



ELECTRICAL MODEL DOCUMENTATION

MODEL SUMMARY

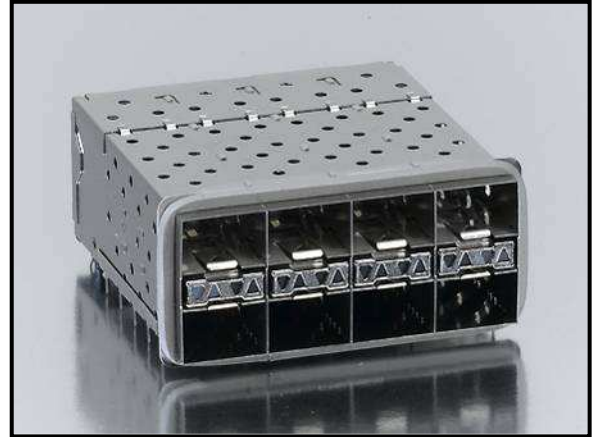
An SFP+ application, defined by SFF-8431, could be an electrical-to-optical module or an electrical-to-electrical device such as a passive cable. SFP+ applications are intended to support Datacom applications. Examples of these applications are 10 Gbps Ethernet, 8.5 Gbps Fibre Channel, 10.51 Gbps Fibre Channel, 10 Gbps Ethernet with FEC and Telecom (SONET OC-192 and G.709 "OTU-2").

The SFF-8083 specification defines the SFP/SFP+ host connector. It includes both the dimensional requirements and the high-speed signal integrity requirements.

The SFF-8432 specification defines the requirements for the improved SFP+ cage and modules in order to address EMC compliance.

Further information regarding this connector product line and other related Molex SFP+ products can be found at <http://www.molex.com/product/sfp-plus.html>

Small Form-Factor Pluggable (SFP+) Stacked Multi-Port Connectors



MODEL TYPE: S-parameter	MODEL FORMAT: Touchstone (*.sNp)
MODEL FILENAME: EE-76090-001_rev2.s16p	DATA FORMAT: Real/Imaginary
MODEL BASIS: Analytical 3-D field solution	MODEL SOURCE: Ansoft HFSS version 11.1.3
BANDWIDTH: DC - 20.48 GHz	RESOLUTION: 10 MHz steps
REFERENCE: 50 ohms	NUMBER OF POINTS: 2049 (2048 + 1 DC)
NUMBER OF CHANNELS: 4 differential	NUMBER OF PORTS: 16 single-ended
CHANNEL TYPE: Coupled pairs + reference	VALIDATION: Yes
MODEL APPLICATION: Open	DATA RATE: 10.3125 Gbps

APPLICABLE PART NUMBER(S):

Light-pipes	Elastomeric Gasket		Metal Gasket	
	Yes	No	Yes	No
2x1	76090	76100	76044	76064
2x2	76091	76101	76045	76065
2x4	76092	76102	76046	76066
2x5	76093	76103	76047	76067
2x6	76094	76104	76048	76068
2x8	76352			

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REVISION: 2	ECN INFORMATION: EC No: UCP2014-0167 DATE: 2009 / 4 / 3	TITLE: SFP+ Stacked Multi-Port Connectors MOLEX CONFIDENTIAL	SHEET No. 1 of 9
DOCUMENT NUMBER: EE-76090-001	CREATED / REVISED BY: P. Casher	CHECKED BY: R. Benson	APPROVED BY: D. Dunham
<small>TEMPLATE FILENAME: SPM[SIZE_A](V.1).DOC</small>			



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MODEL DESCRIPTION

This model is of both the upper port and lower ports. It contains all twenty terminals in each port. However, the two ports were solved separately and then joined as a post process, so there is no modeled coupling, crosstalk, between the two. The host board thickness is 3.0mm (0.118"). A dielectric constant of 3.8 was used for the modeled material properties. It represents an application with 24 layers, 14 power/ground layers and 10 signal layers. The high-speed signals are on layer 23, which is located ~0.3mm (0.0116") from the bottom of the board. This is in order to minimize the stub effects created by the relative connection location to the vias, which support to the connector.

TERMINAL TO MODEL PORT MAPPING TABLE

Available Model Signal Paths

Port	Terminals	Input Ports	Description	Output Ports	Description
Upper	12	1	RD-, Host Board	2	RD-, Module Board
	13	3	RD+, Host Board	4	RD+, Module Board
	18	5	TD+, Host Board	6	TD+, Module Board
	19	7	TD-, Host Board	8	TD-, Module Board
Lower	12	9	RD-, Host Board	10	RD-, Module Board
	13	11	RD+, Host Board	12	RD+, Module Board
	18	13	TD+, Host Board	14	TD+, Module Board
	19	15	TD-, Host Board	16	TD-, Module Board

Non-available Signal Paths

Terminals
1,2,3,4,5,6,7,8,9,10 11,14,15,16,17,20

- Within each port

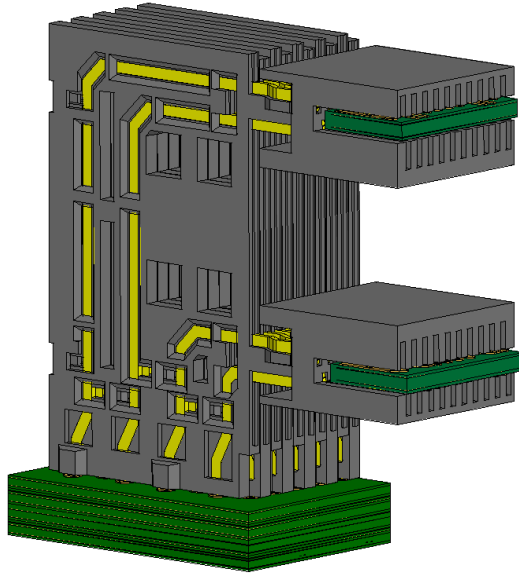
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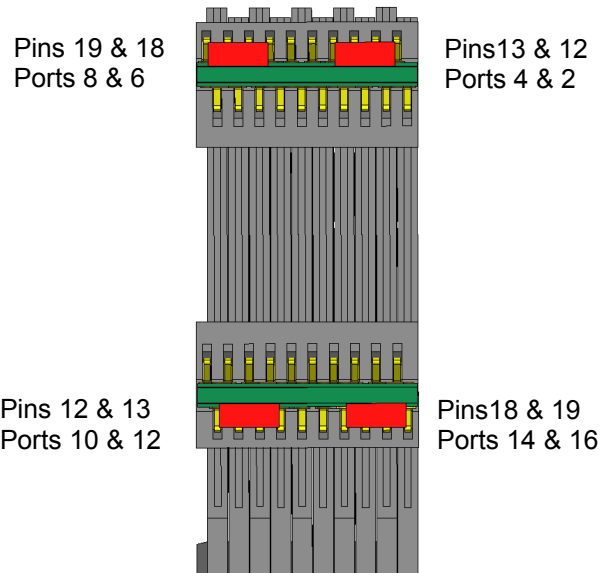
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PART ILLUSTRATIONS

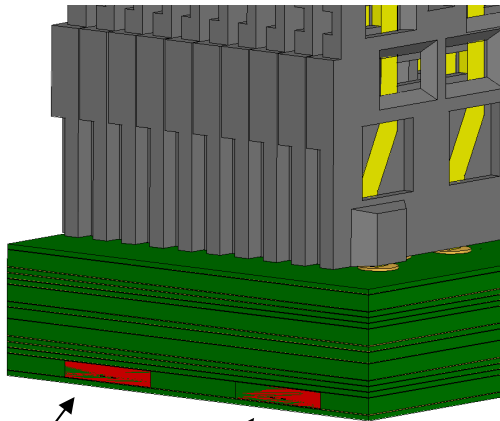
Perspective



Edge Card(S)



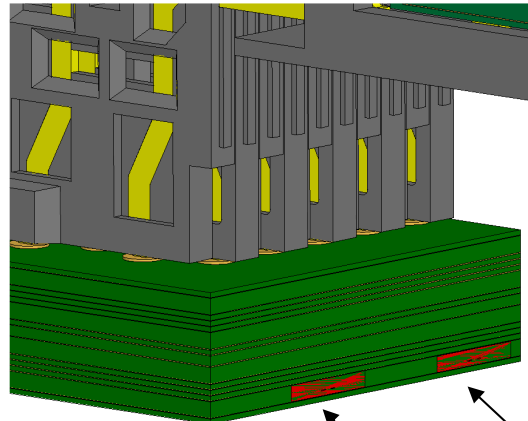
Host Board (Back)



Pins 12 & 13
Ports 1 & 3

Pins 18 & 19
Ports 5 & 7

Host Board (Front)



Pins 12 & 13
Ports 9 & 11

Pins 18 & 19
Ports 13 & 15

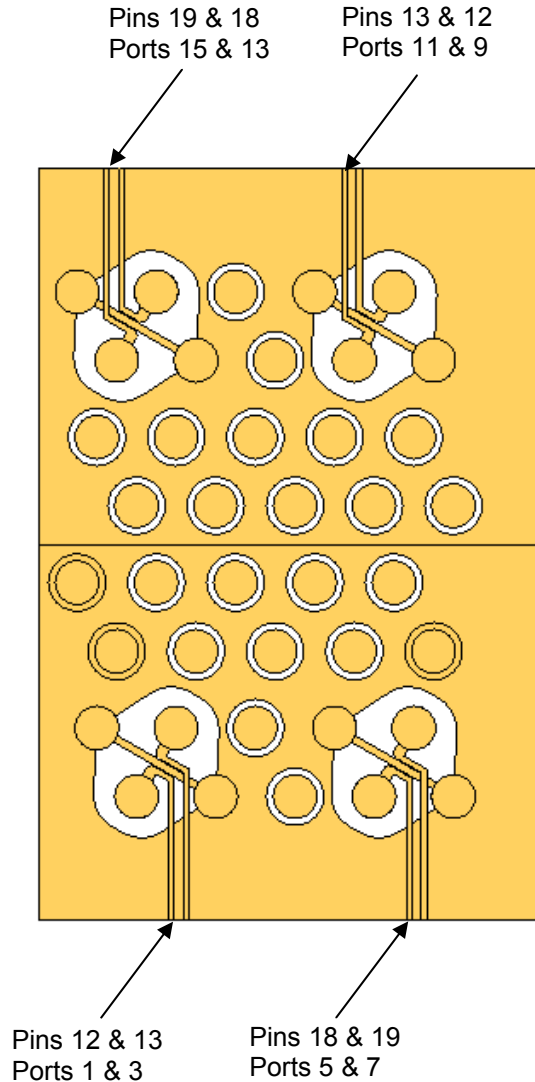
<u>REVISION:</u> 2	<u>ECN INFORMATION:</u> EC No: UCP2014-0167 DATE: 2009 / 4 / 3	<u>TITLE:</u> <p style="text-align: center;">SFP+ Stacked Multi-Port Connectors</p> <p style="text-align: center;">MOLEX CONFIDENTIAL</p> <p style="text-align: right;">RESTRICTED</p>	<u>SHEET No.</u> 3 of 9
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PART ILLUSTRATIONS (continued)

Host Board Routing (Top View)



Board Construction Details

Thickness: 3.0mm (~0.118")
 Layers: 24 (10 Hi-speed Signal, 14 Power/Ground/Misc)
 Board Material: Dk=3.8, Df=0.020
 Copper: 1/2 oz.

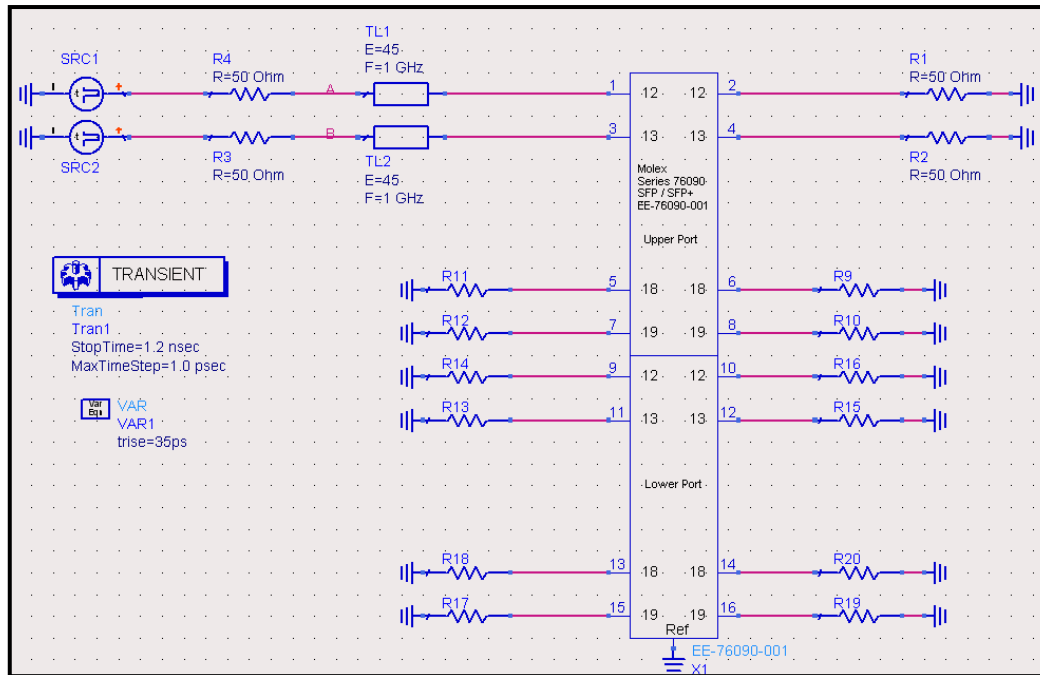
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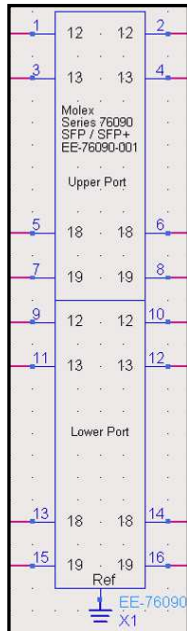
REFERENCE SCHEMATICS

Time Domain Schematic



Schematic Symbol

Application: Agilent Advanced Design System (ADS), version 2006 Update 3
 Filename(s): EE-76090-002.(dsn, ael)



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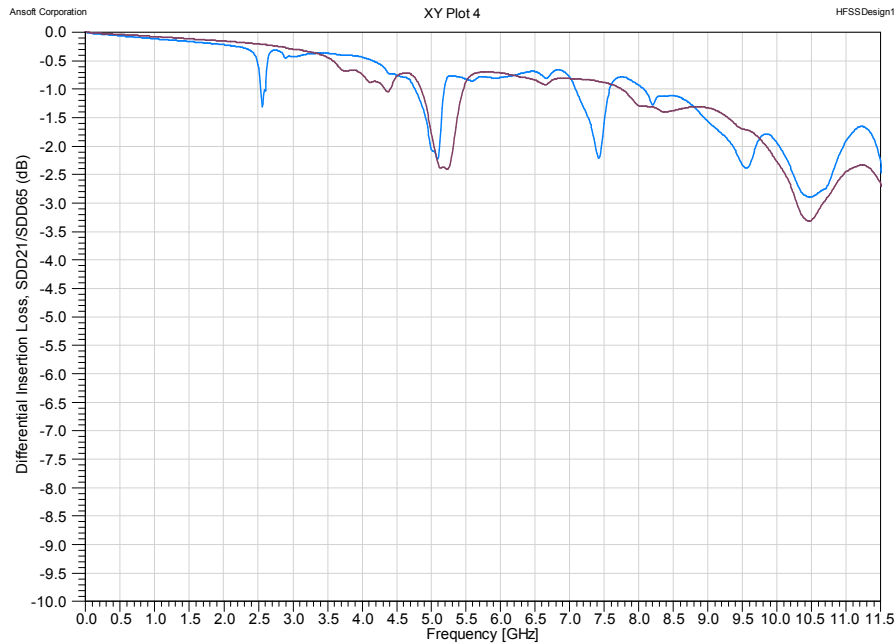
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REFERENCE RESULTS

Differential Frequency Domain

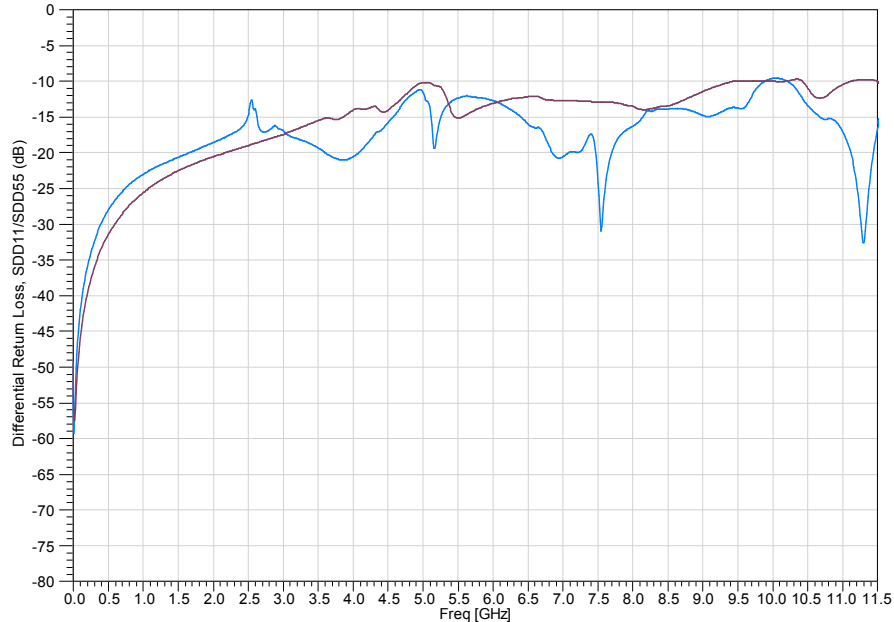
Insertion Loss

- Of assignment 1/3 to 2/4 (blue) and 9/11 to 10/12 (magenta)
- Upper port (blue), Lower port (magenta)



Return Loss

- Of assignment 1/3 (blue) and 9/11 (magenta)
- Upper port (blue), Lower port (magenta)



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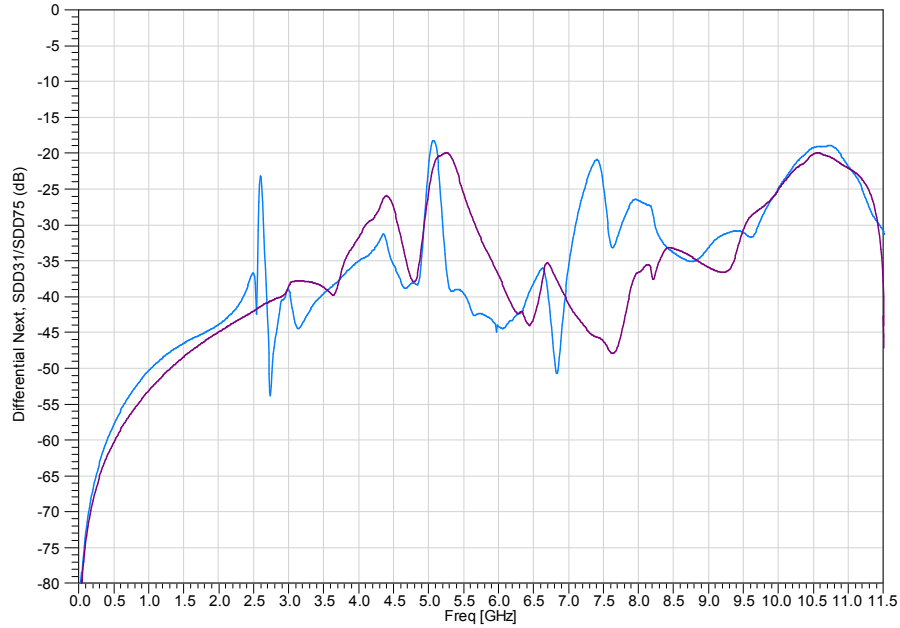
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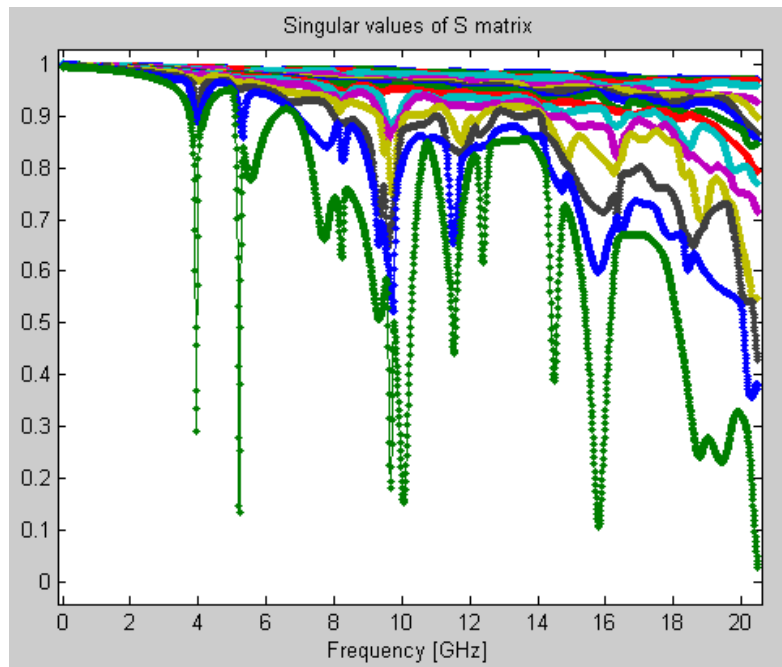
Differential Frequency Domain (continued)

Near-end Crosstalk, With-in Row

- Of Assignment 1/3 to 6/8 (blue) and 9/11 to 14/16 (magenta)



Model Passivity



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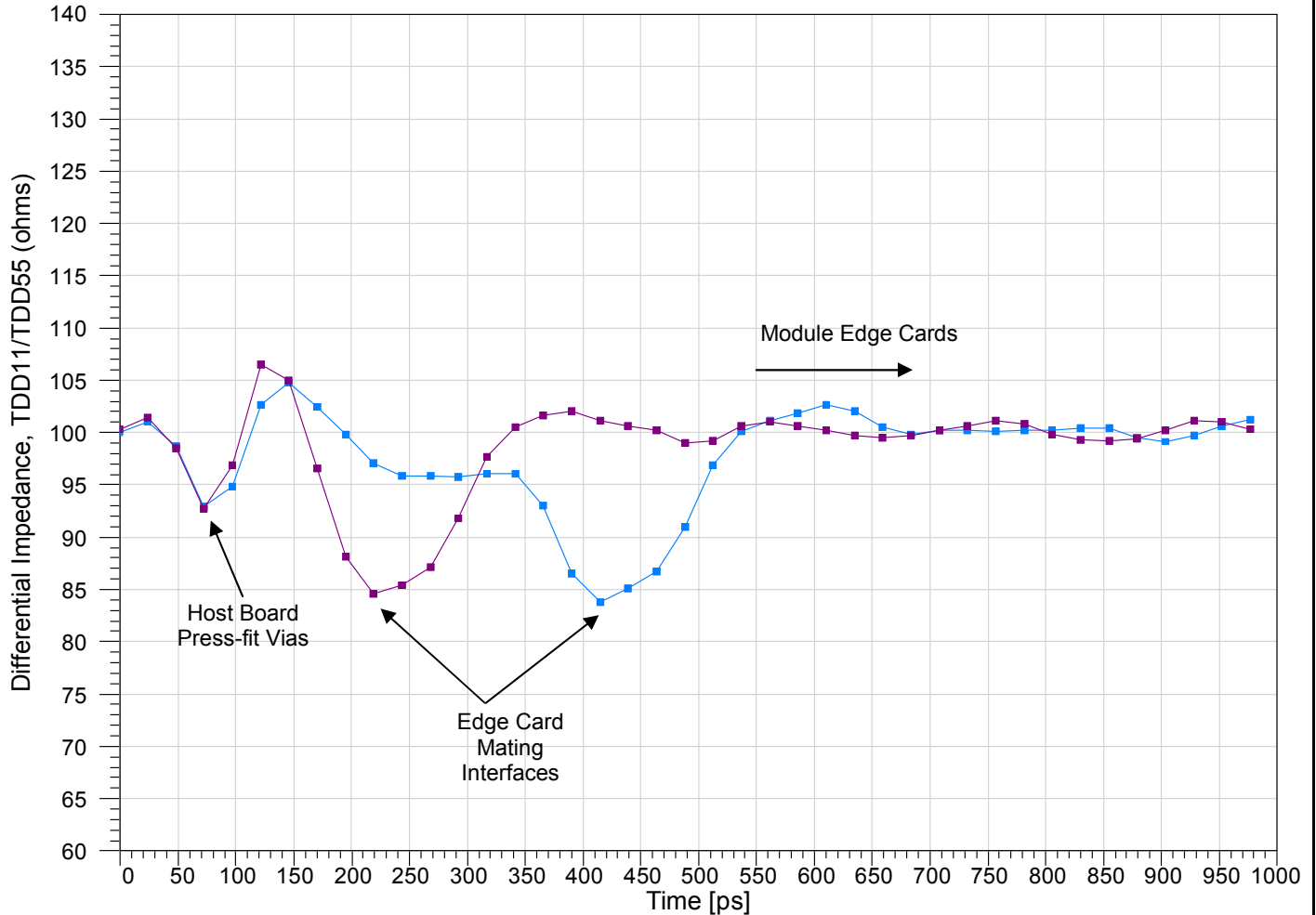
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REFERENCE RESULTS

Differential Time Domain

TDR Response

- Based on frequency-to-time domain transformation within Ansoft's HFSS application
- Rise-time of 25ps (20-80%)
- Upper port (blue), Lower port (magenta)
- Into terminals 1/3 (blue) & 9/11 (magenta) on Host Board Side



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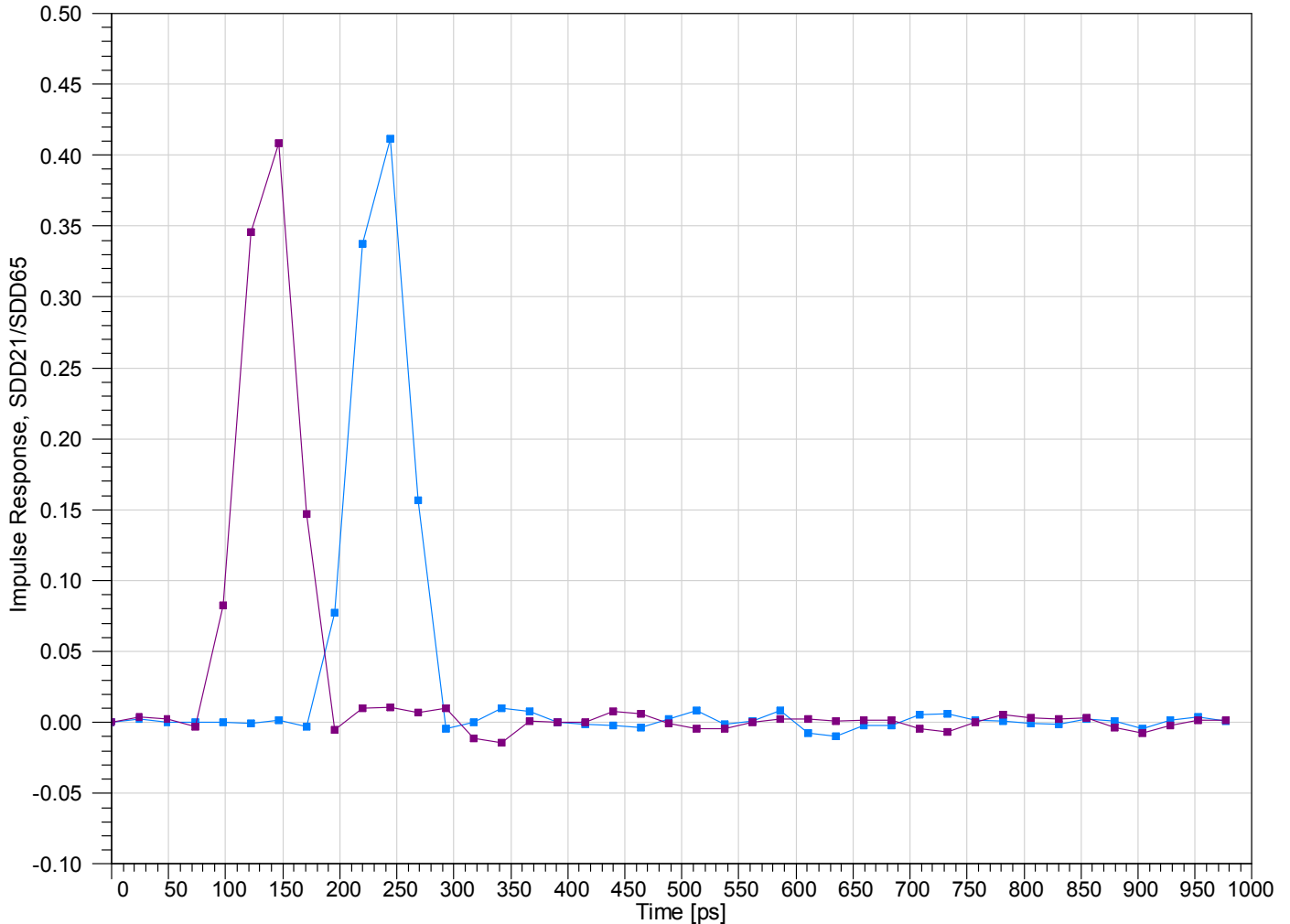
ELECTRICAL MODEL DOCUMENTATION

REFERENCE RESULTS

Differential Time Domain (Continued)

TDT Response

- Based on frequency-to-time domain transformation within Ansoft's HFSS application
- Rise-time of 25ps (20-80%)
- In to terminals 1/3 (blue) & 9/11 (magenta) on Host Board Side
- Out of terminals 2/4 (blue) & 10/12 (magenta) on module Board Side



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