introspect technology

QUICK START GUIDE

PV1 Universal Active Probe

Probing Solution with 5 GHz Bandwidth

C SERIES

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Introduction

OVERVIEW

The PV1 Universal Active Probe is a signal measurement solution for high-speed links carrying low voltage, high-speed signals with a bandwidth of 5 GHz. By providing a completely non-proprietary instrument interface, it facilitates the attachment of a wide range of instruments to any given device under test (DUT) while minimizing circuit loading and maintaining signal integrity. This means that it can be attached to any oscilloscope brand, and it can also be attached to spectrum analyzers, protocol analyzers, and digital capture systems.

QUICK START DOCUMENTATION

This Quick Start Guide will provide the relevant information for a user to set up and perform measurements using PV1 universal active probes. Basic hardware connection instructions are provided as well as a step-by-step procedure.

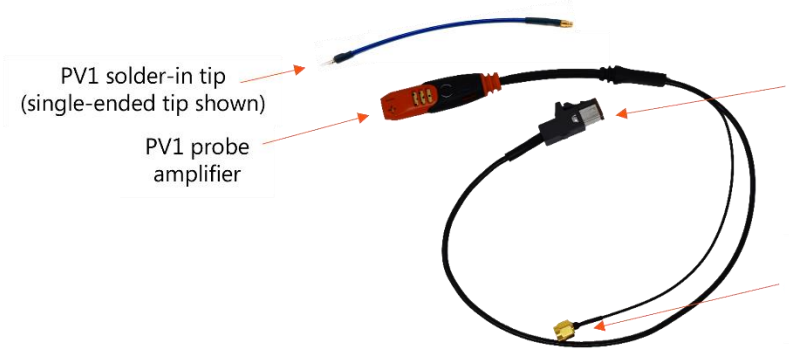
REQUIREMENTS

The full list of hardware requirements for this Quick Start Guide is provided below:

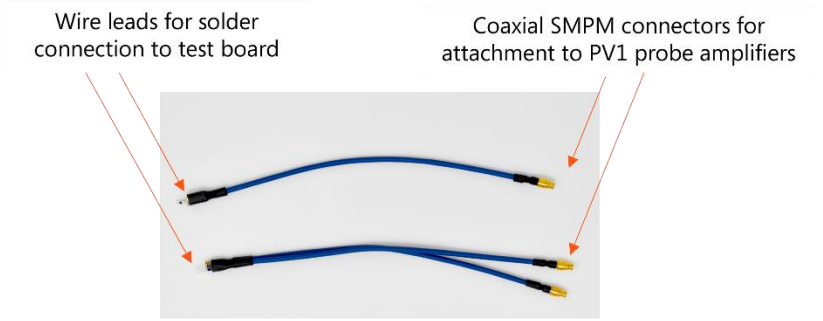
- (Minimum QTY=1) PV1 universal active probes (Introspect Item Number 7123)
- (Minimum QTY=1) PV1 solder-in probe tips, single-ended tips (Introspect Item Number 7127) or twin tips (Introspect Item Number 7126)
- (QTY=1) PV1PSU PV1 power supply (Introspect Item Number 7124)
- (QTY=1) 12V DC voltage adapter (part number CUI SDI65-12-U-P5)
- (QTY=1) SV5C-CPRX MIPI C-PHY Analyzer (Introspect Item Number 5785) or
- (QTY=1) SV5C-DPRX MIPI D-PHY Analyzer (Introspect Item Number 5784)
    - Similar Introspect analysis instruments may also be used with this Quick Start Guide
- (QTY=1) 12V DC power supply for SV5C (part number XP Power AHE220PS12)
- (QTY = 1) MXP to SMA cable, 12 inch, SMA male (part number Huber+Suhner MF53/2x8A_21MXP/11SK/305)
- (QTY = 1 each) USB2 and USB3 cables for connection of the SV5C-CPRX or SV5C-DPRX Analyzer to a user PC

- The user PC must run Introspect's software, Pinetree™

The individual elements of the PV1 universal active probe system are shown in detail in Figure 1 below, and guidelines for attaching the PV1 solder-in probe tips to a device under test are provided in the section which follows. Please note that additional information on PV1 solder in probe tips (both single-ended and twin varieties) may be found in the PV1 Active Probe Datasheet.



(a) PV1 Active Probe



(b) Close-up view of PV1 Probe Tips
(single ended and twin tips shown)

(c) PV1PSU PV1 Power Supply

Figure 1: Components for the PV1 probing system: (a) PV1 active probe (b) PV1 probe tip (c) PV1PSU power supply

GUIDELINES FOR ATTACHING THE SOLDER-IN PROBE TIPS

Figure 2 provides guidelines of soldering PV1 probe tips to high-speed signal traces on test boards, interposers, or test fixtures.

A diagram of a single-ended probe tip attachment is shown in Figure 2(a). For this style of tip, the wire with the axial resistor is the signal connection, and the wire without the axial resistor is the ground connection. Both wires must be soldered to the board under test.

A diagram of a twin (differential) probe tip attachment is shown in Figure 2(b). The two center wires (on the top and bottom of the tip) are for the differential connections, and the off-center wire is the ground connection (one connection per twin tip). All three wires must be soldered to the board under test.

PV1 probe tip wires can be readily attached to footprints with pad sizes and spacing matching 0201 surface mount components dimensions, shown in Figure 2(c). To maximize the mechanical stability of probe attachments, simple adhesives such as hot glue or Kapton tape can be used to firmly hold probe tips in place.

Care should be taken to ensure that the attachment wires of the PV1 probe tips are properly soldered to test boards, with leads trimmed to be as short as possible, for both the signal and ground wires. Where possible, probe tips should be mounted at an angle of 45 degree (or more) with respect to the board.

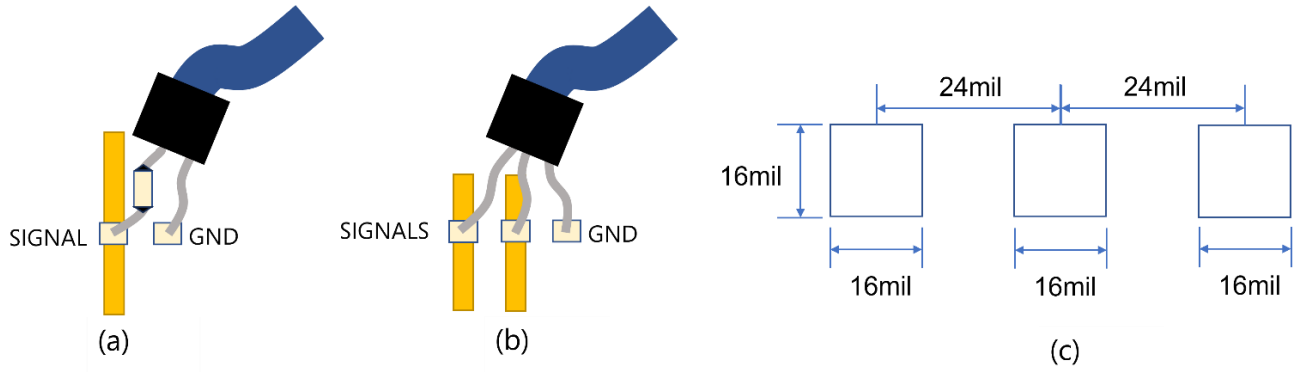


Figure 2: Diagrams for attaching solder-in probes tips to high-speed signal traces

Application Example

Figure 3 demonstrates a typical application for PV1 probes: monitoring live traffic on a phone. In the figure, the high-speed bus between the phone's processor and the display module is laid out on an orange flex-PCB with probing points available. A small rigid test fixture has been created to sit under the test points of interest, and PV1 solder-down probes have been attached to the fixture as shown. The high-speed bus being monitored here is comprised of 3 trios of C-PHY data (requiring nine single-ended PV1 probes). A similar example of monitoring live traffic on a phone could be used for D-PHY. In that case, twin probe tips may be preferable, and up to five twin probe tips (and 10 PV1 amplifiers) would be required.

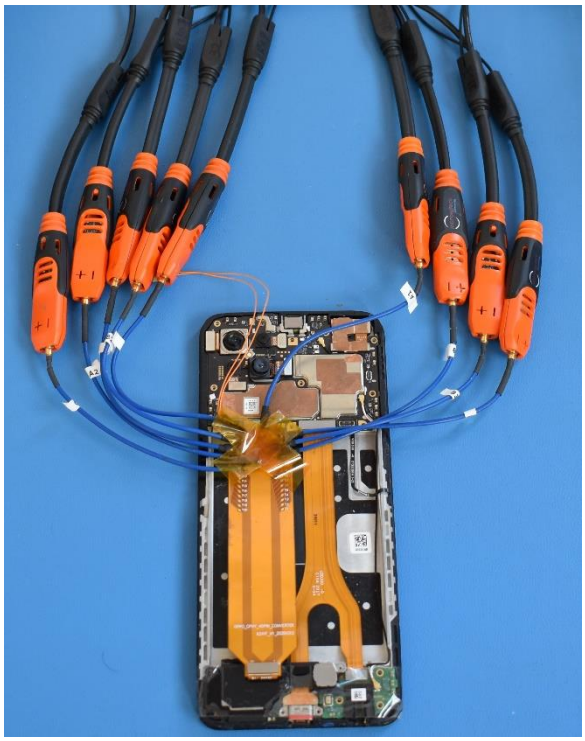


Figure 3: Typical PV1 application: monitoring live traffic on a phone

STEP-BY-STEP PROCEDURE FOR USING THE PV1 ACTIVE PROBES

The fully assembled setup with all required components is shown in Figure 4 below. The full list of required components is given on page 3 of this document. The steps below provide the outline for connecting the setup and making measurements with the PV1 probes. Note that physically connecting the PV1 probe amplifiers to the PV1 probe tips may be left until the last step (step 6 on the following page).

1. Create the test fixture and solder required PV1 probe tips to the test board or interposer, as appropriate for the required test setup. Probe tip attachment guidelines are given in the previous section, and a photo of a test fixture attachment to a phone is shown in Figure 3 and below.

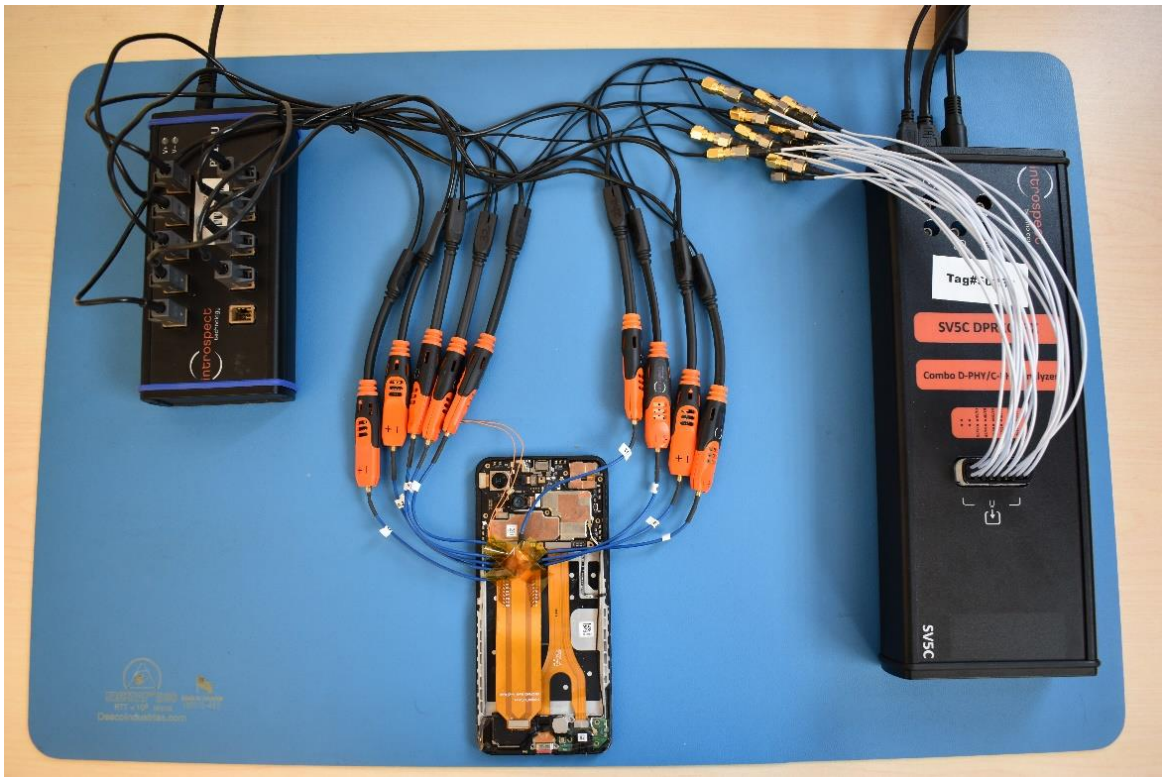


Figure 4: Fully assembled test setup for the PV1 probe application example

2. Connect the PV1PSU power supply to its 12V DC voltage adapter and plug the DC voltage adapter into a suitable AC outlet.
3. Connect all PV1 active probe power cables to the PV1PSU. The power supply unit can accommodate up to 10 active probes simultaneously.
4. Connect the SV5C-CPRX MIPI C-PHY Analyzer (or similar Introspect product) to its 12V DC voltage adapter and plug the DC voltage adapter into a suitable AC outlet.
5. Connect the PV1 Active Probe signal cable (SMA connector) to the Huber+Suhner MXP to a SMA cable assembly, which can then be connected to the SV5C-CPRX MIPI C-PHY Analyzer (or similar instrument). For pinout information for the MXP connector of SV5C MIPI C-PHY Analyzer, please refer to the Introspect SV5C MIPI C-PHY Analyzer datasheet.
6. Connect the PV1 probe amplifiers to the PV1 probe tips soldered to the test fixture. This connection is made with the miniature coaxial connector, as shown previously in Figure 1(b).
7. Power up the PV1PSU (and observe V+ and V- LEDs on the upper right-hand corner of the PV1PSU will turn on).
8. Power up the SV5C MIPI C-PHY Analyzer (or similar instrument) and connect the SV5C-CPRX MIPI C-PHY Analyzer to a PC via USB2 and USB3 cable connections. All control of the SV5C-CPRX MIPI C-PHY Analyzer is handled through Pinetree.

The setup is now ready to perform measurements. Figure 5 shows data that was captured from live traffic on the high-speed bus using the Introspect PV1 active probes, the Introspect SV5C-CPRX, and Pinetree. HS bursts, LP states, DSI packets and fully captured image frames can be measured and analyzed through Introspect's software, as in the examples shown in the figure.

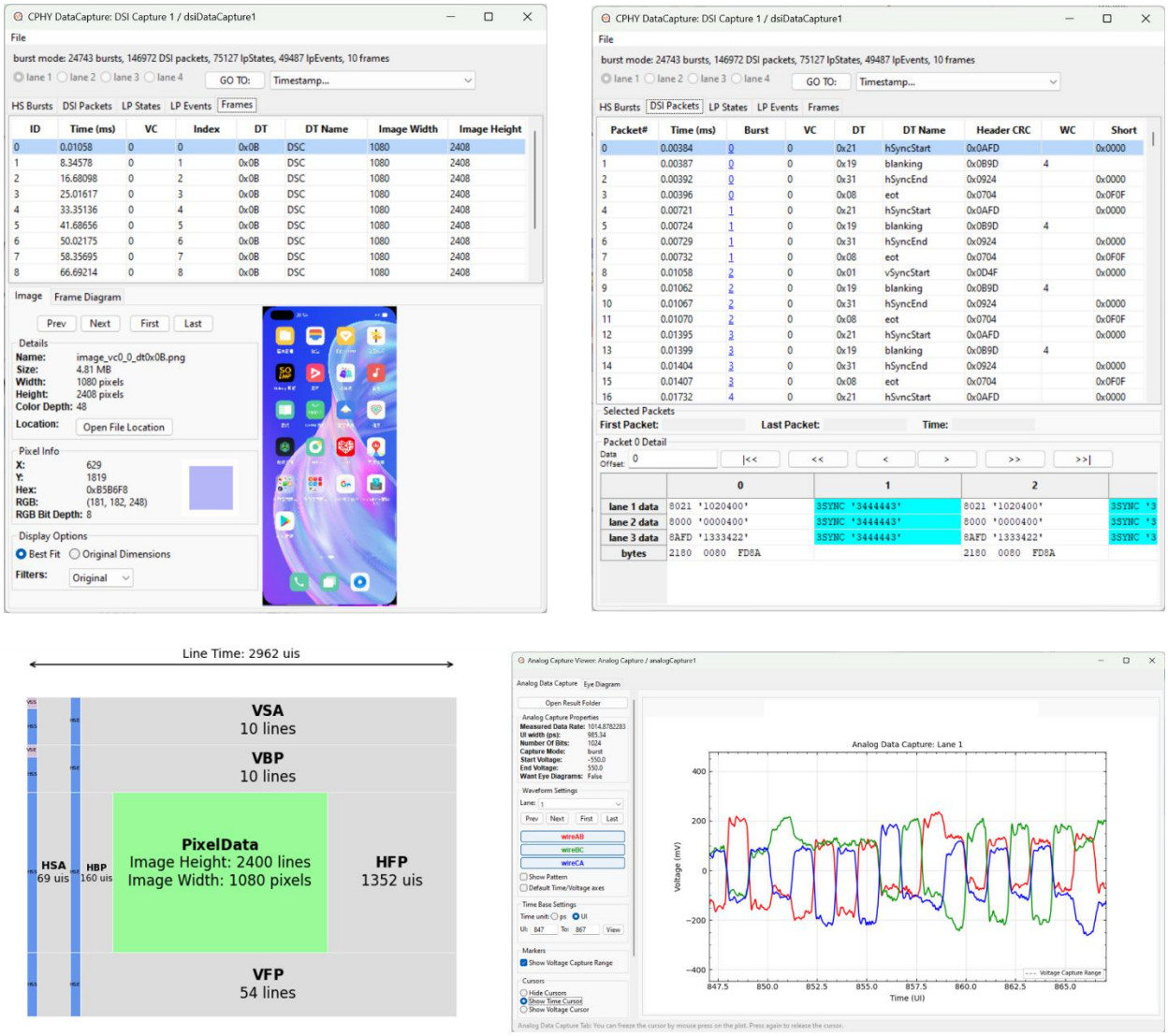


Figure 5: Examples of image frames, packets and analog signal captures made from live phone traffic and viewed in Pinetree™

REVISION NUMBER	HISTORY	DATE
1.0	Document Release	September 28, 2021
1.1	Updated probe tip information and updated the phone application example	July 20, 2023

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