GT-19-230

Signal Integrity Characterization Report

For Glenair VersaLink Micro-D Connectors

GVLM-BS & GVLM-BR

Revision History

Rev	Description of Change	Date	Issued By:	Approved By:
1	Preliminary	08/29/2019	Ali Saberi	Guido Hunziker
2	Calibration charts labeled as such, s-parameters added	09/05/2019	Ali Saberi	Guido Hunziker

Table of Contents

Introduction

This testing was performed in order to evaluate the high-frequency electrical performance of the Glenair VersaLink Micro-D connector. All measurements were taken with a Tektronix DSA8300 Digital Serial Analyzer & a Keysight N5227B VNA network analyzer with option TDR; both connected to SMA-launch PCB test fixtures which are specifically designed for this testing. This report outlines frequency domain performance such as SI performance, Insertion Loss (IL), Return Loss (RL), Near-End Crosstalk (NEXT), Far-End Crosstalk (FEXT), EYE diagram, as well as time-domain performance including Impedance.

Product Overview

Glenair VersaLink Micro-D connector offers outstanding signal integrity results, mating performance, durability and minimal contact resistance.

Test Samples and Test Fixtures

1) Two (2) board mount straight VersaLink Micro-D connectors (PN: GVLM2L-2-9SBSPN-.140) installed on PCB test fixtures (PN: 691-CB193 and 691-CB194, REV 1) and One (1) SMA 2x-trace calibration PCB fixture (P/N: 691-CB194 REV 1)

2) Two (2) board mount right angle VersaLink Micro-D connectors (PN: GVLM2L-2-9SBRPN-.140) installed on PCB test fixtures (PN: 691-CB195 and 691-CB196, REV 1) and One (1) SMA 2x-trace calibration PCB fixture (P/N: 691-CB195 REV 1)

Note* Test fixtures are shown in Figures 1 and 2.

Figure 1. Straight Micro-D test fixtures and 2x-trace calibration PCB

Figure 2. Right Angle Micro-D test fixtures and 2x-traec calibration PCB

Test Equipment:

- Keysight N5227B VNA 4 ports network analyzer with option TDR
- Keysight ECAL Module N4694A 10 MHz – 67 GHz
- Tektronix 8300 TDR Scope with 80E08 Test Modules

Test Setup and Calibration

The VNA was set up to characterize the differential s-parameters and impedance of the mated VersaLink Micro-D connectors. The setup inputs for the VNA are specified as below:

Frequency Sweep:	10 MHz – 20 GHz
IF Bandwidth:	500 Hz
Resolution:	2001 Points
Power Level:	-5.0 dBm

A full 4-ports were calibrated using the ECAL module as illustrated in Figure 3 before commencing test of the mated connectors.

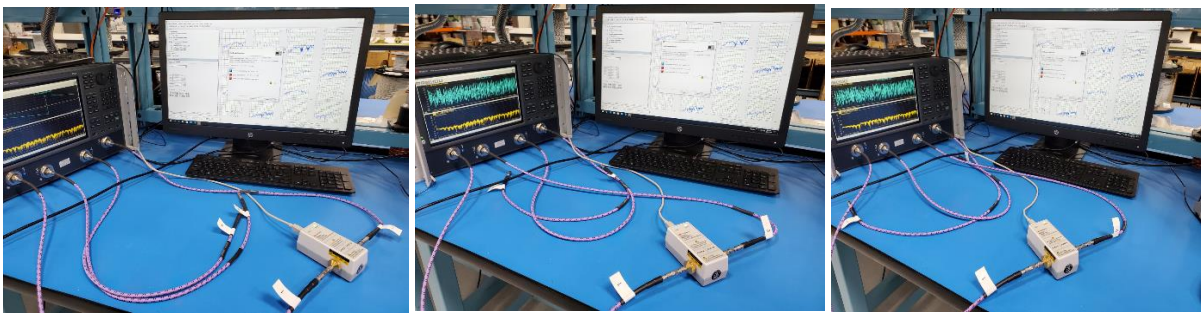


Figure 1. VNA Test Setup and Calibration (Ports 1-2, 1-3, 1-4)

Test Procedure

1. PCB Test Fixture

The PCB test fixture for the VersaLink Micro-D qualification test for Signal Integrity compliance is shown in Figures 1 and 2. The test fixture was first characterized for the impedance performance using the TDR scope to ensure a good impedance match.

The VNA and TDR scope would be used to collect the respective frequency domain and time domain test parameters for the bulk cable and mated connectors:

- Impedance @ 50ps signal rise time using the TDR scope
- Insertion Loss
- Return Loss
- Near-end crosstalk (NEXT) and Far-end crosstalk (FEXT)
- EYE Diagram

For the Insertion Loss, the PCB test fixture artifact that is not part of the mated connectors would be de-embedded from the results using the 2x-trace calibration PCB test fixture.

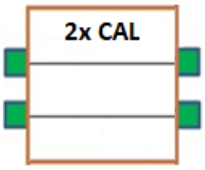


Figure 4. 2x-trace calibration PCB

The VersaLink Micro-D mated PCB under test is considered from the first mated pin/socket to the last mated pin/socket as shown in Figure 5.

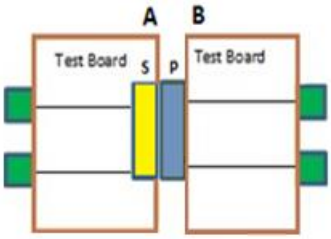


Figure 5. VersaLink Micro-D PCBA

The test data would be saved in a touchstone (.s4p) format for the s-parameters and in a .csv format for the impedance data. All parts of the PCB test fixture artifact that are not part of the cable assemblies would be de-embedded from the results using the Ataitec software and the s-parameter data of the PCB test fixture.

Test Results

The following data represents typical signal integrity performance of mated VersaLink Micro-D connectors:

1) **Testing GVLM-BS**
   a. **GVLM-BS 2x-trace calibration PCB**

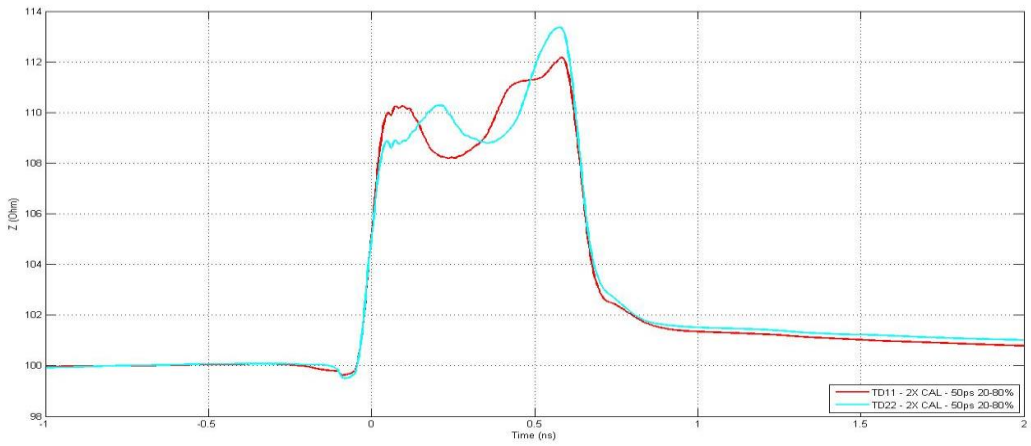


Figure 6. Impedance 50ps 20-80 – 2x-trace calibration PCB

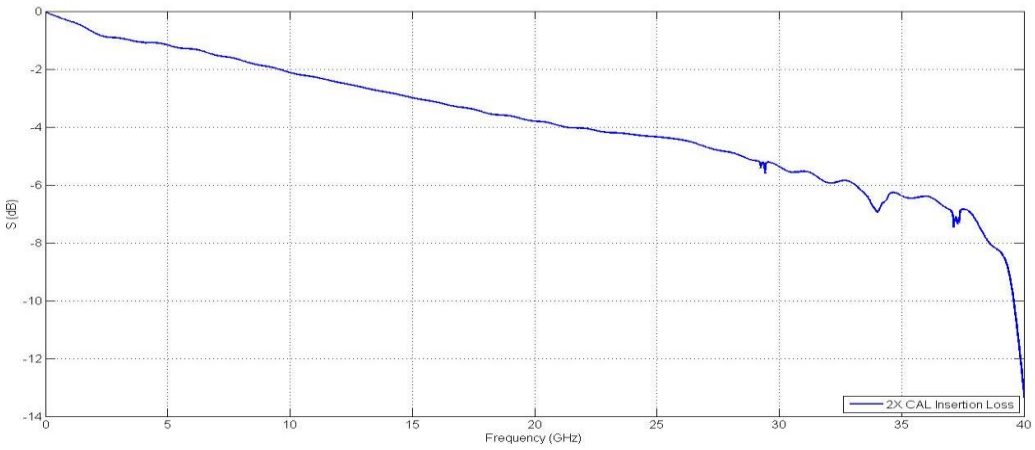


Figure 7. Insertion Loss – 2x-trace calibration PCB

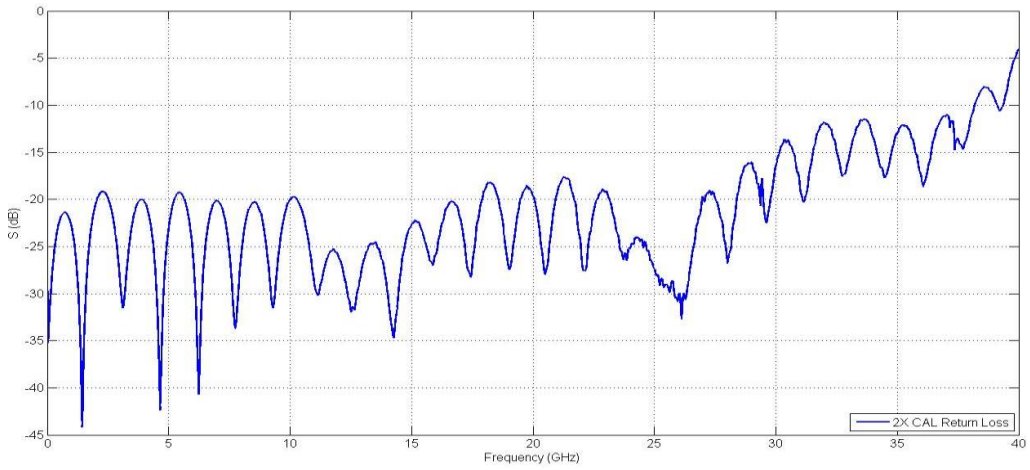


Figure 8. Return Loss – 2x-trace calibration PCB

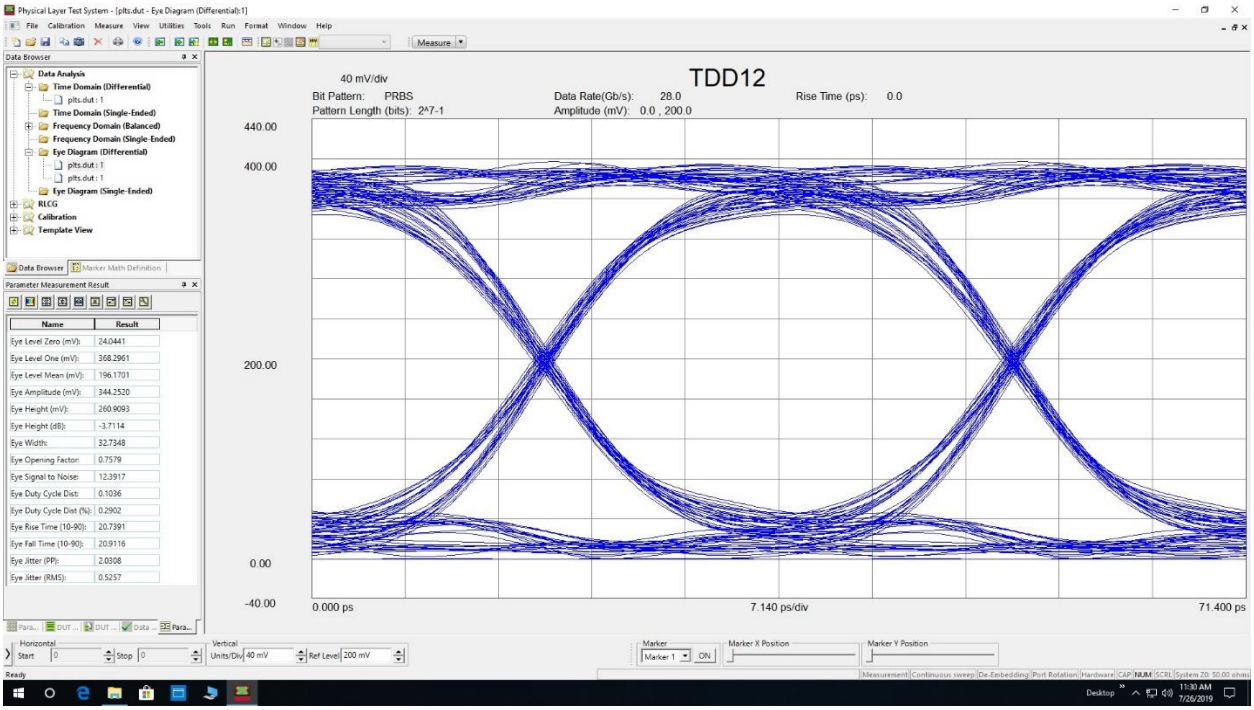


Figure 9. EYE – 2x-trace calibration PCB at 28 Gbps

b. GVLM-BS Mated VersaLink Micro-D PCBA

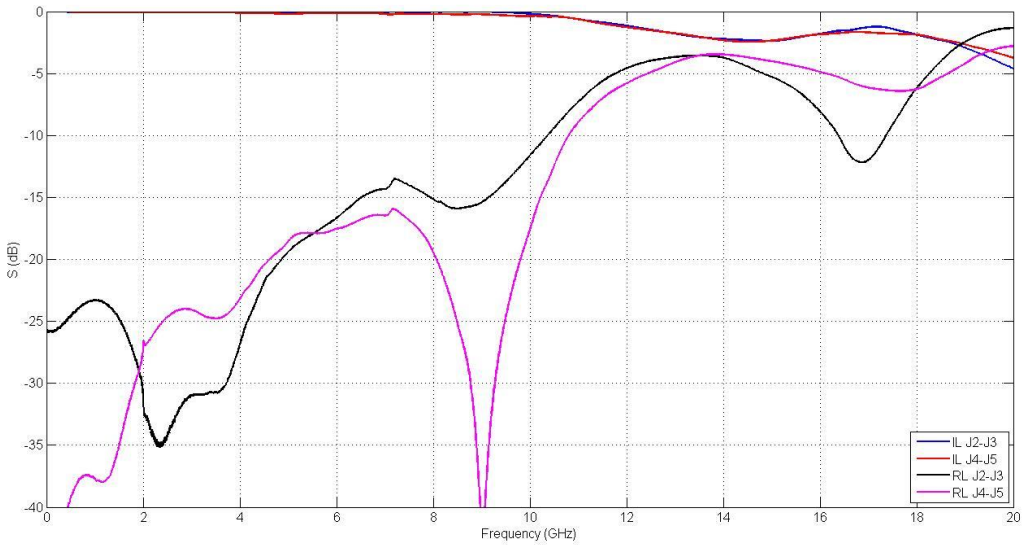


Figure 10. S parameter performance of the Straight VersaLink Micro-D

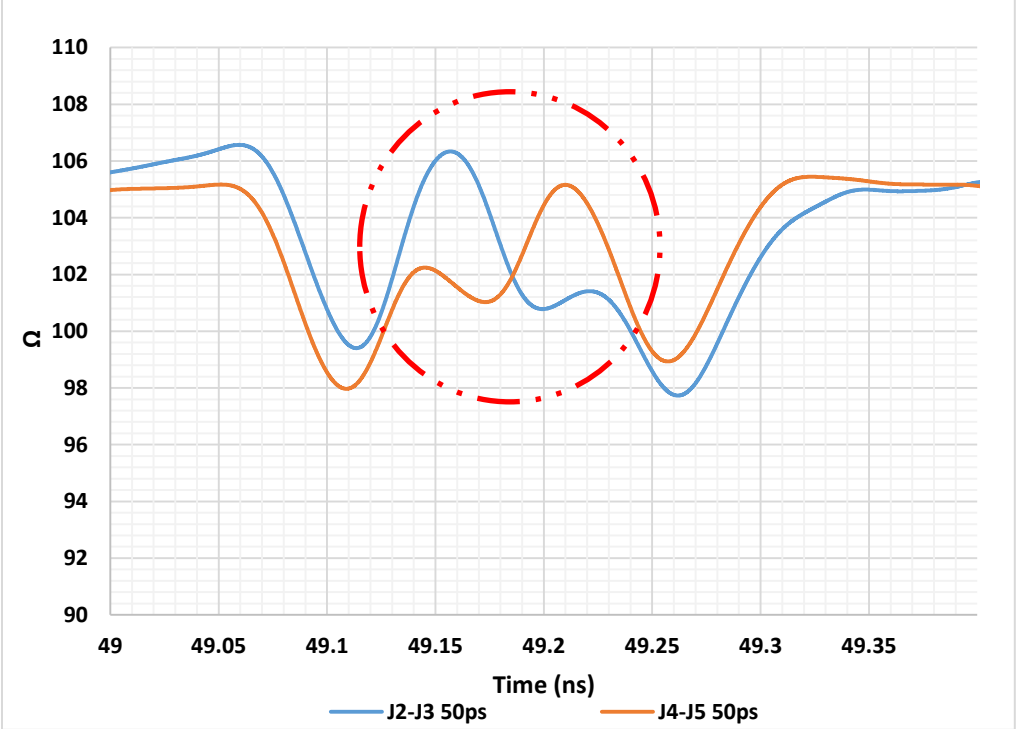


Figure 11. Impedance – GVLM-BS Mated VersaLink Micro-D PCBA

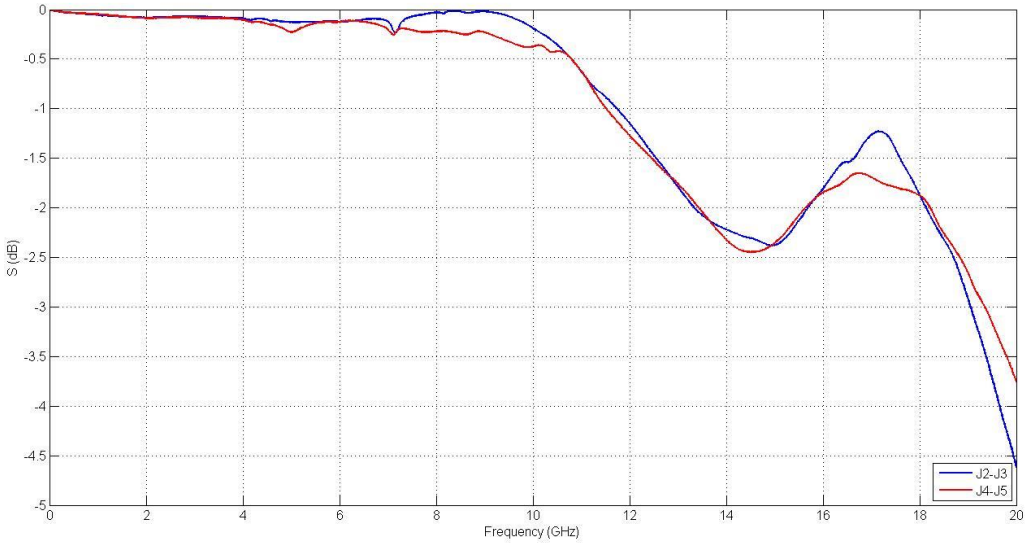


Figure 12. Insertion Loss GVLM-BS Mated VersaLink Micro-D PCBA

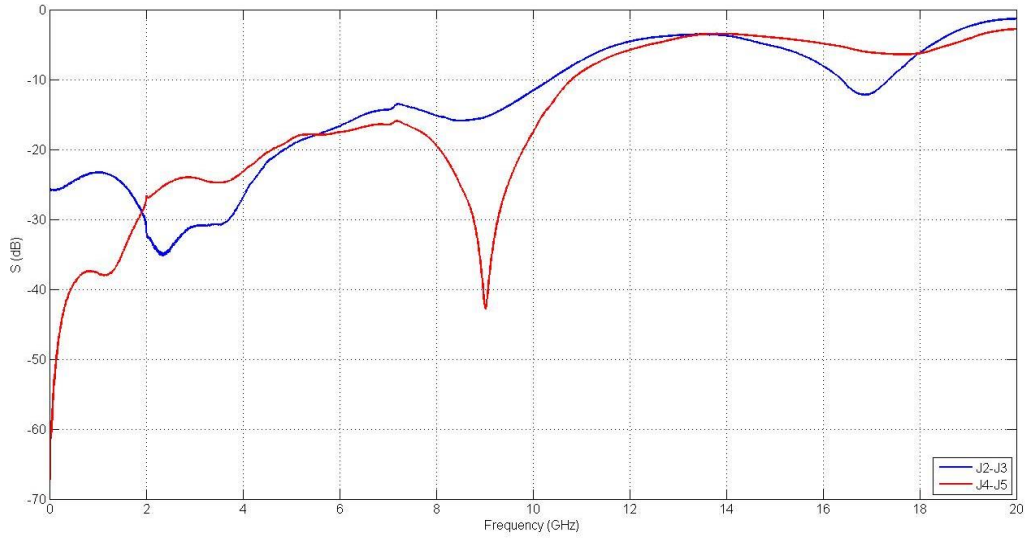


Figure 13. Return Loss GVLM-BS Mated VersaLink Micro-D PCBA

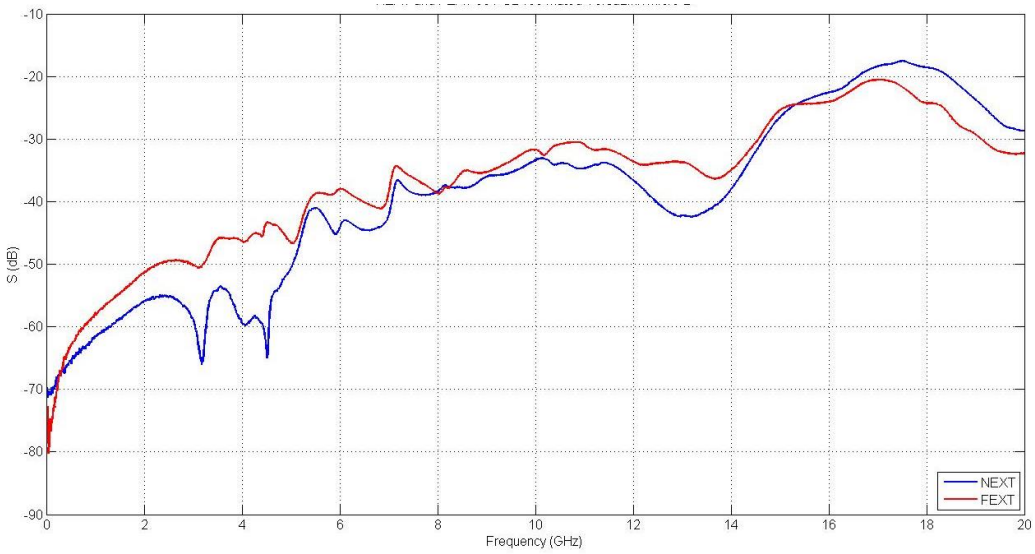


Figure 14. NEXT and FEXT GVLM-BS Mated VersaLink Micro-D

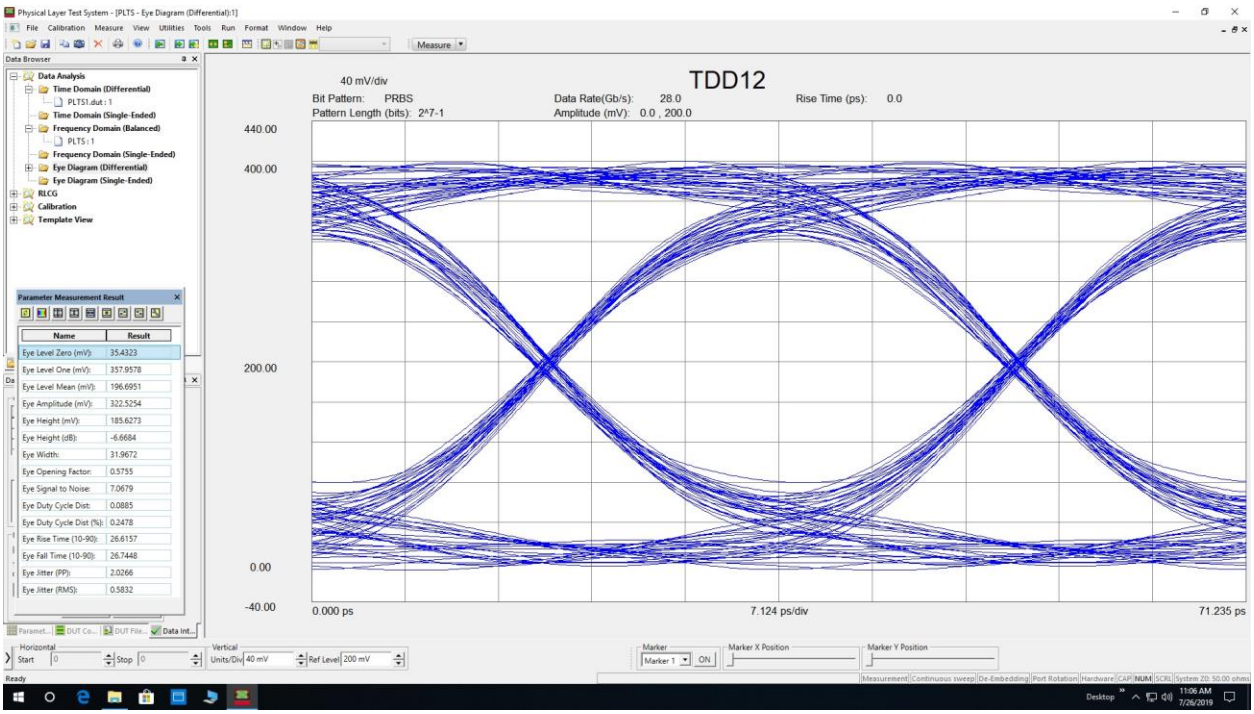


Figure 15. EYE J2-J3 28Gbps

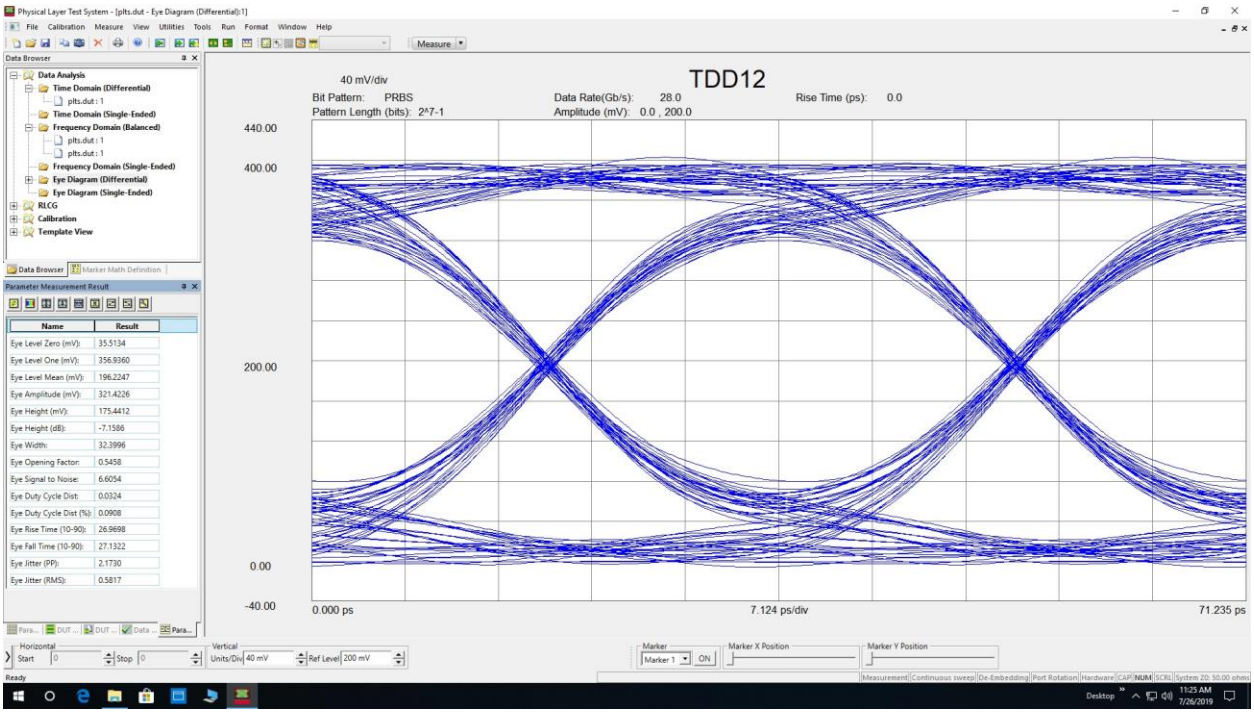


Figure 16. EYE J4-J5 28Gbps

2) Testing GVLM-BR

a. GVLM-BR 2x-trace calibration PCB

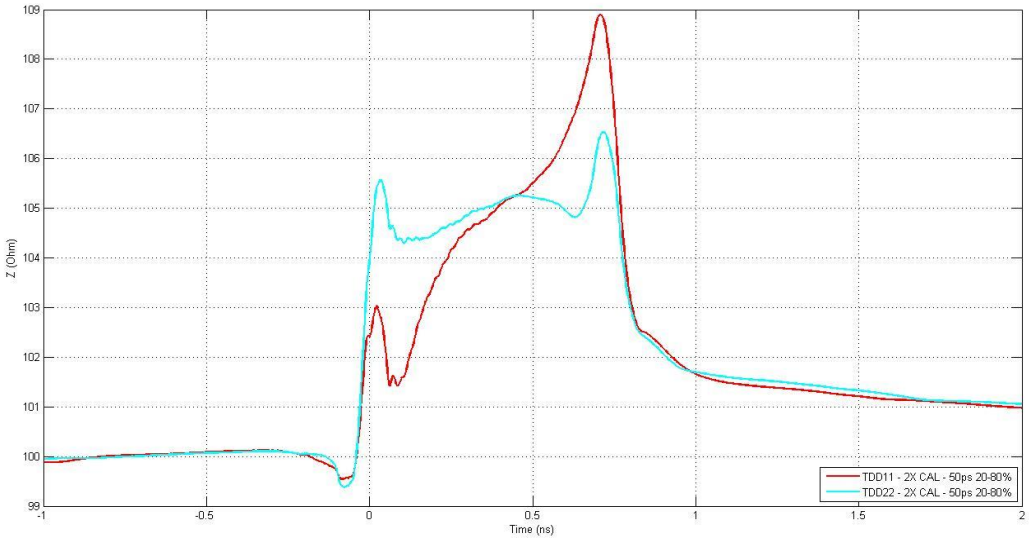


Figure 17. Impedance 50ps 20-80 – 2x-trace calibration PCB

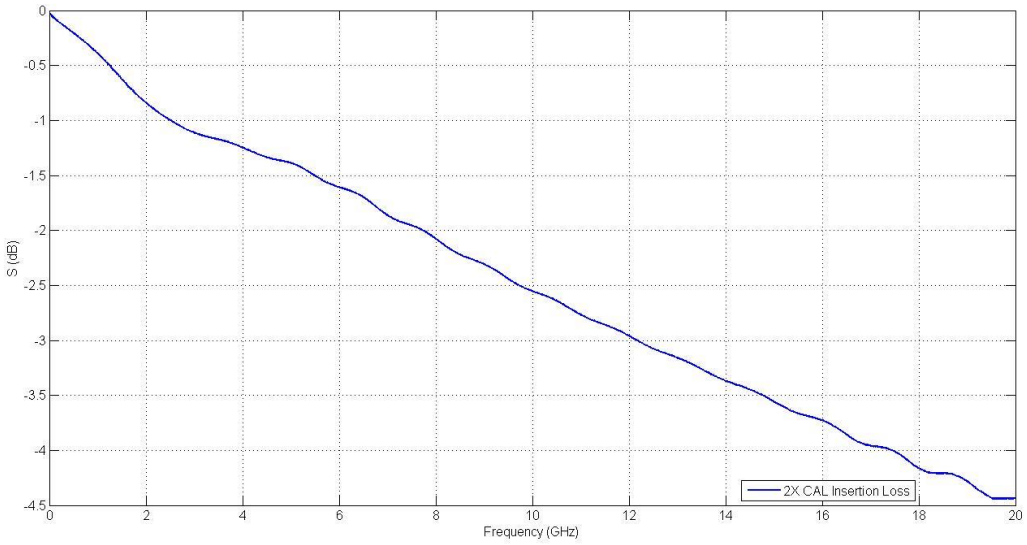


Figure 18. Insertion Loss – 2x-trace calibration PCB

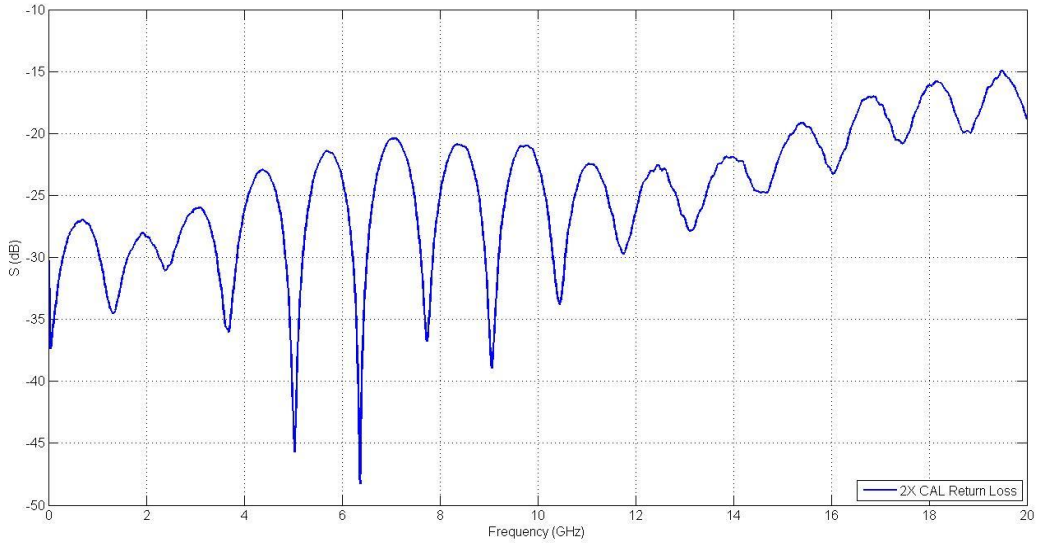


Figure 19. Return Loss – 2x-trace calibration PCB

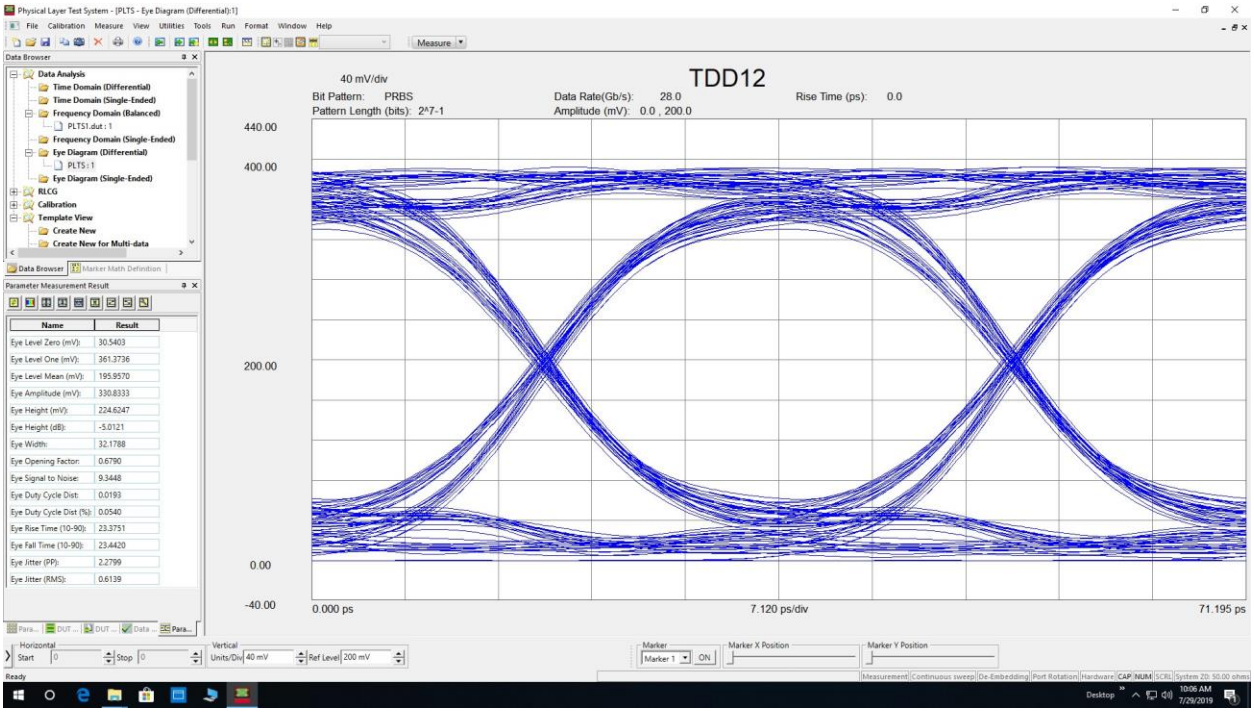


Figure 20. EYE – 2x-trace calibration PCB at 28 Gbps

b. GVLM-BR Mated VersaLink Micro-D PCBA

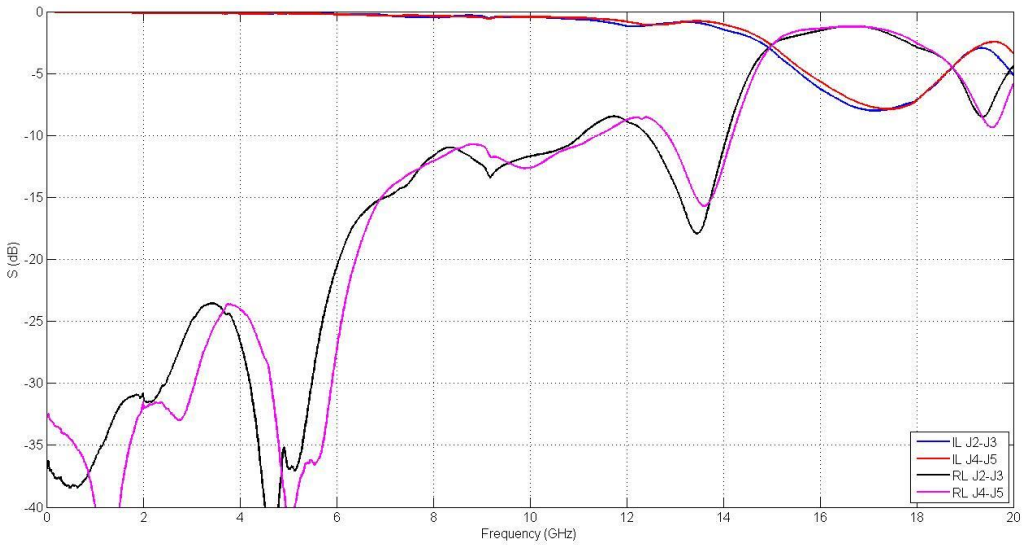


Figure 21. S parameter performance of the Right Angel VersaLink Micro-D

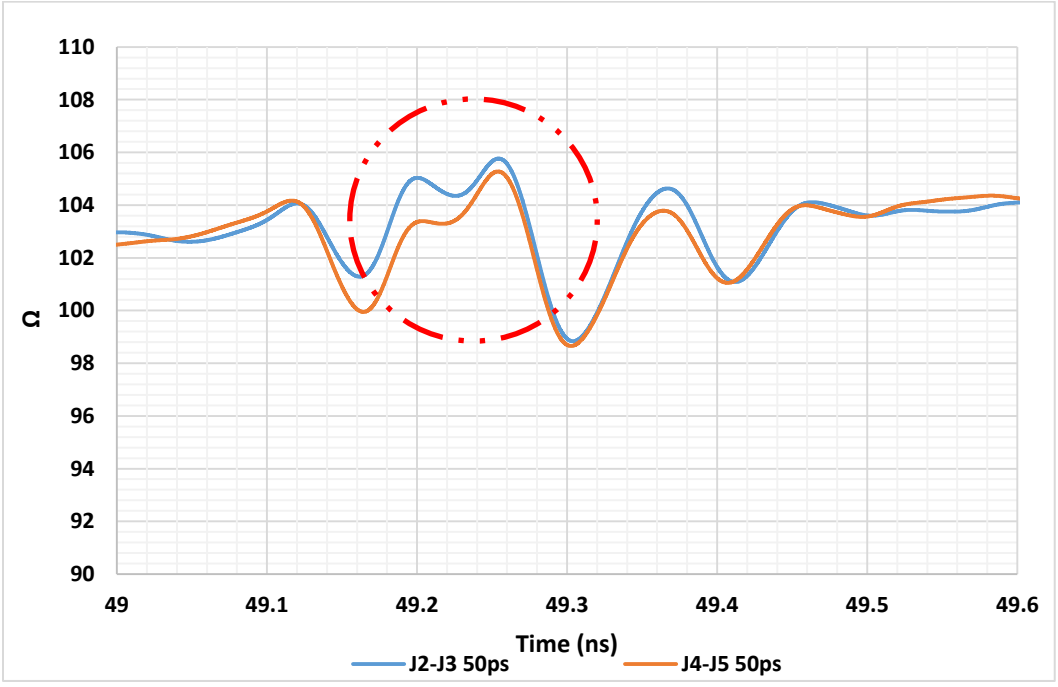


Figure 22. Impedance - GVLM-BR Mated VersaLink Micro-D PCBA

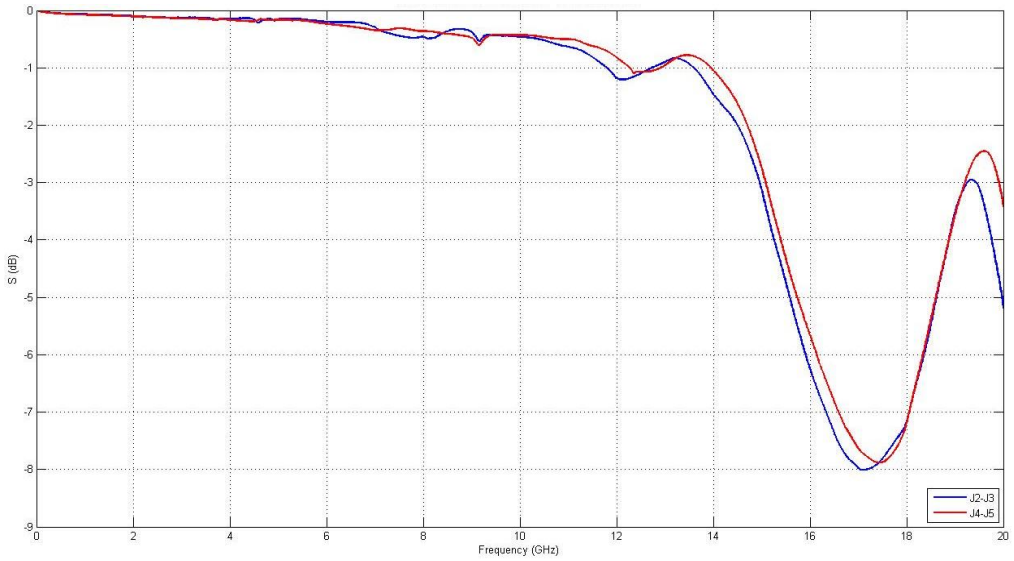


Figure 23. Insertion Loss GVLM-BR Mated VersaLink Micro-D PCBA

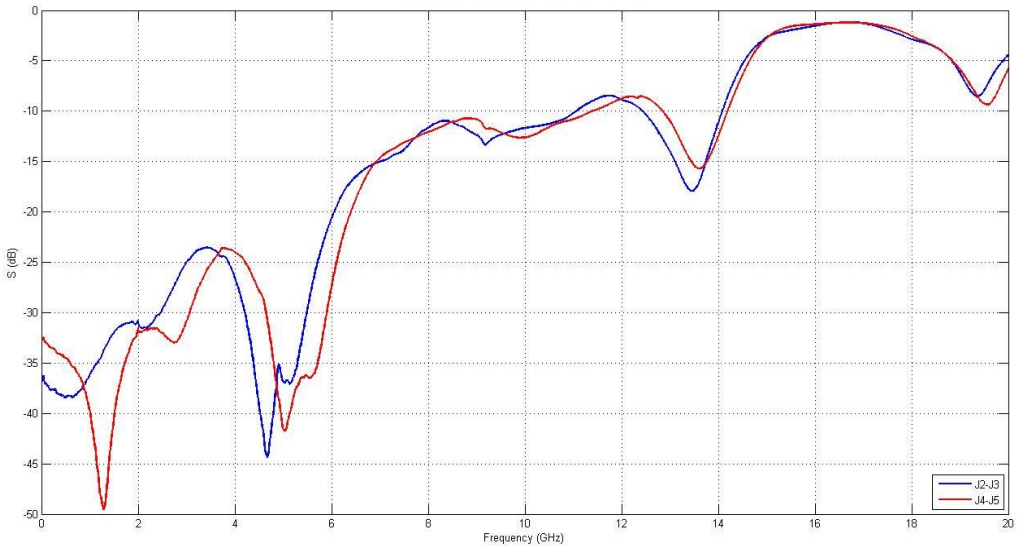


Figure 24. Return Loss GVLM-BR Mated VersaLink Micro-D PCBA

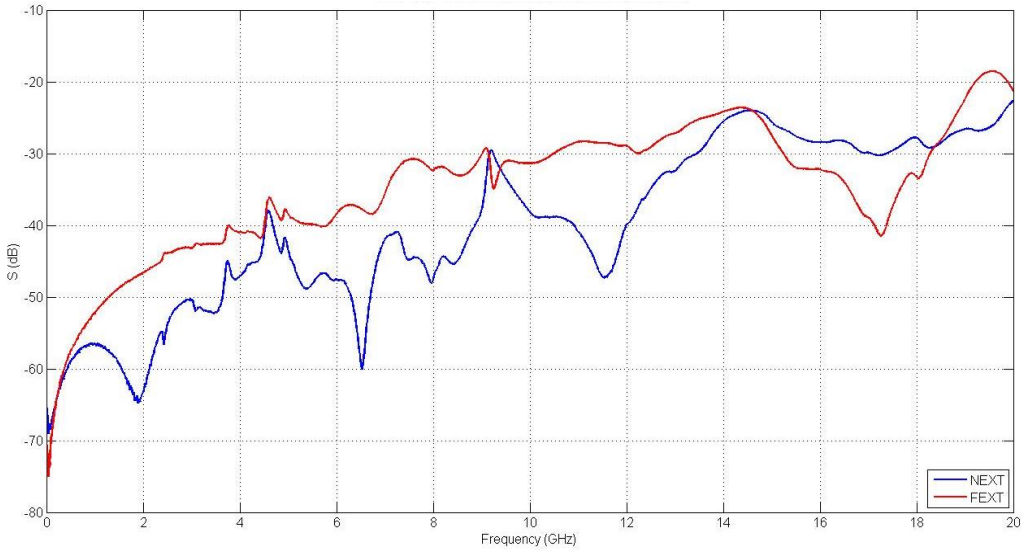


Figure 25. NEXT and FEXT GVLM-BR Mated VersaLink Micro-D

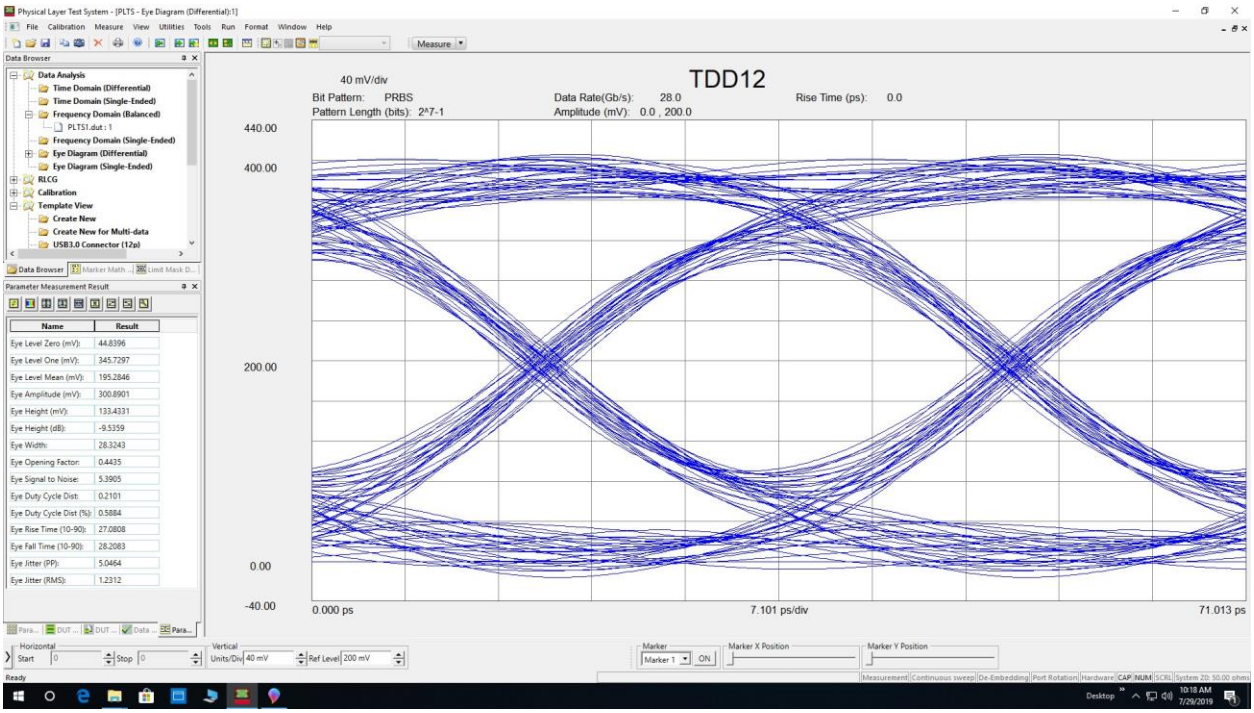


Figure 26. EYE J2-J3 28Gbps

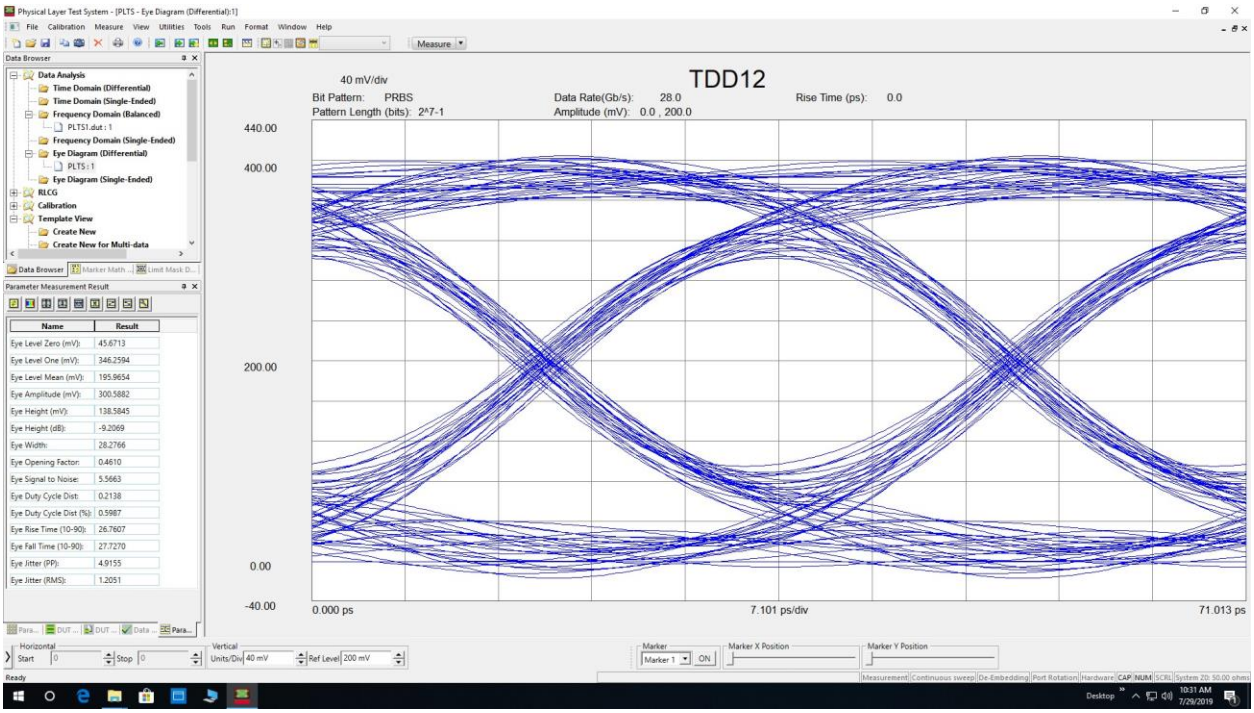


Figure 27. EYE J4-J5 28Gbps

Appendix A.

1) Right Angle VersaLink Micro-D connectors (PN: GVLM2L-2-9SBSPN-.140)

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
1	PRELIMINARY RELEASE	03/22/19	MKH
2	CHANGE MAX OP TEMP	04/25/19	MKH

SIZE C | 1 | GVLM-BR | REV 2

HOW TO ORDER

SAMPLE PART NUMBER	GVLM	2	L-	2-9	P	BR	P	T	-.110
SERIES	GVLM - GLENAIR VERSALINK MICRO-D								
SHELL FINISH	2 - NICKEL 5 - GOLD								
INSULATOR MATERIAL	L - PPS								
CONTACT LAYOUT (V-M)	1-0, 2-0, 1-9, 2-9, 4-0, 2-15, 3-9, 4-15, 4-31, 8-9, 10-0								
CONTACT TYPE[2]	P - PIN (PLUG) S - SOCKET (RECEPTACLE)								
TERMINATION TYPE	BR - BOARD RIGHT ANGLE								
HARDWARE[1]	P - JACKPOST								
THREADED INSERT OPTION	T - THREADED INSERT IN BOARD MOUNT HOLE OMIT FOR THRU-HOLE								
PC TAIL LENGTH[3]	.080, .110, .140 LENGTH IN INCHES ±.015								

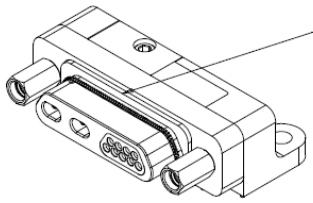
1 - HARDWARE ALWAYS REQUIRED TO ENSURE CONNECTOR PAIR IS FULLY MATED WHEN INSTALLED.
2 - PLUG CONNECTOR USES PIN MICRO-D CONTACTS AND SOCKET VERSALINK CONTACTS. RECEPTACLE USES SOCKET MICRO-D CONTACTS AND PIN VERSALINK CONTACTS.
3 - THESE CONNECTORS ARE SOLDER-DIPPED IN 60/40 TIN-LEAD SOLDER.

MATERIALS AND FINISHES:

CONNECTOR SHELL	- ALUMINUM ALLOY 6061 (SEE ORDERING INFO FOR PLATING OPTIONS)
INSULATOR (V)	- RIGID DIELECTRIC
INSULATOR (M)	- POLYPHENYLENE SULFIDE (PPS)
PIN CONTACT	- COPPER ALLOY, GOLD OVER NICKEL PLATING
SOCKET CONTACT	- COPPER ALLOY, GOLD OVER NICKEL PLATING
GROUND PIN	- COPPER ALLOY, GOLD OVER NICKEL PLATING
GROUND SPRING	- STAINLESS STEEL, GOLD PLATING
HARDWARE	- 300 SERIES STAINLESS STEEL, PASSIVATED
ENCAPSULANT	- EPOXY RESIN HYSOL EE4215

PERFORMANCE SPECIFICATIONS:

CURRENT RATING	- 3 AMP
DWV (CONTACT M)	- 600 VAC SEA LEVEL
INSULATION RESISTANCE (CONTACT M)	- 5000 MEGOHMS MINIMUM
CONTACT RESISTANCE (CONTACT M)	- 8 MILLIOHMS MAXIMUM
LOW LEVEL CONTACT RESISTANCE	- 32 MILLIOHMS MAXIMUM
OPERATING TEMPERATURE	- -55°C TO 125°C
MATING FORCE (CONTACT V)	- (5 OUNCES) X (# OF CONTACTS)
MATING FORCE (CONTACT M)	- (10 OUNCES) X (# OF CONTACTS)



PERIPHERAL FLANGE SEAL
BLUE FLUOROSILICONE RUBBER
MOD CODE 1089 (PLUG ONLY)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONS ±1/16
SYMMETRY ℄ ±.001
RADII ±.005
DECIMALS X ±.1, .XX ±.01, .XXX ±.005, .XXXX ±.0010
ANGLES ±2°
DO NOT SCALE THIS DRAWING

DRAWN	MKH	03/05/19
CHECK	MKH	03/05/19
ENGR	MKH	03/05/19

D Brown
D Brown

RELEASE DATE
ORIGINAL RELEASE DATE
B/P P/C 017

GLENAIR, INC.
1211 AIR WAY, GLENDALE, CALIFORNIA 91201

TITLE: CONNECTOR, BOARD MOUNT, RIGHT ANGLE, MICRO-D, VERSALINK

CODE IDENT. NO.	SIZE	DWG NO	REV
06324	C	GVLM-BR	2

SCALE: N/A | WEIGHT: N/A | SHEET 1 OF 6

2) Straight VersaLink Micro-D connectors (PN: GVLM2L-2-9SBRPN-.140)

SIZE C | 1 GVLM-BS | REV 1

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
1	PRELIMINARY RELEASE	09/28/18	MKH

HOW TO ORDER

SAMPLE PART NUMBER	GVLM	2	L-	2-9	P	BS	PN	-.110
SERIES	GVLM - GLENAIR VERSALINK MICRO-D							
SHELL FINISH	2 - NICKEL 5 - GOLD							
INSULATOR MATERIAL	L - PPS							
CONTACT LAYOUT (V-M)	1-0, 2-0, 1-9, 2-9, 4-0, 2-15, 3-9, 4-15, 4-31, 8-9, 10-0							
CONTACT TYPE[2]	P - PIN (PLUG) S - SOCKET (RECEPTACLE)							
TERMINATION TYPE	BS - BOARD STRAIGHT							
HARDWARE[1]	PN - EXTENDED JACKPOST WITH HEX NUT AND LOCKWASHER							
PC TAIL LENGTH[3]	.080, .110, .140 LENGTH IN INCHES ±.015							

1 - HARDWARE ALWAYS REQUIRED TO ENSURE CONNECTOR PAIR IS FULLY MATED WHEN INSTALLED.
2 - PLUG CONNECTOR USES PIN MICRO-D CONTACTS AND SOCKET VERSALINK CONTACTS. RECEPTACLE USES SOCKET MICRO-D CONTACTS AND PIN VERSALINK CONTACTS.
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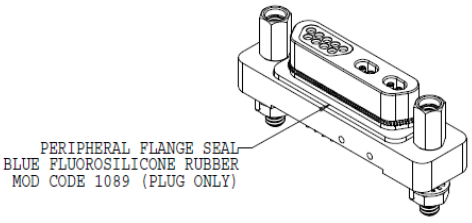
CONNECTOR SHELL	- ALUMINUM ALLOY 6061
(SEE ORDERING INFO FOR PLATING OPTIONS)	
INSULATOR (V)	- RIGID DIELECTRIC
INSULATOR (M)	- POLYPHENYLENE SULFIDE (PPS)
PIN CONTACT	- COPPER ALLOY, GOLD OVER NICKEL PLATING
SOCKET CONTACT	- COPPER ALLOY, GOLD OVER NICKEL PLATING
GROUND SPRING	- STAINLESS STEEL, GOLD PLATING
HARDWARE	- 300 SERIES STAINLESS STEEL, PASSIVATED
ENCAPSULANT	- EPOXY RESIN HYSOL EE4215

PERFORMANCE SPECIFICATIONS:

CURRENT RATING	- 3 AMP
DWV (CONTACT M)	- 600 VAC SEA LEVEL
INSULATION RESISTANCE (CONTACT M)	- 5000 MEGOHMS MINIMUM
CONTACT RESISTANCE (CONTACT M)	- 8 MILLIOHMS MAXIMUM
LOW LEVEL CONTACT RESISTANCE	- 32 MILLIOHMS MAXIMUM
OPERATING TEMPERATURE	- -55°C TO 125°C
MATING FORCE (CONTACT V)	- (3 OUNCES) X (# OF CONTACTS)
MATING FORCE (CONTACT M)	- (10 OUNCES) X (# OF CONTACTS)



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONS ±1/16
SYMMETRY ℄ ±.001
RADII ±.005
.X ±.1
.XX ±.01
DECIMALS .XXX ±.005
.XXXX ±.0010
ANGLES ±2°
DO NOT SCALE THIS DRAWING

DRAWN	MKH	09/28/18
CHECK	MKH	09/28/18
ENGR	MKH	09/28/18

D. Brown
D. Brown

RELEASE DATE
ORIGINAL RELEASE DATE

GLENAIR, INC.
1211 AIR WAY, GLENDALE, CALIFORNIA 91201

TITLE: CONNECTOR, BOARD MOUNT, STRAIGHT, MICRO-D, VERSALINK

CODE IDENT. NO.	SIZE	DWG NO	REV
06324	C	GVLM-BS	1

SCALE: N/A | WEIGHT: N/A | SHEET 1 OF 4