



HARWIN

Test Report Summary

HT08402

Electrical, Mechanical & Environmental Testing
Archer .5 (M58-X50 Series)

1. Introduction

1.1. Description and Purpose

Archer .5 (M58 Series) is a range of board-to-board mezzanine 0.5mm pitch connectors in a double row format with polarized, shrouded housings. The connectors are available in male and female vertical connector styles for surface mount soldering, with contact counts up to 100 (50+50).

The Archer .5 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 QA000350. The results were used to define the Component Specification C053XX for the Archer .5 range. The tests indicate that the Archer .5 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	4
EIA-364-20C: 2004	Withstand Voltage	3.4	4
EIA-364-21C: 2000	Insulation Resistance	3.5	5
N/A	Temperature Life (without load)	3.6	5
EIA-364-32C: 2000	Thermal Shock (Temperature Cycling)	3.7	5
EIA-364-26B: 1999	Salt Spray	3.8	5
EIA-364-31B: 1999	Humidity	3.9	5-6
EIA-364-28D: 1999 (BS EN 60068-2-6: 2008 Test Fc)	Vibration	3.10	6
EIA-364-27B: 1996	Mechanical Shock	3.11	6
N/A (Signal Integrity – 3.11 [9])	Differential Insertion Loss	3.12.1	6-7
	Differential Return Loss	3.12.2	8
	Impedance	3.12.3	9
	Crosstalk (Near-end)	3.12.4	10

2.2. List of Connectors

The following connectors are used throughout the testing:

- M58-2500342R – Female 30 contact SMT connector
- M58-3500342R – Male 30 contact SMT connector
- M58-2500442R – Female 40 contact SMT connector
- M58-3500442R – Male 40 contact SMT connector
- M58-2500842R – Female 80 contact SMT connector
- M58-3500842R – Male 80 contact SMT connector
- M58-2501042R – Female 100 contact SMT connector
- M58-3501042R – Male 100 contact SMT connector

3. Test Results

3.1. Contact Resistance: EIA-364-23B: 2000

Methodology: A minimum of 5 contact pairs in fully assembled mated connectors were measured using a precision milli/micro-ohmmeter for resistance prior to any electrical, mechanical, or environmental testing. The pre-conditioned samples tested are detailed below.

Specification:

- Initial = 60mΩ max per contact
- Post-Conditioned = 80mΩ max per contact

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

Mated Pair	Max	Min	Average
Sample 1	54.6	43.86	50.06
Sample 2	58.2	44.56	50.79
Sample 3	59.1	45.23	50.87
Sample 4	55.5	50.87	50.73

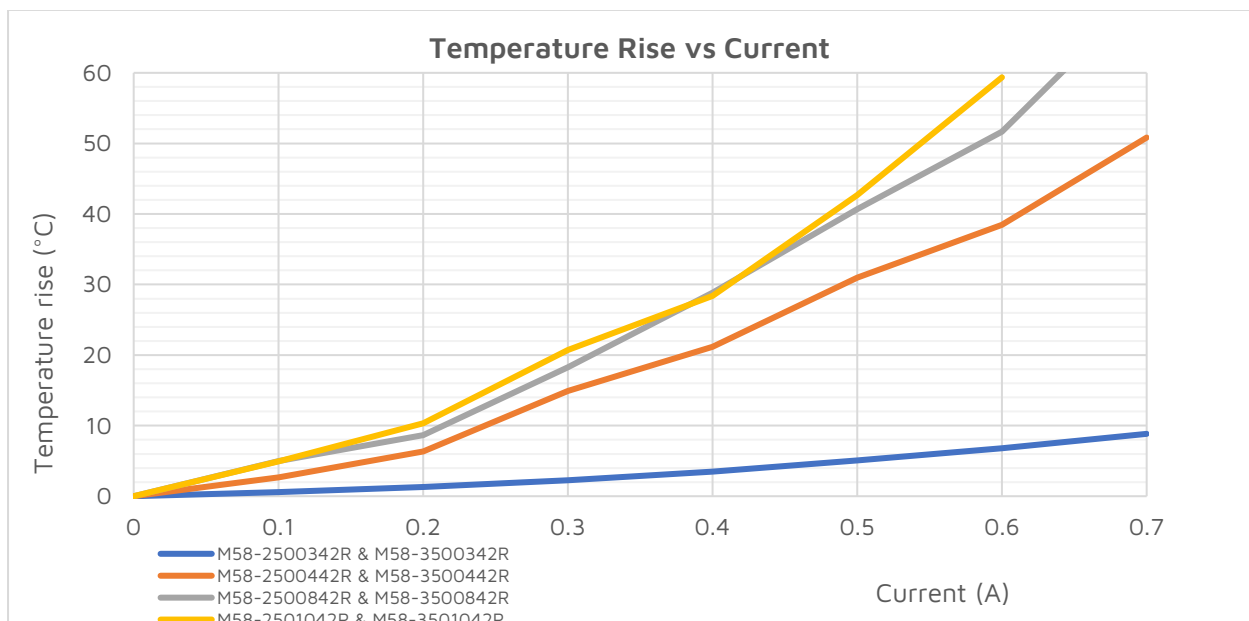
Post-conditioned contact resistance values (in mΩ)

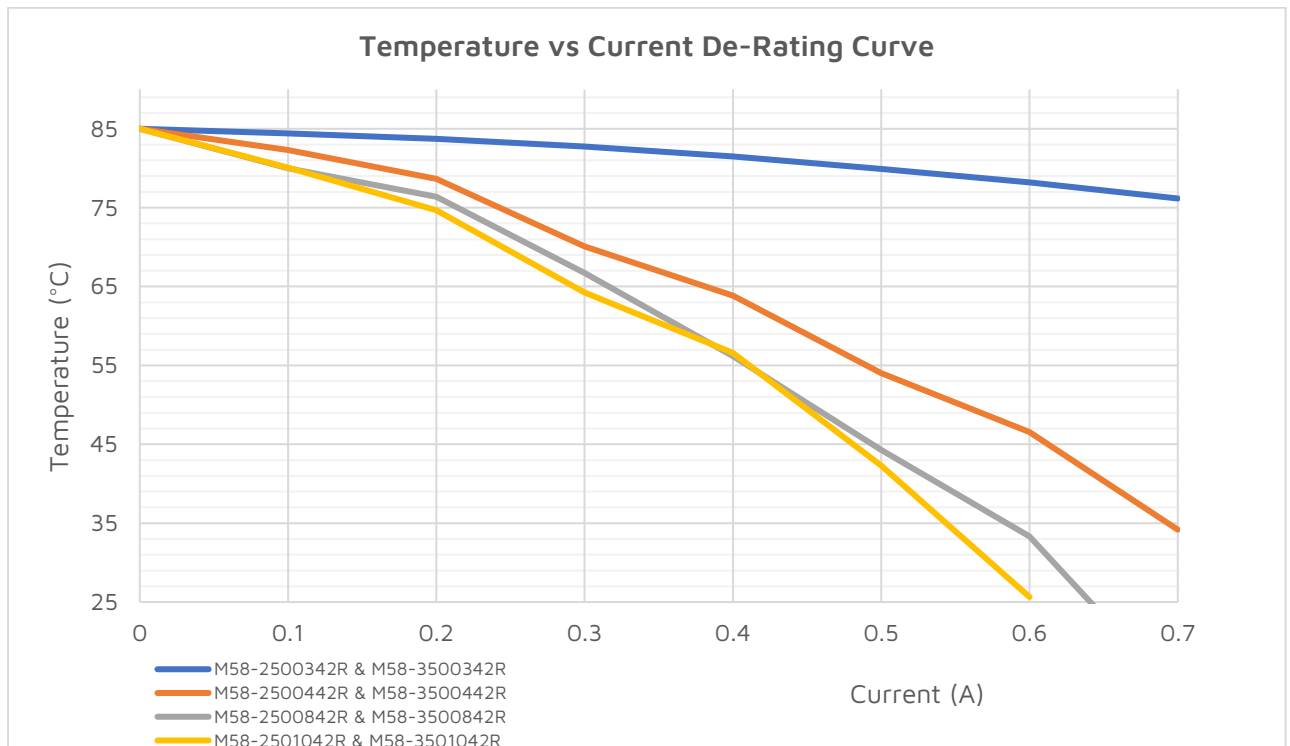
Condition	Max	Min	Average
Temperature Life	59.3	53.3	55.8
Thermal Shock	58.4	53.3	55.6
Humidity	64.7	57.8	61.1
Salt Spray	58.8	51.5	54.8
Vibration	56.6	54.1	55.3
Mechanical Shock	57.2	53.7	55.1
Durability	58.4	54.1	55.6

3.2. Power Rating (Current vs Temperature Rise): EIA-364-70A: 1998

Methodology: The test demonstrates the current carrying capacity of pre-conditioned Archer .5 connectors. The mated connector pairing had contacts linked in series through traces on custom test PCBs. The thermocouple was positioned in the middle of the outer face of the female connector to avoid damaging contacts in the measurement process. Current was applied in 0.1A steps from 0A to 0.5A (minimum). The results are detailed in the following graphs.

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 minimum.

Specification:

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

Results:

Mated Pair	Pre-conditioned
M58-2500342R & M58-3500342R	PASS
M58-2500442R & M58-3500442R	PASS
M58-2500842R & M58-3500842R	PASS
M58-2500842R & M58-3500842R	PASS

3.4. Withstand Voltage: EIA-364-20C

Methodology: A minimum of 150V 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 = 150V AC/DC for 60 seconds
- Current leakage = 1mA max.

Results: No obvious changes to the connectors.

Mated Pair	Pre-conditioned
M58-2500342R & M58-3500342R	PASS
M58-2500442R & M58-3500442R	PASS
M58-2500842R & M58-3500842R	PASS
M58-2500842R & M58-3500842R	PASS

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

Methodology: 150V was applied to connector pairs in two series circuits to determine whether the resistance satisfies the required specification values of $>1,000M\Omega$. Samples were visually inspected following the test.

Specification: 1,000M Ω min at 150V

Results: No obvious changes to the connectors.

Mated Pair	Pre-conditioned
M58-2500342R & M58-3500342R	PASS
M58-2500442R & M58-3500442R	PASS
M58-2500842R & M58-3500842R	PASS
M58-2500842R & M58-3500842R	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 +85°C and 96 hours at -55°C. Samples were visually inspected following the test and Contact Resistance was measured.

Specification: Operating temperature = -55°C to +85°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 (-55°C to +85°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 -55°C for 30 minutes, +85°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 \pm 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; no obvious changes to the samples were noted.

Specification: 10Hz to 55Hz, 1.5mm pk-pk displacement, 198m/s² (20G), 2 hours in each of three axes

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.

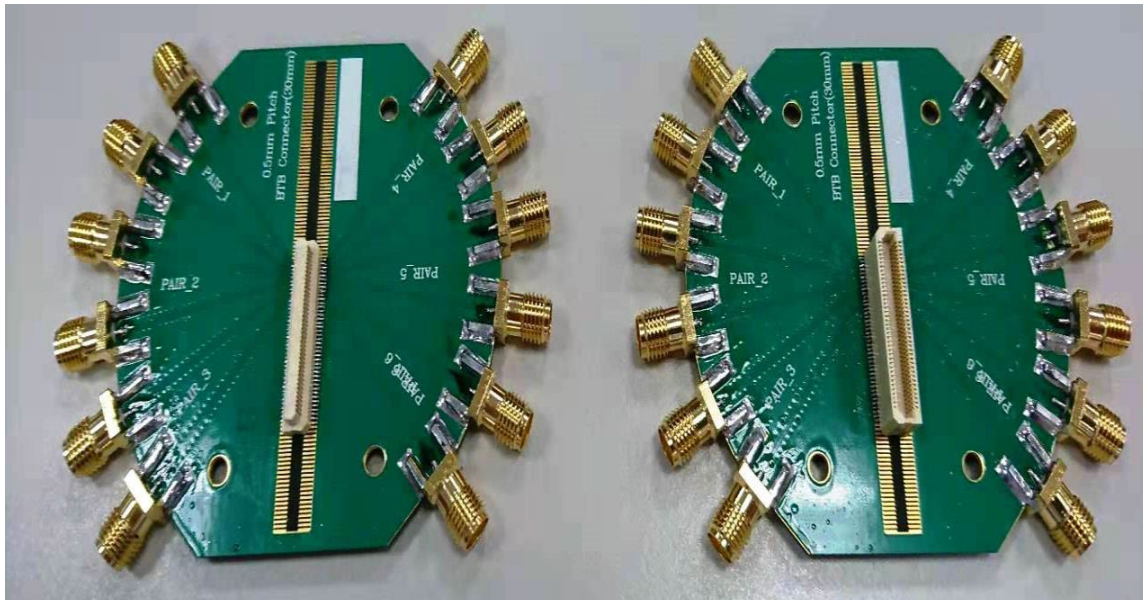
Specification:

- Acceleration = 50G (gn), Peak value 490m/s²
- Shock Shape = Half Sine Pulse, 3 shocks in each axis

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 differential insertion and return loss up to 12GHz using a VNA, with the mated samples connected through surface mount SMAs with impedance matched traces. Impedance profiles were produced using a rise time of 35ps.

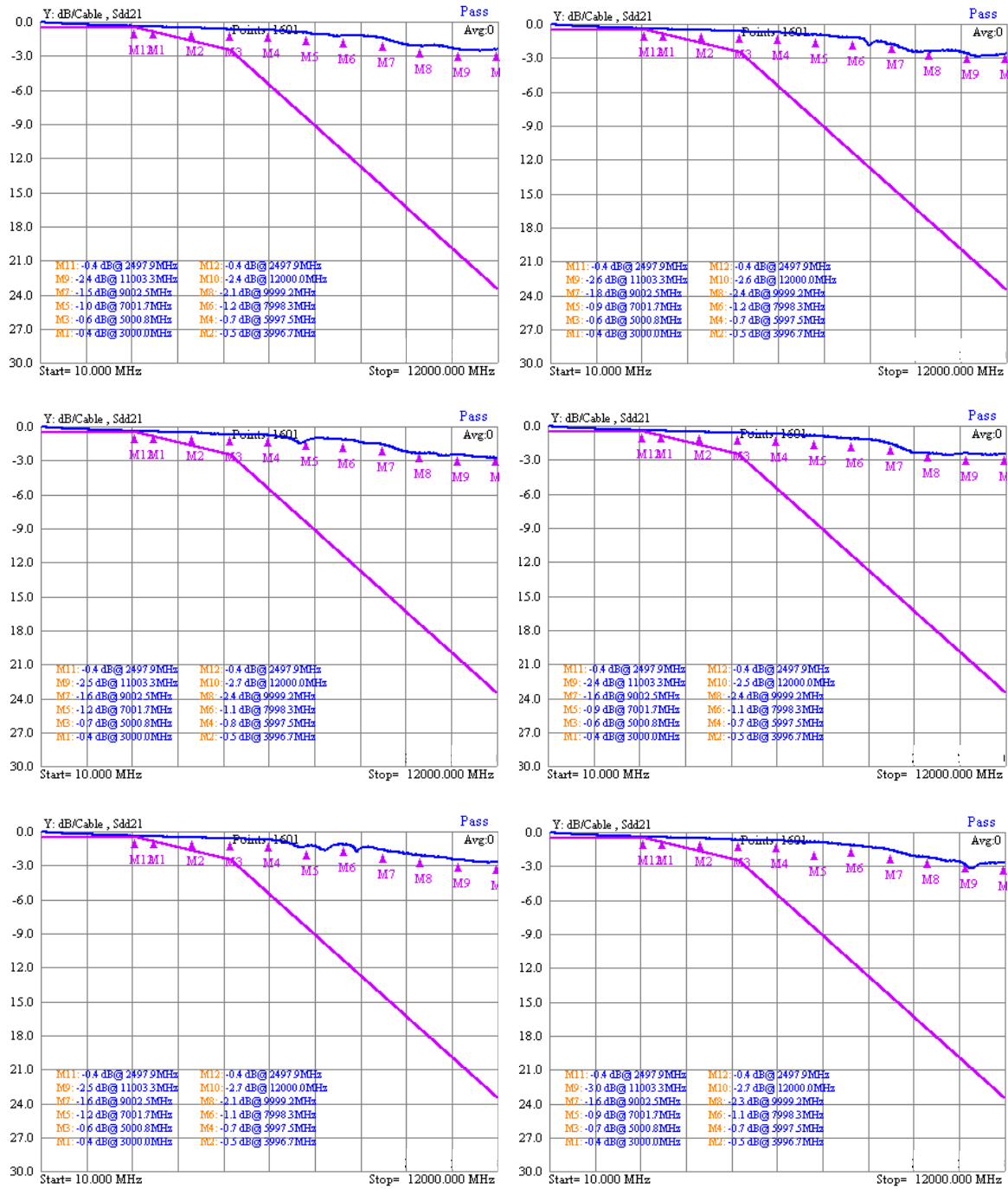


Signal Integrity Test PCBs

Connectors were analysed on the following: Differential Insertion loss, Differential Return loss, Impedance, and Crosstalk (NEXT).

3.12.1. Differential Insertion Loss

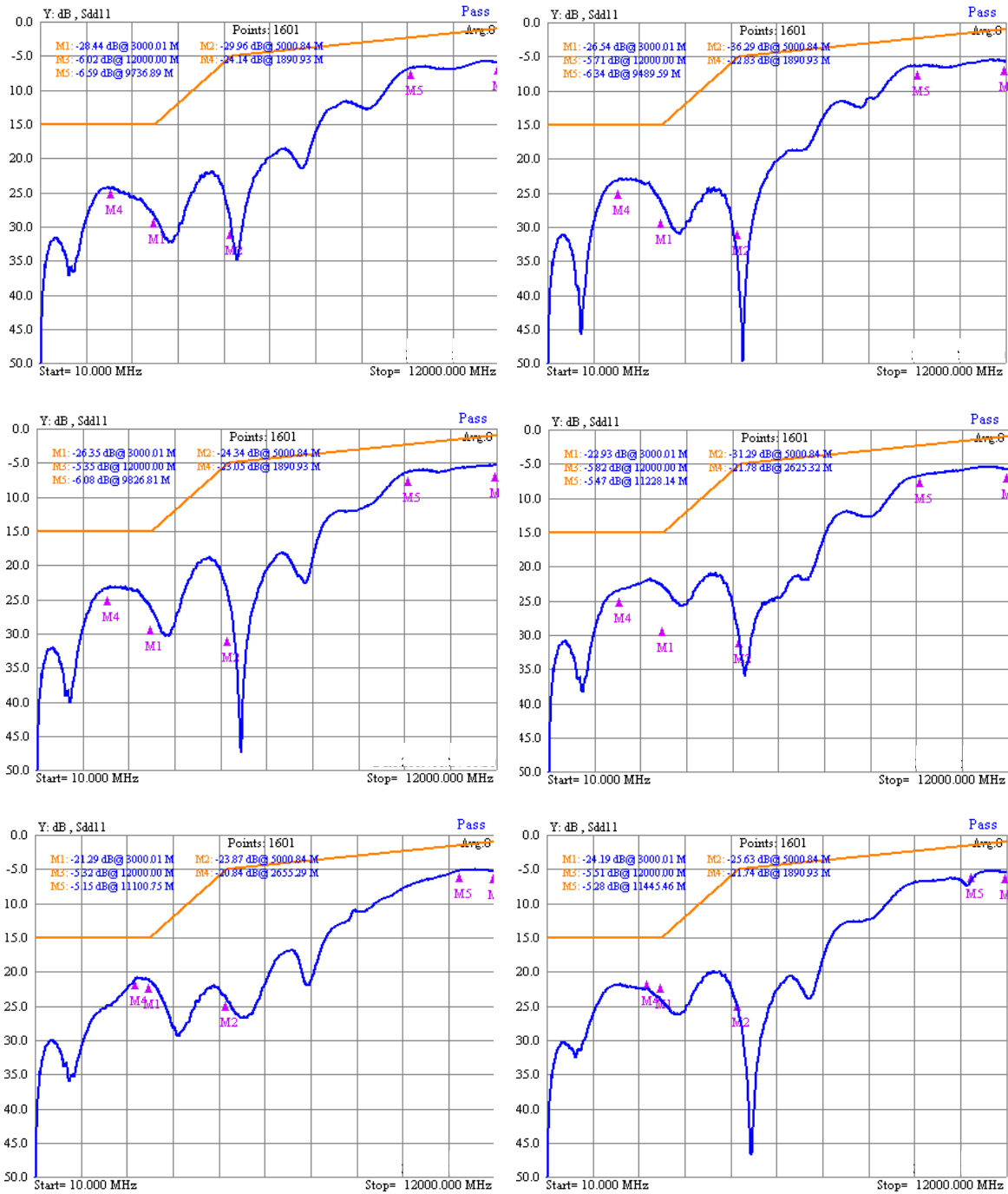
- 12GHz Test (6 contact pairs, 1 contact pair per plot) -1.2dB at 8GHz



Differential Insertion Loss measured up to 12GHz (-1.2dB at 8GHz)

3.12.2. Differential Return Loss

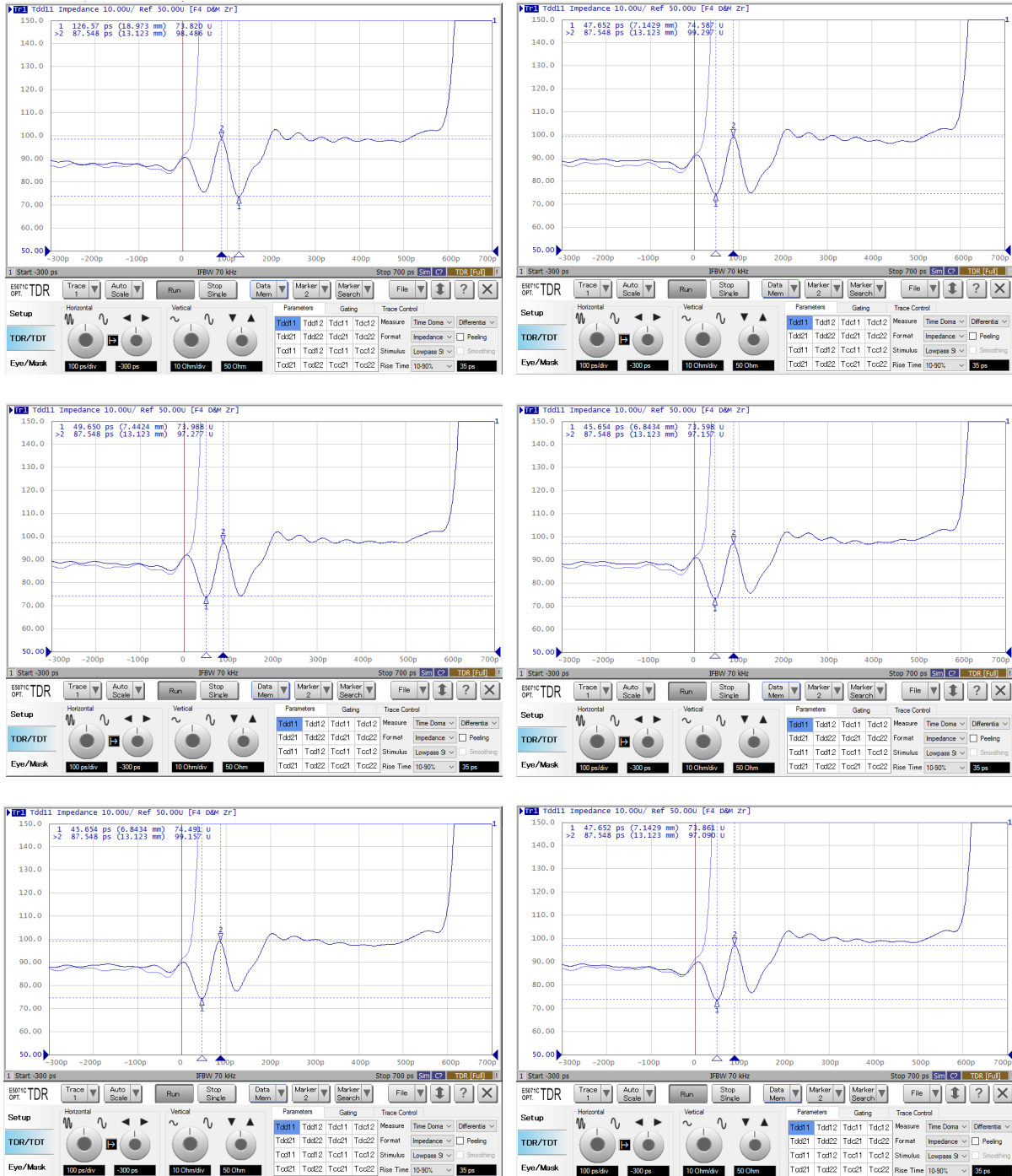
- 12GHz Test (6 contact pairs, 1 contact pair per plot) -15dB at 8GHz



Differential Return Loss measured up to 12GHz (-15dB at 8GHz)

3.12.3. Impedance

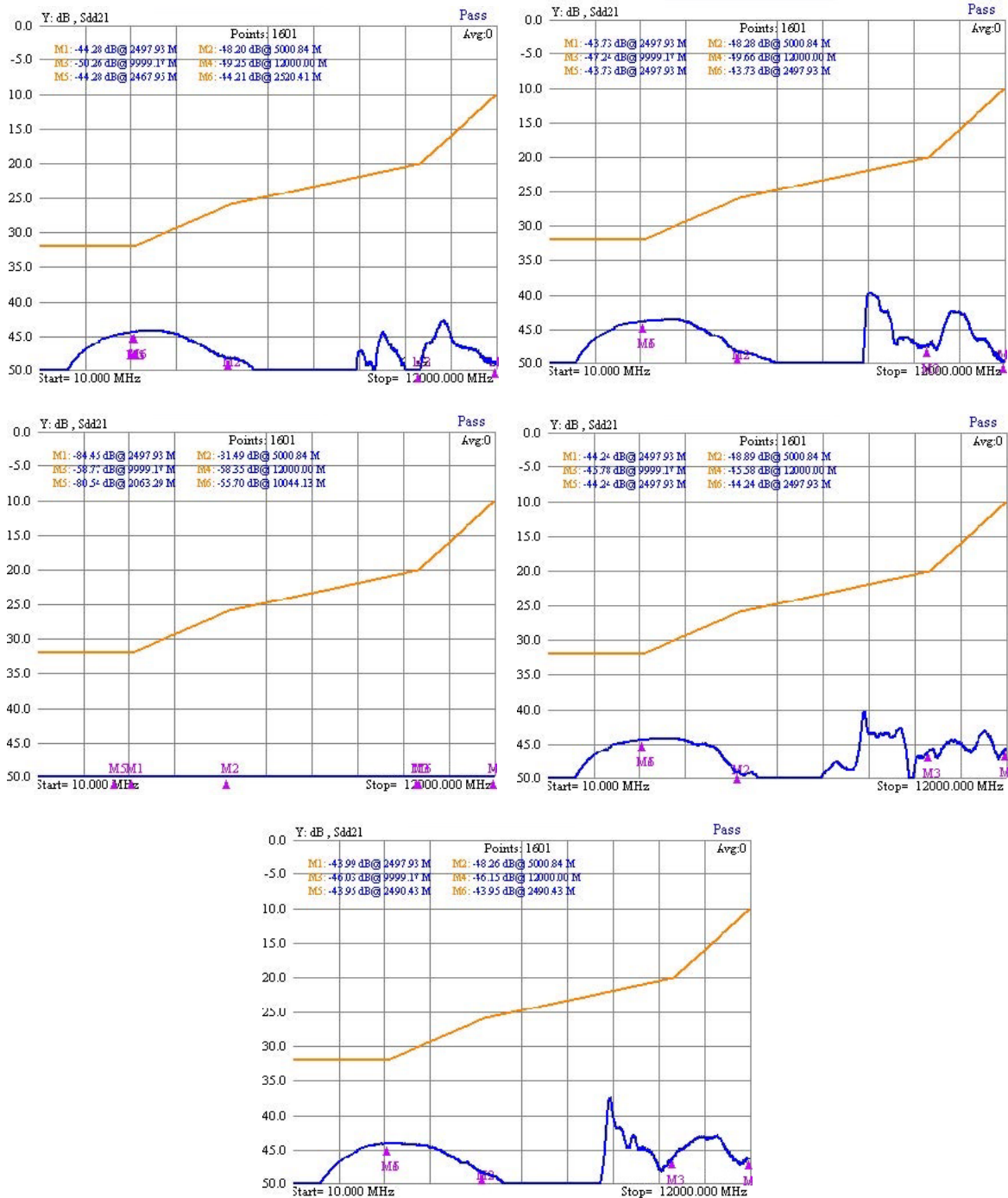
- 35ps rise time Test 73.5-99.3Ω at 35ps



Impedance profile measured at 28.5GHz (73.5-99.3Ω at 35ps)

3.12.4. Crosstalk

- 12GHz Test..... -35dB at >12GHz (NEXT)



Near-end Crosstalk measured up to 12GHz (-35dB at >12GHz)