TriMode Probe Family

P7600 Series TriMode Probes Datasheet



Overview

The P7600 Series TriMode probes, the MSO/DPO70000DX, DPO/DSA70000D, and 7 Series DPO Oscilloscopes are designed to deliver the industry's lowest system noise levels. This high sensitivity is critical for being able to make accurate measurements on low amplitude signals.

Key performance specs

- Full 33 GHz bandwidth to the probe tip (P7633)
- Industry's lowest probe and oscilloscope system noise

Key features

TriMode™ probe - one setup, three measurements without adjusting probe tip connections

- Differential
- Single ended
- Common mode

Remote head design connectivity

- Allows placement of probe amplifier close to the circuit being measured
- Coaxial adapters
  - 2.92mm
  - SMP
- P7500 probe tip adapter
  - Use P7500 Series TriMode solder-in probe tips
- Probe automatically detects tips and applies DSP correction filters

Probe-specific S-parameters

- Unique DSP filters created from data stored in the probe

TekConnect® Interface - TekConnect scope/probe control and usability

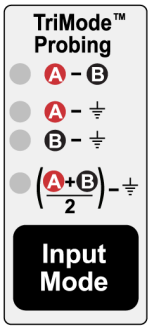
- Direct control from probe compensation box or from scope menu

Applications

Including, but not limited to: MIPI M-PHY, PCI Express, Serial ATA, Serial Attached SCSI, Fibre Channel, and HDMI

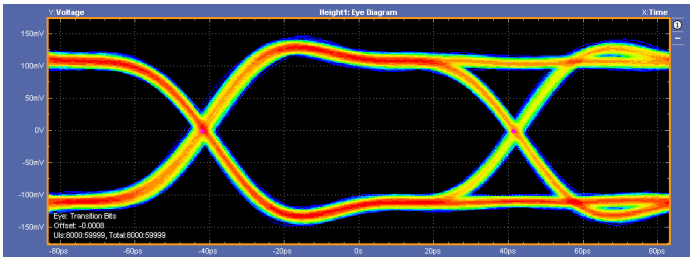
Combining TriMode probing with low noise performance

TriMode probing enhances productivity by enabling differential, single-ended, and common mode measurements with a single probe setup. Connecting a probe to the device under test can be a time consuming activity, especially if the probe has to be set up differently to make all the necessary measurements. TriMode probing improves productivity by reducing setup time, because only one setup is needed to make the three different types of measurements. Switching between Differential Mode [A-B], Single-Ended Mode [A-Gnd, B-Gnd], and Common Mode [((A+B)/2)-Gnd] is as easy as a press of a button.



Changing input modes on the probe is as easy as a press of a button

As high speed serial data standards increase in speed and signal swings shrink, probes with high bandwidth coupled with low noise and high sensitivity are increasingly important for making accurate measurements.



12 Gb/s 200 mV_{pp} signal measured with a P7633 and a P76CA-292C coaxial adapter

The P7600 Series TriMode probes, the MSO/DPO70000DX, DPO/DSA70000D, and 7 Series DPO Oscilloscopes are designed to deliver the industry's lowest system noise levels. When used with a P76CA-xxx Coaxial Adapters, the vertical setting on the oscilloscope can be set as low as 3.48 mV/div with a system noise <1.1 mV_{rms} at 33 GHz bandwidth.

This high sensitivity is critical for being able to make accurate measurements on low amplitude signals. The P7600 Series TriMode probes were designed to deliver superior sensitivity and allow the oscilloscope to directly measure small signals without using a zoom function. Using a zoom function to look at small signals does not change the intrinsic noise floor of the instrument which can make measurements on small signals problematic.

Connectivity

The P7600 Series probes utilize an interchangeable active tip design built around a custom tip interface using high frequency SMPM connectors. The P7600 Series probes feature an Automatic Adapter ID function that recognizes the attached adapter and automatically applies the correct DSP filters that eliminate imperfections in the frequency response all the way to the probe tip. This feature eliminates the risk of manually selecting the wrong tip type and is more efficient for the user.

Coaxial adapters

Coaxial adapters enable the probe to act like a differential input channel for the oscilloscope which effectively doubles the number of differential signals a single oscilloscope can measure simultaneously.

P76CA-292



33 GHz Bandwidth Coaxial Adapter with 2.92 mm (Female) connectors. This adapter is calibrated at the input connectors and is ideal for use with off the shelf or custom cables. Low skew cable pairs should be used to preserve full bandwidth performance.

P76CA-292C



33 GHz Bandwidth Coaxial Adapter with 2.92 mm (Male) connectors and 6" of high performance cable. This adapter is calibrated at the input connectors and is ideal for directly connecting to devices with 2.92 mm or SMA output connectors.

P76CA-SMP



33 GHz Bandwidth Coaxial Adapter with SMP (Female) connectors and 6" of high performance cable. This adapter is calibrated at the input connectors and is ideal for directly connecting to devices with SMP output connectors.

P7500 Series solder tip adapter

This adapter allows the P7630 probe to use existing Tektronix P7500 probe tips. The P7600 Series probe amplifiers have a 50 Ω input. When combined with a P7500 probe tip, the probe turns into a passive Z0 style probe with 450 Ω of differential input impedance. While Z0 probes can typically present a significant DC load to the device under test, the P7600 Series probes will minimize the effect of DC loading through the use of termination voltage adjustment.

P76TA



30 GHz Bandwidth P7500 Tip Adapter. The probe and oscilloscope system will support up to 30 GHz of bandwidth when this adapter is used with the P75PST Performance Solder Tip.

Unique probe filters

The P7600 Series probes contain probe specific S-parameter data. Attaching a P7600 probe to a MSO/DPO/70000DX, DPO70000SX, or 7 Series DPO transfers this data to the instrument to create unique system DSP filters based on the specific S-parameter data of the oscilloscope and the probe. Creating unique filters based on the specific response of the system is critical as bandwidths increase. At bandwidths of 33 GHz, small variations in the signal path can lead to significant variation in frequency response. These variations are corrected using DSP filtering.

Specifications

Specifications are typical unless noted otherwise. All specifications apply to all models unless noted otherwise

Model Overview

Probe model	**P7633**		**P7625**	
Adapter	**P76CA-xxx**	**P76TA**	**P76CA-xxx**	**P76TA**
Characteristic	**(Typical)**	**(Typical)**	**(Typical)**	**(Typical)**
Bandwidth (typical)	33 GHz	30 GHz	25 GHz	25 GHz
Rise time (10-90%) (typical)	14 ps	16 ps	18 ps	18 ps
Rise time (20-80%) (typical)	11 ps	12 ps	14 ps	14 ps

Characteristics

Attenuation

- P76CA-xxx:0.25X / 0.5X / 1X / 2X / 4X
- P76TA: 1.25X / 2.5X / 5X / 10X / 20X

Input voltage range

- P76CA-xxx: 1.2 Vpp single-ended, 2.0 Vpp differential
- P76TA: 6.0 Vpp single-ended, 10.0 Vpp differential

Operating voltage window

- P76CA-xxx: -4 V to +4 V
- P76TA: -5 V to +5 V

Offset voltage range

-4 V to +4 V

Termination voltage range

-4 V to +4 V

DC input resistance

- P76CA-xxx: 50 Ω ±2 Ω
- P76TA: 225 Ω

DC output zero common mode imbalance (guaranteed)

< ±4 mV

DC gain accuracy, probe only (guaranteed)

±2.0% all gain settings

Input return loss

- P76CA-xxx:
  - >20 dB to 5 GHz
  - >12 dB 5 GHz to 20 GHz
  - >10 dB 20 GHz to 30 GHz
  - >8 dB 30 GHz to 33 GHz
- P76TA: NA

Z min

- P76CA-xxx: NA
- P76TA: 225 Ω at 1 GHz, 150 Ω at 10 GHz, 100 Ω at 25 GHz

Noise, referred to input (System noise with oscilloscope set in minimum V/div setting)

- <1.1 mV_{rms} (33 GHz)
- <0.9 mV_{rms} (25 GHz)

CMRR (differential mode)

- P76CA-xxx:
  - >40 dB at DC
  - >14 dB DC to 15 GHz
  - >6 dB 15 GHz to 30 GHz
  - >4 dB 30 GHz to 33 GHz
- P76TA: NA

Nondestructive input voltage range

- P76CA-xxx: -5 V to +5 V (DC + peak AC)
- P76TA: -8 V to +8 V (DC + peak AC)

Interface

TekConnect

Minimum system requirements

Instrument	Bandwidth	Firmware version	Recommended probe
MSO/DPO73304DX, DPO73304SX, and DPO/DSA73304D	33 GHz	V6.8 and above	P7633
MSO/DPO72504DX, DPO73304SX, 7 Series DPO, and DPO/DSA72504D	25 GHz	V6.8 and above	P7625

Environmental characteristics

Temperature

- Operating: 0 to +40 °C
- Nonoperating: -20 °C to +71 °C

Humidity

- Operating: Up to +40 °C 20%-80% RH
- Nonoperating: +30 °C to +46 °C 0-90% RH

Altitude

- Operating: 3000 meters
- Nonoperating: 12000 meters

Ordering information

Model	Description
P7633	Low Noise TriMode™ Probe, 33 GHz, TekConnect Interface
P7625	Low Noise TriMode™ Probe, 25 GHz, TekConnect Interface
All P7600 Series probes require a P76CA-SMP, P76CA-292, P76CA-292C, or P76TA adapter for connection to the device under test. These adapters are ordered separately.	

Service options

Opt. C3 - Calibration Service 3 Years

Opt. C5 - Calibration Service 5 Years

Opt. D3 - Calibration Data Report 3 Years (with Opt. C3)

Opt. D5 - Calibration Data Report 5 Years (with Opt. C5)

Opt. G3 - Complete Care 3 Years (includes loaner, scheduled calibration, and more)

Opt. G5 - Complete Care 5 Years (includes loaner, scheduled calibration, and more)

Opt. R3 - Repair Service 3 Years (including warranty)

Opt. R3DW - Repair Service Coverage 3 Years (includes product warranty period). 3-year period starts at time of instrument purchase

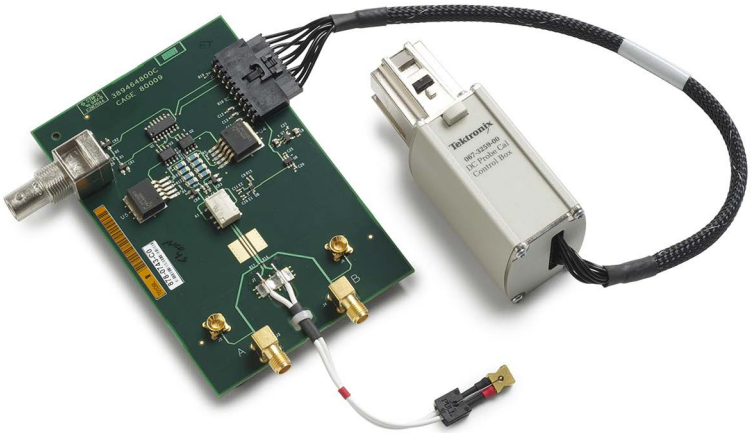
Opt. R5 - Repair Service 5 Years (including warranty)

Opt. R5DW - Repair Service Coverage 5 Years (includes product warranty period). 5-year period starts at time of instrument purchase

Standard accessories

Accessory	Quantity	Tektronix part number
Printed Manual	1 kit	071-3026-xx
Data Calibration Report: Lists the manufacturing test results of your probe at the time of shipment	1 each	Standard with probe
Certificate of Traceable Calibration	1 each	Standard with probe
Antistatic wrist strap	1 each	006-3415-xx
DC probe calibration fixture	1 each	067-3259-xx
50 Ω BNC-M to BNC-M cable assembly, 10 in.	1 each	012-0208-xx
ESD protective cap	3 each	276-1152-xx
Hex wrench, 2 mm	1 each	129-2781-xx
Color band kit	1 kit	016-0633-xx

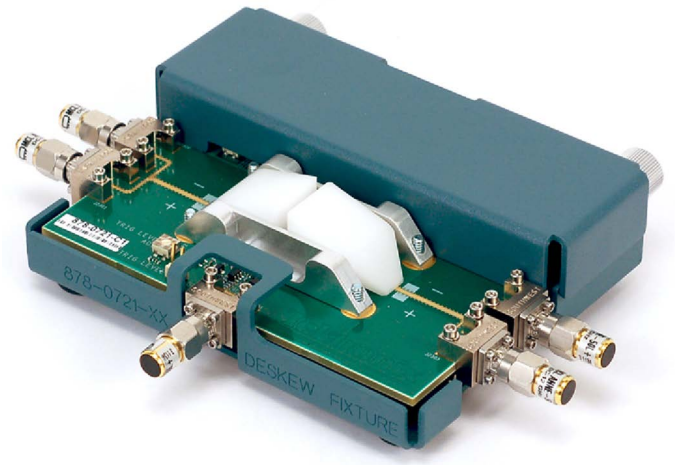
DC Probe Calibration Fixture



Recommended accessories

Description	Tektronix part number
2.92 mm Coaxial Adapter	P76CA-292
2.92 mm Coaxial Adapter with Cables	P76CA-292C
SMP Coaxial Adapter with Cables	P76CA-SMP
P7500 Tip Adapter	P76TA
P7500 TriMode Performance Solder Tip	P75PST
P7500 TriMode Long Reach Solder Tip	P75TLRST
P7500 TriMode Resistor Solder Tip	020-2936-xx
P7500 TriMode Extended Resistor Solder Tip	020-2944-xx
Solder Tip Ramps, Kit of 25	020-3118-xx
Adhesive Tip Tape, Strip of 10	006-8237-xx
Deskew Fixture	067-2431-xx
SMPM Bullet Removal Tool	003-1934-xx
SMPM Replacement Bullet Contacts (package of 4)	020-3105-xx
G3PO Bullet Removal Tool	003-1896-xx
G3PO Replacement Bullet Contacts (package of 4)	013-0359-xx
Wire Kit	017-0103-xx
Replacement Resistor Kit	020-2937-xx

P7600 Series Probes Deskew Fixture



P75PST Solder Tip



Bullets and Bullet Removal Tool



Certifications

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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