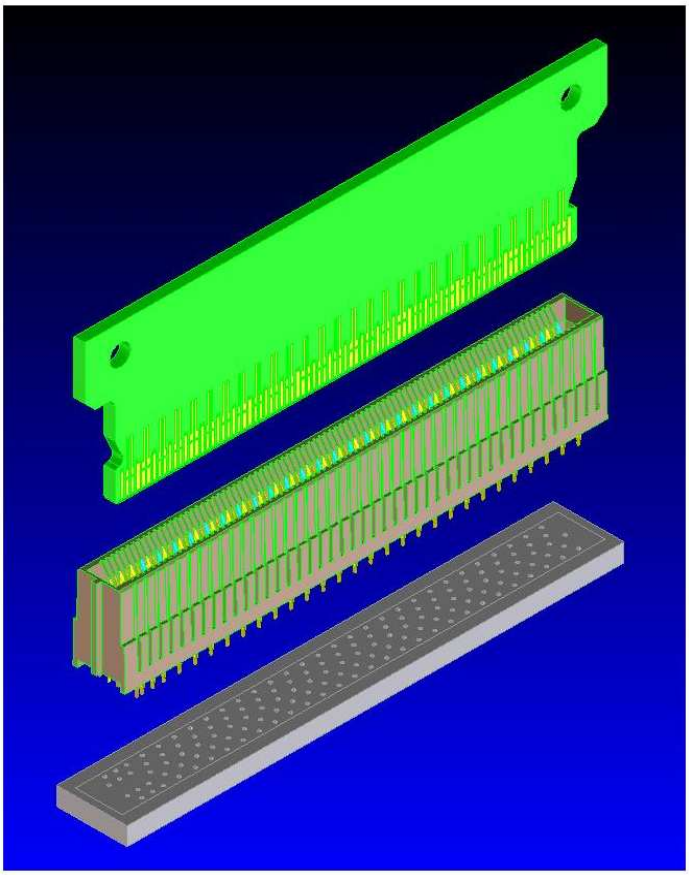
10 Gig Edge Connector SI Guideline



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DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
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10 Gig Edge Connector SI Guideline

SIGNAL INTEGRITY REPORT

1.0 SCOPE

This Signal Integrity report covers the 10 Gig Edge Connector performance.

Disclaimer: Molex does not guarantee the performance of the final product to the information provided in this document. All information in this report is considered Molex proprietary and confidential. This guide is not intended as a substitute for engineering analysis.

Revision History

Revision name	Revision details
Rev A	Original document
Rev B	Typographical errors corrected

2.0 PRODUCT DESCRIPTION

2.1 EVALUATED: SERIES 75594 (MICROTCA 170 CIRCUIT ASSY)

Height: 12.31mm
Pitch: 0.75 mm
Routability: Both perpendicular directions
Plated Thru-Hole size: 0.46 mm (18 mil) finished hole size
Number of pins / number of contacts: 143 pins / 170 contacts

3.0 APPLICATION DESCRIPTION

Molex 10 Gig Edge connector has been designed to be used in μTCA platform for telecommunications and enterprise computer network equipment. μTCA platform can also be used in Consumer Premises Equipment (CPE). As AdvancedTCA is designed for very high capacity and high performance applications, 10 Gig Edge Connector is considered to be more compact, cost sensitive, and lower capacity and performance.

Molex 10 Gig Edge connector is a vertical connector which can be pressed fit into the μTCA backplane. A module edge card mates with this connector.

Molex has designed this connector around its preferred foot print to accomplish both better performance and lower cost.

4.0 TEST FIXTURE DESCRIPTION

4.1 FIXTURE COMPONENTS

Host board, Module board

4.2 MATERIAL

Nelco 4000-13SI

4.3 THICKNESS

Board	2.8mm (0.11") host, 1.58mm (0.062) module
Copper	1/2oz. (signal layers)

4.4 NUMBER OF LAYERS

12 for the host board, 8 for the module board

4.5 SIGNAL LAYERS

3, 5, 8 & 10 (host board), 3 & 6 (module board)

4.6 TRACE WIDTHS

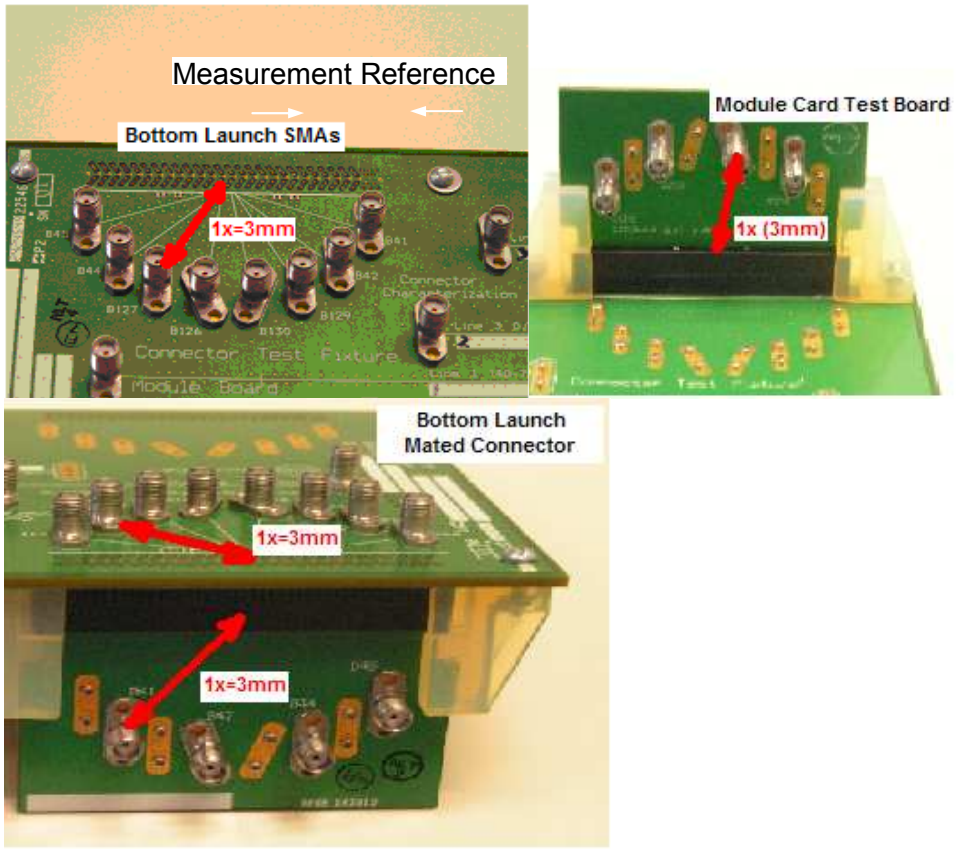
7.5 mil uncoupled strip-lines
5.8 - 5.5 - 5.8 mil coupled strip-lines

4.7 CALIBRATION STRUCTURES

SLOT (1.0 to 20 GHz) End of the test cable

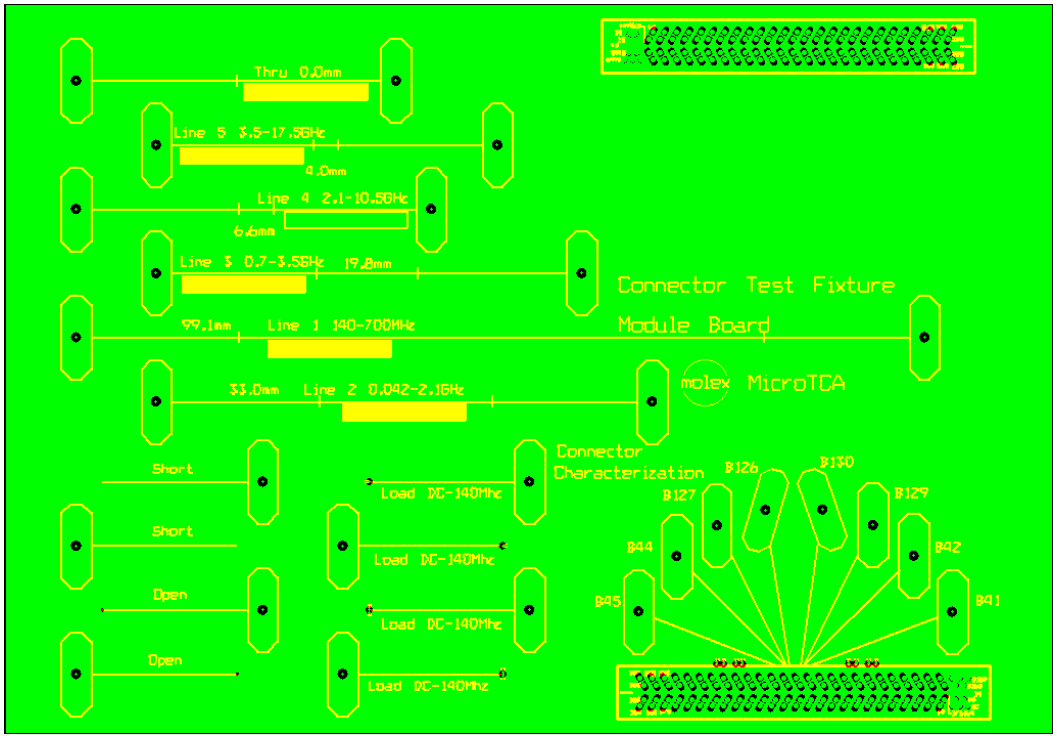
4.8 MEASUREMENT REFERENCE PLANE

SMA interface. Insertion loss data presents the SMA-to-SMA loss minus the signal loss for two SMA's separated by 60 mm (2x distance) of the transmission line (2x Cal.). See the picture below for clarification. Return loss data includes the effect of both SMA launch and traces.

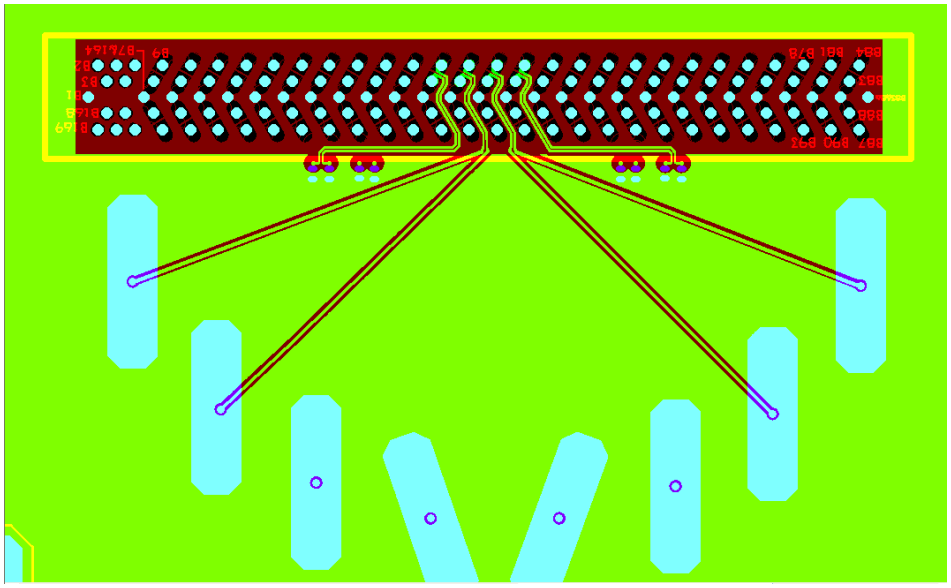


Measurement Reference

4.9 TRACE ROUTING



4.10 TRACE ROUTING EXAMPLE



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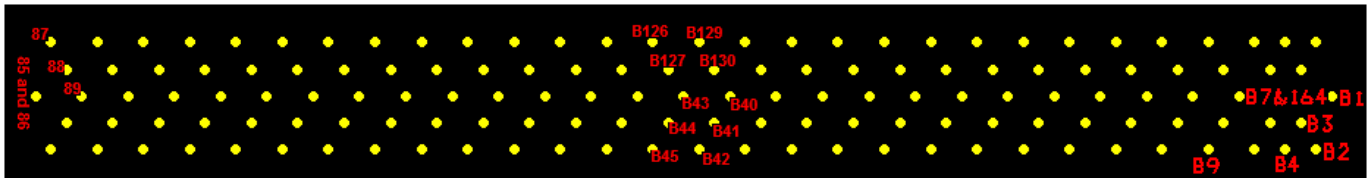
4.11 SIGNAL LABELING

4.11.1 FOOT-PRINT AND PIN NUMBERING



4.11.2 DIFFERENTIAL PAIRS/PCB LAYER (SMA TEST BOARD PORTS)

B41-B42/Layer 10
B44-B45/Layer 10
B126-B127/Layer 8
B129-B130/Layer 8

4.11.3 50 OHMS TERMINATED LINED

B38, B39, B46, B47, B123, B124, B132, B133

4.11.4 GROUND PINS

All common pins, All other pins are open

4.12 TEST SET-UP AND DESCRIPTION

4.12.1 EQUIPMENT LIST

Agilent E8364B Vector Network Analyzer
Agilent PLTS version 3.120 software

4.12.2 TESTS PERFORMED

Insertion Loss (from 10 MHz to 20 GHz)
Return Loss (from 10 MHz to 20 GHz)
Isolation (from 10 MHz to 20 GHz)

Frequency domain data have been collected using a four port measurement system (Agilent PNA Series Network Analyzer Model E8364B). A maximum frequency of 20 GHz has been set for the entire measurements. Time domain analysis was performed by converting frequency domain data utilizing Agilent Physical Layer Test System.

TDR and crosstalk direction is from the daughter card side. All immediate neighbors are terminated with 50Ω loads.

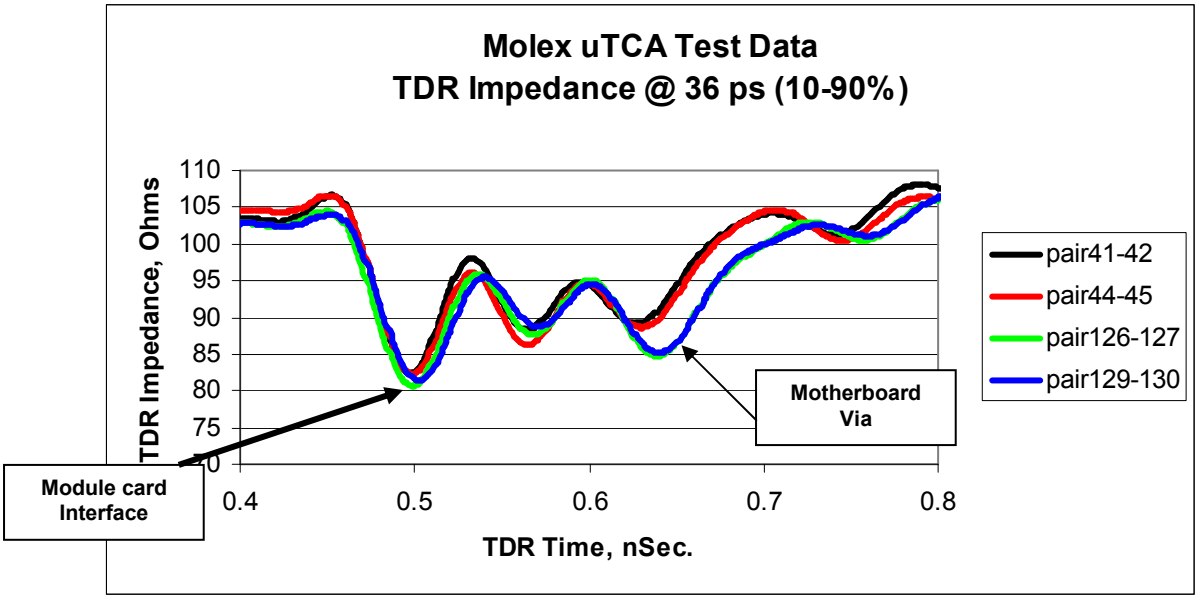
Listening on the daughter card side is NEXT.
Listening on the backplane side is FEXT.

Total crosstalk is reported as the total sum of the maximum value of all the individual contributions. The victim is chosen as the pair 41-42. To calculate the total crosstalk in time domain, we have added the twice of the crosstalk from pair 44-45, twice of the crosstalk from 126-127, with the crosstalk from 129-130.

5.0 CONNECTOR TIME DOMAIN ANALYSIS

5.1 DIFFERENTIAL TDR IMPEDANCE

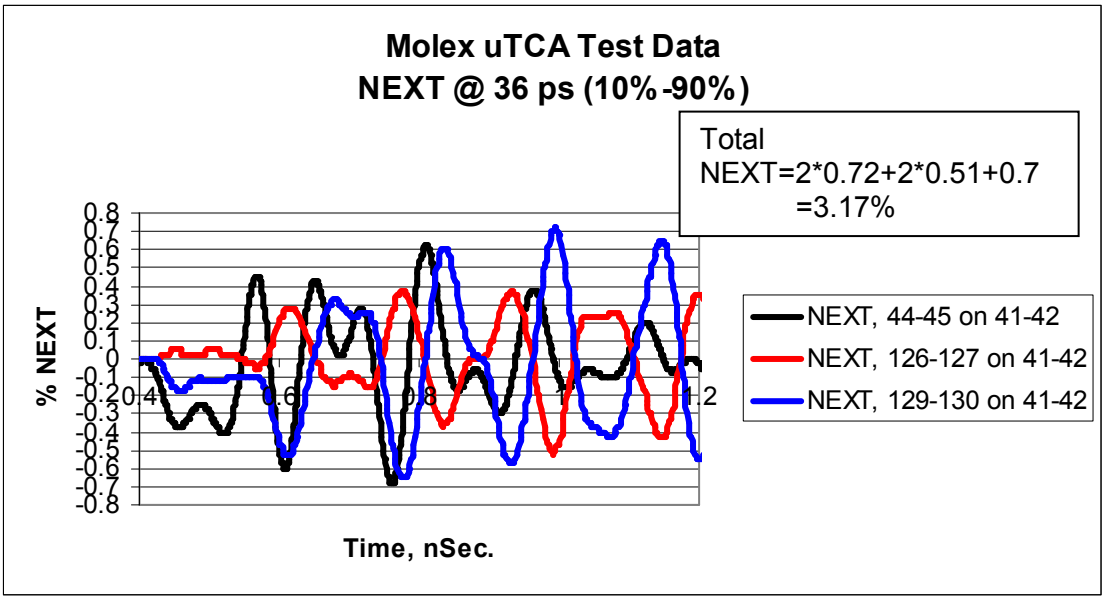
Maximum measurement Frequency: 20 GHz
Maximum Rise-time: 36ps (10-90%)



Molex 10 Gig Edge Connector differential TDR impedance of a bottom launch with signal via stubs of 0.4 mm (pins 41-42 and 44-45) and 0.8 mm (pins 126-127 and 129-130). This TDR is produced from frequency data measurement using Agilent Physical Layer Test System.

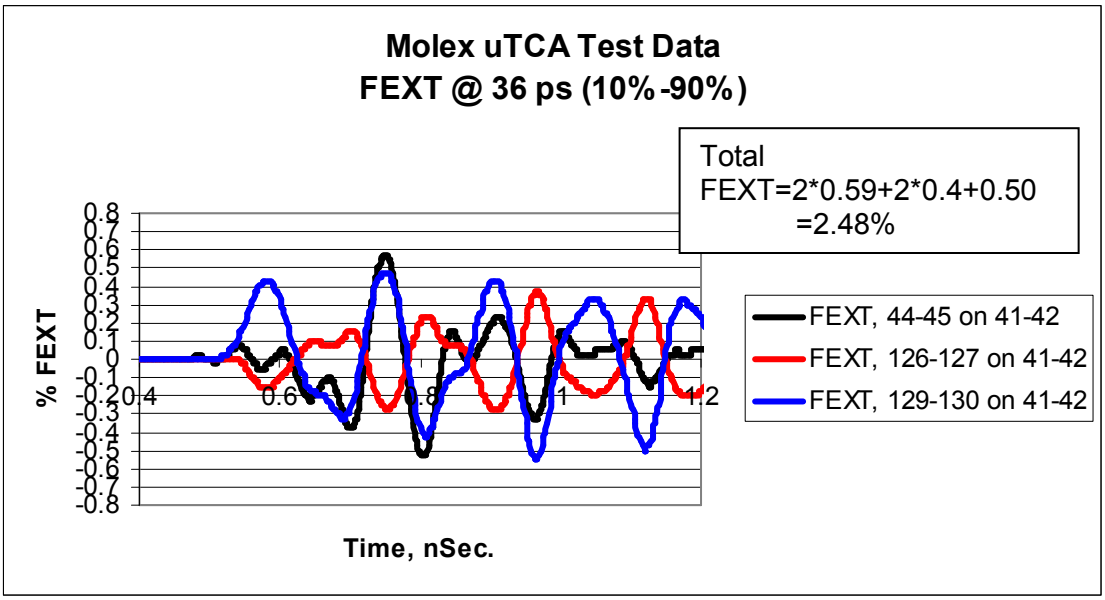
5.2 TIME DOMAIN CROSS-TALK

5.2.1 % NEAR END CROSS-TALK (NEXT)



Molex 10 Gig Edge Connector differential Near End cross-talk with bottom launch configuration. Data is transformed from frequency domain for fmax=20 GHz. The victim pair corresponds to the connector pins #41and #42. All other adjacent pairs are terminated to 50 Ohms.

5.1.2 % FAR END CROSS-TALK (NEXT)



Molex uTCA connector differential Far End cross-talk with bottom launch configuration. Data is transformed from frequency domain for fmax=20 GHz. The victim pair corresponds to the connector pins #41and #42. All other adjacent pairs are terminated to 50 Ohms.

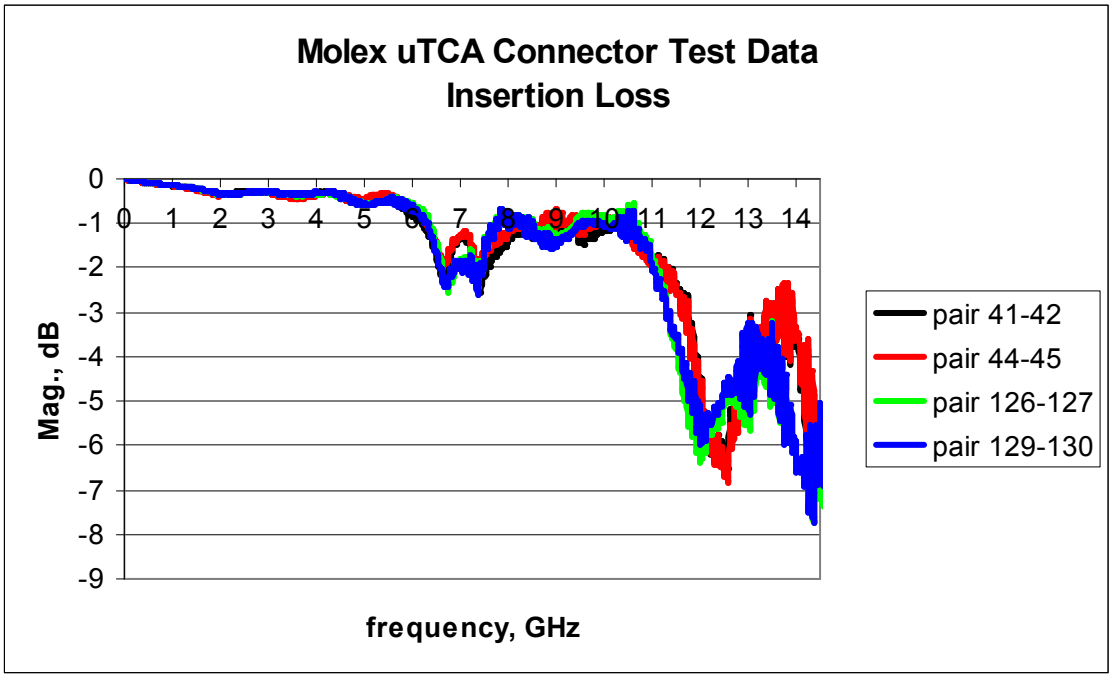
5.1.3 % SKEW (WITHIN A PAIR)

It should be noted that the tabulated skew includes trace length differences due to turns and PCB material in-homogeneity.

pairs	Skew, pSec.
pair 41-42	4.6
pair 44-45	2.3
pair 126-127	0
pair 129-130	4.6

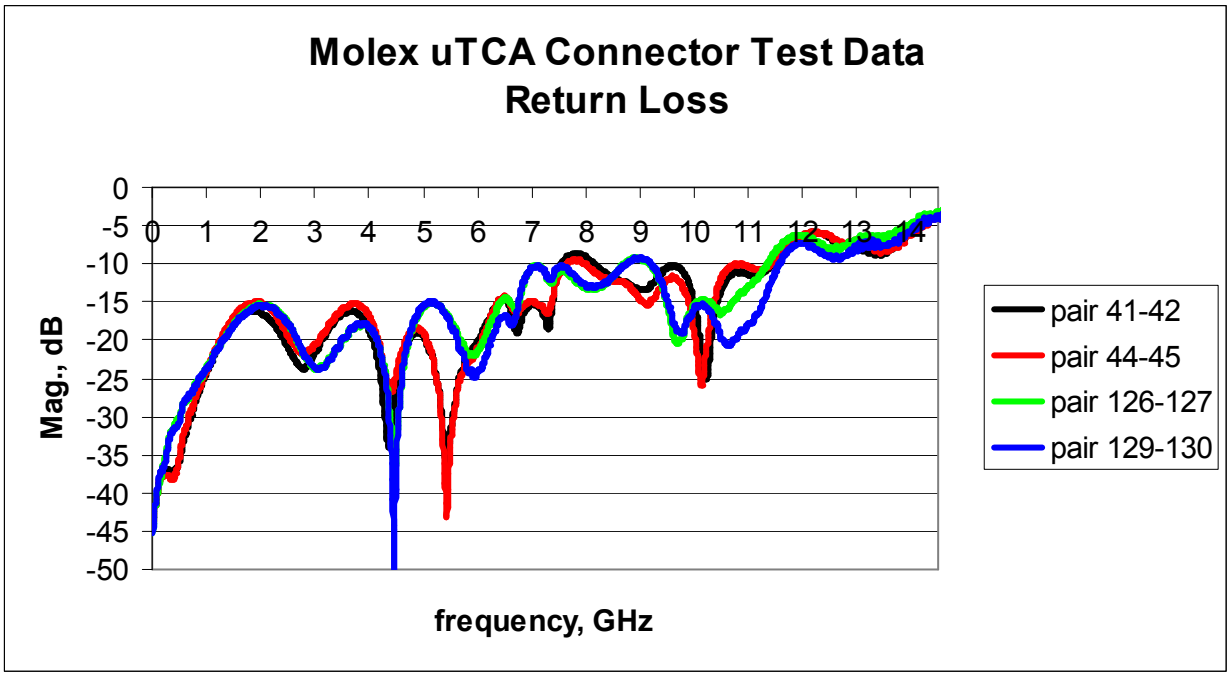
6.0 CONNECTOR FREQUENCY DOMAIN ANALYSIS

6.1 DEEMBEDED DIFFERENTIAL INSERTION LOSS



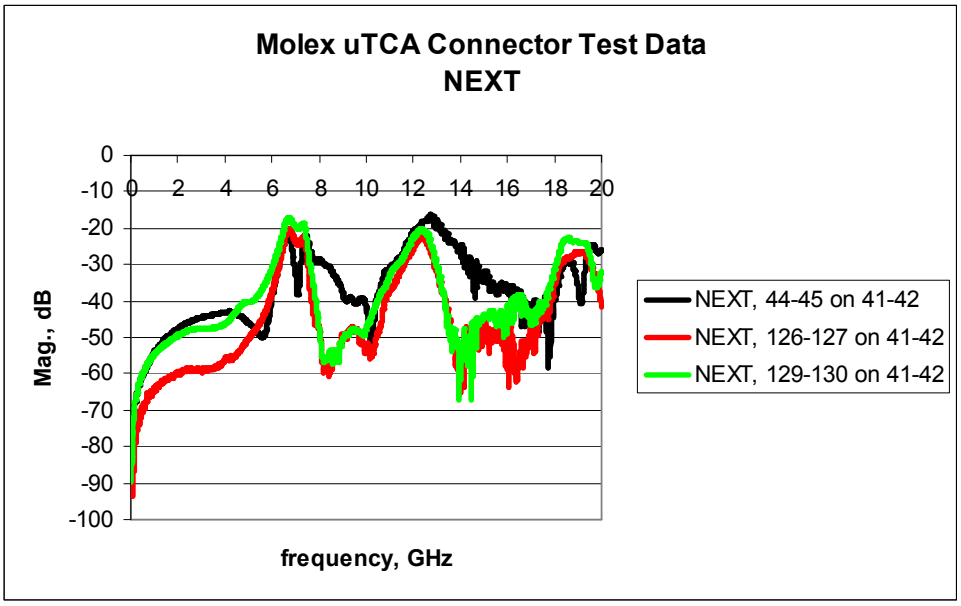
Molex 10 Gig Edge Connector differential Insertion Loss for a bottom launch with signal via stubs of 0.4 mm (pins 41-42 and 44-45) and 0.8 mm (pins 126-127 and 129-130).

6.2 DIFFERENTIAL RETURN LOSS



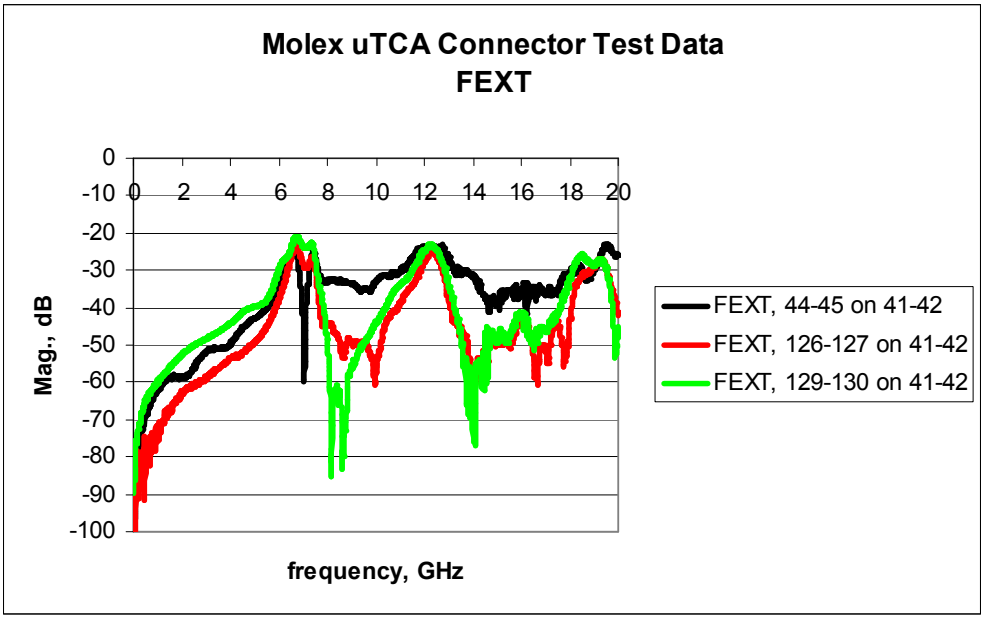
Molex 10 Gig Edge Connector differential Return Loss for a bottom launch including two SMAs and 6mm of transmission line.

6.3 DIFFERENTIAL NEAR END CROSS-TALK (NEXT)



Molex 10 Gig Edge Connector differential Near End Cross-talk for a bottom launch arrangement on the victim signal pair 41-42 and aggressors pairs 44-45, 126-127, and 129-130.

6.4 DIFFERENTIAL FAR END CROSS-TALK (FEXT)



Molex 10 Gig Edge Connector differential Far End Cross-talk for a bottom launch arrangement on the victim signal pair 41-42 and aggressors pairs 44-45, 126-127, and 129-130.