DATA SHEET

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.

The PV1 consists of a lightweight probe amplifier and a solder-in tip. Both of these components are optimized for accessing hard to reach signals in live systems and for measuring entire buses such as those found in MIPI, DDR, eMMC, and similar systems.

KEY FEATURES

- High bandwidth: guaranteed 5 GHz bandwidth with a high linearity and accuracy
- Non-proprietary interface: output cable of the probe amplifier has a male SMA connector for attachment to any 50 Ohm instrument
- Optimized voltage range: linear performance is guaranteed for low-voltage applications such as MIPI. Extended linear range is available through different probe tip options
- Miniature and lightweight: probe amplifier is housed in a compact enclosure, enabling attachment in confined spaces

KEY BENEFITS

- Maintain signal integrity: measure live signal links in their mission modes without custom test fixtures
- Deploy widely: connect the PV1 to Introspect Technology instruments or to oscilloscopes, logic analyzers, spectrum analyzers, and digital capture tools
- Access highly integrated buses: use the solder-in probe tips for optimized signal sniffing in hard to reach locations

Concepts and Terminology

The PV1 probing system consists of the following key components:

- PV1 probe amplifier
- PV1 solder-in tip
- PV1PSU power supply for the probe amplifier
- SMA interface to measurement instrument

Figure 1 shows an illustration of the main components of the probing system. Since the PV1 is an active probe, it needs power, and this is provided through the PV1PSU power supply from Introspect Technology (not shown in the figure). Having the PV1PSU as a stand-alone power supply enables the PV1 to be "universal" in that it can attach to any measurement instrument.

Figure 2 shows the solder-in tip of the PV1 probing system. This is an integral part of the signal measurement solution and should not be replaced. It consists of the short attachment wire on the DUT side and the probe amplifier mating connector on the PV1 amplifier side. The solder-in wire is optimized for impedance matching and bandwidth. Every care should be taken to ensure that the short attachment wire is properly soldered to the DUT board with short leads on both the signal and ground pins.

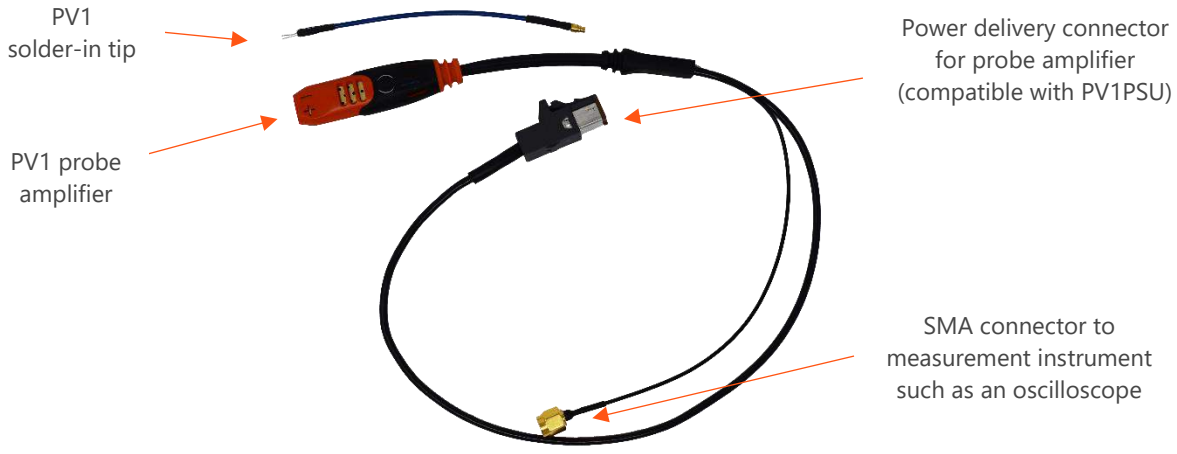

Figure 1: PV1 probing system consists of the solder-in tip and the probe amplifier

Figure 2: Solder-in tip interfaces to the DUT and to the probe amplifier

Figure 3: Solder-in tip interfaces to the DUT and to the probe amplifier

Figure 3 illustrates the attachment of the solder-in tip to the PV1 probe amplifier. As can be seen, this is a coaxial interface with a retention mechanism. The combination of the light weight of the probe amplifier and the retention mechanism in the connector ensures that this solution is practical for many measurement situations.

Performance Characteristics

Figure 4 shows the step response of the PV1 probing system. This response is obtained by driving the PV1 with an ideal 8-picosecond step input, thus ensuring that the true performance of the PV1 is exposed. As can be seen, a sharp and linear step response is achieved. The corresponding frequency-domain view of the PV1 performance is shown in Figure 5.

Figure 4: PV1 step response, measured with an 8-picosecond stimulus source

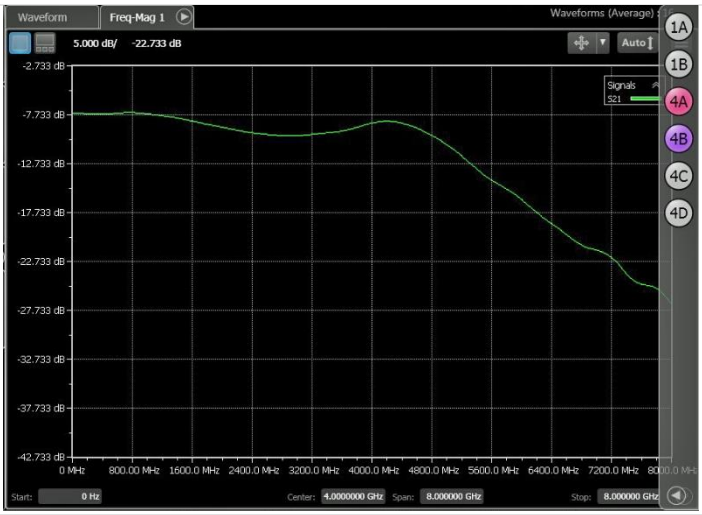

Figure 5: PV1 frequency-domain gain response

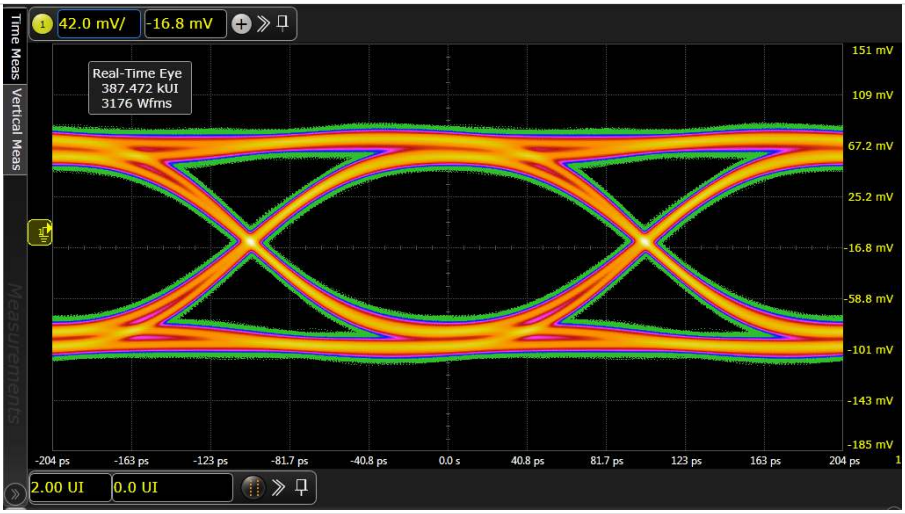

Figure 6: Eye diagram of a PRBS7 pattern running at 5 Gbps as measured by PV1

Figure 6 shows a 5 Gbps PRBS7 eye diagram measurement performed by the PV1, illustrating high signal fidelity without degradation due to noise or impedance mismatches. Table 1 shows additional technical specifications.

Table 1: Key performance parameters

PARAMETER	VALUE	DESCRIPTION
Rise Time	62 ps	20%-80% value
Linearity	50 dB	Spurious free dynamic range measured at 5 MHz and across entire voltage range
Power Dissipation	0.8 W	Operate at room temperature without cooling
Standard Solder-In Tip (1 V/V)		
Input Impedance	600 Ω	
Linear Range	-0.4 V to 0.6 V	
Maximum Voltage Range	-1.5 V to 1.8 V	
4:1 Solder-In Tip (0.25 V/V)		
Input Impedance	2 KΩ	
Linear Range	-1.3 V to 2.8 V	
Maximum Voltage Range	-4 V to 5.0 V	

Revision Number	History	Date
1.0	Document Release	January 27, 2019
1.1	Updated specifications and document formatting	December 1, 2019
1.2	Updated specifications	January 12, 2020

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