supplier: TX Pair
Amphenol: TX Pair

1/21/2010