HRi RANGE EZi RANGE BBi RANGE

HARWiN

Test Report Summary

HT08003

Electrical, Mechanical & Environmental Testing
Archer .8 (M58 Series)

ARCHER

// HARWIN.COM

1. Introduction

1.1. Description and Purpose

Archer .8 (M58 Series) is a range of board-to-board mezzanine 0.8mm pitch connectors in a double row format with polarized, shrouded housings with location pegs. The connectors are available in male and female vertical connector styles for surface mount soldering, with contact counts up to 120 (60+60).

The Archer .8 range offers a low profile, high density connector in tape & reel ready for high volume automated assembly, and high speed signal transmission. The following tests were performed to confirm the connectors meet the proposed specifications under the EIA-364 electrical connector standards.

1.2. Conclusion

The following data has been taken from Harwin Test report QA000250. The results were used to define the Component Specification C053XX for the Archer .8 range. The tests indicate that the Archer .8 range performs as required, suitable for a wide range of applications calling for high density, high speed, board-to-board connectors.

2. Test Method and Requirements

2.1. Specification Parameters

Testing Standard	Description of Test	Section	Page No.
EIA-364-23B: 2000	Contact Resistance	3.1	3
EIA-364-70A: 1998	Current Rating	3.2	3–4
EIA-364-09C: 1999	Durability	3.3	5
EIA-364-20C: 2004	Withstand Voltage	3.4	5
EIA-364-21C: 2000	Insulation Resistance	3.5	5
N/A	Temperature Life (without load)	3.6	6
EIA-364-32C: 2000	Thermal Shock (Temperature Cycling)	3.7	6
EIA-364-26B: 1999	Salt Spray	3.8	6
EIA-364-31B: 1999	Humidity	3.9	6
EIA-364-28D: 1999 (BS EN 60068-2-6: 2008 Test Fc)	Vibration	3.10	7
EIA-364-27B: 1996	Mechanical Shock	3.11	8
N/A (Signal Integrity – 3.11 [9])	Insertion Loss	3.12.1	10-11
	Return Loss	3.12.2	12-13
	Impedance	3.12.3	14-15
	Crosstalk	3.12.4	16-17
	VSWR	3.12.5	18

2.2. List of Connectors

The following connectors are used throughout the testing:

- M58-2800342R – Female 30 contact SMT connector
- M58-3800342R – Male 30 contact SMT connector
- M58-2800642R – Female 60 contact SMT connector
- M58-3800642R – Male 60 contact SMT connector
- M58-2801242R – Female 120 contact SMT connector
- M58-3801242R – Male 120 contact SMT connector

3. Test Results

3.1. Contact Resistance: EIA-364-06C: 1999

Methodology: One contact, 20 contacts, and 30 contacts on each 30-contact sample connector (M58-2800342R and M58-3800342R) were measured using a precision milli/micro-ohmmeter for resistance, prior to any electrical, mechanical, or environmental testing. Post-conditioned samples of the 30-contact connectors were subjected to contact resistance testing.

Specification:

- Initial = 50mΩ max per contact
- Post-Conditioned = 100mΩ max per contact

Results: Pre-Conditioned contact resistance values (in mΩ)

Mated Pair	Max	Min	Average
Sample 1	36.47	30.39	33.12
Sample 2	36.60	32.61	35.21
Sample 3	33.30	31.41	32.55
Sample 4	35.50	32.65	33.75
Sample 5	35.16	32.20	33.29

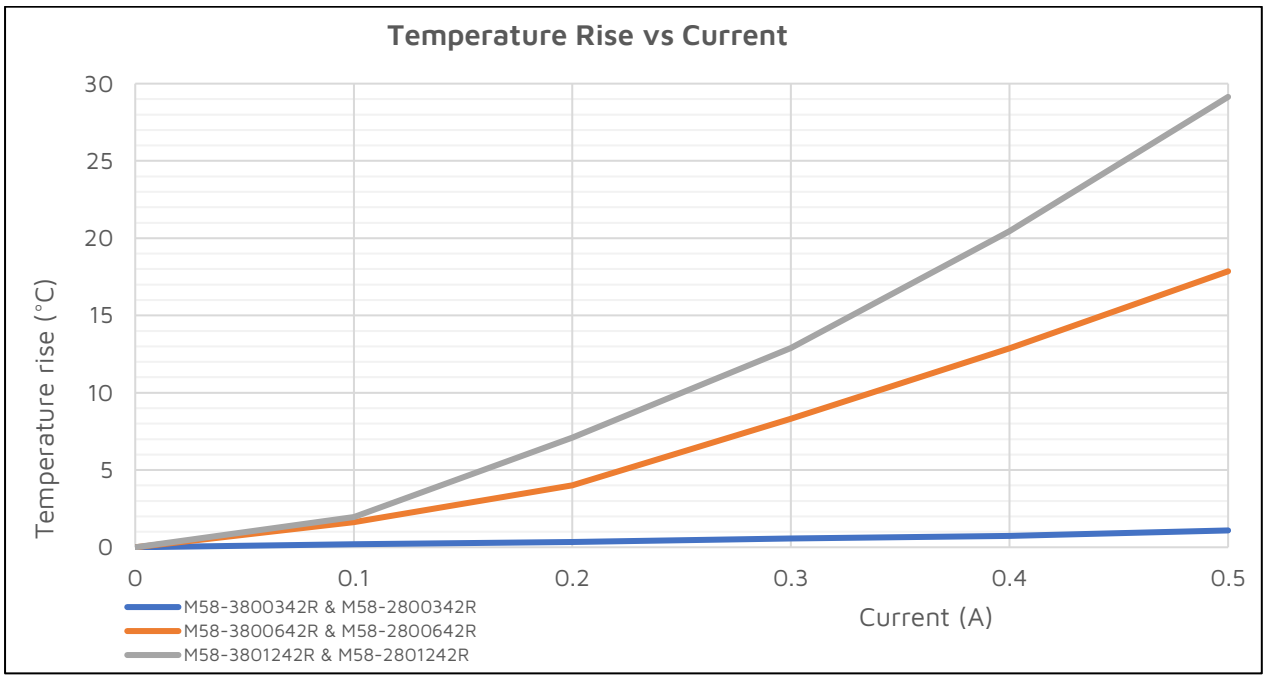
Post-conditioned contact resistance values (in mΩ)

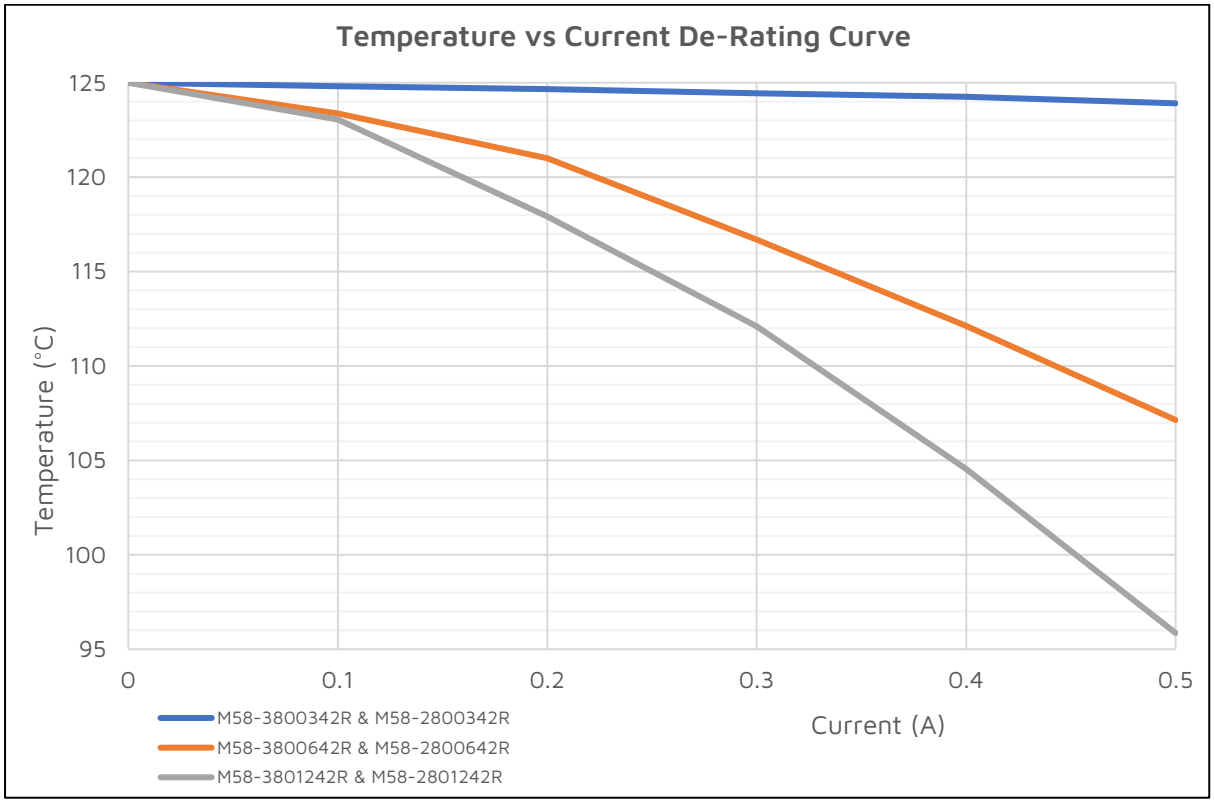
Condition	Max	Min	Average
Temperature Life	44.42	40.35	42.55
Vibration	45.5	41.9	43.35
Thermal Shock	45.3	41.6	43.71
Salt Spray	44.39	40.58	42.24
Humidity	44.59	40.23	42.29

3.2. Power Rating (Current vs Temperature Rise) to EIA-364-23B: 2000

Methodology: The test demonstrates the current carrying capacity of pre-conditioned Archer .8 connectors. The mated connector pairing had contacts linked in series through traces on custom test PCBs. The thermocouple was positioned in the center of the connectors, with a hole drilled through the female half after being mounted to the PCB. Current was applied in 0.1A steps from 0A to 0.5A.

Specification: Current Rating = 0.5A per contact





3.3. Durability: EIA-364-09C: 1999

Methodology: For this test, fully assembled connector pairs were mated at a speed of 25±3 mm/min for 30 cycles.

Specification:

- Insertion force = 1.0N max per contact
- Withdrawal force = 0.1N min per contact

Results:

Mated Pair	Pre-conditioned	Humidity 96h
M58-2800342R & M58-3800342R	PASS	PASS
M58-2800642R & M58-3800642R	PASS	PASS
M58-2801242R & M58-3801242R	PASS	PASS

3.4. Withstand Voltage: EIA-364-20C: 2004

Methodology: A minimum of 500V AC (60Hz) was applied to connector pairs in two series circuits for 60 seconds to determine whether breakdown or flashover occurred. Current leakage was measured during the test. Samples were visually inspected following the test.

Specification:

- Voltage Proof = 500V AC/DC for 60 seconds
- Current leakage = 1mA max.

Results: No obvious changes to the connectors.

Mated Pair	Pre-conditioned	Humidity 96h
M58-2800342R & M58-3800342R	PASS	PASS
M58-2800642R & M58-3800642R	PASS	PASS
M58-2801242R & M58-3801242R	PASS	PASS

3.5. Insulation Resistance: EIA-364-21C: 2000

Methodology: 500V was applied to connector pairs in two series circuits for two minutes to determine whether the resistance satisfies the required specification values of >1,000MΩ. Samples were visually inspected following the test.

Specification: 1,000MΩ min at 500V

Results: No obvious changes to the connectors.

Mated Pair	Pre-conditioned	Humidity 96h
M58-2800342R & M58-3800342R	PASS	PASS
M58-2800642R & M58-3800642R	PASS	PASS
M58-2801242R & M58-3801242R	PASS	PASS

3.6. Temperature Life (Without Load)

Methodology: All connectors tested were mounted to boards through solder reflow and so were subjected to temperatures exceeding 150°C prior to any testing. The connectors were subjected to 96 hours at +125°C and 96 hours at -40°C. Samples were visually inspected following the test and Contact Resistance was measured.

Specification: Operating temperature = -40°C to +125°C

Results: No obvious changes to the connectors. See section 3.1. for the Contact Resistance values.

3.7. Thermal Shock (Temperature Cycling): EIA-364-32C: 2000, Condition 1

Methodology: This test was conducted by cycling the temperature between the two extremes (-40°C to +125°C) for 5 cycles with a dwell time of 30 minutes at each extreme. Samples were visually inspected following the test and Contact Resistance was measured.

Specification: 5 cycles of -40°C for 30 minutes, +125°C for 30 minutes

Results: No obvious changes to the connectors. See section 3.1. for the Contact Resistance values.

3.8. Salt Spray: EIA-364-26B: 1999

Methodology: Samples were assembled and subjected to the salt spray mist in an appropriate test chamber. The samples were rinsed clean following testing and were visually inspected following the test, and Contact Resistance was measured.

Specification:

- Duration = 24 hours continuous
- Salt Solution = 5% NaCl
- Salt Mist Chamber Temperature = +35°C±2°C

Results: No obvious changes to the connectors. See section 3.1. for the Contact Resistance values.

3.9. Humidity to EIA-364-31B: 1999 Method 2, Condition A

Methodology: The samples were pre-conditioned for 24 hours at 50°C, then conditioned in a humidity chamber for 96 hours at 40°C with 90-95% relative humidity. The connectors were subjected to a visual inspection post-testing. Post-conditioned testing was performed for Contact Resistance, Withstand Voltage and Insulation Resistance.

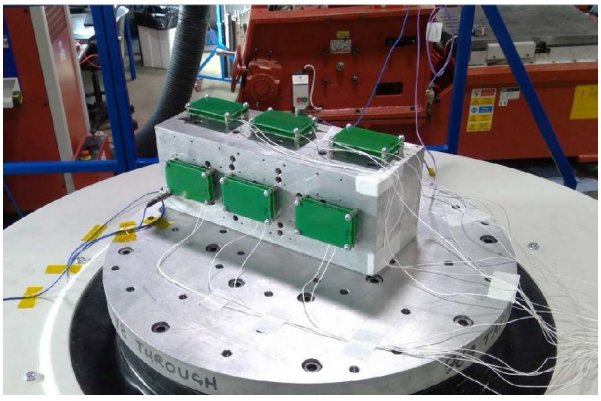
Specification:

- Pre-conditioning = +50°C for 24 hours
- Relative Humidity = 90-95%
- Temperature = +40°C
- Duration = 120 hours

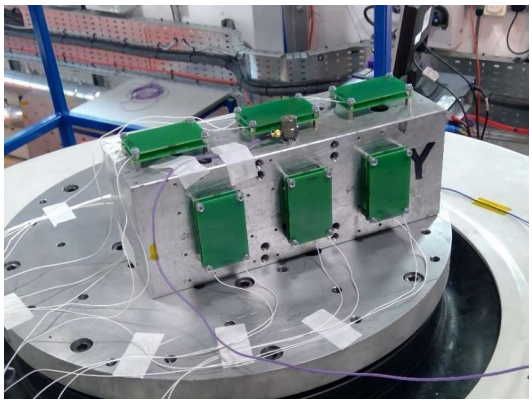
Results: No obvious changes to the connectors. See section 3.1. for the Contact Resistance values, section 3.4. for the Withstand Voltage, and 3.5. for the Insulation Resistance.

3.10. Vibration: EIA-364-28D: 1999, Condition 4 / BS EN 60068-2-6: 2008, Test Fc

Methodology: The pre-conditioned samples were subjected to a Swept Sine Test with continuous monitoring at ≥1 microsecond. Upon completion of testing the samples were visually inspected.

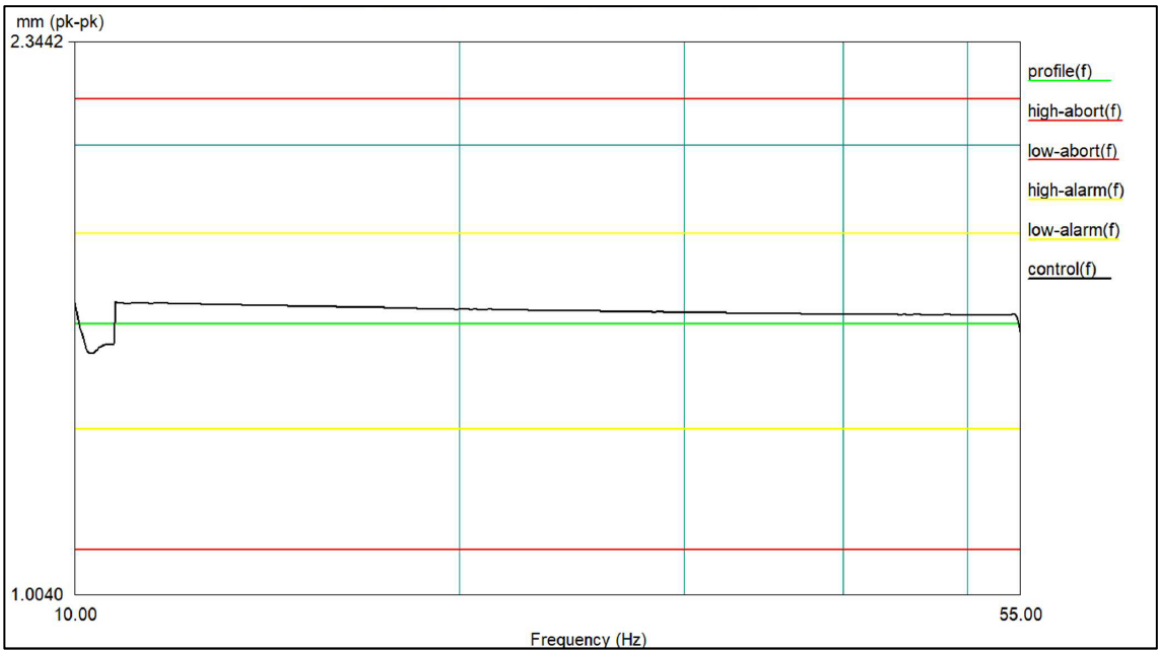


Mounted for Z and X axes testing



Mounted for Z and Y axes testing

Specification: 10Hz to 55Hz, 1.52mm pk-pk displacement, 198m/s^2 (20G), 2 hours in each axis, 6 hours total



Typical Sine Vibration Plot

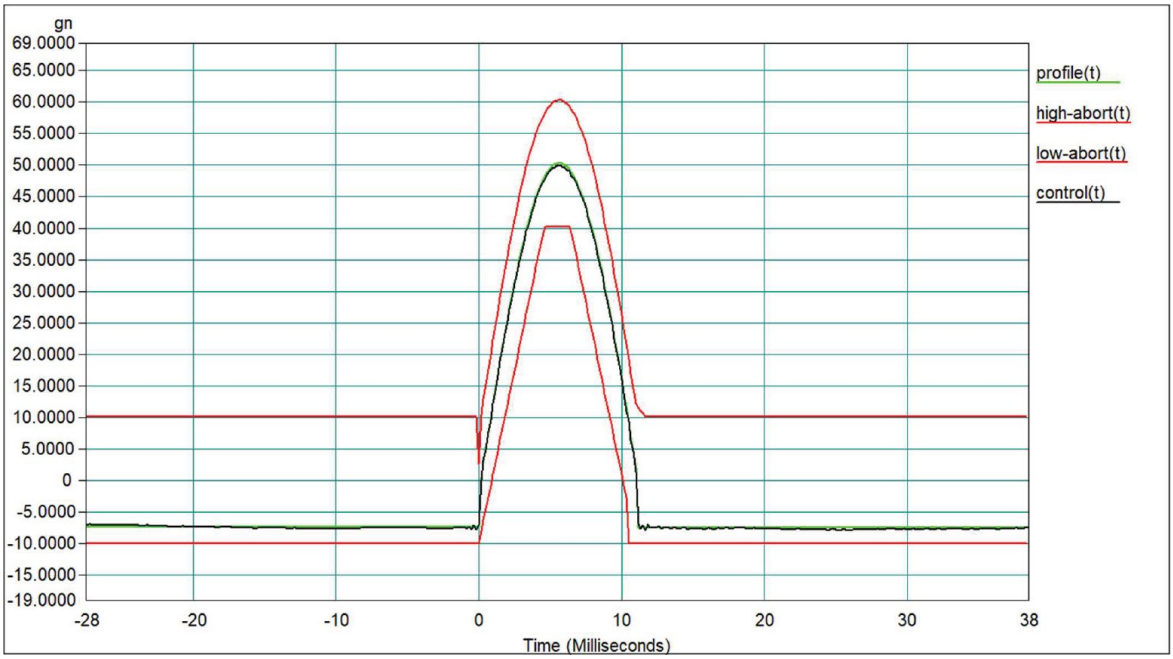
Results: No triggers were noted on any samples during the test process. No obvious changes to the samples were noted.

3.11. Mechanical Shock: EIA-364-27B: 1996

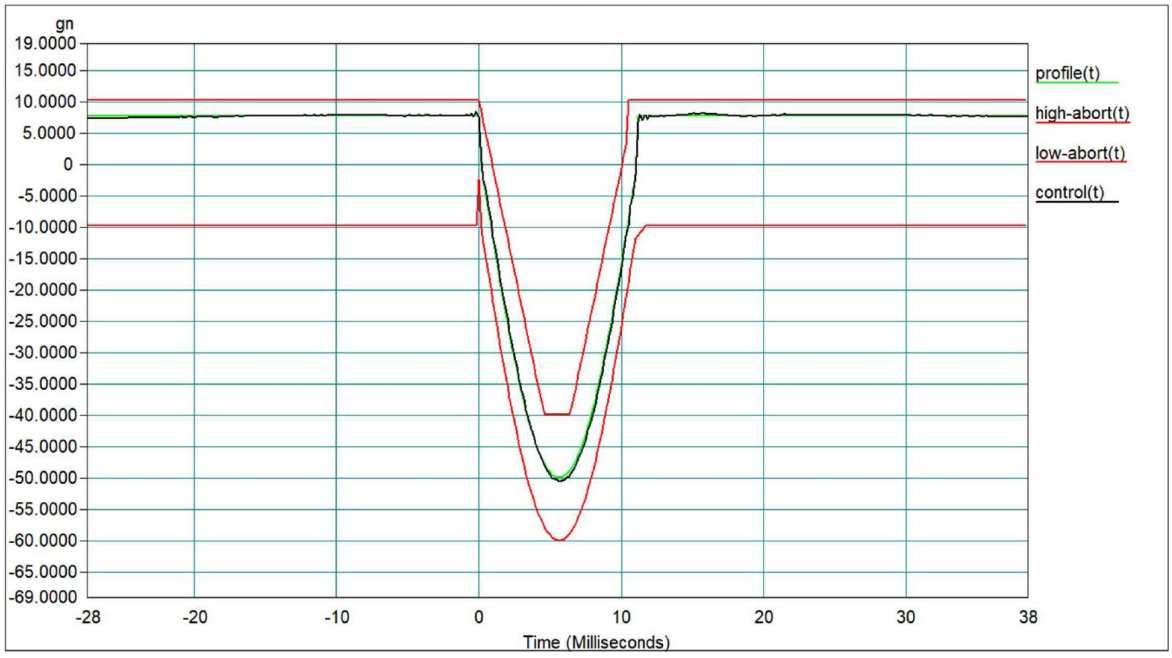
Methodology: Shock Test Sequence was carried out on pre-conditioned samples. During the test, the samples were monitored continuously for discontinuities of ≥1 microsecond. Upon completion of testing the samples were visually inspected.

Specification:

- Acceleration = 50G (gn)
- Shock Duration = 11ms
- Shock Shape = Half Sine Pulse, 3 shocks in each axis



Typical Positive Mechanical Shock

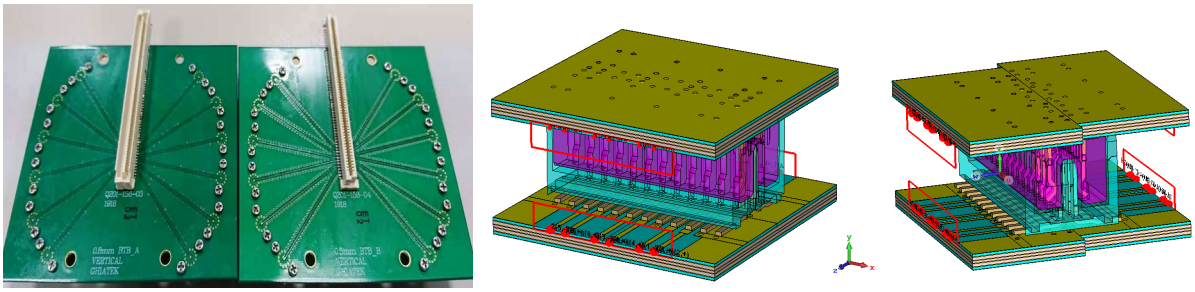


Typical Negative Mechanical Shock

Results: No triggers were noted on any samples during the test process. No obvious changes to the samples were noted.

3.12. Signal Integrity

Methodology: Samples were tested for insertion and return loss up to 5GHz and 20GHz using a VNA, with the mated samples connected through surface mount SMAs with impedance matched traces. Impedance profiles were produced using rise times of 50ps and 35ps. A digital twin was produced in parallel to perform further analysis.

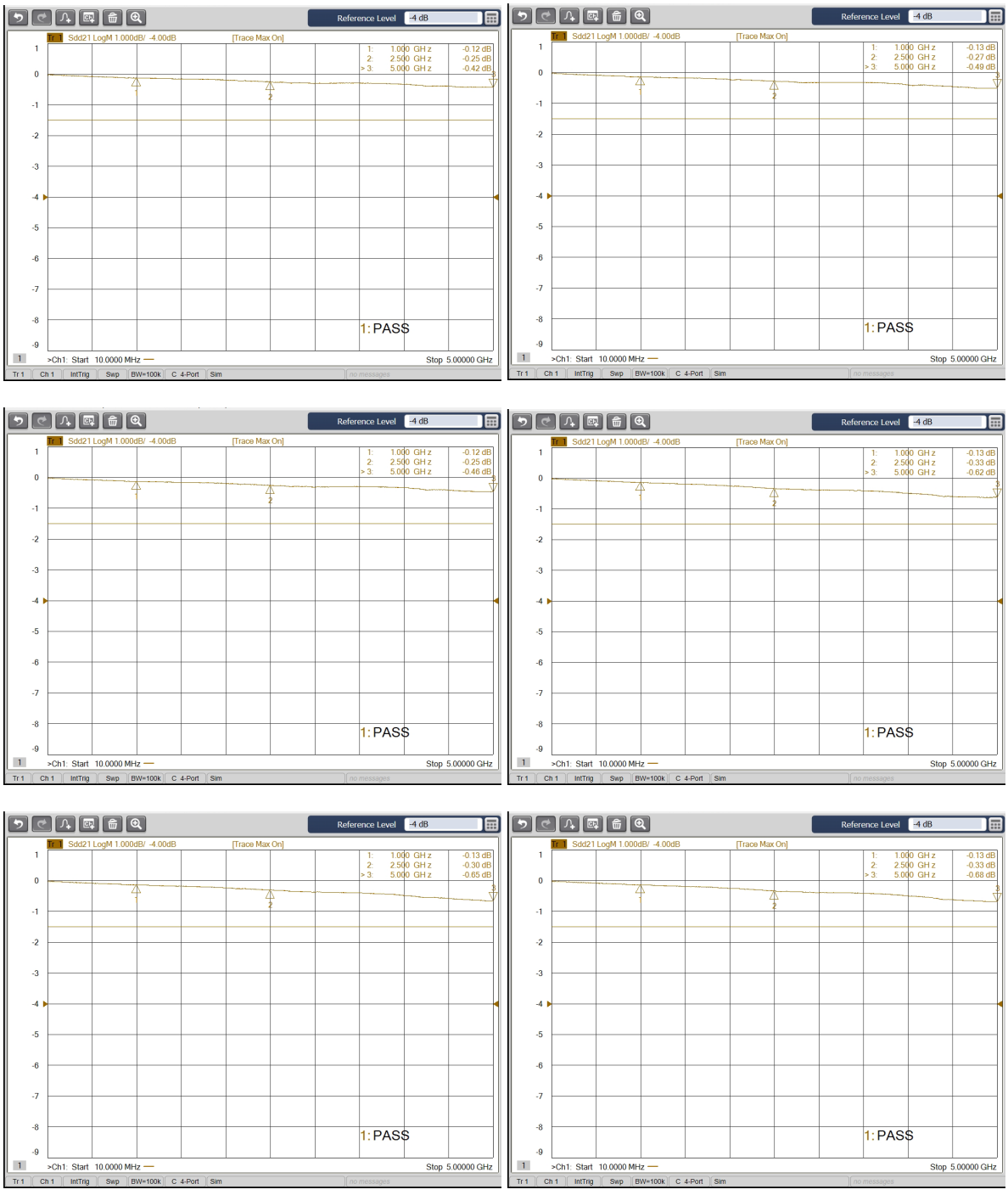


Signal Integrity Test PCBs, Simulated test setups (inline pairs, offset pairs)

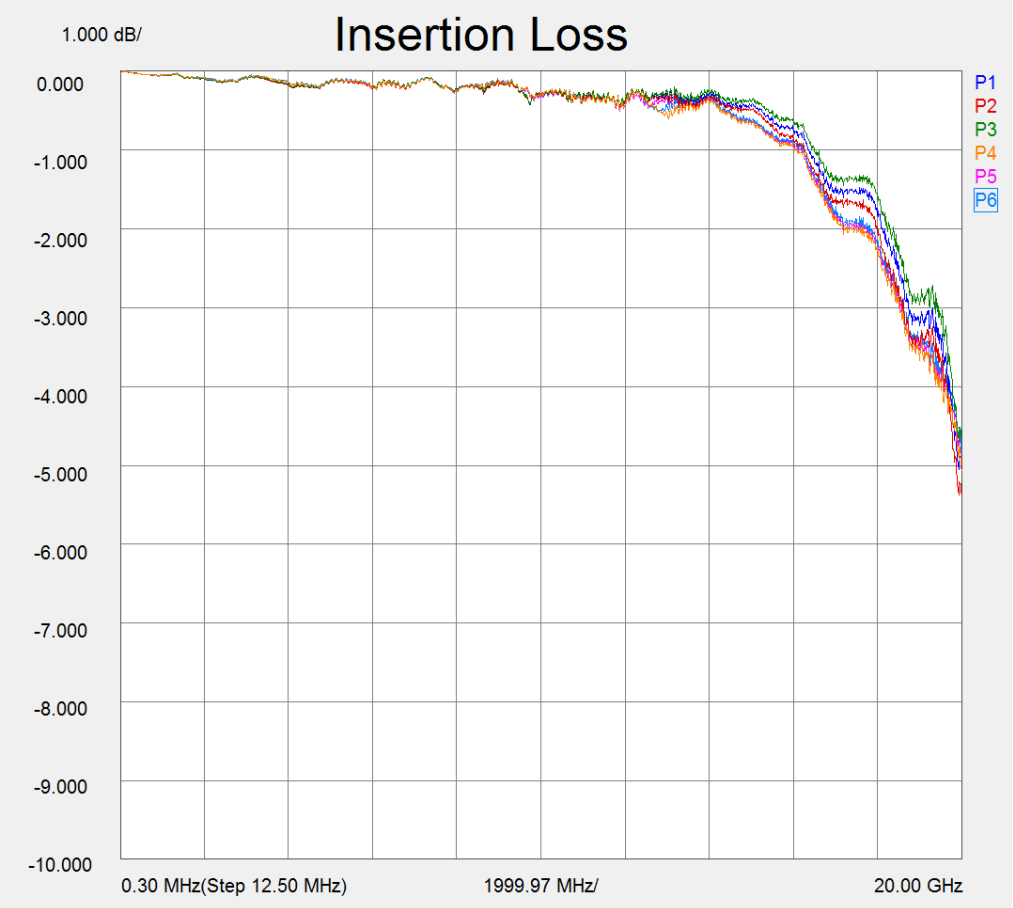
Connectors were analysed on the following: Insertion loss, Return loss, Impedance, Crosstalk (NEXT/FEXT), VSWR.

3.12.1. Insertion Loss

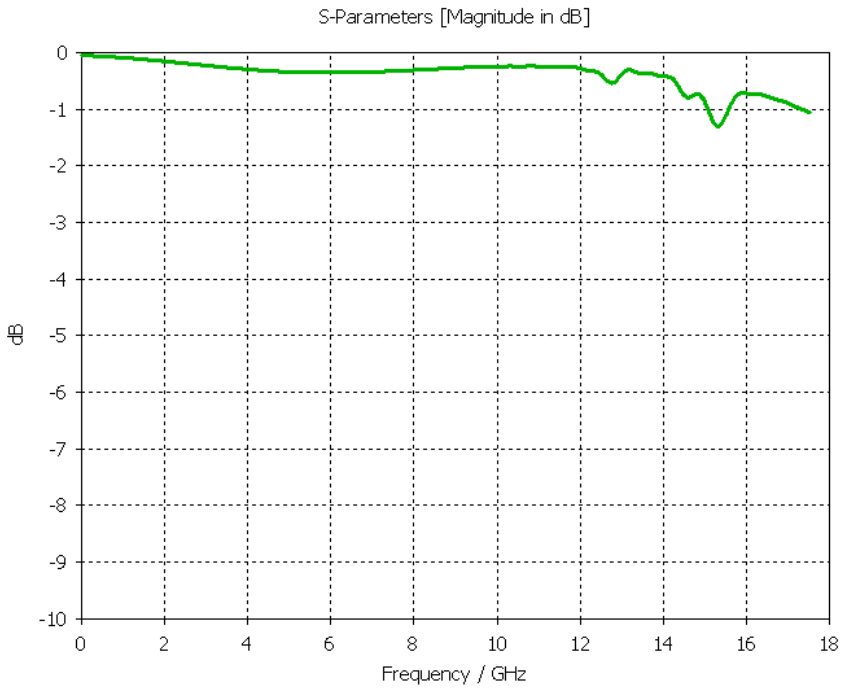
- 5GHz Test (6 contacts, 1 contact per plot)..... -0.68dB at 5GHz
- 20GHz Test (6 contacts on single plot) ..... -3dB at >18GHz
- 18GHz Simulation ..... -1dB at 15GHz



Insertion Loss measured up to 5GHz (-0.68dB at 5GHz)



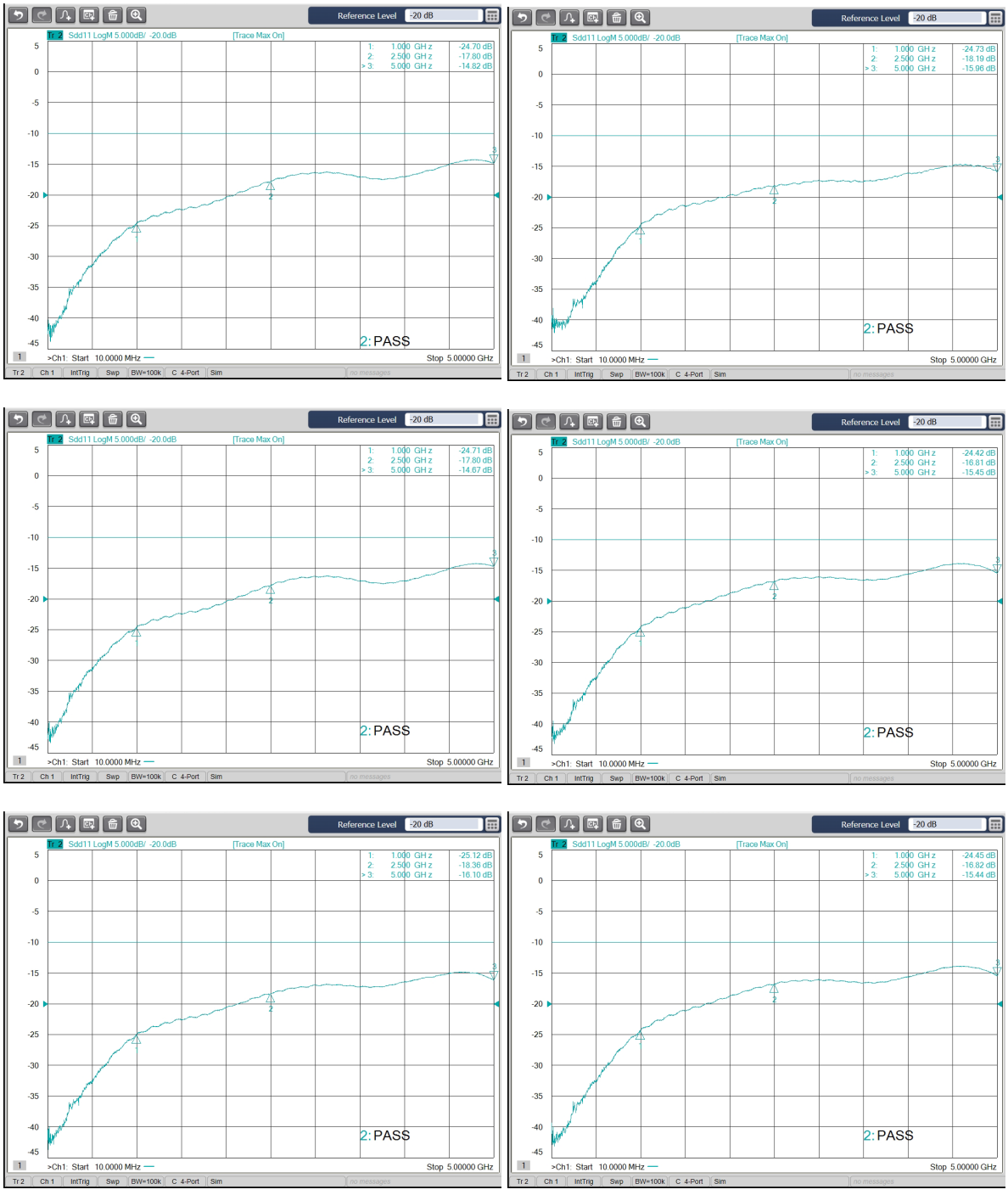
Insertion Loss measured up to 20GHz (-3dB at >18GHz)



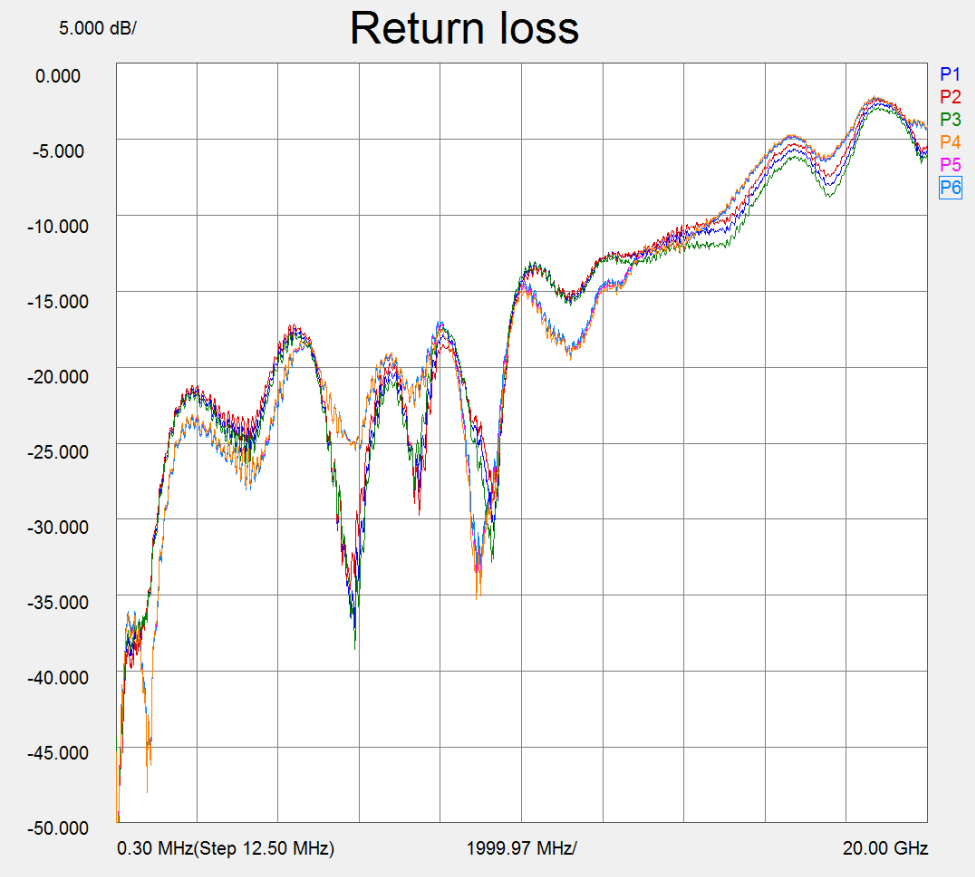
Insertion Loss simulated up to 18GHz (-1dB at 15GHz)

3.12.2. Return Loss

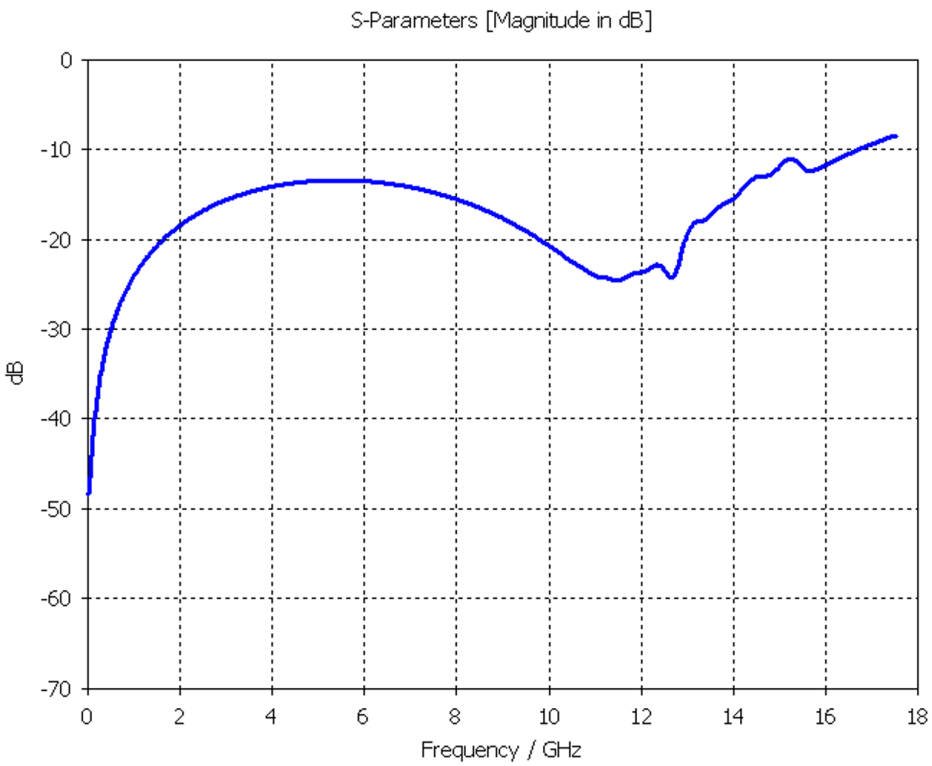
- 5GHz Test (6 contacts, 1 contact per plot)..... -14.67dB at 5GHz
- 20GHz Test (6 contacts on single plot) ..... -15dB at 10GHz, -10dB at 15GHz
- 18GHz Simulation ..... -10dB at >16GHz



Return Loss measured up to 5GHz (-14.67dB at 5GHz)



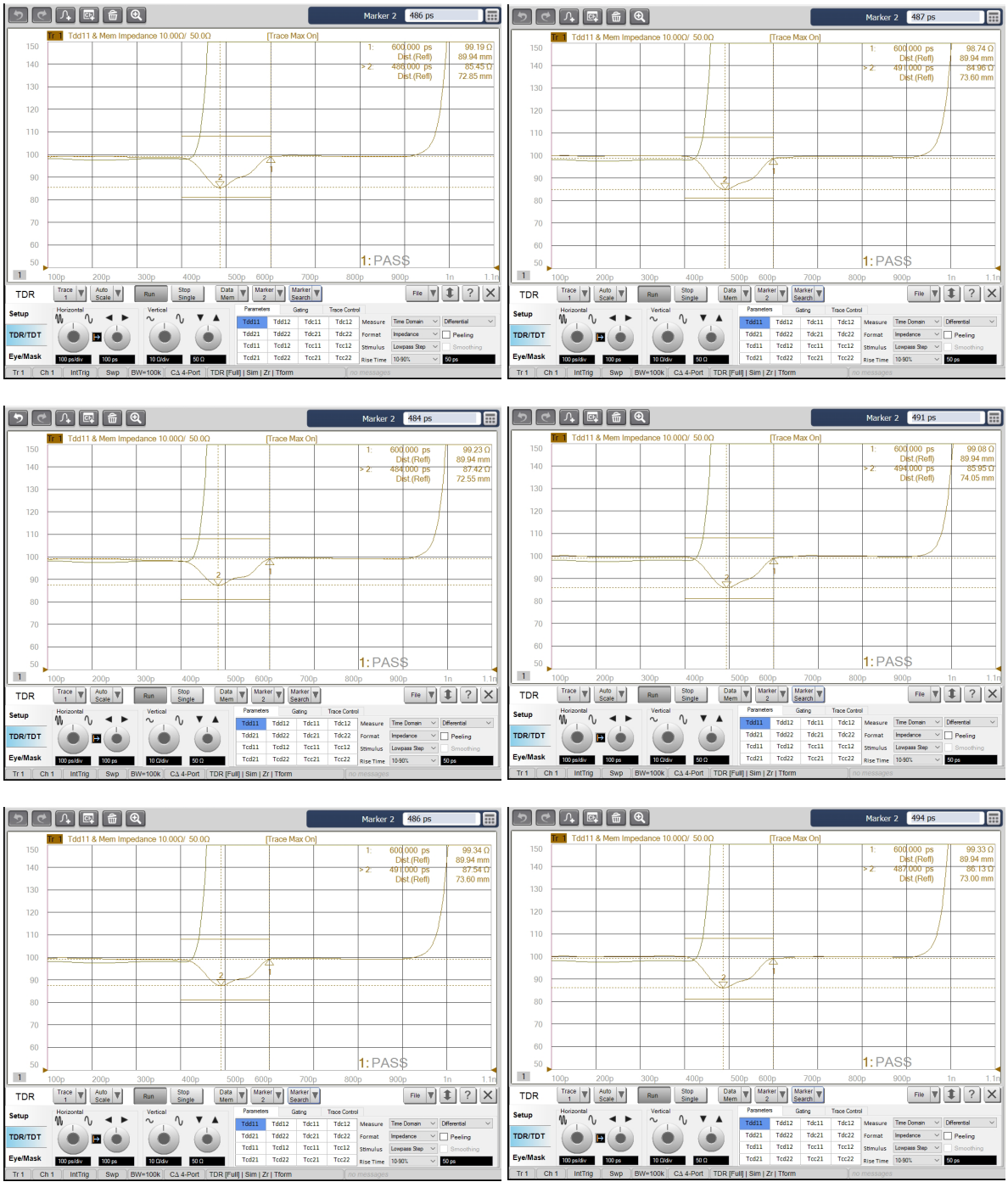
Return Loss measured up to 20GHz (-15dB at 10GHz, -10dB at 15GHz)



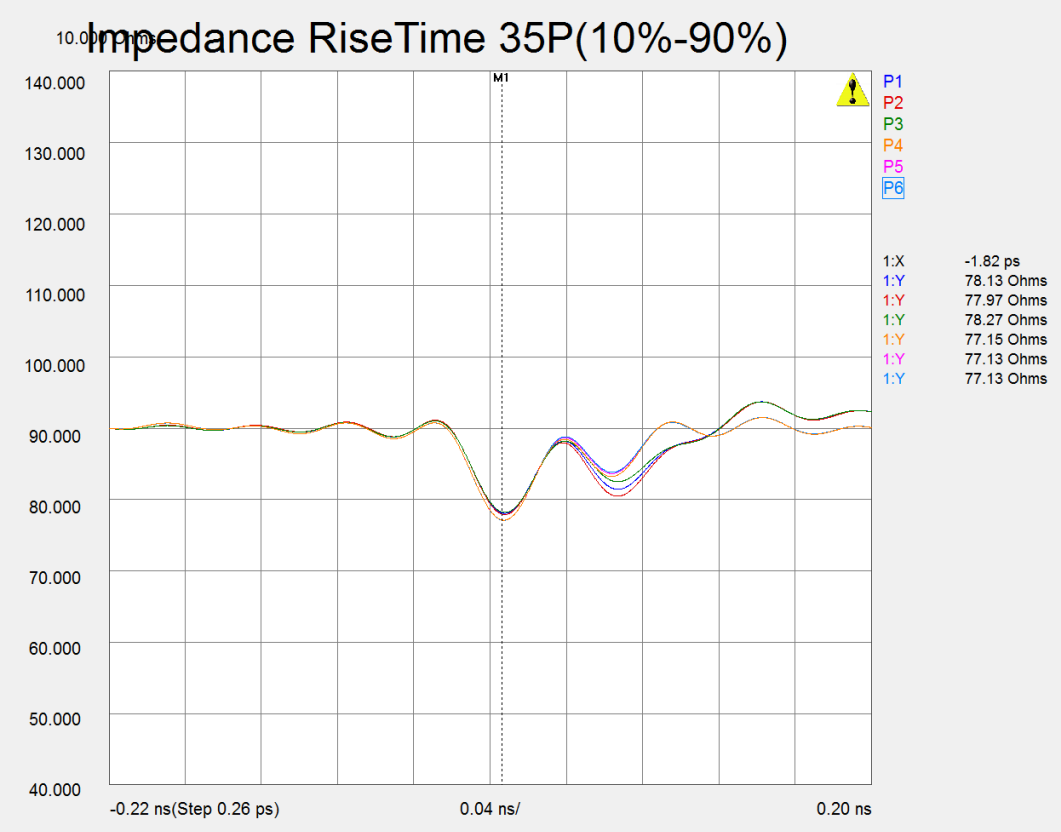
Return Loss simulated up to 18GHz (-10dB at >16GHz)

3.12.3. Impedance

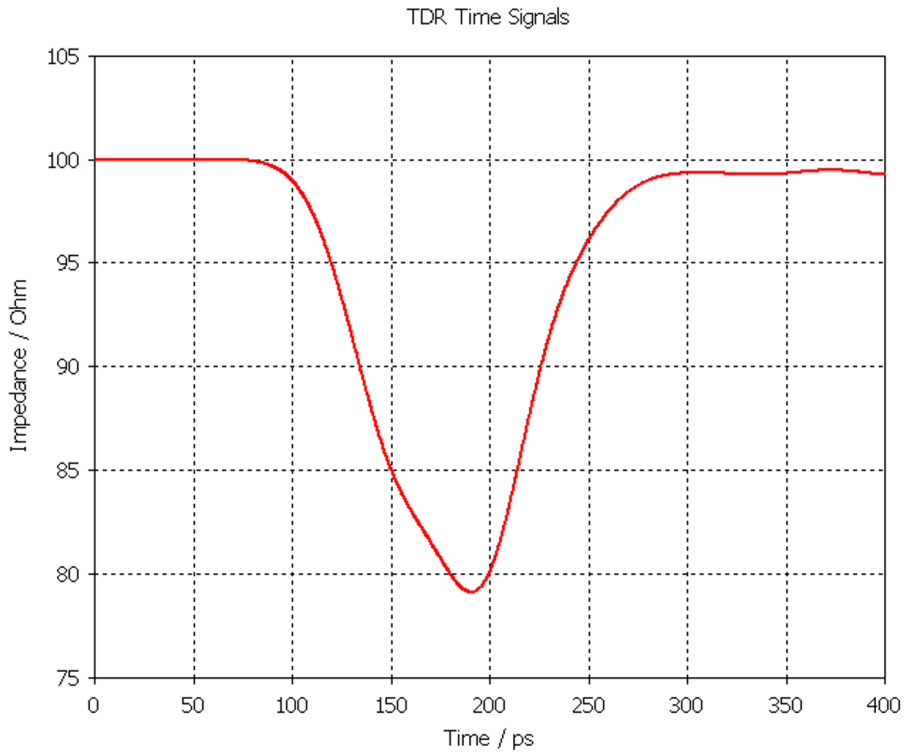
- 50ps rise time Test ..... 84.96-99.74Ω at 50ps
- 35ps rise time Test ..... 77-92Ω at 35ps
- 55ps rise time Simulation..... 79-100Ω at 50ps



Impedance profile measured at 20GHz (84.96-99.74Ω at 50ps)



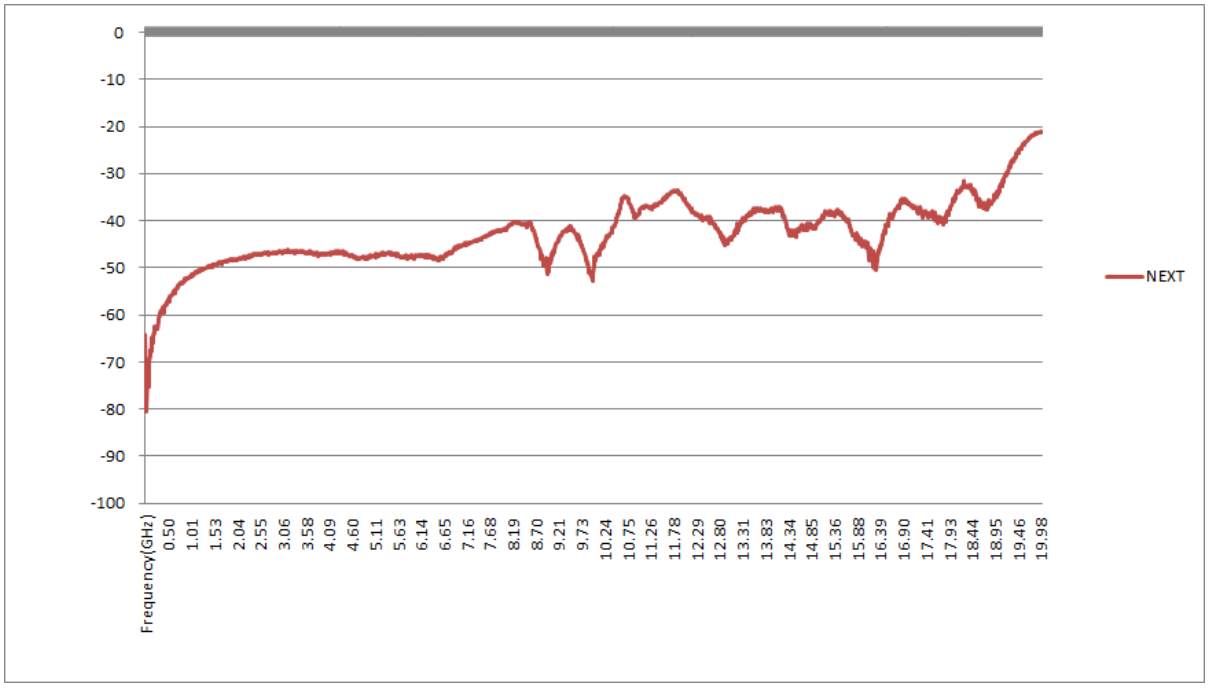
Impedance profile measured at 28GHz (77-92Ω at 35ps)



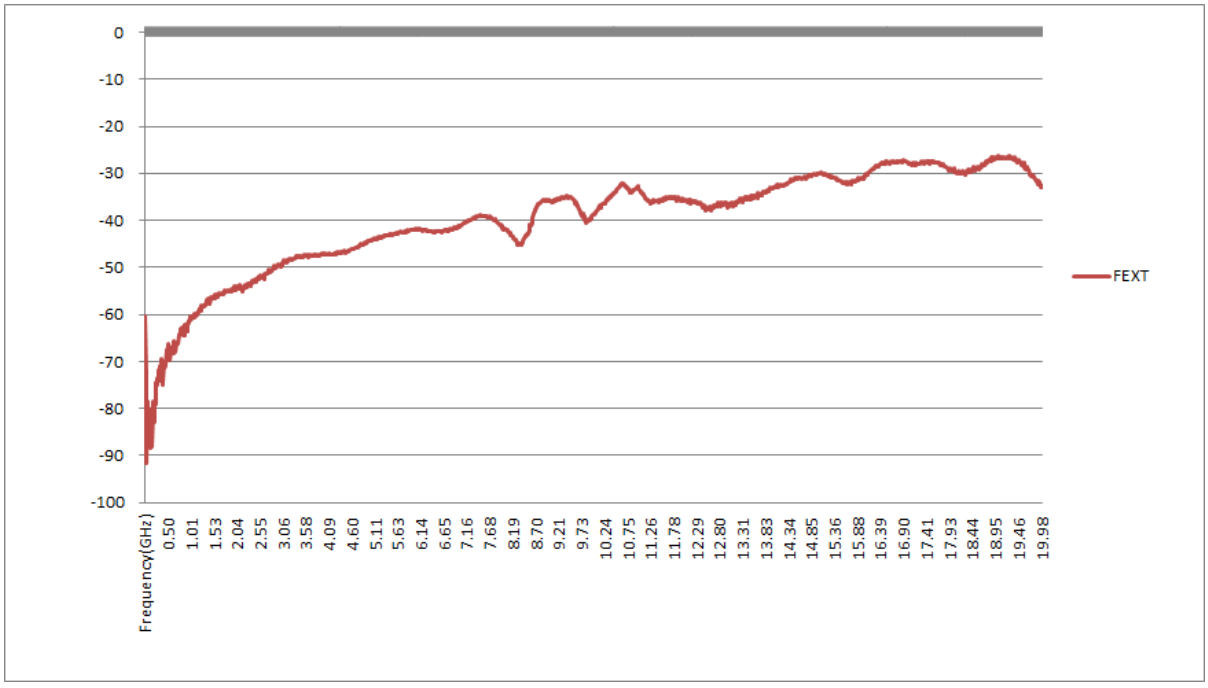
Impedance profile simulated at 18GHz (79-100Ω at 55ps)

3.12.4. Crosstalk

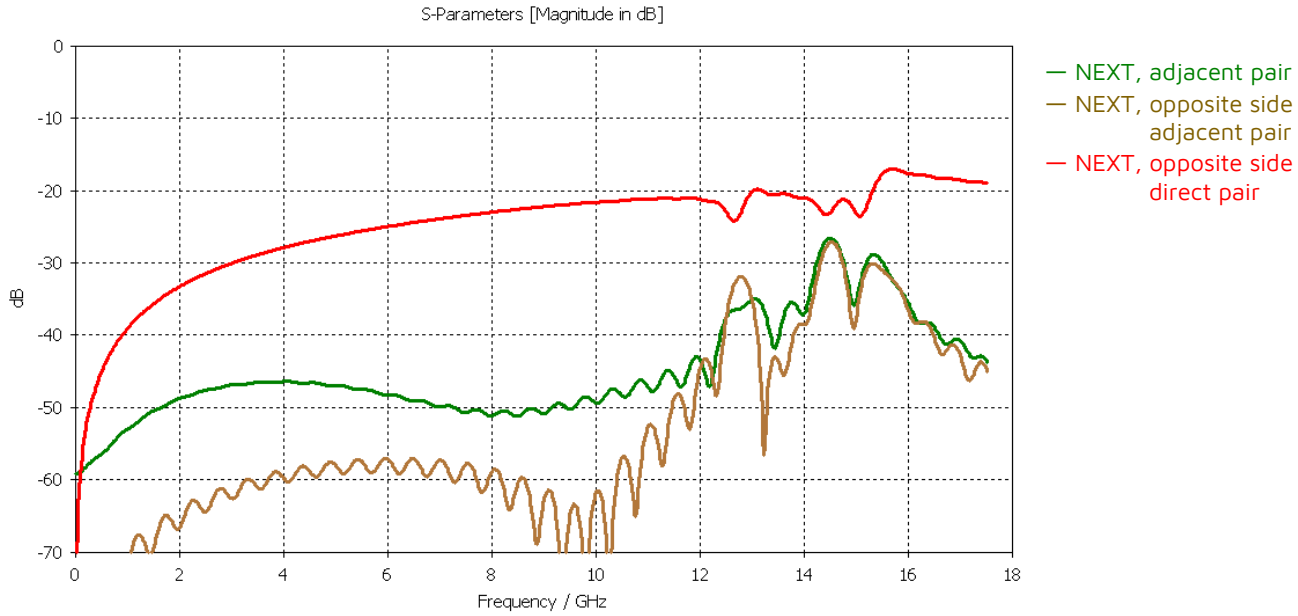
- 20GHz Test near-end crosstalk (NEXT)..... -20dB at >20GHz
- 20GHz Test far-end crosstalk (FEXT) ..... -25dB at >20GHz
- 18GHz Simulation near-end crosstalk (NEXT)..... -25dB at >18GHz
- 18GHz Simulation far-end crosstalk (FEXT) ..... -25dB at >18GHz



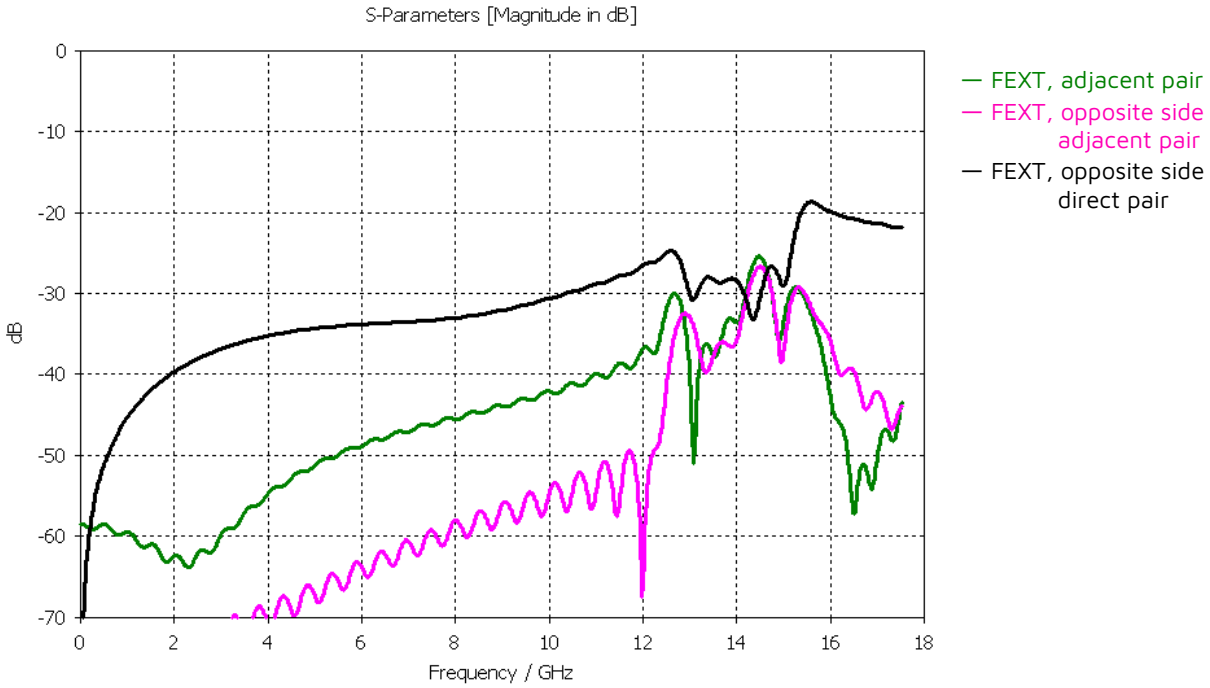
Near-end Crosstalk measured up to 20GHz (-20dB at >20GHz)



Far-end Crosstalk measured up to 20GHz (-25dB at >20GHz)



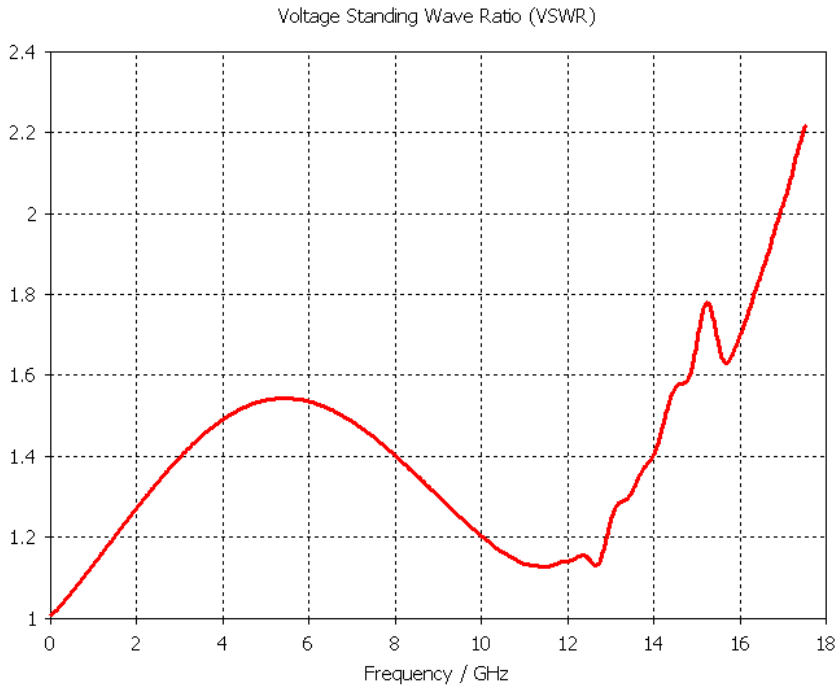
Near-end Crosstalk simulated up to 18GHz (-25dB at >18GHz)



Far-end Crosstalk simulated up to 18GHz (-25dB at >18GHz)

3.12.5. VSWR

- 18GHz Simulation ..... <1.2:1 at 12GHz



VSWR simulated up to 18GHz (<1.2:1 at 12GHz)