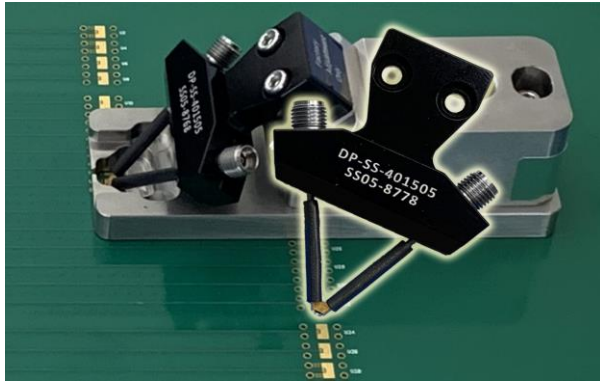


D-PROBE DP-SS SERIES

RUGGED 40/20 GHZ DIFFERENTIAL PROBE (SIGNAL-SIGNAL ONLY)



FEATURES:

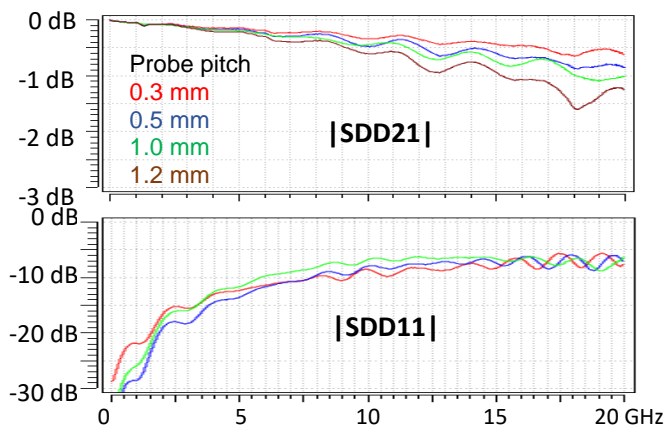
- **High Bandwidth:** DC to 40/20 GHz
- **Low Insertion Loss:** < 3 dB @ 40/20 GHz
- **Signal-Signal Only:** Accurate S-parameter & TDR measurements without the need of ground pads
- **Ruggedness:** Strong enough for direct probing on uneven solder bumps
- **High Repeatability:** No moving parts
- **Applications:** Measurements for Delta-L+ PCB, DDR memory, PCIe, USB, HDMI, Display Port, and 100 Gigabit Ethernet boards

D-Probe series is designed for signal integrity and RF testing. Its strong beryllium copper (BeCu) tips are perfect for direct probing of test pads on uneven surfaces, such as solder bumps. With only two signal pins, D-Probe can perform accurate measurements without the need of nearby ground pads. For example, many DDR chips do not have enough ground pins around their differential signals. In this case, typical GSSG probes cannot be used. The user experience of D-Probe is similar to that of the microprobe. TP250 Precision Positioner allows an engineer to switch between the D-Probe and microprobe easily.

SPECIFICATIONS

Bandwidth	40 GHz (0.3/0.4/0.5/0.6 mm pitch) 35 GHz (0.8 mm pitch) 20 GHz (0.3 – 1.2 mm pitch)
Insertion Loss	Less than 3 dB @ Bandwidth
Impedance	50±2 Ohm
Connector Type	Female 2.92mm/40GHz, SMA/20GHz
Size/ Weight	51x38 x12 mm (2x1.5x0.5 in.)/ 20 gm
Probe Force	80 gm (typical) 250 gm (max w/o damage)

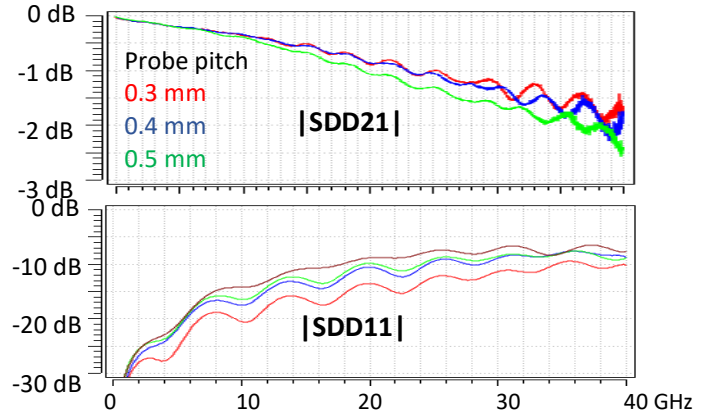
20 GHz D-Probe



Un-calibrated SDD21/SDD11 of 0.3/0.5/1.0/1.2 mm pitch

20 GHz PART NO.	BW (GHz)	PROBE PITCH
DP-SS-201503	20 GHz	0.3 mm / 12 mil
DP-SS-201504	20 GHz	0.4 mm / 16 mil
DP-SS-201505	20 GHz	0.5 mm / 20 mil
DP-SS-201508	20 GHz	0.8 mm / 32 mil
DP-SS-201510	20 GHz	1.0 mm / 40 mil
DP-SS-201512	20 GHz	1.2 mm / 48 mil

40 GHz D-Probe



Un-calibrated SDD21/SDD11 of 0.3/0.4/0.5 mm pitch

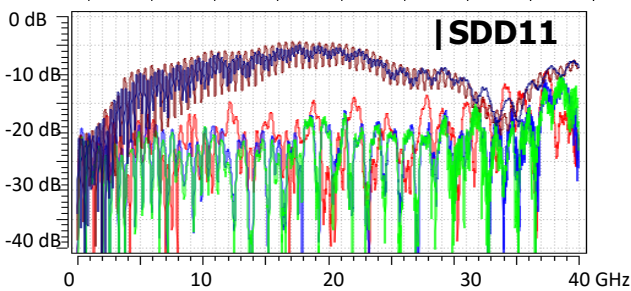
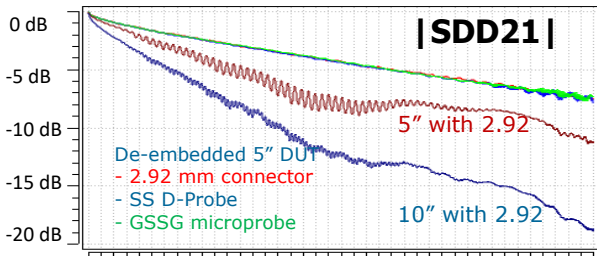
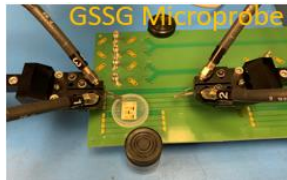
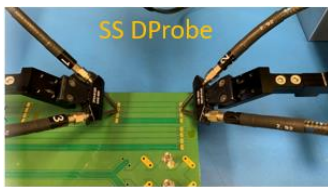
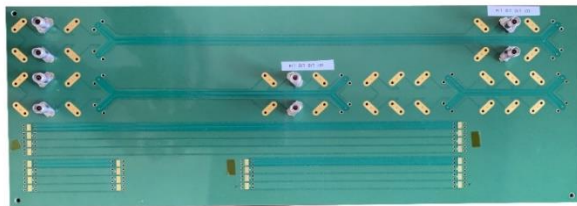
40 GHz PART NO.	BW (GHz)	PROBE PITCH
DP-SS-401502	40 GHz	0.2 mm / 8 mil
DP-SS-401503	40 GHz	0.3 mm / 12 mil
DP-SS-401504	40 GHz	0.4 mm / 16 mil
DP-SS-401505	40 GHz	0.5 mm / 20 mil
DP-SS-401506	40 GHz	0.6 mm / 24 mil
DP-SS-351508	35 GHz	0.8 mm / 32 mil

MEASUREMENTS

S-Parameter Measurement

With de-embedding tools, such as AITT-SFD, SS-only D-Probes, GSSG microprobes, and connectors provide comparable accuracy. Measurement data of a Delta-L 4.0 PCB with various differential stripline traces and via stubs are used for the comparison among the D-Probes, GSSG microprobes, and 40-GHz 2.92 mm connectors. Delta-L 4.0 unified probe launch allows both SS D-Probes and GSSG microprobes to probe the identical traces.

40 GHz Delta-L 4.0 Test Board

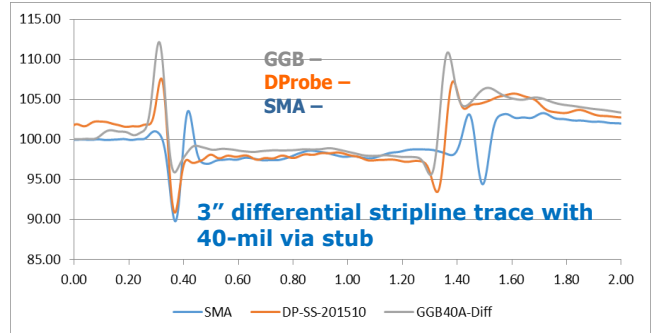


Comparison of S-Parameter Measurements

By using the 10" trace as the total and 5" trace as the 2X Thru, the Sdd21 and Sdd11 of the de-embedded 5" trace show that 2.92 mm connector, SS only D-Probe, and GSSG microprobe provide the comparable accuracy up to 40 GHz. The 2X Thru method removes the effects caused by the via and probe contact.

TDR Measurement

D-Probe is also ideal for TDR measurements that are essential to the development of high-speed CPU, FPGA, and Flex printed circuit boards.



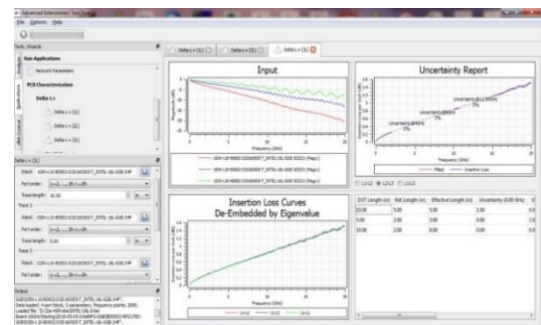
Comparison of TDR measurements

Delta-L + PCB Test Solution

This 40/20 GHz solution includes two DP-SS-401505DL/201510DL handheld probes, and AITT-DLP tool for Intel Delta-L+ PCB test method.



40/20 GHz Delta-L+ Handheld Probes



AITT-DLP Delta-L+ Software Tool (40 GHz)

ACCESSORIES

- AITT-DLP (Delta-L+ software tool, 40 GHz)
- DP-SS-201510DL (20 GHz Delta-L 3.0 hand probe)
- DP-SS-401505DL (40 GHz Delta-L 4.0 hand probe)
- DP-Hand01 handheld wand (not for VNA measurements)



D-Probe on
TP250



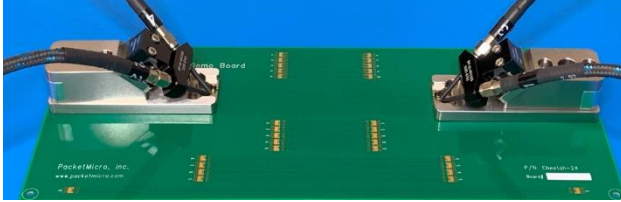
D-Probe on
DP-Hand01



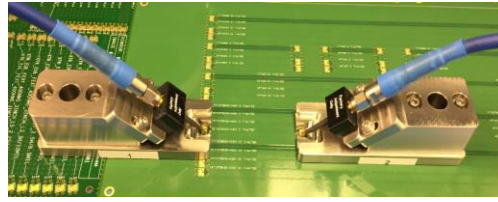
Probes in
Case-Hand01

HANDHELD PROBES FOR DELTA-L 4.0/3.0

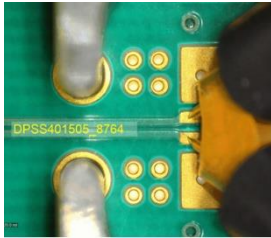
PacketMicro offers three different handheld probes for PCB characterization based on Delta-L 4.0/3.0 methodology that enables accurate PCB trace loss measurements and material extraction by removing the via effect.



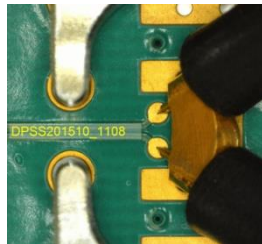
Differential Signal-Signal Probes



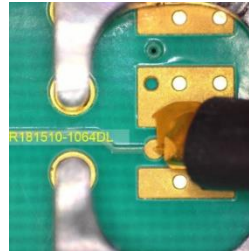
Single-ended Signal-GND Probe



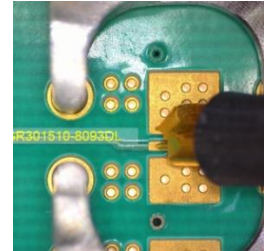
Delta-L 4.0
(40 GHz 0.5mm D-Probe)



Delta-L 3.0
(20 GHz 1.0mm D-Probe)



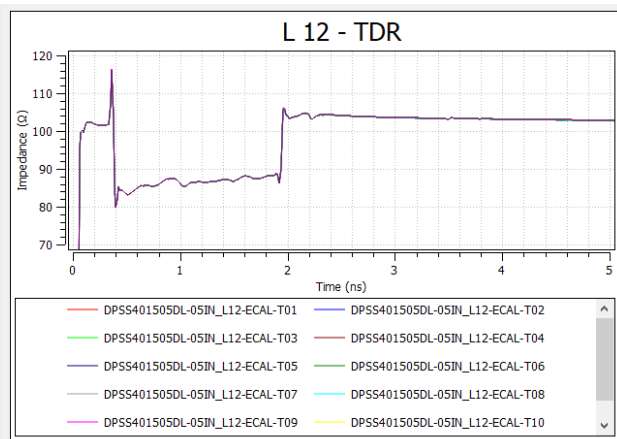
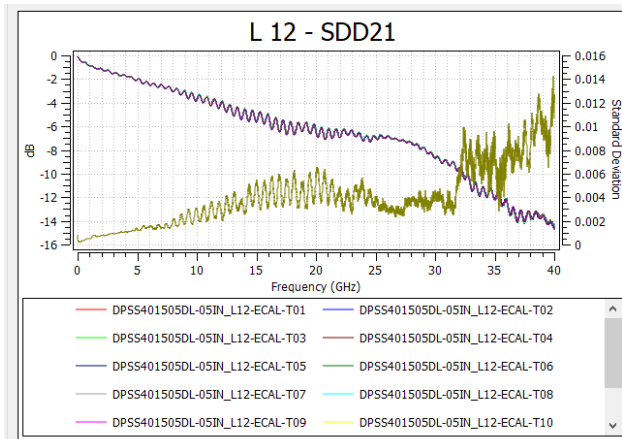
Delta-L 3.0
(18 GHz 1.0mm S-Probe)



Non-standard
(30 GHz 0.5mm S-Probe)

EXCELLENT PROBING REPEATABILITY

In addition to the probe bandwidth requirement, the probing repeatability is essential. PacketMicro handheld probes are specifically designed for Intel Delta-L+ methodology and has excellent repeatability due to its constant probe force and launch angle. The following report, generated by AITT-DLP tool, shows that 12 different measurements were performed on the same differential trace. The standard deviation is 0.004 dB @ 28 GHz.



DUT Information

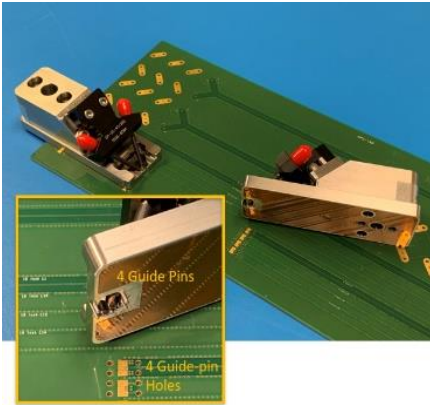
	Mean	Maximum	Minimum	Range	Standard Deviation
L 12					
4.000 GHz	0.341	0.342	0.339	0.003	0.001
8.000 GHz	0.612	0.616	0.609	0.007	0.002
12.890 GHz	0.884	0.891	0.880	0.011	0.003
16.000 GHz	0.997	1.004	0.990	0.014	0.003
28.000 GHz	1.478	1.485	1.470	0.015	0.004

Summary

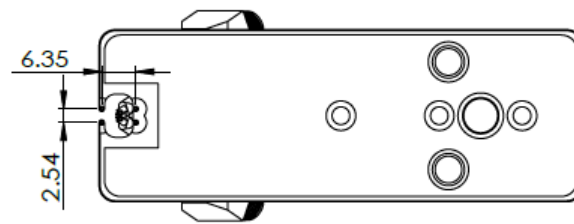
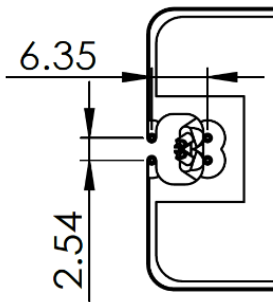
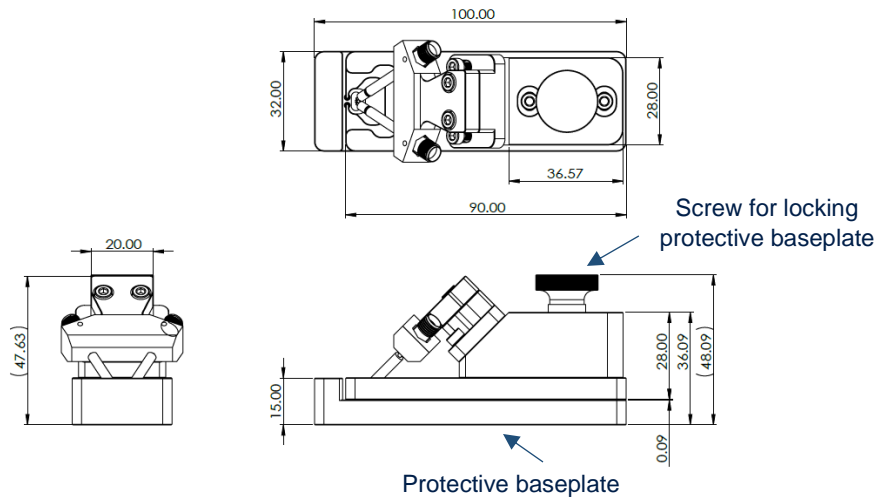
	Mean	Maximum	Minimum	Range	Standard Deviation
L 12					
Probe	115.933	116.531	115.103	1.429	0.409
Via	79.699	79.753	79.640	0.113	0.035
Trace	86.677	86.684	86.668	0.015	0.004

HANDHELD FIXTURE DIMENSIONS

DP-SS-401505DL/DP-SS-201510DL Dimensions (mm)

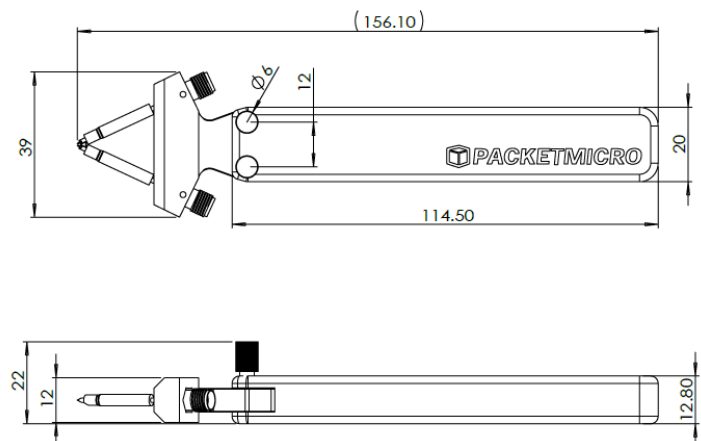


400 grams without baseplate
500 grams with baseplate



Bottom view without protective baseplate

DP-Hand01 Dimensions (mm)



NOTES:

- DP-SS-401505DL/DP-SS-201510DL handheld probe is specifically designed for Intel Delta-L+ methodology. User should refer to the Intel document for the detail probing pad footprint in PCB layout design.
- Any adjustment of the DP-SS-401505DL/DP-SS-201510DL should be sent back to PacketMicro or its authorized distributors for services. Please do not remove the DProbe from its DP-hand02 fixture.