RTPGE – Connector Systems Performance Evaluation

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Supporters:

- **Mehmet Tazebay – Broadcom Corporation**

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Introduction:

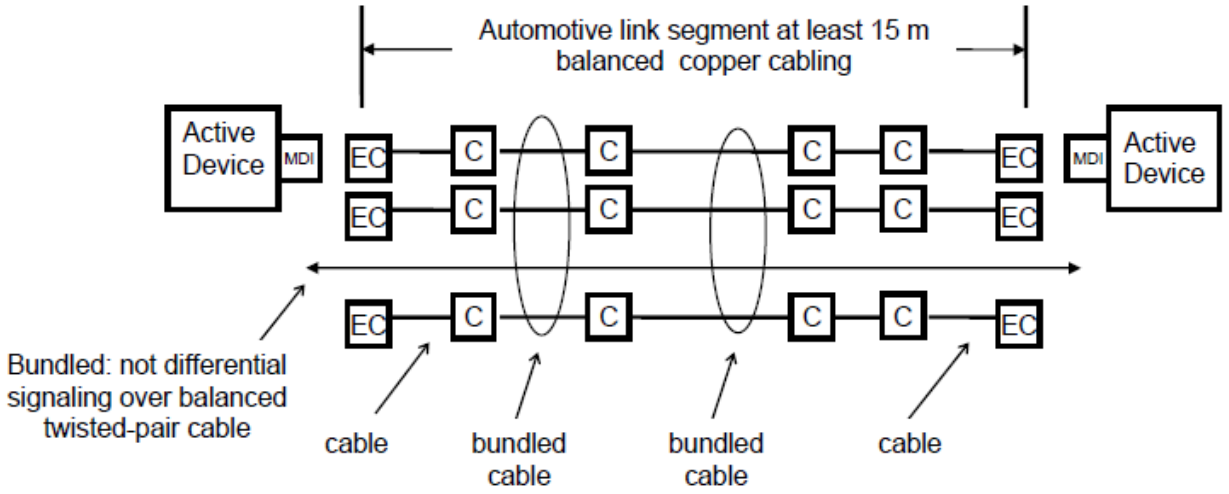
Objective of this report is to document and present for team's consideration test results for 4 connection systems that Molex has investigated for possible use in RTPGE applications.

Test limit for Mode Conversion is the proposed limit from "RTPGE EMC Limit Lines" presentation by Mehmet Tazebay and Ahmad Chini, Broadcom Corporation, from June 26, 2013.

Introduction:

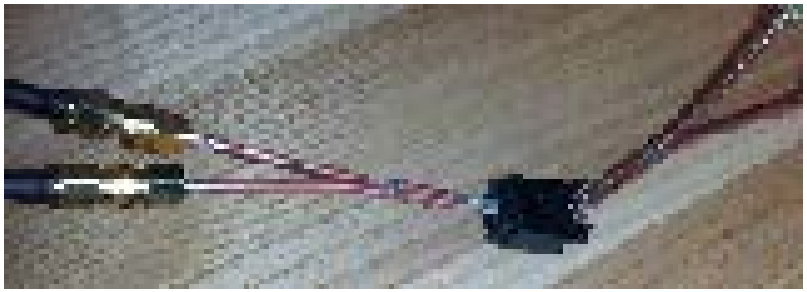
Connection systems tested:

- **Header/cable plug version of interconnect Type 1.0 – board mounted header and cable terminated plug;**
- **Inline version of interconnect Type 1.1 – cable terminated in-line receptacle and plug;**
- **Header/cable plug version of interconnect Type 2 – board mounted header and cable terminated plug;**
- **Inline version of interconnect Type 3 – cable terminated in-line receptacle and plug;**



Test setup:

Due to the fact that two of the four types of connection systems are intended for direct attachment to cable, for these tests we chose to use coaxial line test fixtures directly attached to connector systems.



Solder joints between coaxial line fixtures and connector system terminals were covered with metallic tape to control impedance at solder joints.

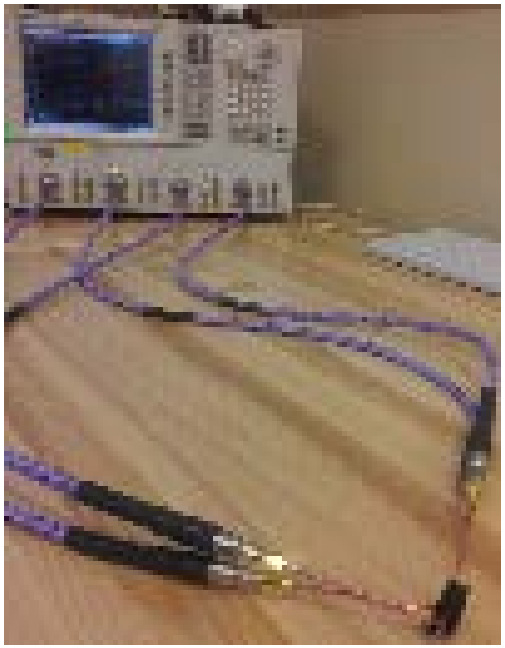
Test setup:

Equipment used:

- **4-port Vector Network Analyzer capable of 300 kHz – 20 GHz was used.**
- **Digital oscilloscope**

Scope setup:

VNA setup:



Test Results – TDR Impedance Summary:

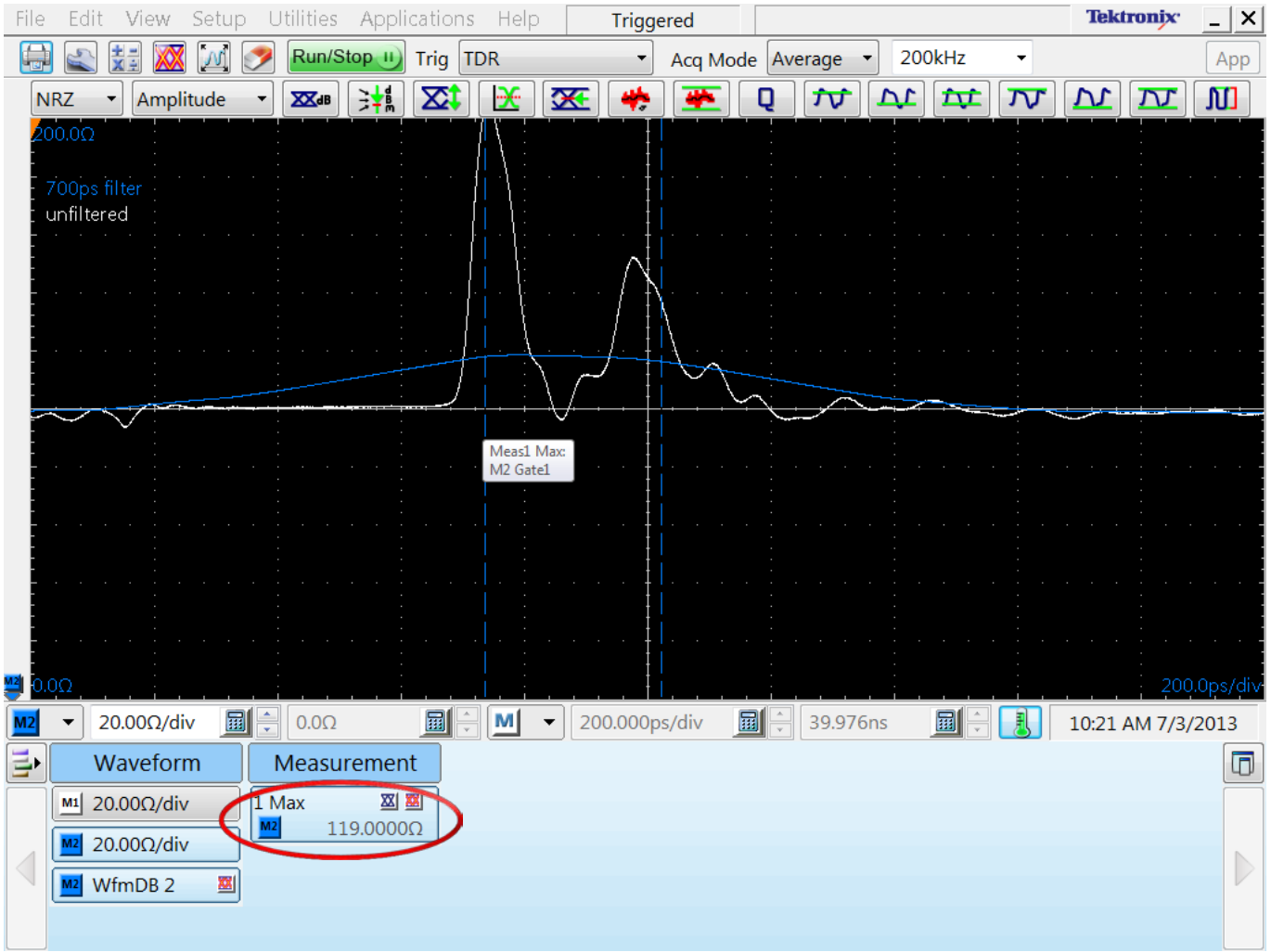
Impedance summary, filtered at 700ps:

Limit: 100Ω +/- 10%

- **Type 1.0 – 105.5 Ω**
- **Type 1.1 - 105 Ω**
- **Type 2 - 109.5 Ω**
- **Type 3 - 98 Ω**

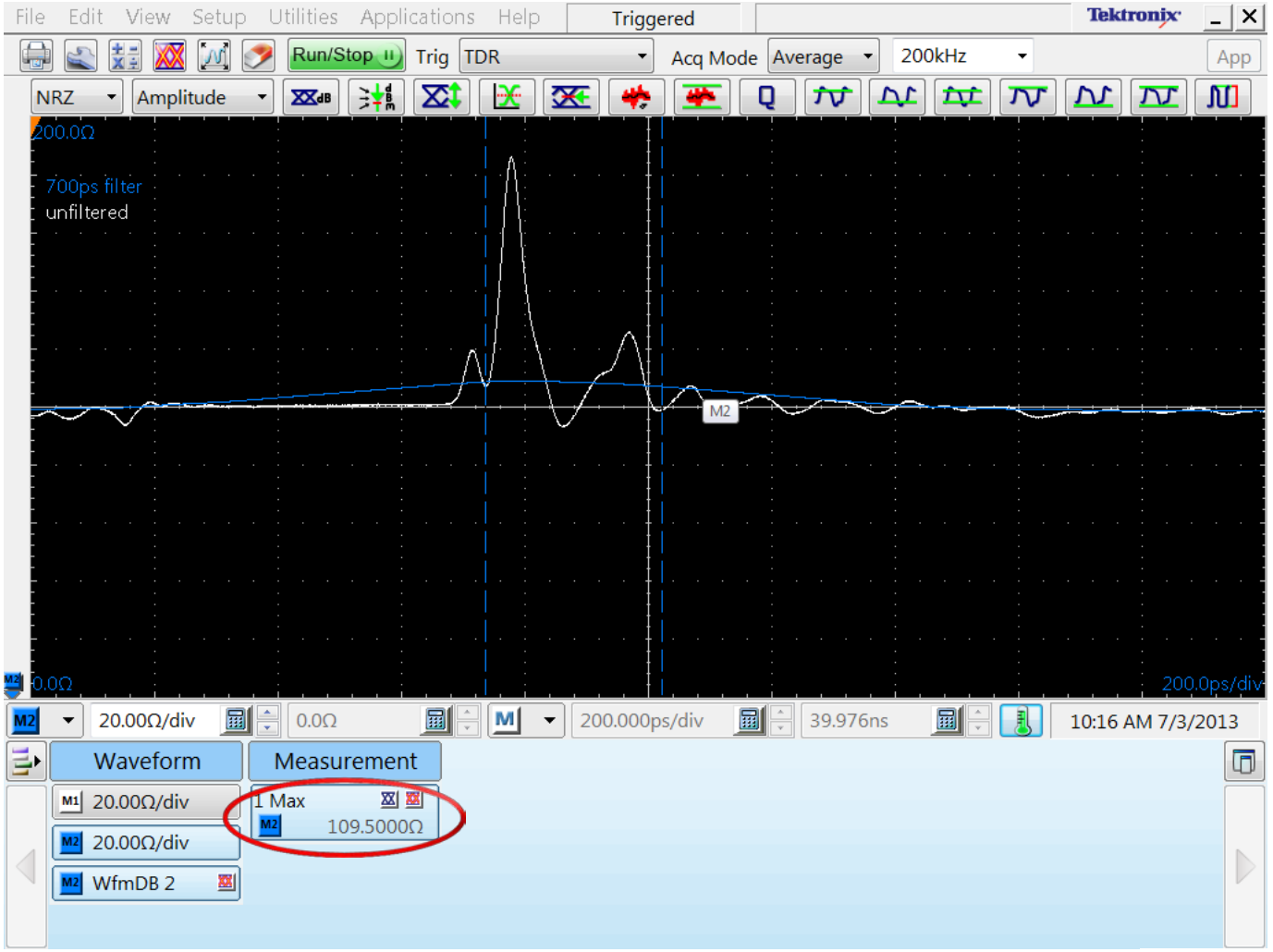
Test Results – TDR Impedance:

Type 2 <u>without</u> metallic tape around solder joints:



Test Results – TDR Impedance:

Type 2 <u>with</u> metallic tape around solder joints:

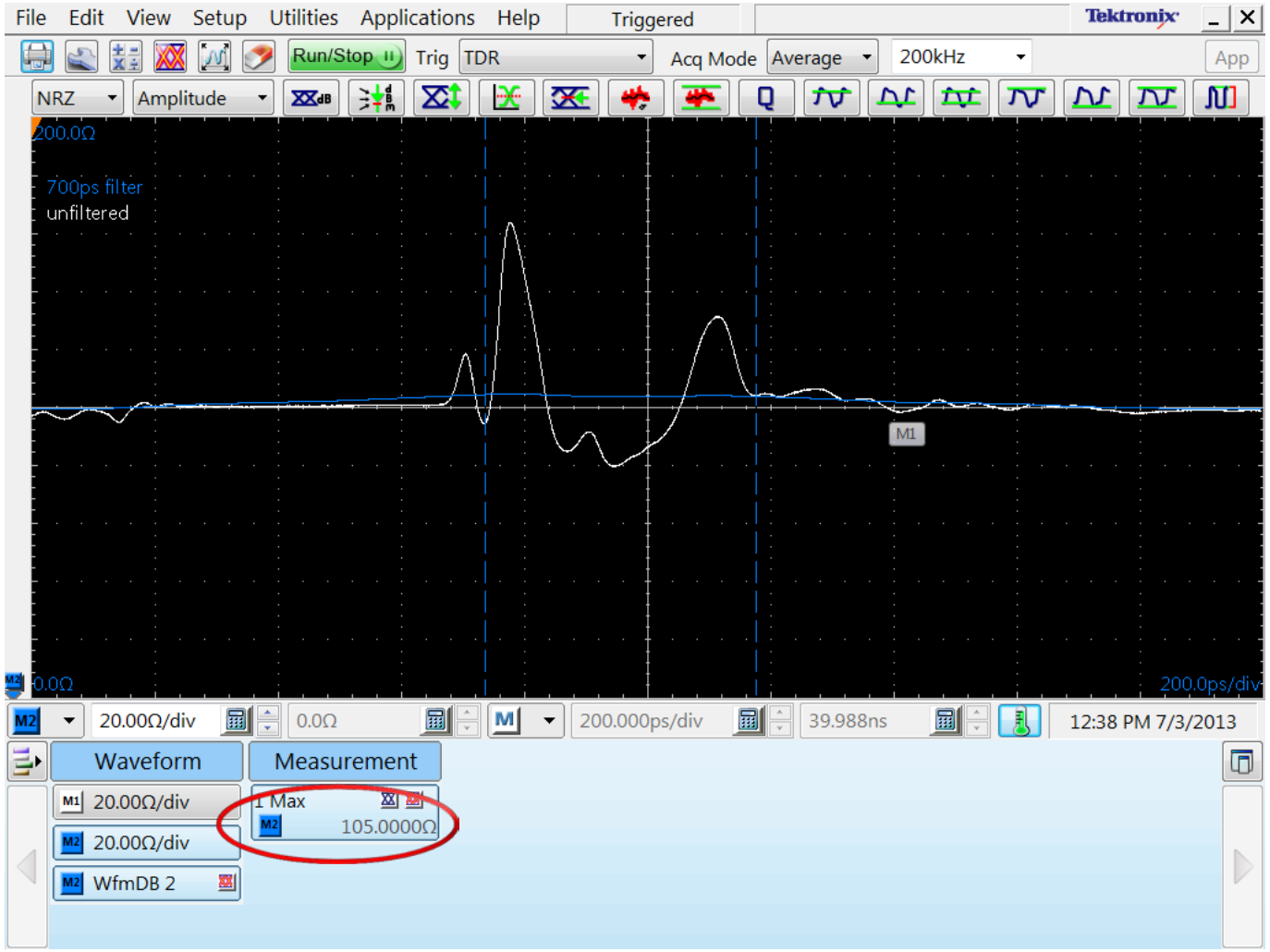


Test Results – TDR Impedance:

Type 1.0 with metallic tape around solder joints:

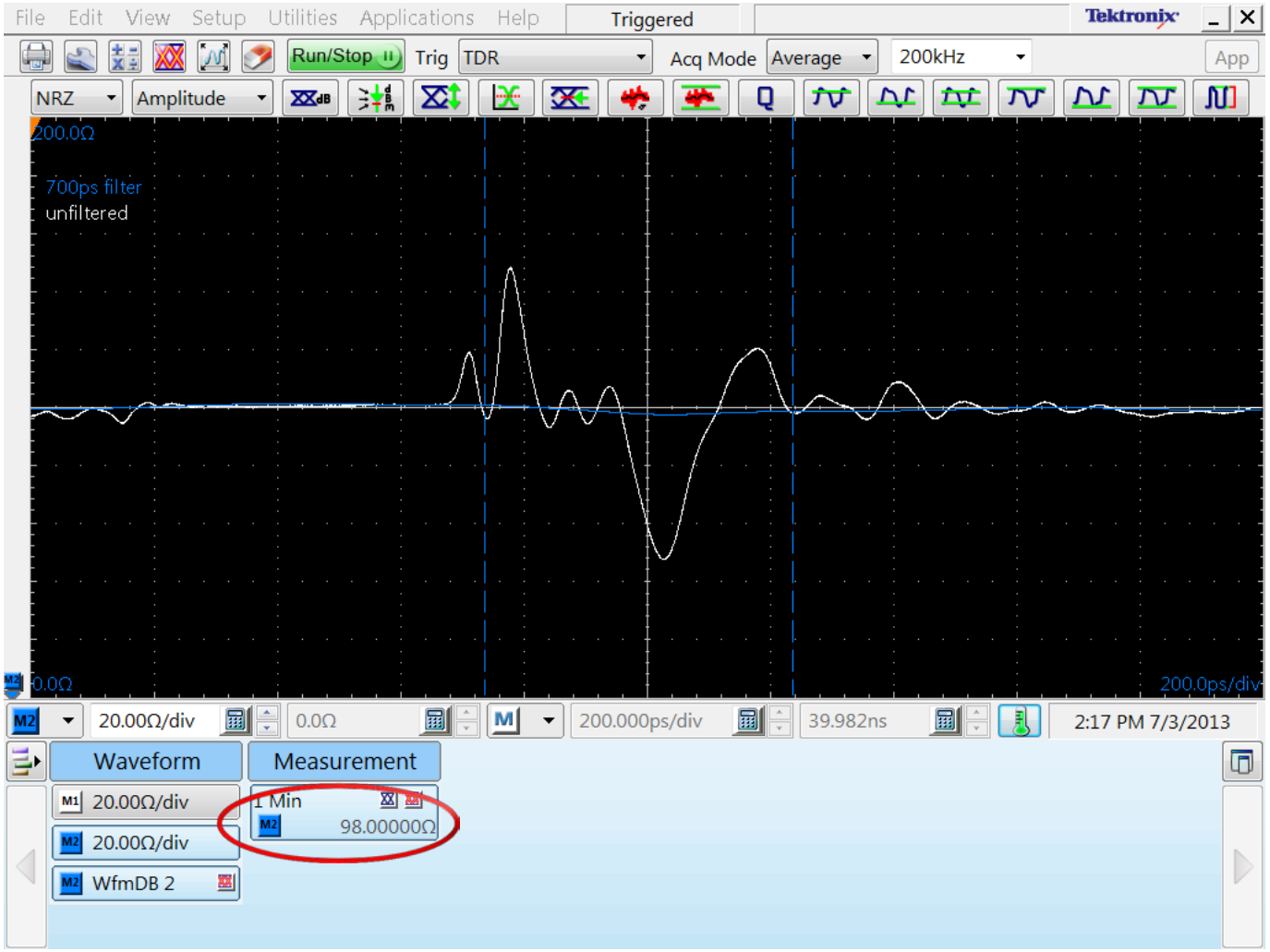
Test Results – TDR Impedance:

Type 1.1 <u>with</u> metallic tape around solder joints:



Test Results – TDR Impedance:

Type 3 <u>with</u> metallic tape around solder joints:



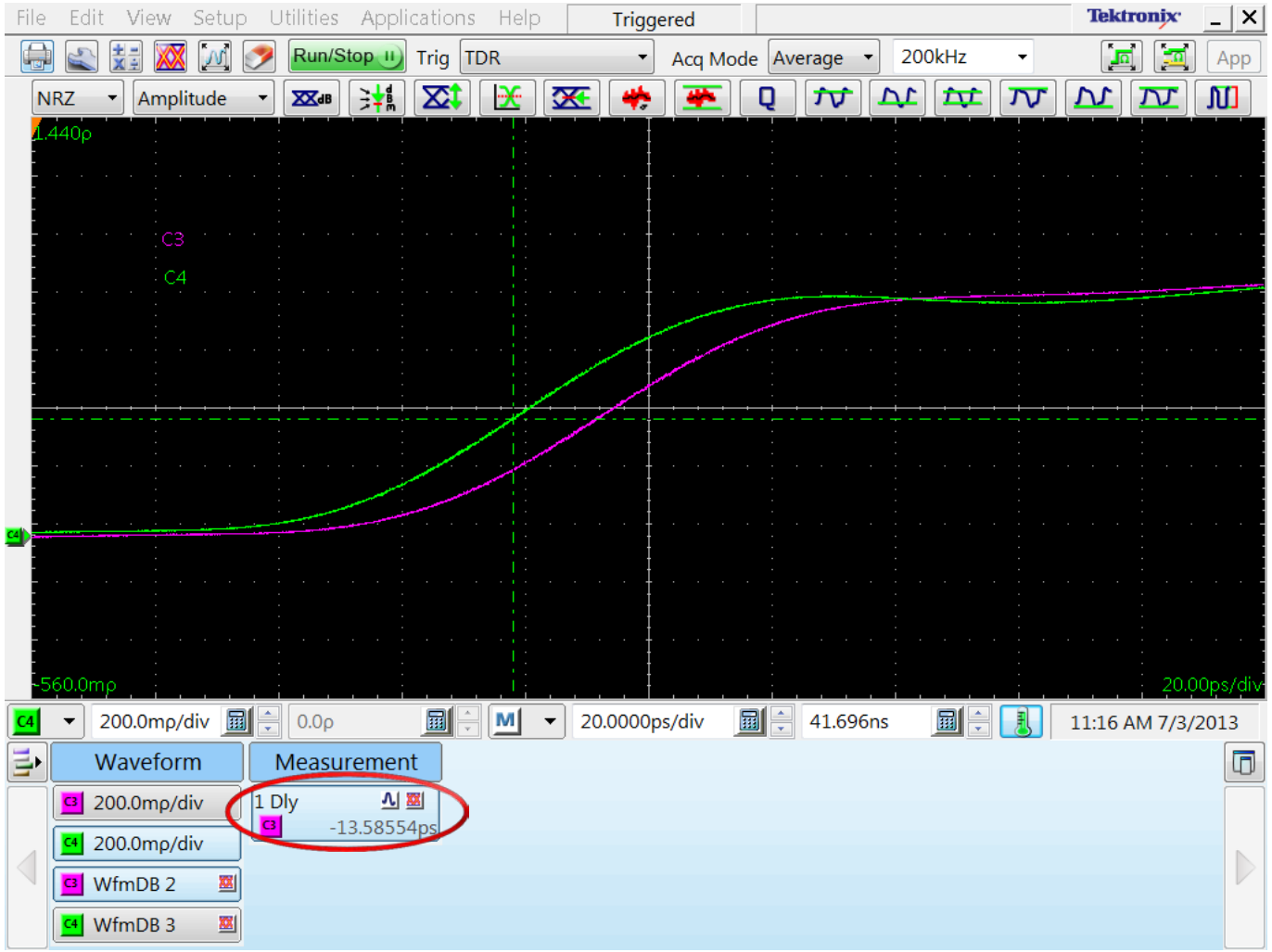
Test Results – Skew Summary:

Intra Pair Skew (TDT values) – for informative purposes:

- **Type 1.0 – 7 ps**
- **Type 1.1 – 1 ps**
- **Type 2 - 5 ps**
- **Type 3 - 5 ps**

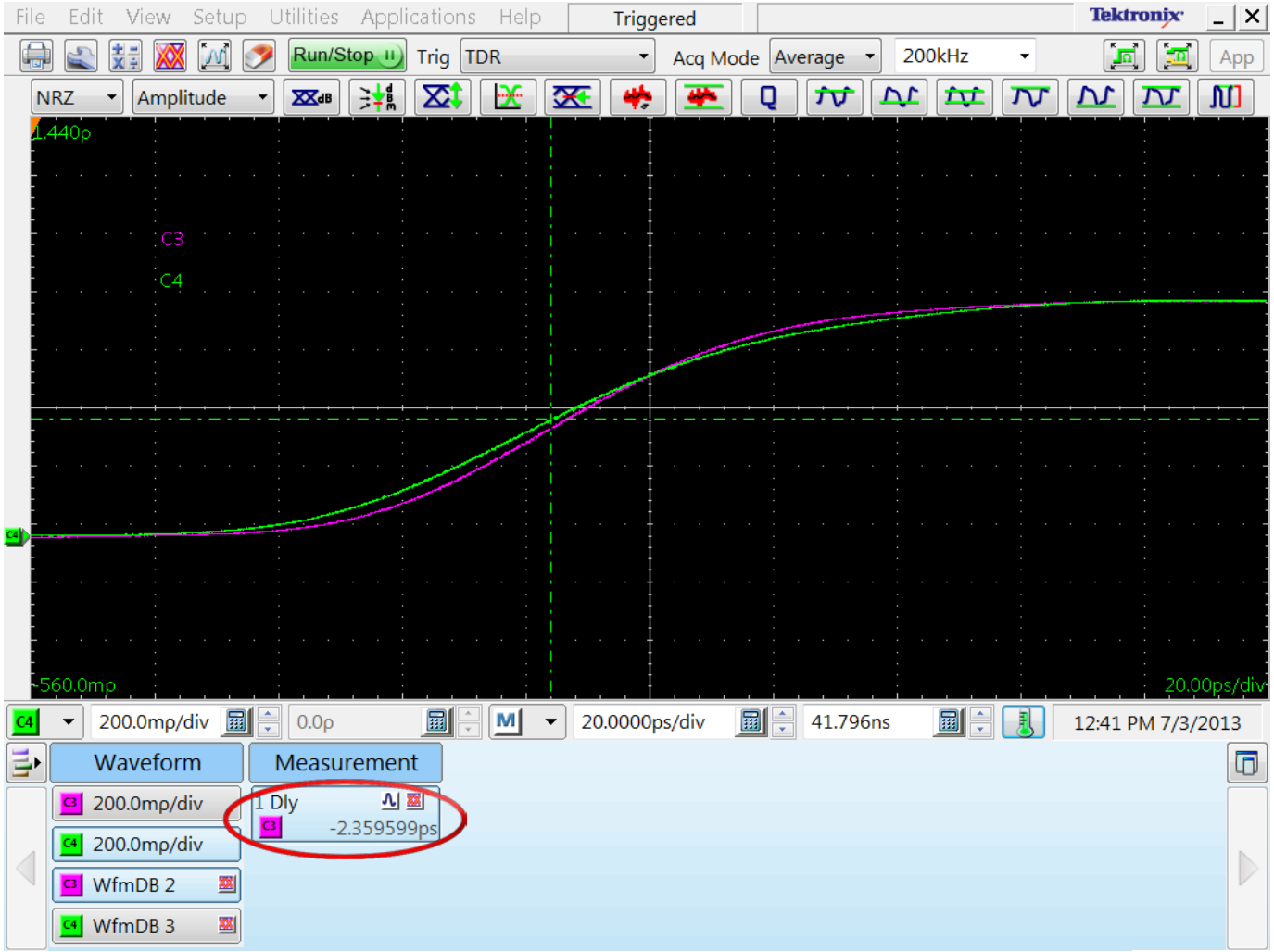
Test Results – TDR Skew:

Type 1.0 – actual skew is ~ 7 ps (TDR skew is 13.6 ps)



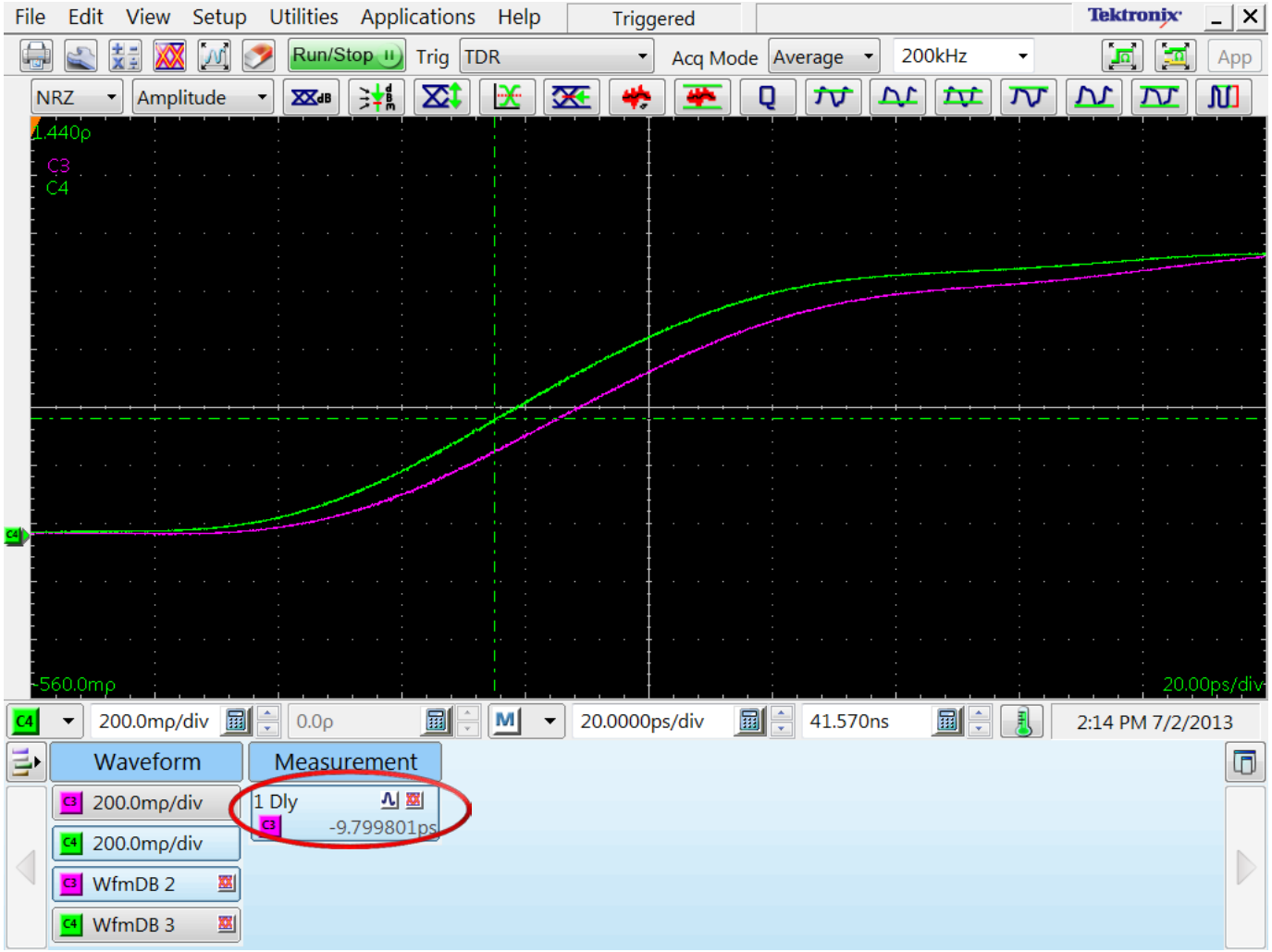
Test Results – TDR Skew:

Type 1.1 – actual skew is ~ 1.2 ps (TDR skew is 2.4 ps)



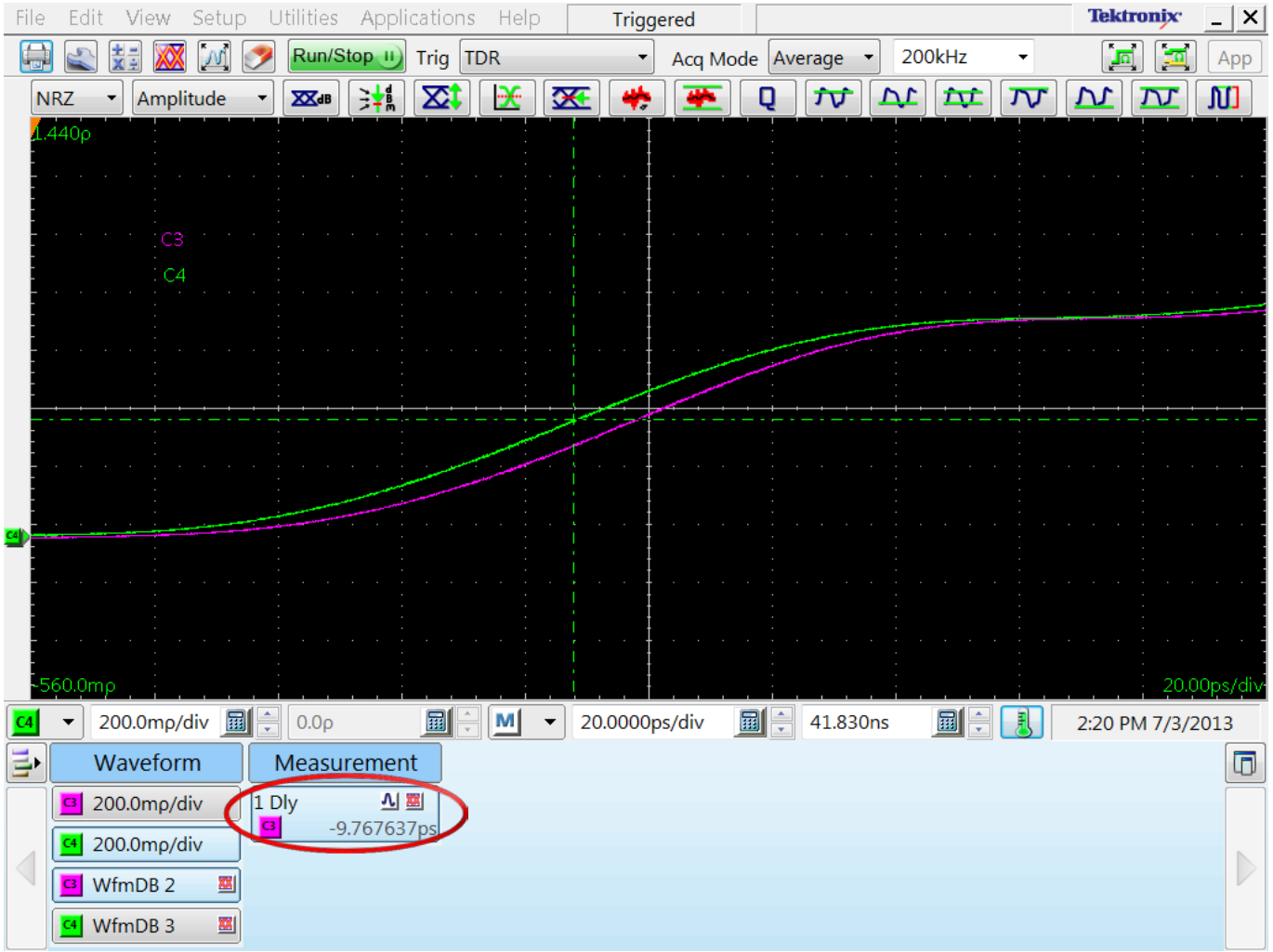
Test Results – TDR Skew:

Type 2 – actual skew is ~ 5 ps (TDR skew is 9.8 ps)



Test Results – TDR Skew:

Type 3 – actual skew is ~ 5 ps (TDR skew is 9.8 ps)



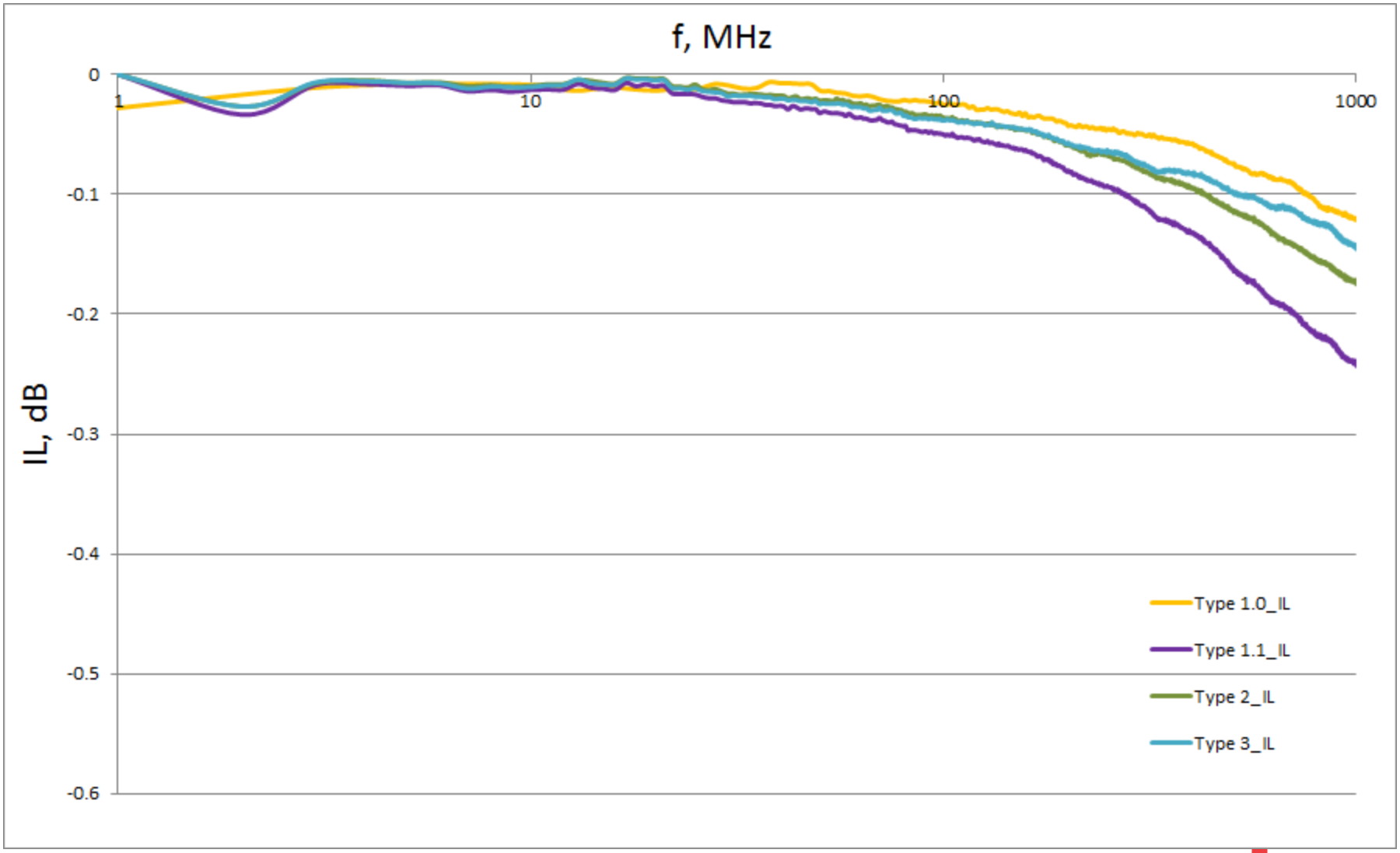
Test Results – IL, RL, TCL/TCTL Summary:

IL, RL presented as is without limit lines.

TCL/TCTL data at or below limit line.

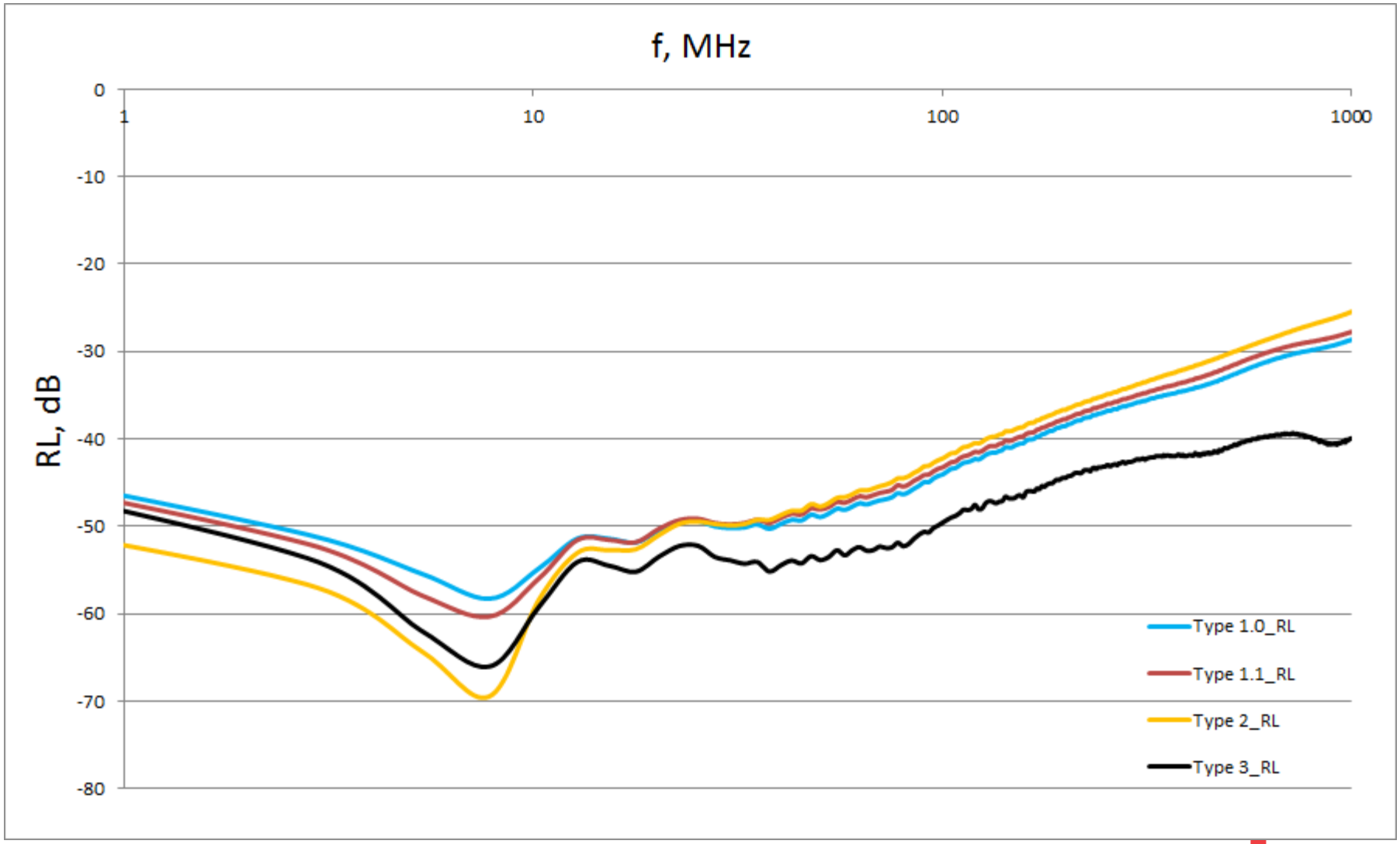
Test Results – IL:

All four connector systems presented on the same graph



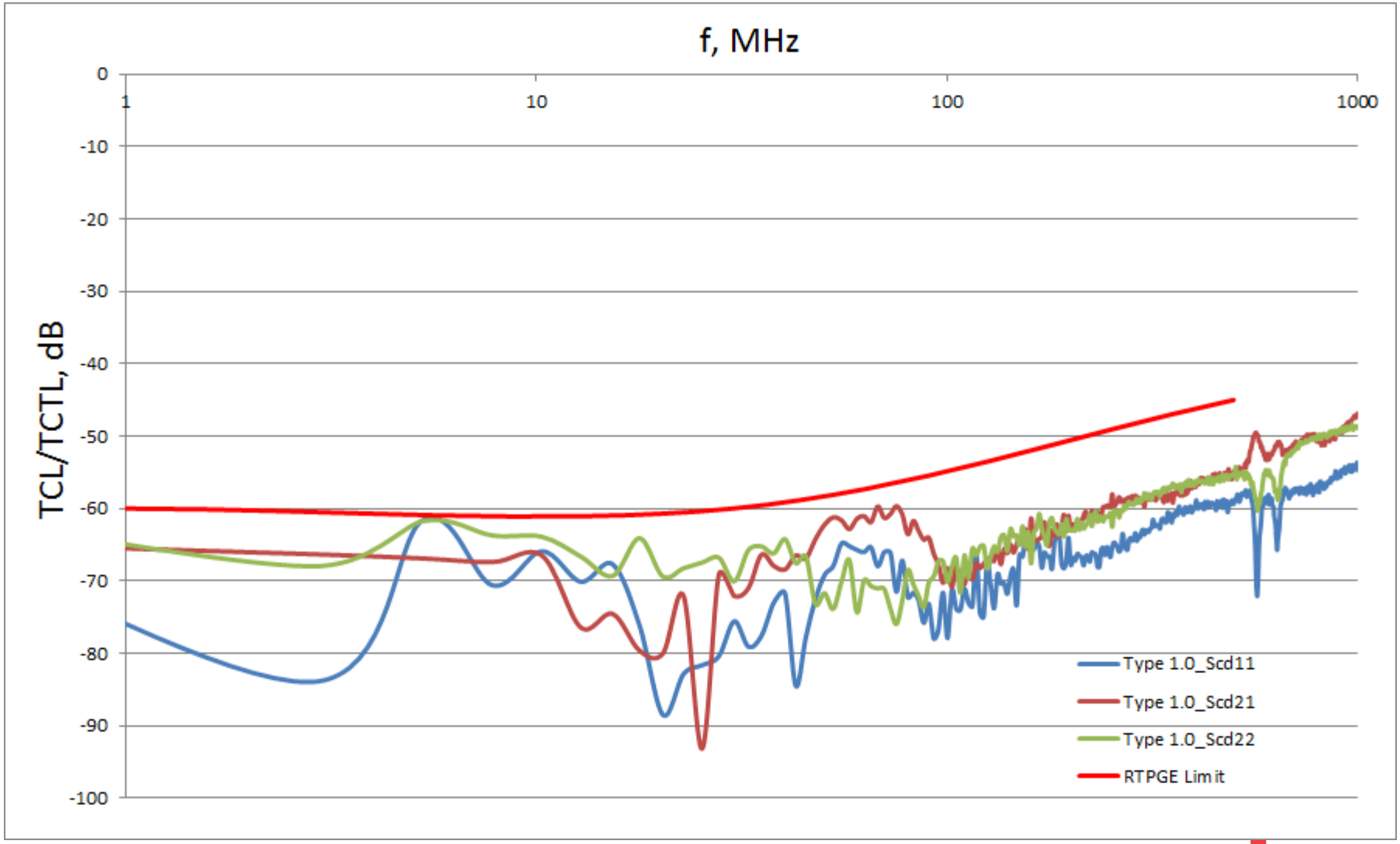
Test Results – RL:

All four connector systems presented on the same graph



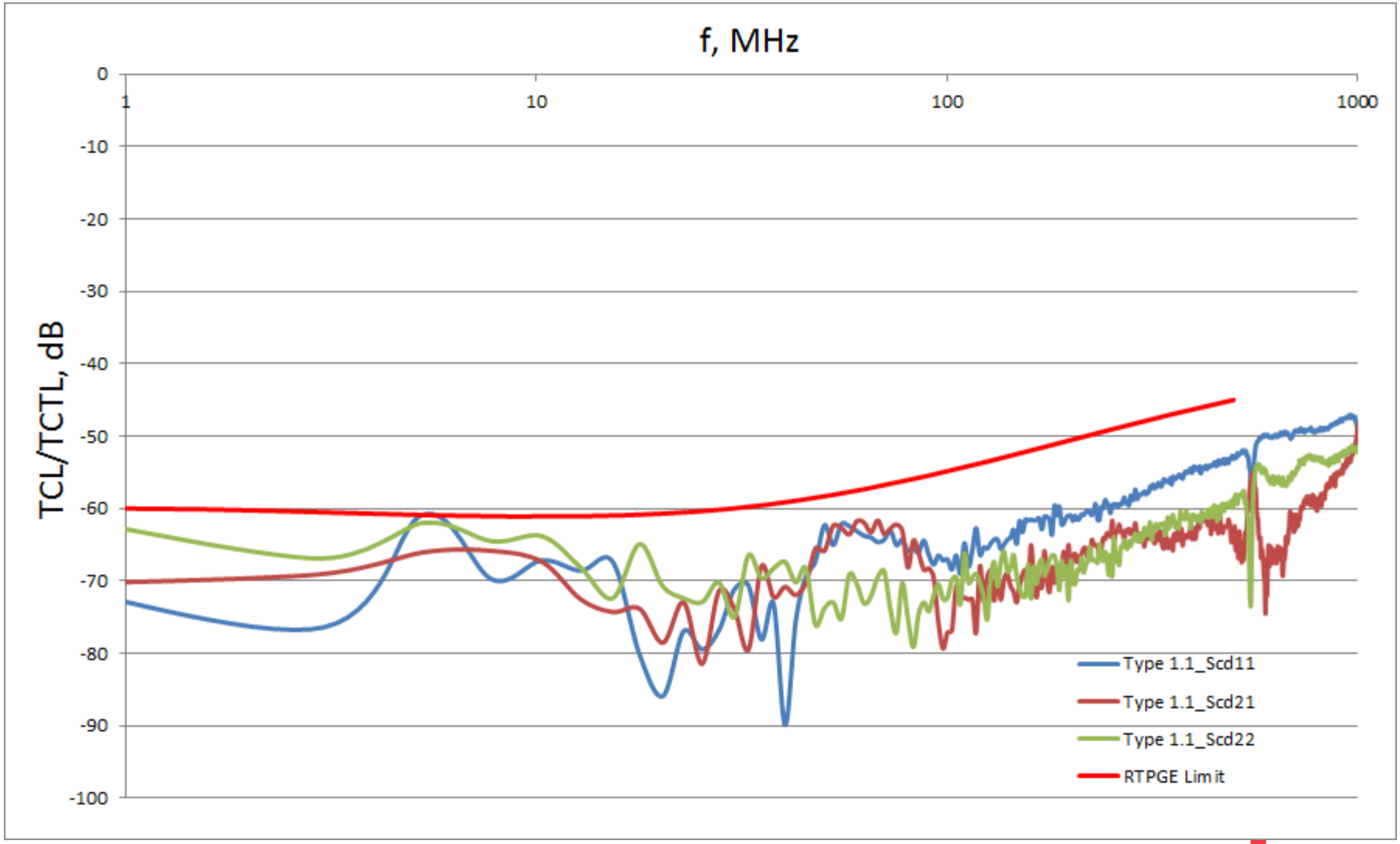
Test Results – TCL/TCTL:

Type 1.0



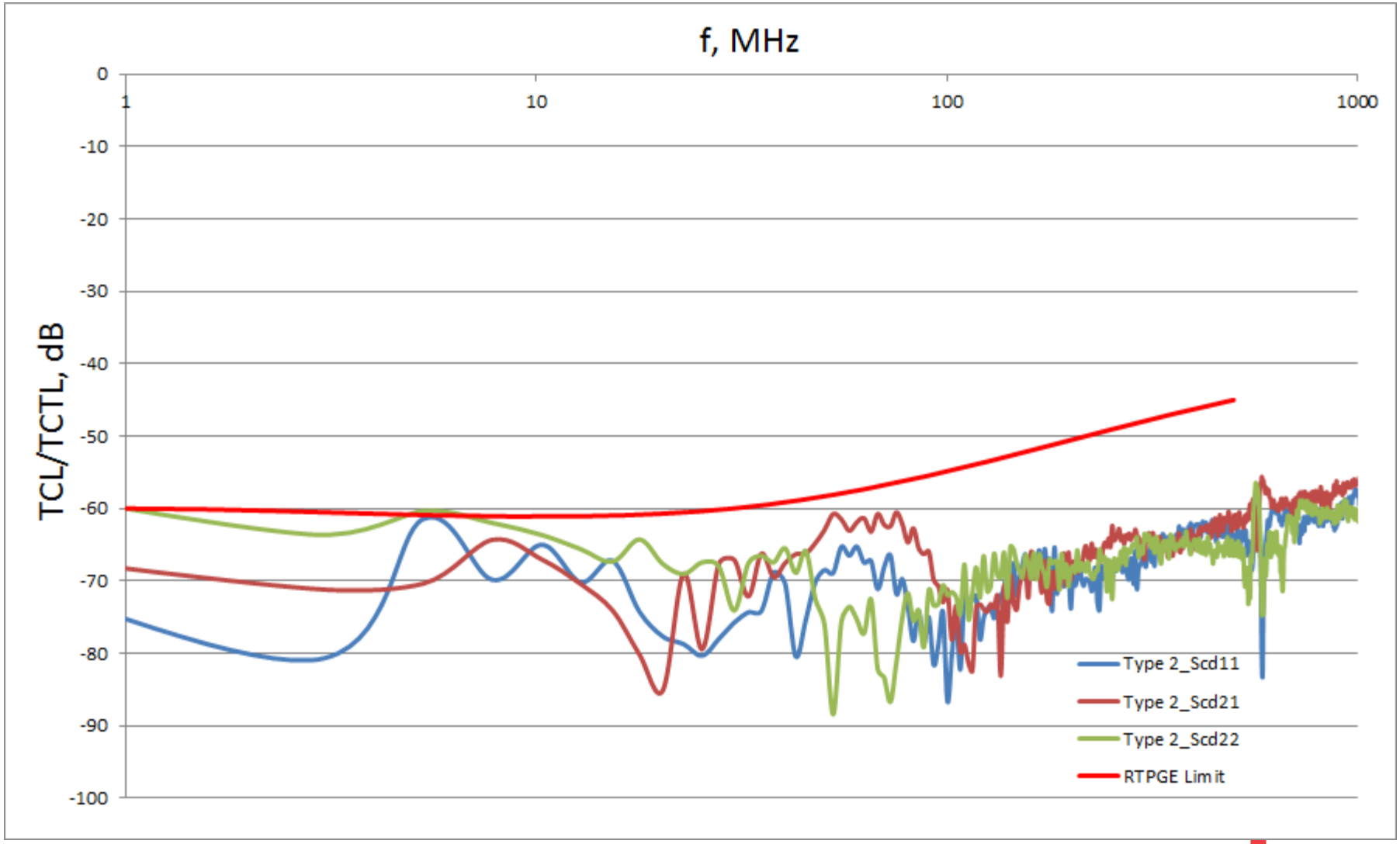
Test Results – TCL/TCTL:

Type 1.1



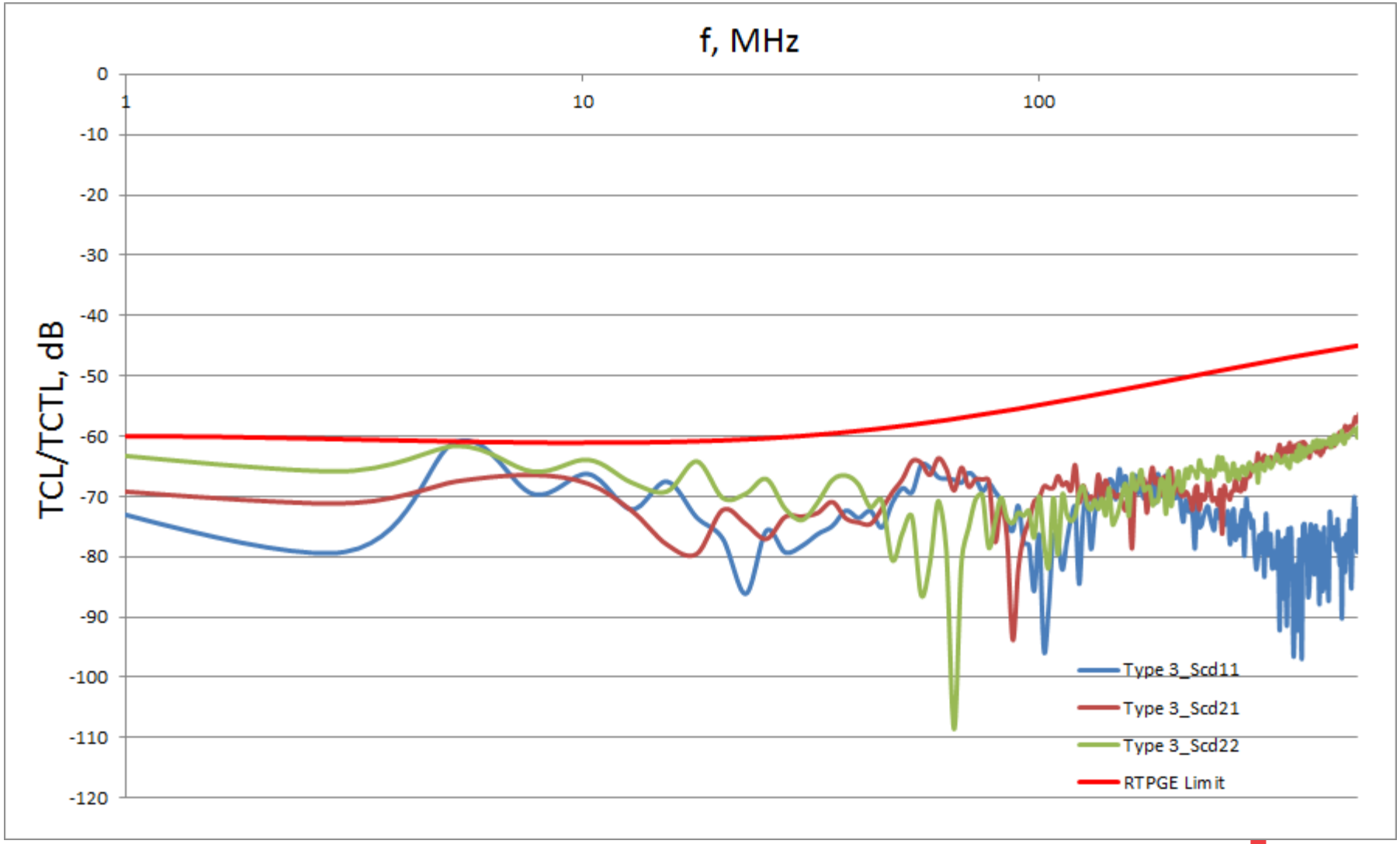
Test Results – TCL/TCTL:

Type 2



Test Results – TCL/TCTL:

Type 3



Conclusions:

- Test results we obtained for impedance, intra-pair skew, IL and RL are very encouraging;
- TCL/TCTL data is below or right on the proposed limit line;
- There are connector systems available on the market today that can support RTPGE development, even though they were not specifically designed for RTPGE application, at least at the initial stages of the development.

Thank you