DVT40-1MM 40 GHz Multi-Mode Two Probe Kit

Features

- Fully Balanced True Differential Probe without ground contact, adaptable to Single Ended Input Impedance for TDR measurements
- Measure S4p SDD21/SDD11 S-parameters to 40 GHz
- Adjustable Signal Probe Pitch (from 350 um to 1.8 mm) 4-6um
- ~4.5 ps TDR Rise Time
- Conductive Diamond Plated Probe Tips for repeatably reliable measurements

Electrical Characteristics

- Attenuation: 1X, Max Voltage-in: 5.0V
- Connector Type**:** 2.92 mm 40 GHz K
- Probe Rise Time: Approximately ~4.5 ps nominal
- Differential S-parameter Bandwidth: 40 GHz after an In-Situ De-embedding (ISD) DVT Probe model is applied to the Probe measurement by the VNA.
- Differential Impedance: 100 ohms +/- 6% (nominal)
- Single impedance: 50 ohms +/- 3% (using conversion kit)

Mechanical Characteristics

- Rugged Brass/Gold-plated Probe Tips
- Conductive diamond-plated probe tips
- Fixed Pitch Signal to Signal Probe Tips
- No Ground Pin Required
- Adapters included to mount on Probe Positioners
- Differential S-S Probe Pitch: .35mm – 1.8mm

Applications

Time Domain Measurement

True Differential or Single Ended mode impedance measurements on PCBs, Cables, Backplanes, Daughter-Cards, and Flex Circuits.

A TDR rise time of ~4.5 ps for high resolution PCB Impedance measurements or Failure Analysis with 20 um Fault Isolation.

Frequency Domain Measurement

Use a 4-port VNA to extract differential SDD21/SDD11 return and insertion loss S-Parameters to 40 GHz with differential de-embedding applied.

The DVT40 bandwidth is attained by using the optional Ataitec In-Situ De-embedding (ISD) software to de-embed the probe loss from PCB measurements and set the VNA reference plane to the probe tips.

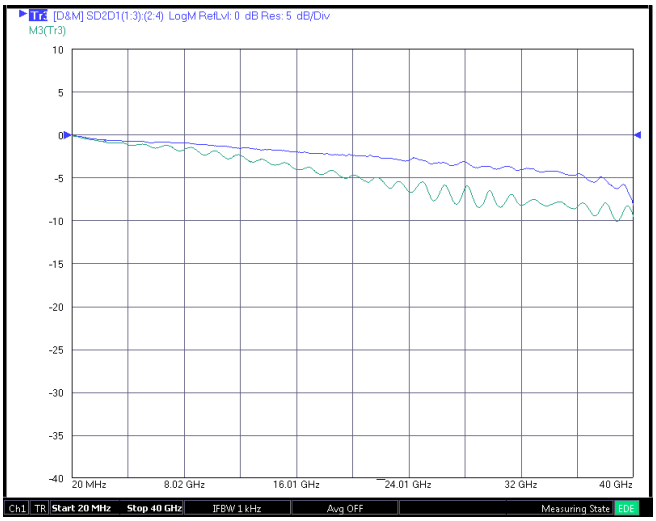
The DVT40 probe is all you need to characterize Gb/s interconnects in the time or frequency domain. The DVT40-1MM 40 GHz Dual Multi-Mode Probe Kit comes in an elegant wooden box with two DVT40 probes to measure differential Time Domain Reflectometry (TDR) impedance (Z-line) measurements. Once impedance sensitive transmission lines are verified, use the second probe as a receiver to measure SDD21 “thru” bandwidth measurements and return loss (SDD11) S-parameters to verify that the differential traces can transmit USB3, PCI/e Gen4, SATA/SAS, 10 G Base-R, FEC, etc. baseband digital standards and meet their time and frequency specifications.

~4.5 ps Differential or Single Ended TDR Probe: A true differential multi-mode probe capable of making differential or single ended impedance measurements using any TDR system. With ~4.5 ps TDR rise time (rt), it’s an ideal probe for performing PCB Failure Analysis to locate opens as small as 20um. The DVT40 twin-ax cable design is like having two probes in one: a differential and a single-ended probe. Compatible with the fastest TDR instruments from Tektronix, Keysight (Agilent), LeCroy, Rohde & Schwarz and MultiLane.

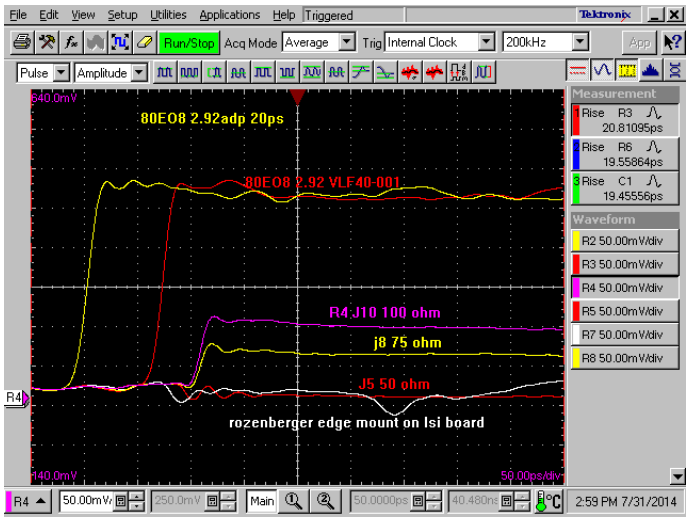
Accurate Differential S-parameter Measurements to 40 GHz: The optional Ataitec "In-Situ De-embedding" (ISD) Software (ISD01N2) comes with a 60-day license, technical support and the ISB40 40 GHz in-situ board used to make probe measurements for creating the S4p differential probe model used to de-embed the probe.

The software creates an S4p differential probe model for the DVT40 probe that uniquely models the coupling between the two signal conductors in the twin-ax probe cable electrical crosstalk to produce a virtual ground eliminating a need for a physical ground probe. The model is used in a 4-port VNA to de-embed the probe from the PCB measurements, remove probe resonance and set the VNA reference plane at the probe tips for Time Domain measurements. Creating a S4p probe model to 40 GHz only requires three measurements: open_probe.S2p, short_probe.S2p and probe in situ.S4p measurement using the ISB40 40 GHz board and a 4 port VNA. The ISD S4P probe model improves measurement accuracy and extends the measurement bandwidth to 40 GHz.

Differential SDD21/SDD11 S-Parameter Measurements



Differential or Single-Ended Impedance Measurements



(Above left) The green trace above is a differential "thru" Insertion-loss measurement of a differential trace on the ISB40 40 GHz board using the DVT40 probe with the other end of the trace connected to the VNA. This 4-port insertion-loss measurement contains the combined differential frequency loss of the DVT40 probe and the trace.

We create a true differential S4P probe model using the Ataitec ISD software and load it into the VNA. The VNA applies the probe model to de-embed the probe to a real time measurement by removing the probe frequency loss to 40GHz from the differential trace measurement, as seen in the blue insertion loss measurement.

(Above right) The DVT40 can measure both true differential impedance measurements without a ground probe, and single-ended. The DVT40-1MM probe kit contains an accessory to convert the DVT40 into a single-ended impedance probe.

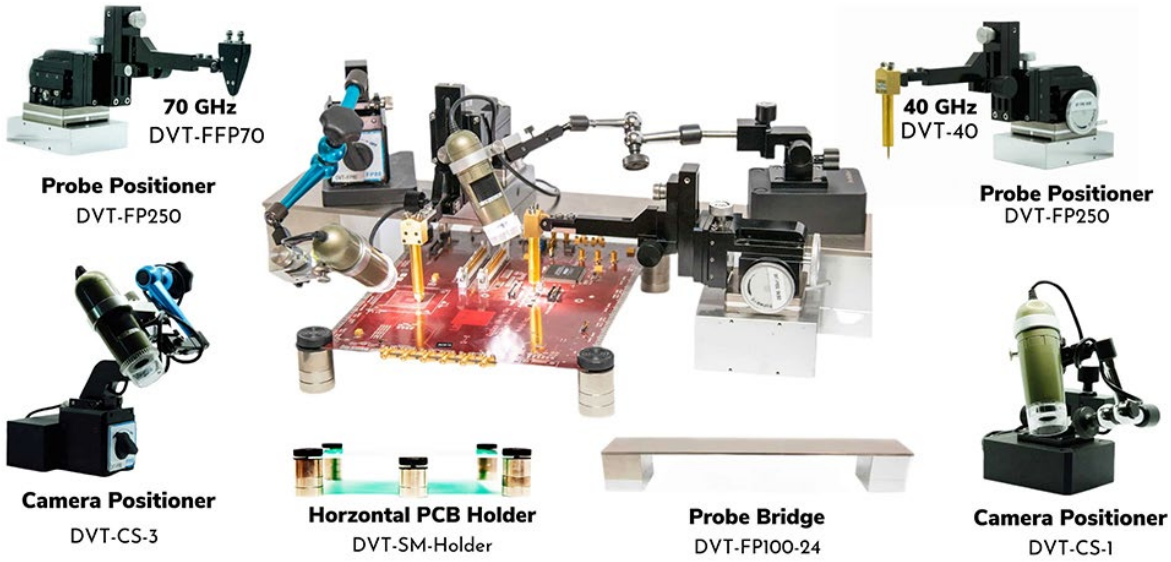
DVT40-1MM Probe Kit Contents

2 – 40 GHz Differential Multimode TDR/VNA S-Parameter Probes
- 2.92 mm K differential connector assembly in a Y formation
- Gold-plated probe body and differential connector assembly
- Gold-plated conductive diamond (4-6 um) adjustable probe tips

2 – Custom Mount Anodized Adapters connect the DVT40 probe to the end of the probe positioner arm.
2 – Custom Ultem® Hand Mount Adapters convert the DVT40 to a precise, ergonomic hand probe.
2 – Stainless Steel Tweezers for fine 110mm pitch adjustments
1 – Steel SMA wrench to tighten cables to probes
1 – Pitch setting calibration tool (.8 mm, 1 mm, 1.27 mm)
1 – Desktop Macro-Lens Inspection Station, 5x magnification
1 – 50-ohm Conversion Kit Accessory: 2 - 50 ohm caps, 5 - 20-gauge wires and 5 pre-cut shrink-wraps

DVT Solutions, LLC
Giga Probes

Build A Dual DVT40 40 GHz Time And Frequency Domain Measurement System



To configure a dual DVT40 Desk-top probe system to probe >10" x 12" board:

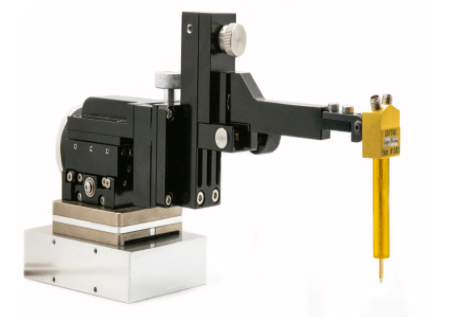
- Use one DVT-FP250 probe positioner to connect the DVT40 probes to the end of the probe arm in the vertical position.
- Move the probe to the test pads using its XYZ and theta 50TPI controls.
- Use either the DVT-CS-3 or DVT-CS-1 cameras to verify the probes are making contact with probe pads as small <20mils in diameter and to planarize the probe tips to the test pads.
- Fixture the test board using 4-6 Horizontal PCB-Holders and use one or two probe bridges to extend the reach of the probe arms into the board for probing PCBs lager than 10" x 10".
- For smaller boards consider using one camera and no bridge. Each USB camera probe image is displayed using it utility software on a PC display to verify if both probes are making contact at the same time. Using two cameras will vastly reduce setup times than using one camera that will force repositioning the camera each time you move probes to different probing positions.

Probe System Components

DVT40-1MM Dual Multi-Mode Probe Kit

40 GHz/~4.5 ps Dual Probe Differential Multi-Mode TDR and S-Parameters Probe kit. Contains two variable pitch conductive diamond-plated DVT40 differential probes, convertible to 50 ohms. Includes pitch setting tools and four 17-inch 25 GHz cables.

DVT-FP250 Probe Positioner



Rigid arm probe manipulator with XYZ pitch 40 TPI controls & magnetic base. Recommended for probing with DVT40 and DVT-FPPXX probes.

DVT-CS-1 Camera System

Camera System used to accurately place probe tips on test pads and to planarize the probe tips to the test pads so both probe tips land on the pads at the same time.

Call or email us: DVT Solutions, LLC • 650-743-5669 • sales@gigaprobes.com

DVT-SM Holders

Stackable Magnetic PCB Holders to secure the corners of a PCB to keep it from moving while probing. You can also remove a segment from two of the holders and place them under the PCB near where it will be probed to keep the board from bowing (At least 6 holders recommended).

DVT-FP100 Magnetic Bases

DVT-FP100-1IN, DVT-FP100-1.5IN and DVT-FP100-2IN Stackable 1", 1.5" and 2" magnetic blocks used to raise the probe and camera positioners to clear the test board.

DVT-PB100-24 Probe Bridge

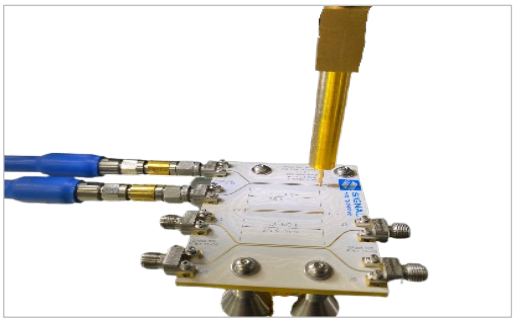
Versatile bridge with magnetic base for probing applications. Extends the probe reach to enable probing of larger boards.

ISB40-002 Probe De-embedding Kit

The ISB40-002 Probe De-embedding Kit includes these two items:

- **Ataitec In-Situ De-embedding (ISD) software.** 6-month license, free technical support, and software upgrades. The kit is used to create true differential probe models for the DVT40 probe.
- **ISB40 ISD In-situ board**. (On right) The In-situ "thru" measurement from the board is used to create the ISD probe model and to verify probe model accuracy.
  - 40 GHz differential trace with 2.92 mm 40 GHz RF connectors. Using cables, directly connect the VNA to this trace that has a known loss characteristic to 40 GHz. Make a new measurement from this trace and compare the two measurements to verify if they correlate.
  - This measurement is used to quickly locate bad or marginal RF cables and any front panel setting that can cause measurement errors.

ISB40 ISD In-situ board



Benefits of De-embedding

- Wide variable pitch (.35 mm- 1.8 mm) measurement to 40 GHz
- Make real-time Insertion-Loss measurements by de-embedding probe loss from PCB measurements
- Differential (SDD21/SDD22) S-parameter measurements do not require a physical ground
- VNA measurement reference plane is moved to the probe tips
- Reduces internal resonance after de embedding is applied

Online Tutorials & Demos

DVT40-1MM 40 GHz Multi-Mode Two Probe Kit demonstration and assembly
https://youtu.be/Dknr5qUxHcM