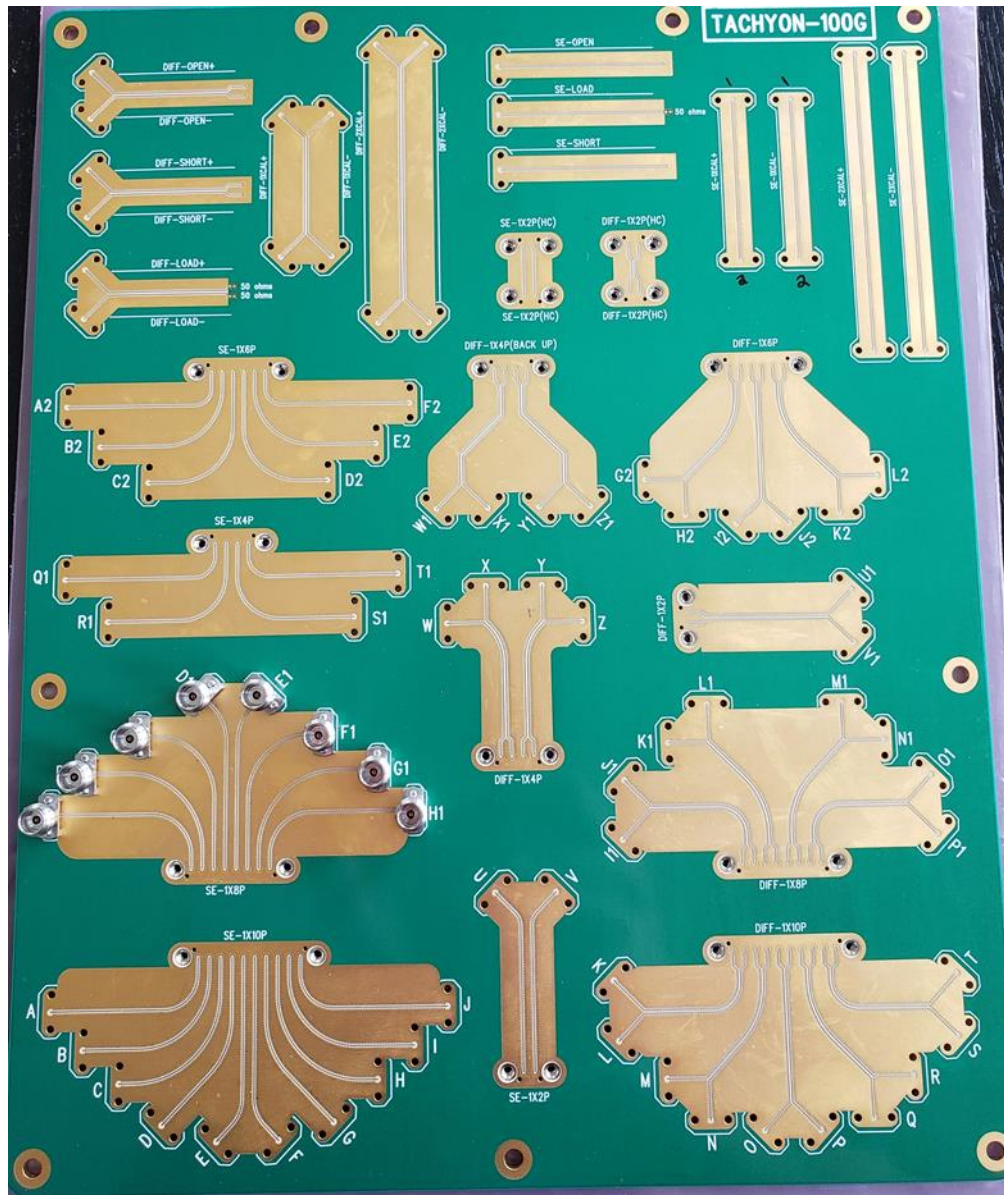


SIGNAL INTEGRITY REPORT

Test and Measurement Performance Report

Part Number TM7SSSH28S8MS028 (Core HC)

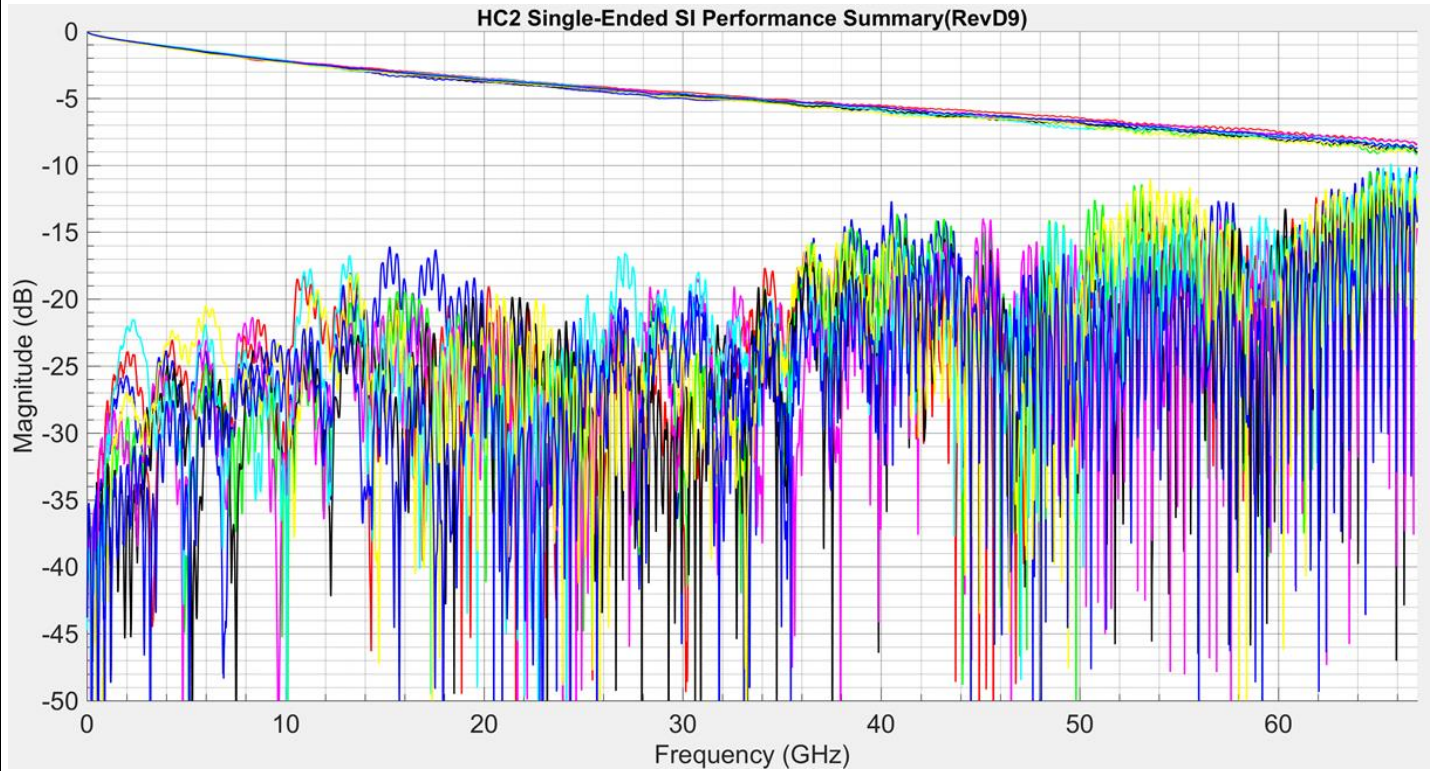
Distribution: Internal and External Use



| | | | |
|---|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 1 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT

SI Performance Summary (Attenuation & Reflections, Single-Ended)



Legend: [Single-Ended, 8-Measurements shown](#)

* For further details regarding the testing setup and configuration please see the rest of the report.

| | | | |
|--|---|---|---|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 2 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran |
| | | ENGINEERING MANAGER E.Soubh | |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

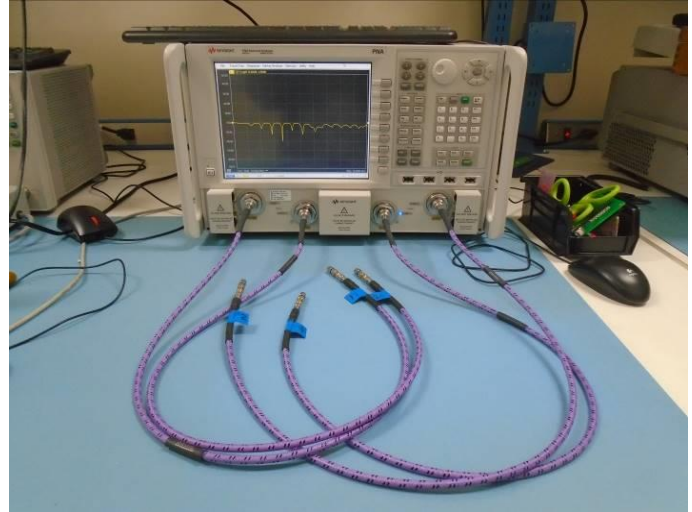
SIGNAL INTEGRITY REPORT

1.0 TEST SETUP AND DUT

Equipment, fixtures, and methods

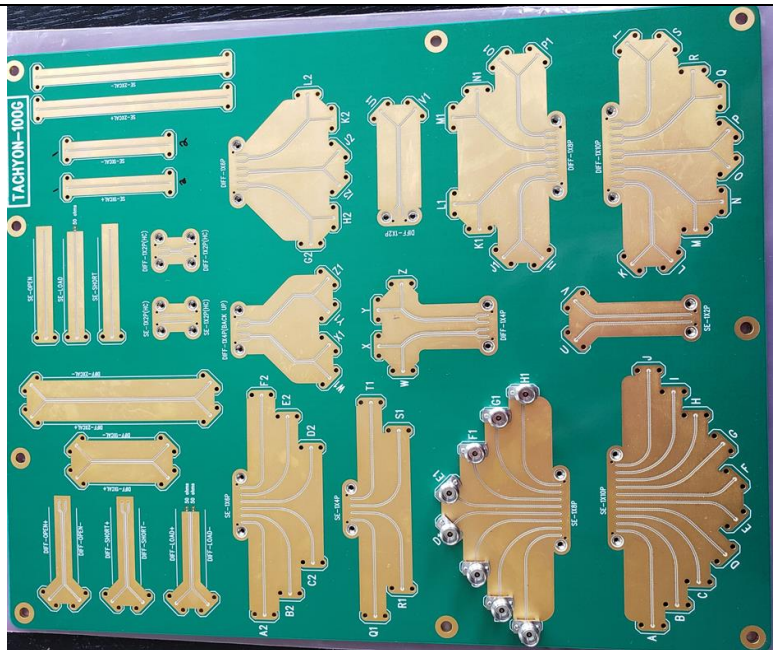
Test method: All data measured from test PCB shown below and a N5227A PNA Network Analyzer

- Calibration was performed up to the 1.85mm SMA adapters using calibration kit: 85058B
- Data was swept from 10 MHz to 67GHz for 6700 points
- Data averaging was turned off.
- Data is not dembedded and includes the board traces and the Core HC cable assembly



Assembly Description

- T&M PN: TM7SSSH28S8MS028
- 8- Position LCP Connector Housing, single piece at the interface
- **11-inch solid center conductor 092 coax cable**
- Carlisle DUT PCB: Core HC, CPW, Vertical Launch, **Rev D, #9**
- **Port 1: 1.85mm Cable Connector (Core HC)**
- **Port 2: 1.85mm CPW Vertical Launch Precision Connector (on HC2, CPW PCB)**



Testing Samples:

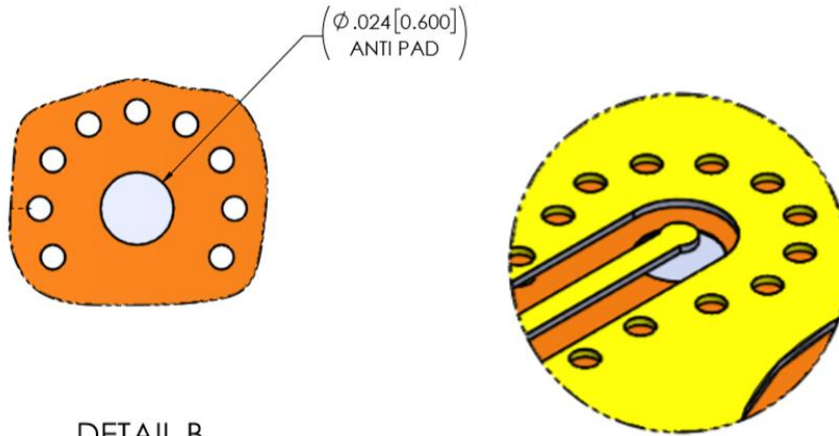
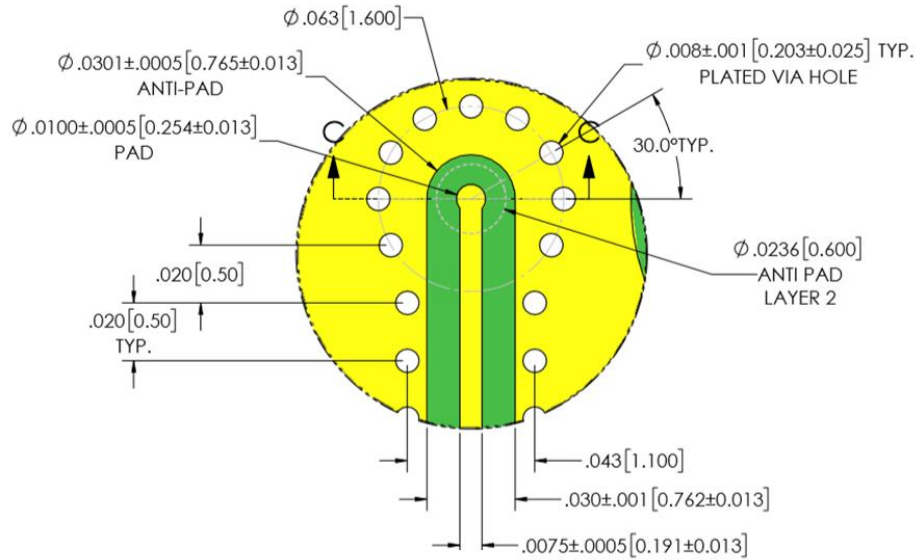
- 1 Samples
- 8 Channels
- 8 THRU Measurements w/ PCB (8 Channels x 1 samples) -> **Single-Ended**
- 8 THRU Measurements w/RF Adaptor (8 Chan. x 1 samples) -> **Single-Ended**

| | | | |
|---|--|--|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 3 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT

2.0 BOARD STACKUP & FOOTPRINT INFORMATION

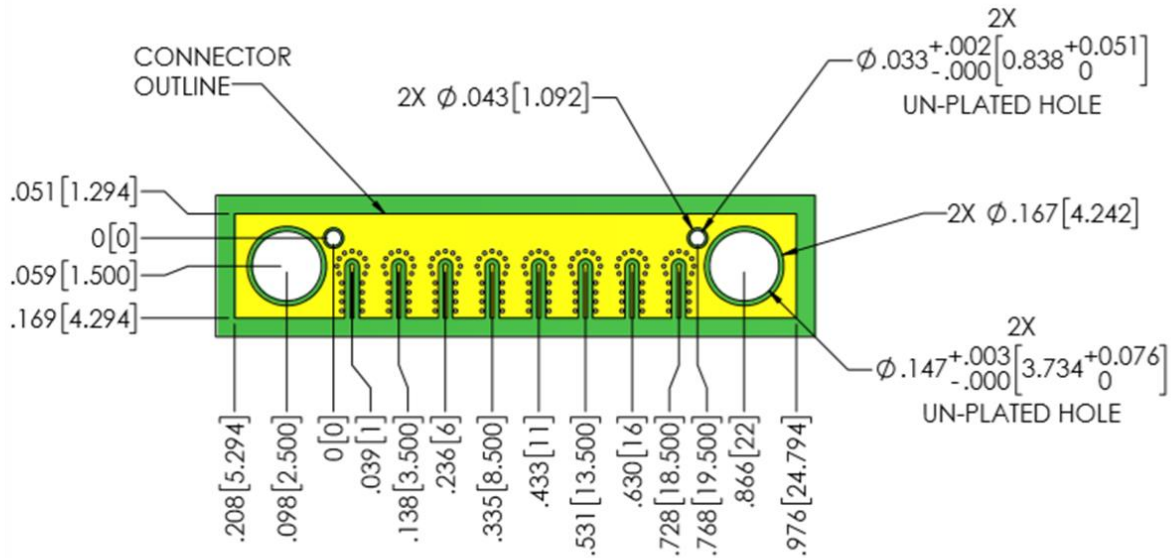
- Carlisle Core HC 2.5mm CPW Test Board
 - Revision D, #9, Coplanar Waveguide, Vertical Launch
 - **Cable Assembly placed on 8-Position Single-Ended Footprint**
- Dielectric Material: Tachyon 100G (Dk.2.97, Df 0.0014 @ 20 GHz)
 - Thickness: 0.104mm / 4.11 mil
 -



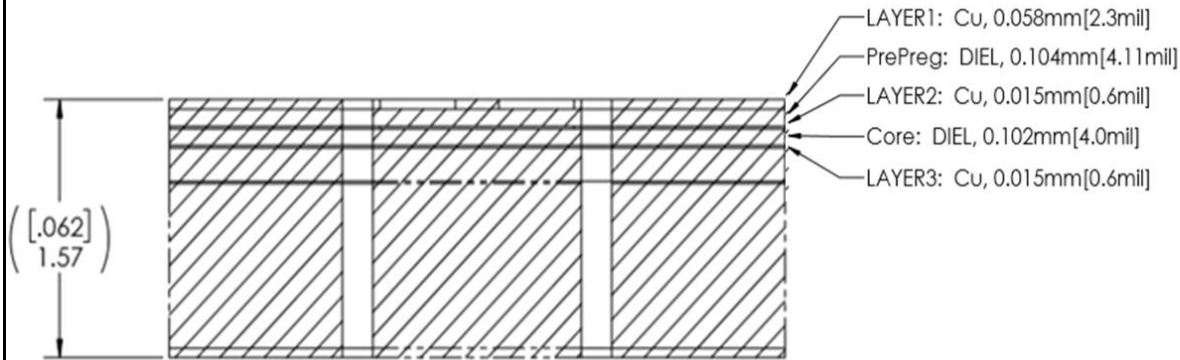
DETAIL B
SCALE 32 : 1
LAYER2

| | | | |
|---|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 4 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT



Core HC 2.5mm CPW Test Board Stackup (RevD0)



C) PCB FINISH

1. Surface Protective Plating

- All exposed copper on the outer layers shall be plated with a protective surface finish.
- All exposed pads, edge fingers and plated through holes shall be ENIG with thickness listed in Table 2.

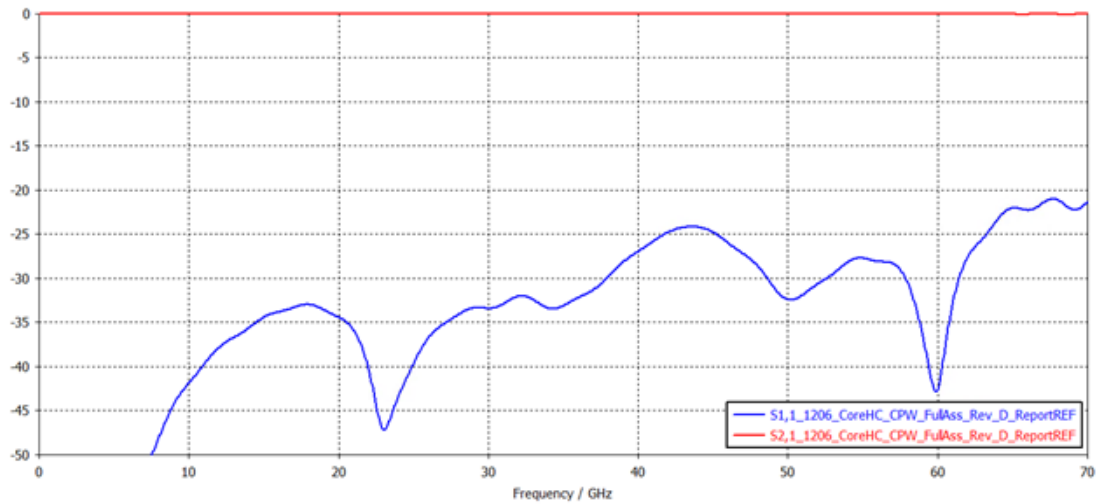
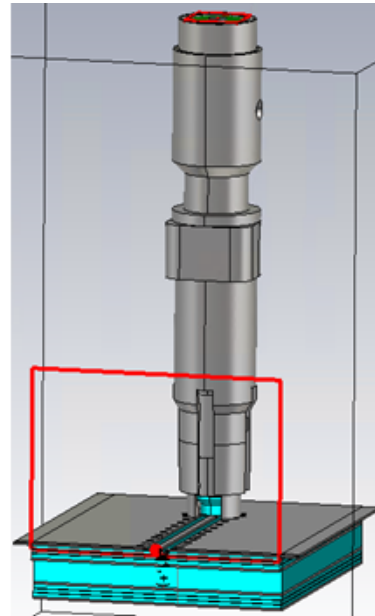
Table 2: Protective Plating Thickness

| Nickel | | Immersion Gold | |
|---------------------------|---------|---------------------------|------------|
| μm (microinch) | | μm (microinch) | |
| Min. | Max. | Min. | Max. |
| 2.5 (100) | 13(512) | 0.051 (2) | 0.2032 (8) |

| | | | |
|---|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 5 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT

**Simulated Data (CST)
1 connector to PCB**



| | | | |
|--|--------------------|----------|----------|
| CoreHC_RevD_CPW_1206_032619_FullAss_SE_Rev_1.s2p | 3/26/2019 4:26 PM | S2P File | 147 KB |
| CoreHC_2p5mm_PCB_RevD_03262019_CPW_SE_Rev_1.stp | 3/26/2019 4:35 PM | STP File | 1,042 KB |
| CoreHC_2p5mm_InterconnectOnly+SolderConnections_03112019_Rev_1 | 3/11/2019 12:01 PM | STP File | 1,415 KB |

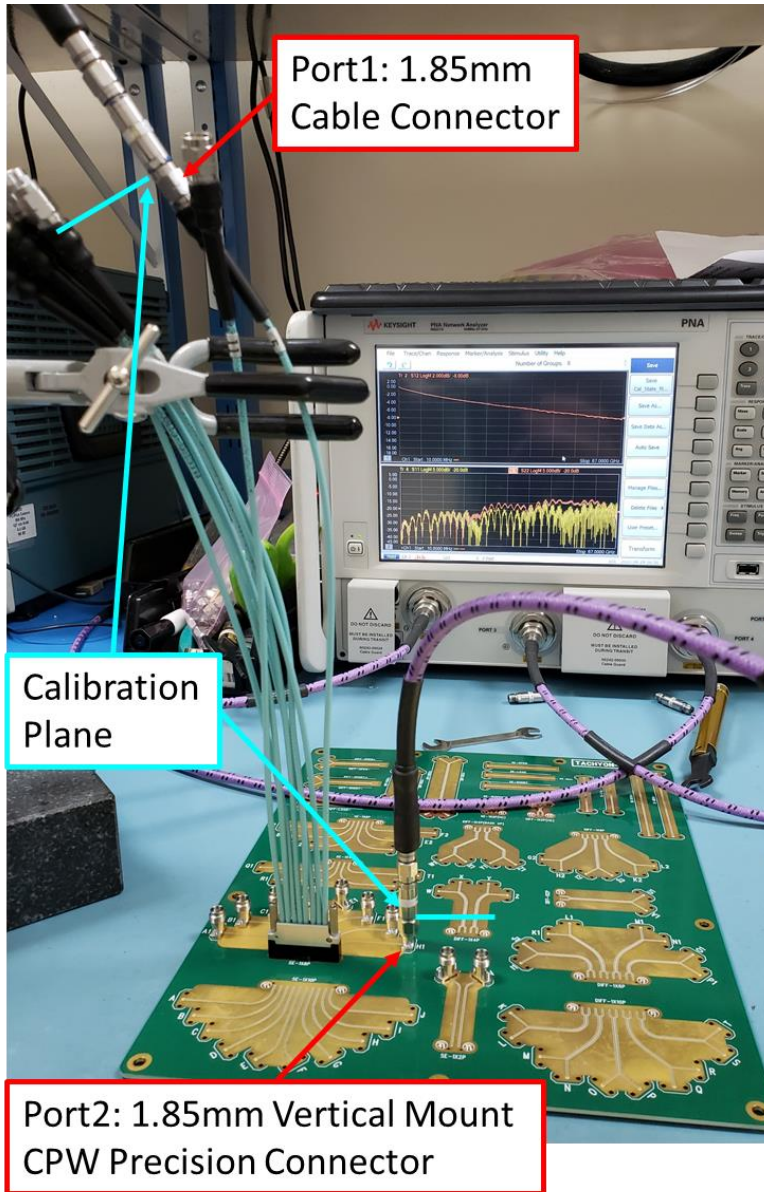
| | | | |
|--|--|---|--|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/ 12 / 2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 6 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

3.0 MEASUREMENT SET-UP (HC2 CPW REVD BOARD)

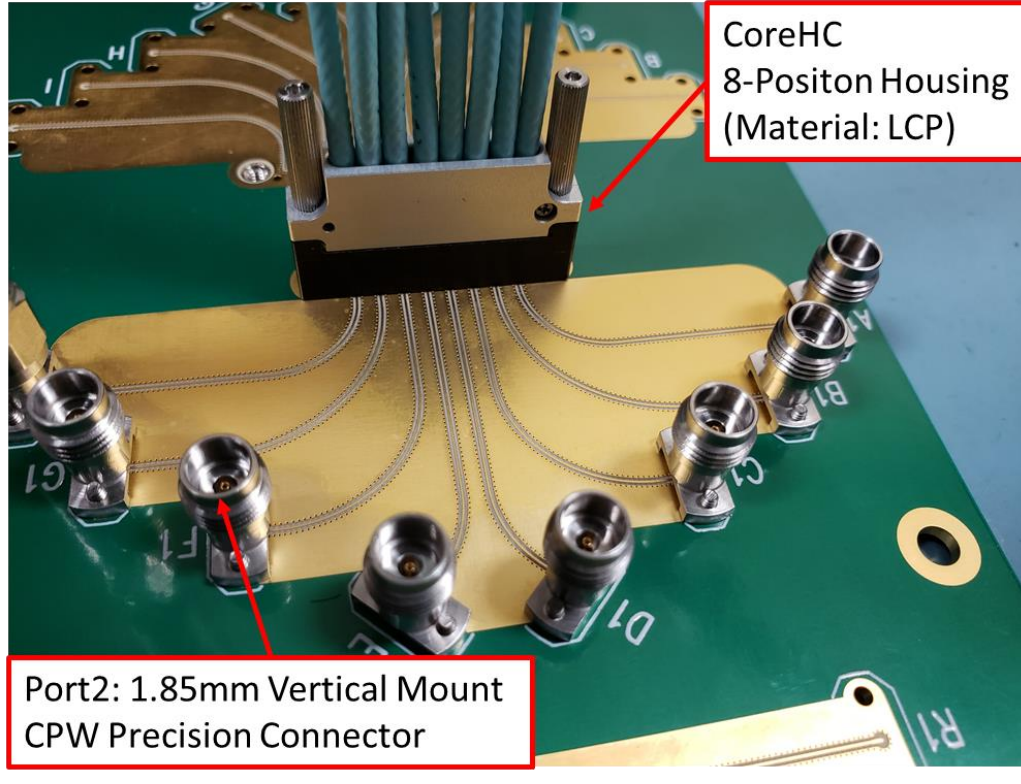


Measurements are not dembedded and include the Core HC assembly (cable connector, cable, interconnect), PCB (transitions, traces) and 1.85mm CPW vertical mount precision connector.



| | | | |
|---|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 7 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT



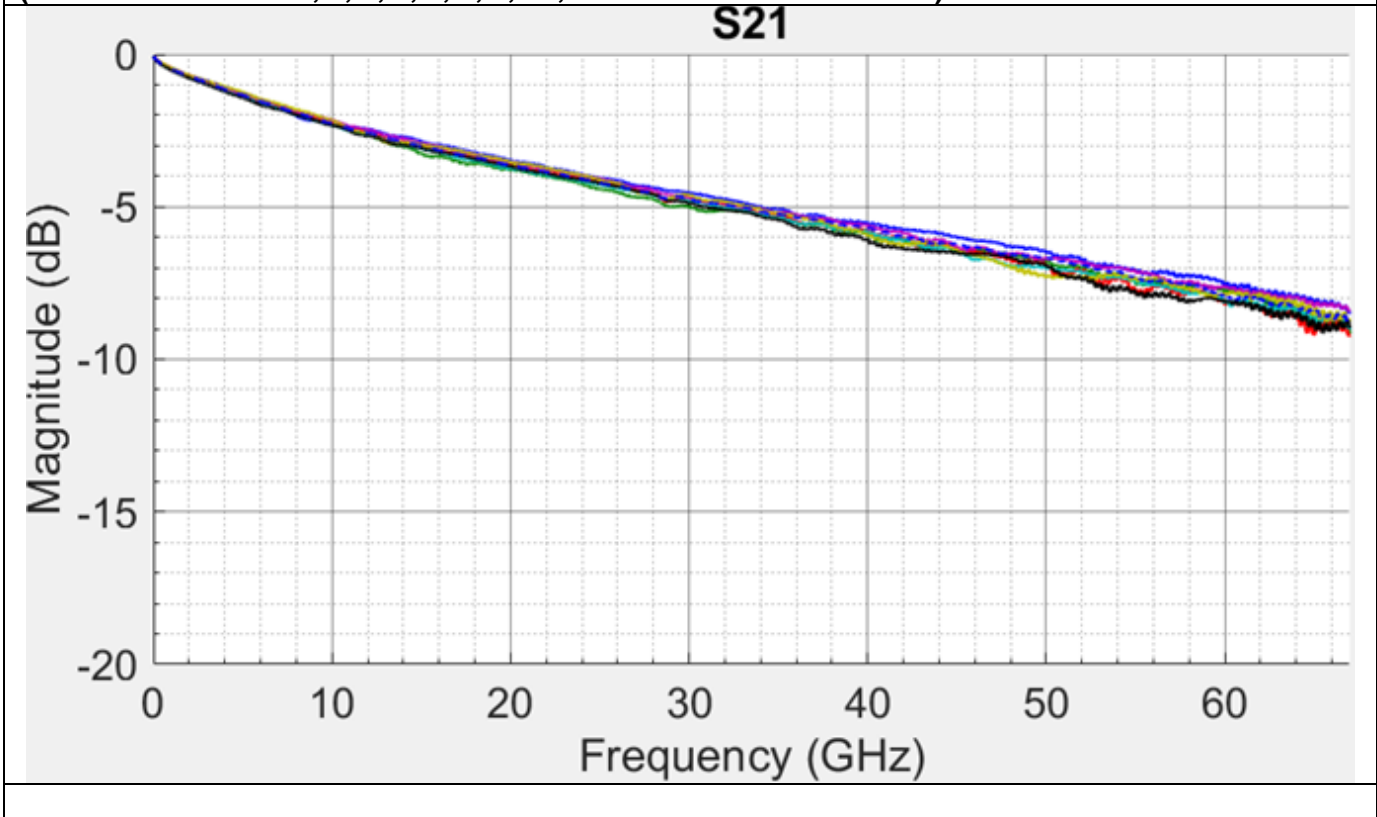
| | | | |
|--|--|---|--|
| <u>REVISION:</u> 1 | <u>ECN INFORMATION:</u> EC No: N/A DATE: 05/ 12 / 2020 | <u>TITLE:</u> Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | <u>SHEET No.</u> 8 of 18 |
| <u>DOCUMENT NUMBER:</u> RSI-TM7SSSH28S8MS028 | <u>SI ENGINEER:</u> R.Stavoli | <u>DESIGN ENGINEER</u> H.Tran | <u>ENGINEERING MANAGER</u> E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT

4.0 SIGNAL INTEGRITY RESULTS (HC2 CPW REVD BOARD)

Insertion Loss (S21), Single-Ended

(CoreHC Channels: 2, 3, 4, 5, 6, 8, 9, 11, Board Locations: A1 → H1)

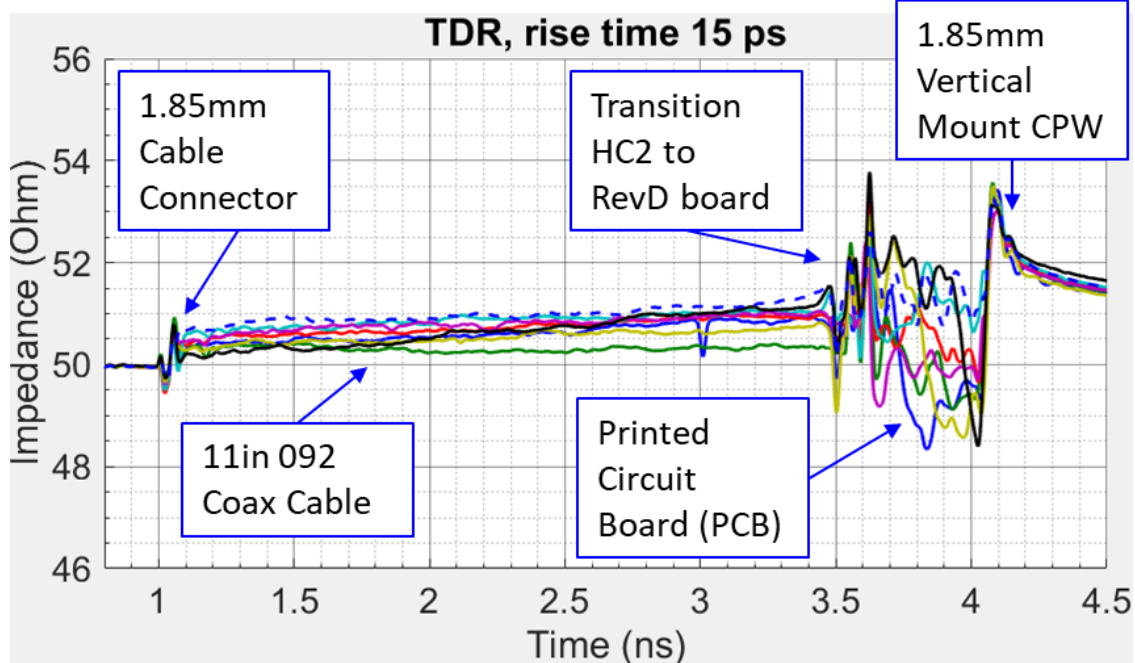
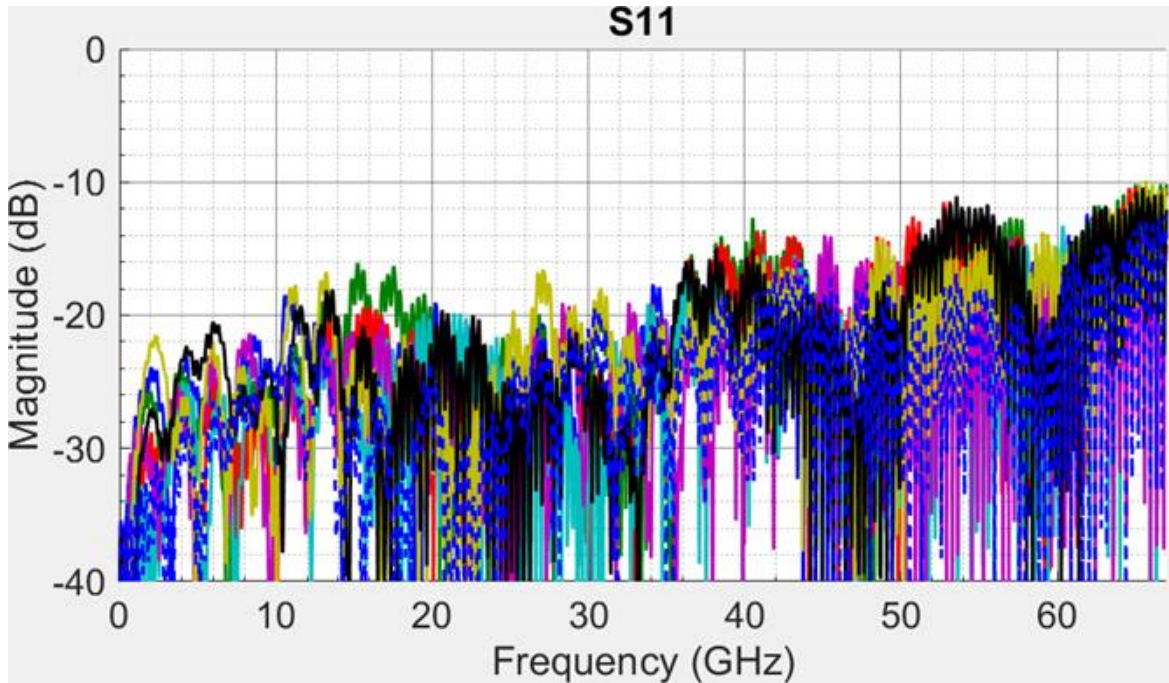


| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 9 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

Return Loss (S11), Single-Ended

(CoreHC Channels: 2, 3, 4, 5, 6, 8, 9, 11, Board Locations: A1 → H1)

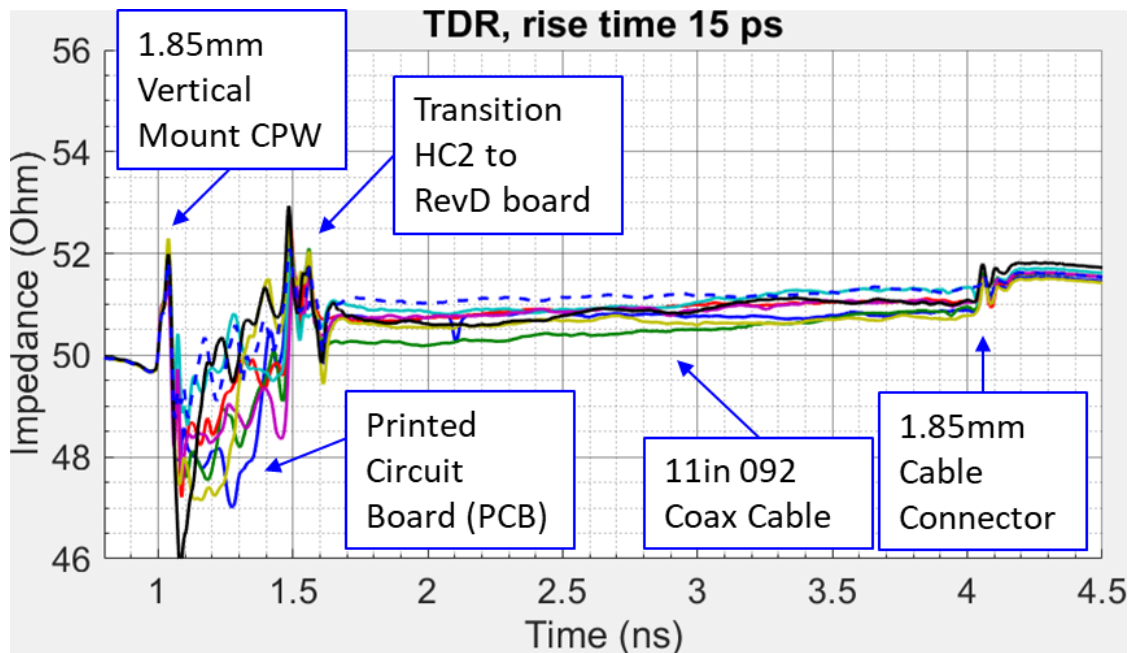
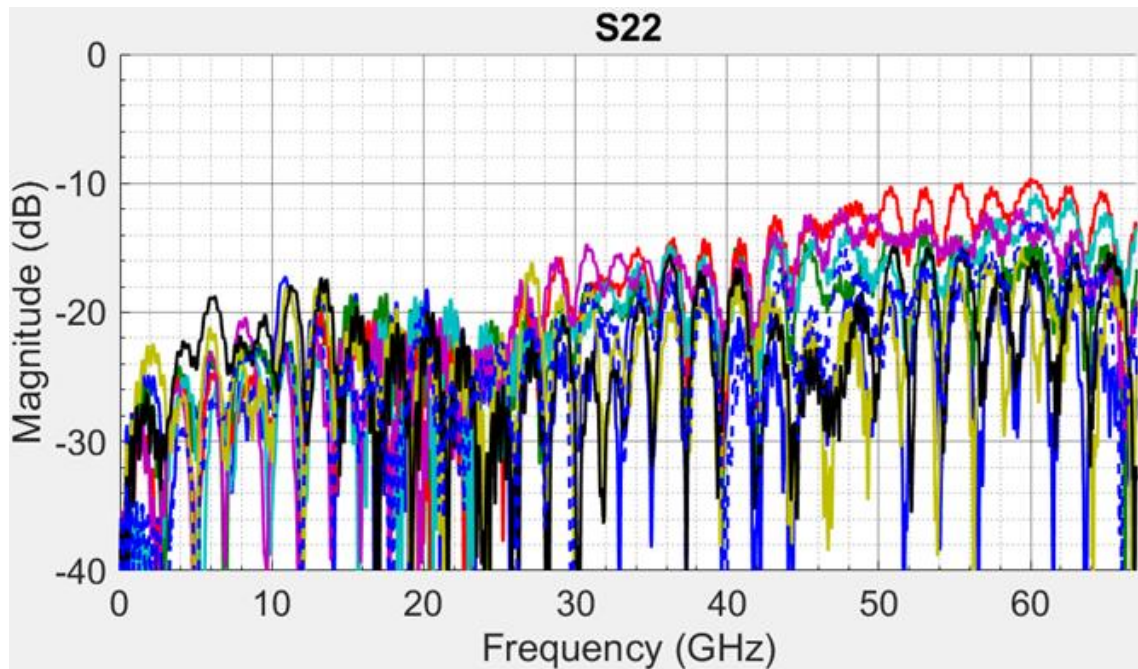


| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 10 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

Return Loss (S22), Single-Ended

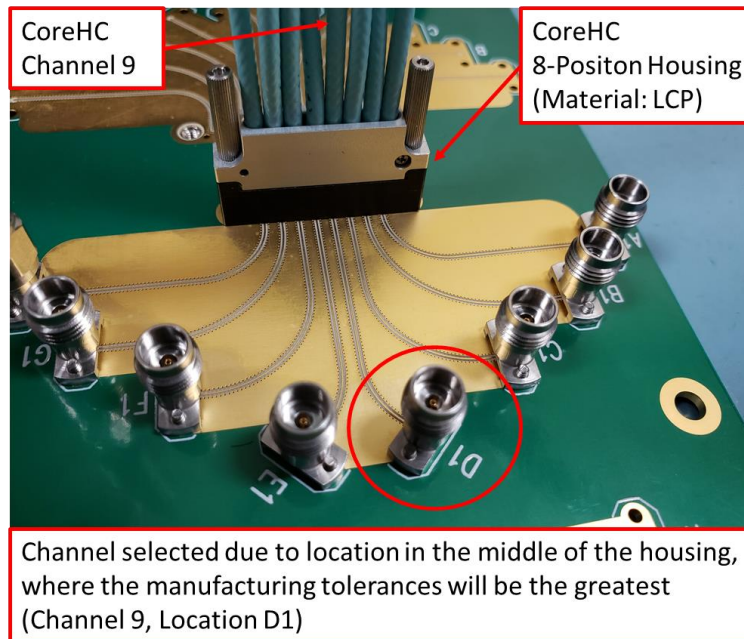
(CoreHC Channels: 2, 3, 4, 5, 6, 8, 9, 11, Board Locations: A1 → H1)



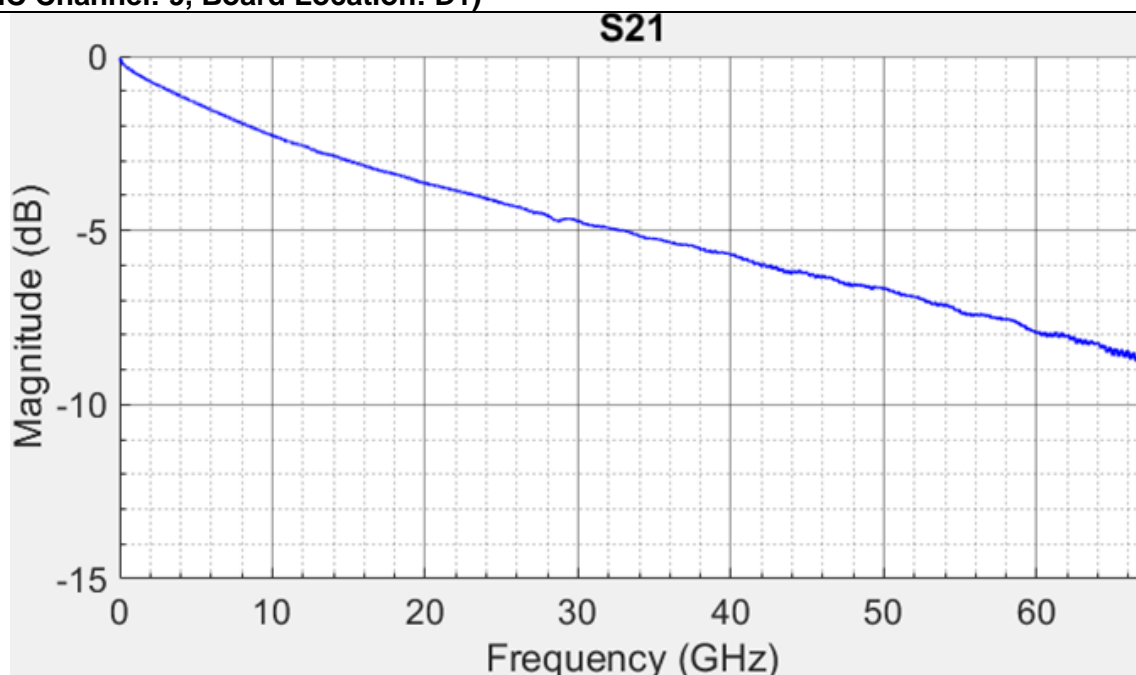
| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 11 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

5.0 SIGNAL INTEGRITY RESULTS (HC2 CPW REVD BOARD), CHANNEL #9



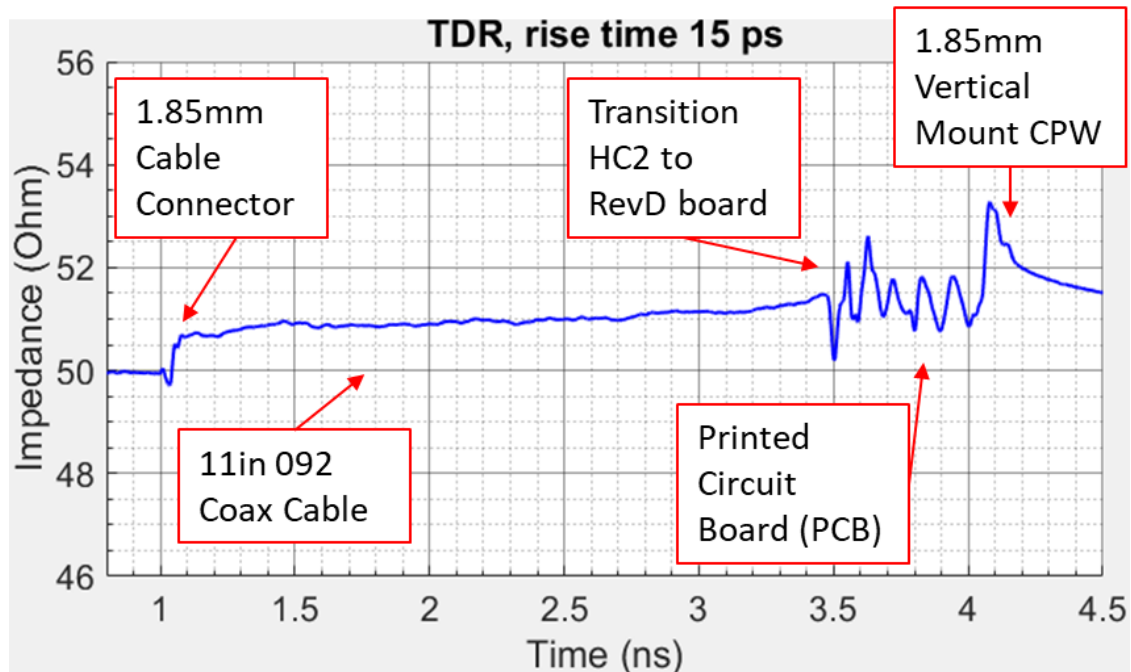
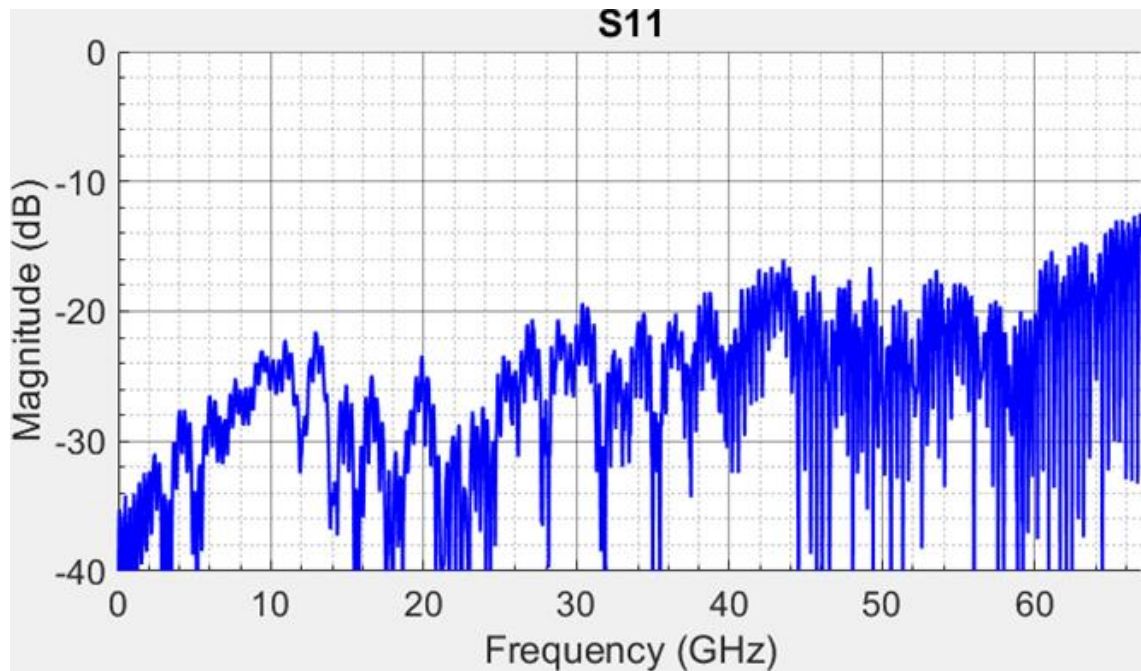
Insertion Loss (S21), Single-Ended (CoreHC Channel: 9, Board Location: D1)



| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 12 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

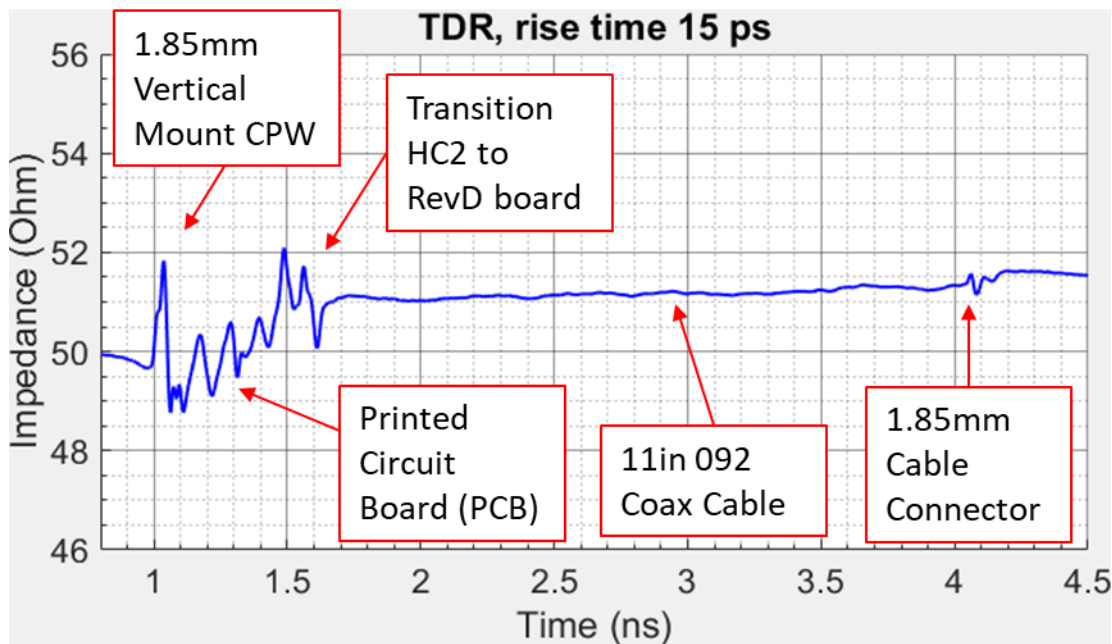
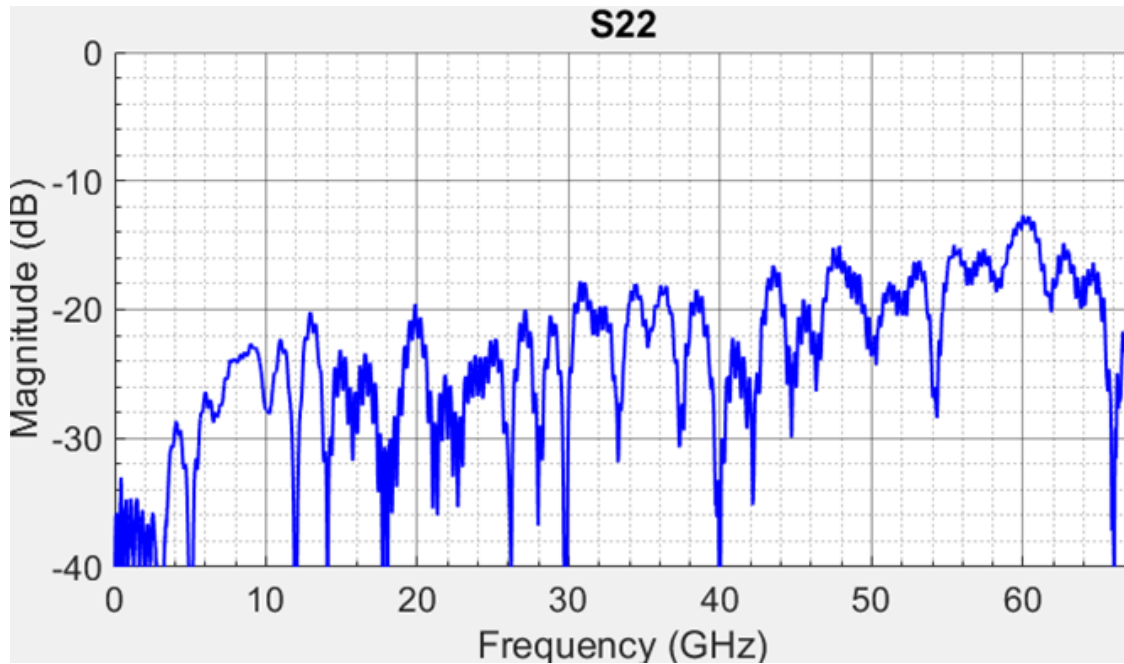
Return Loss (S11), Single-Ended (CoreHC Channel: 9, Board Location: D1)



| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 13 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

Return Loss (S22), Single-Ended (CoreHC Channel: 9, Board Location: D1)



| | | | |
|--|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 14 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

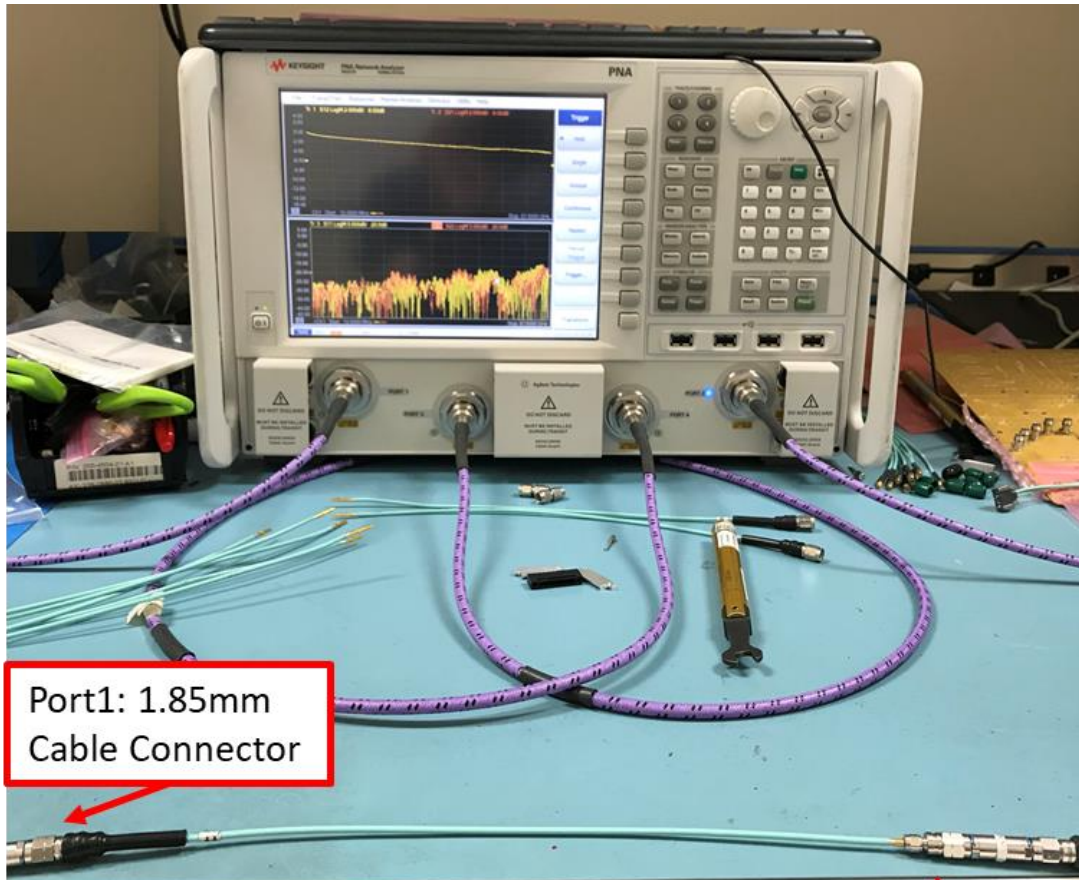
SIGNAL INTEGRITY REPORT

6.0 MEASUREMENT SET-UP (HC2 1.85MM RF ADAPTOR #1)

Port 1: Core HC
(1.85mm Cable Connector)

Device Under Test

Port 2: Core HC Interface
(1.85mm RF Core HC Adaptor #1)



Port1: 1.85mm
Cable Connector



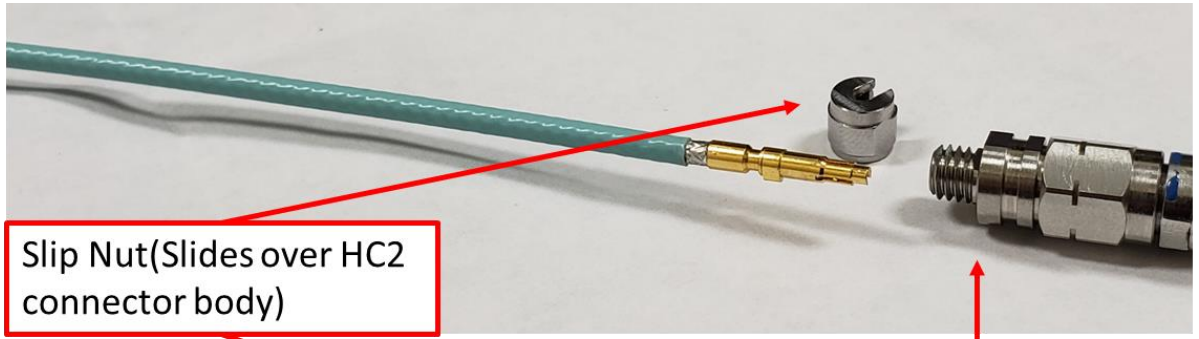
Port2: 1.85mm
CoreHC
Adaptor

| | | | |
|---|---|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/ 12 / 2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 15 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| TEMPLATE FILENAME: SPM(SIZE_AJ)(V.1).DOC | | | |

SIGNAL INTEGRITY REPORT

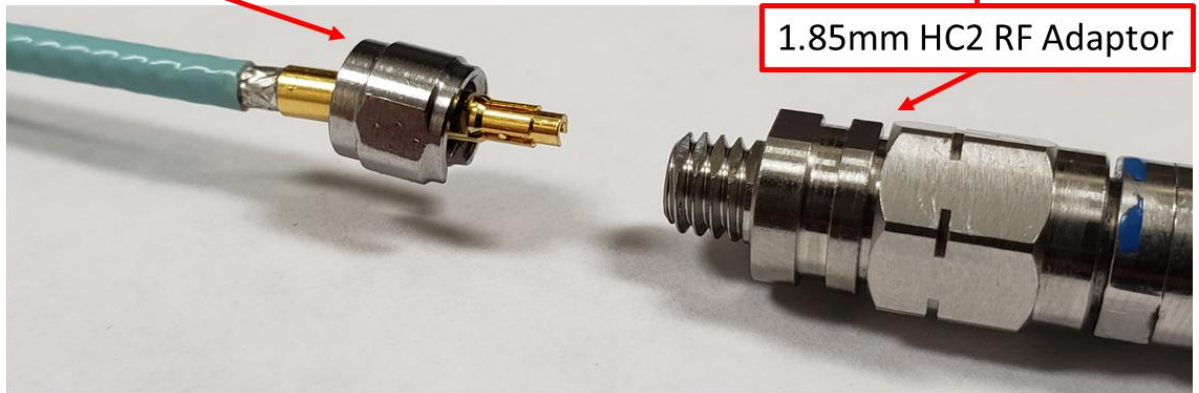
HC2 Adaptor Testing Procedure

Step 1



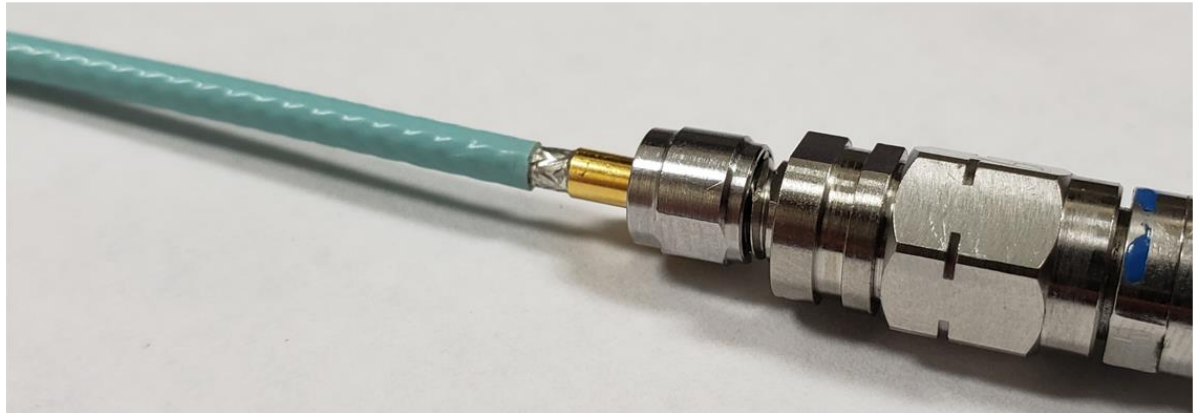
Slip Nut(Slides over HC2 connector body)

Step 2



1.85mm HC2 RF Adaptor

Step 3



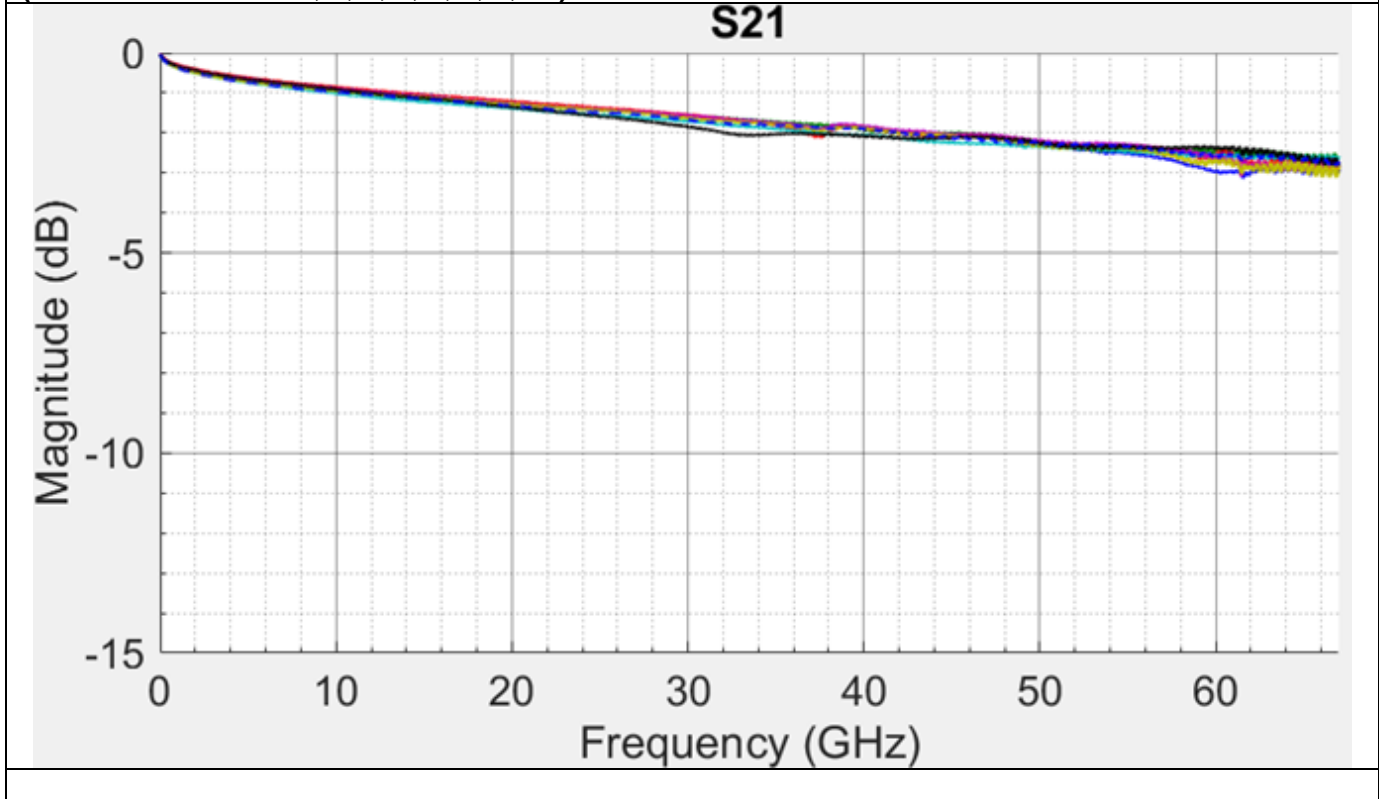
| | | | |
|--|---|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/ 12 / 2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 16 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

7.0 SIGNAL INTEGRITY RESULTS (HC2 1.85MM RF ADAPTOR #1)

Insertion Loss (S21), Single-Ended

(CoreHC Channels: 2, 3, 4, 5, 6, 8, 9, 11)

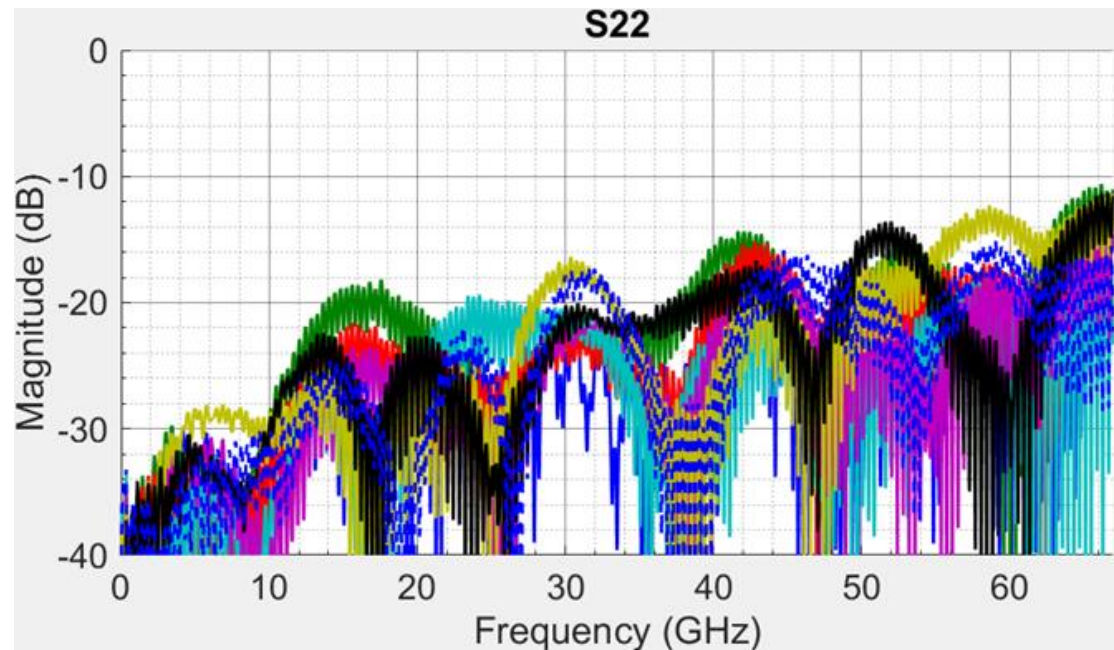
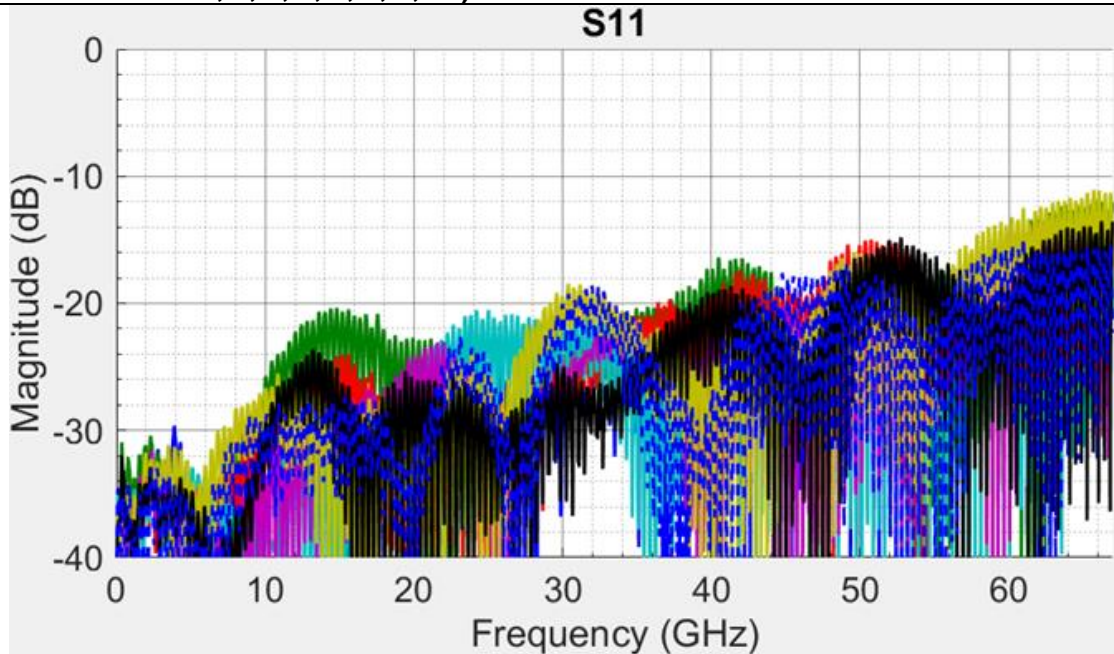


| | | | |
|---|--|---|---------------------------------------|
| REVISION: 1 | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB) CARLISLE IT CONFIDENTIAL | SHEET No. 17 of 18 |
| DOCUMENT NUMBER: RSI-TM7SSSH28S8MS028 | SI ENGINEER: R.Stavoli | DESIGN ENGINEER H.Tran | ENGINEERING MANAGER E.Soubh |
| <small>TEMPLATE FILENAME: SPM(SIZE_AJ)(V.1).DOC</small> | | | |

SIGNAL INTEGRITY REPORT

Return Loss (S11, S22), Single-Ended

(CoreHC Channels: 2, 3, 4, 5, 6, 8, 9, 11)



8.0 APPENDIX, (SPARAMETERS SHOWN IN REPORT)

HC2 Reference Cable Assembly_8-Postion Measurements_042920 5/11/2020 3:23 PM Compressed (zipped) Folder 4,186 KB

| | | | |
|--|---|---|--|
| REVISION: <p style="font-size: 2em; font-weight: bold; color: blue;">1</p> | ECN INFORMATION: EC No: N/A DATE: 05/12/2020 | TITLE: <p style="font-size: 1.2em; font-weight: bold; color: blue;">Core HC 2.5mm CPW: Configuration 1X8P (HC2 to PCB)</p> <p style="font-weight: bold; color: black;">CARLISLE IT CONFIDENTIAL</p> | SHEET No. <p style="font-size: 1.2em; font-weight: bold;">18 of 18</p> |
| DOCUMENT NUMBER: <p style="font-size: 1.2em; font-weight: bold; color: blue;">RSI-TM7SSSH28S8MS028</p> | | SI ENGINEER: <p style="font-weight: bold; color: blue;">R.Stavoli</p> | DESIGN ENGINEER: <p style="font-weight: bold; color: blue;">H.Tran</p> |
| | | ENGINEERING MANAGER: <p style="font-weight: bold; color: blue;">E.Soubh</p> | |
| TEMPLATE FILENAME: SPM(SIZE_A)(V.1).DOC | | | |