



# 2015 Product Catalog

## Test & Measurement Solutions





# 6 Instruments. 1 Scope. Infinite Versatility.



## The 6-in-1 MDO3000 Mixed Domain Oscilloscope with a spectrum analyzer.

Designs have evolved, integrating analog, digital and RF technologies. Now, it's the oscilloscope's turn. Introducing the MDO3000 Mixed Domain Oscilloscope. Featuring a spectrum analyzer, function generator and more, it's the only scope that comes with the instruments you use most, built-in. It's also upgradeable, enabling you to add instruments and increase bandwidth as your needs grow. So you get unlimited versatility at a starting price that's anything but limiting.

Win one at [tek.com/oneisthenewsix](http://tek.com/oneisthenewsix)

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### 6 Advanced Instruments Built In

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- |   |   |
|---|---|
| ■ <b>Oscilloscope:</b> 100 MHz-1 GHz models, 2 or 4 channels, 5 GS/s sample rate, 10 Mpoint record length | ■ <b>Arbitrary/Function Generator:</b> 50 MHz, 13 standard plus arbitrary waveforms |
| ■ <b>Spectrum Analyzer:</b> 9 kHz-3 GHz with 3 GHz wide capture bandwidth                                 | ■ <b>Protocol Analyzer:</b> Serial data trigger, decode and analysis                |
| ■ <b>Logic Analyzer:</b> 16 channels, 121 ps timing resolution  | ■ <b>Digital Voltmeter:</b> 4-digits resolution                                     |
-



## Support for the Latest Standards

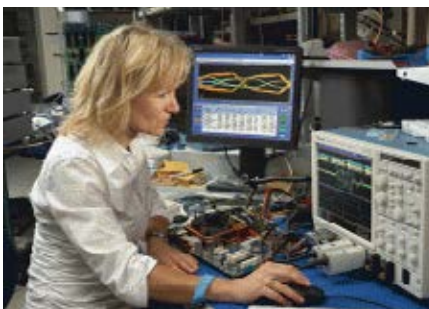
Working on 100G / 400G communications?



### Learn about:

- DSA8300 Series Sampling Oscilloscopes (Page 24)
- Optical Modulation Analyzers (Page 71)
- AWG70000A Series Arbitrary Waveform Generators (Page 49)

Need to test for compliance to standards like USB 3.1? DDR4? PCIe3?



### Learn about:

- MSO/DPO70000DX Series Oscilloscopes (Page 22)
- Compliance Testing, Analysis and Debugging Software (Page 32)
- BSA Series Bit Error Rate Testers (Page 59)

## Tektronix and Keithley - From Nanovolts to Gigahertz.

SourceMeter® SMUs

Switch Systems

Semiconductor Test Systems

Digital Multimeters

Data Acquisition

Low-level Instruments

Power Supplies

As part of the Tektronix portfolio, Keithley Instruments brings the DC test tools you need to do your job better and with greater confidence. Take a look inside to see the capabilities we provide. Together, Tektronix and Keithley address your measurement needs from low level precision measurements to powerful time and frequency domain measurements.

**KEITHLEY**  
A Tektronix Company

**Tektronix®**



# New Products



## DPO7000C Series

Get into the details of critical high-speed signals and find the most elusive signal anomalies. These oscilloscopes offer measurement and decoding packages for many of today's communications and memory bus standards. Fast waveform capture rate, Pinpoint® triggering, and Visual Trigger & Search will help you solve the most frustrating troubleshooting mysteries, fast. And jitter analysis comes in every box.



## RSA306 USB Spectrum Analyzer

The RSA306 USB Spectrum Analyzer delivers full-featured spectrum analysis with 9 kHz to 6.2 GHz frequency coverage at half the cost of a standard solution.

It's compact, weighs just 1.3 pounds, takes little space on your bench, and fits easily in your hand, bag, pocket or tool belt. It runs with the full-featured [SignalVu-PC Vector Signal Analysis \(VSA\) Software](#), which is now a free download!

- **Powerful** – Real-time analysis capability and 9 kHz to 6.2 GHz frequency coverage
- **Affordable** – Less than half the cost of a conventional unit, plus free [SignalVu-PC Vector Signal Analysis \(VSA\) Software](#)
- **Portable** – USB Spectrum Analyzer ready to connect to a PC with USB 3.0
- **Customizable** – Create custom setups on your PC without worrying about losing your settings
- **Programmable** – Use the programmatic interface to SignalVu-PC or write your own measurement applications with the [Applications Programming Interface](#).



## DMM7510 7½-Digit Graphical Sampling Multimeter

The DMM7510 combines all the advantages of a precision digital multimeter, a graphical touchscreen display, and a high speed, high resolution digitizer to create an industry first: a graphical sampling multimeter. The digitizer gives the DMM7510 unprecedented signal analysis flexibility; the five-inch capacitive touchscreen display makes it easy to observe, interact with, and explore measurements with “pinch and zoom” simplicity. This combination of high performance and high ease of use offers unparalleled insight into your test results.

For an in-depth look at all of our products, including demos and 360-degree product explorers, please visit [www.tektronix.com](http://www.tektronix.com).

All information on [www.tektronix.com](http://www.tektronix.com) supersedes all other information.

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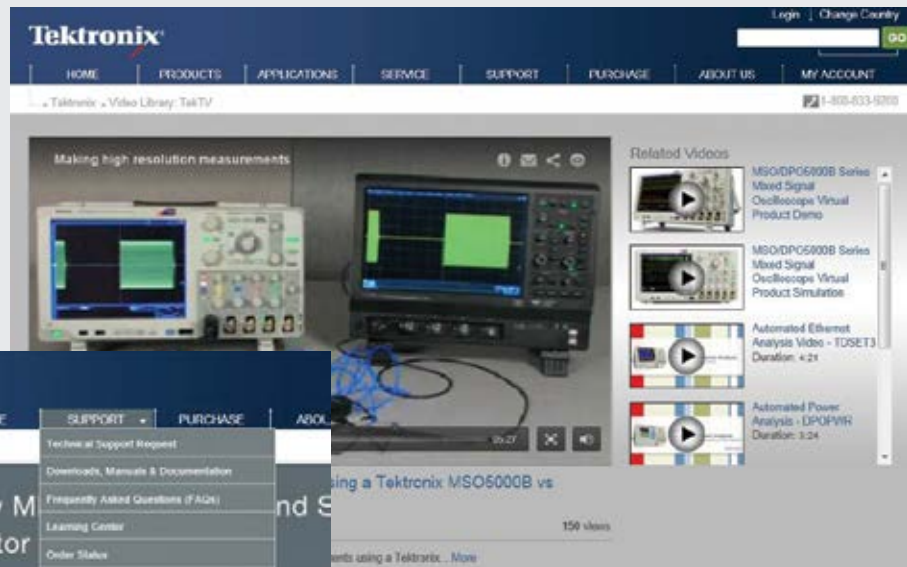




# Resources for You

## TekTV

From the [Video Library](#) you have easy access to nearly all the videos on the site. Browse by product, application, most popular or by video type. View a video, share it, and give us your feedback.



## Wondering What Else Tektronix is Up To?

Check out the Tektronix [Bandwidth Banter](#) blog and stay up to date on the latest news from Tektronix on [Twitter](#) and [Facebook](#).

## Special Offers

Check in frequently to find out the latest special [promotions](#).

## FAQs

Find [answers](#) to common (and not-so-common) questions.

## TekSelect Used Test Equipment

Don't let tight budgets interfere with your work. Tektronix and Keithley [refurbished equipment](#) is available at substantial savings, with:

- Guaranteed Quality
- Reliable Performance
- Fast Delivery

## Downloads

Our [library](#) is full of information designed to enhance your understanding and help you solve measurement challenges.





# Education Solutions

Tektronix provides a complete product portfolio to prepare students today for the real-life measurements of tomorrow. Our unique set of bench solutions includes the industry's best test and measurement instruments from oscilloscopes, power supplies, DMMs, generators, and spectrum analyzers to the industry's first network-based instrument management solution for teaching labs. So, whether learning basic design skills or progressing to more advanced electrical engineering topics, students get practical, hands-on experience for the real world now on the instruments they'll be using in the real world later.



## TekSmartLab™

TekSmartLab is the industry's first network-based instrument management solution for teaching labs that brings a more efficient lab experience.

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## TBS1000B-EDU

Meet the world's first dedicated teaching oscilloscope; the TBS1000B-EDU. Not only does it deliver the performance you expect to see in a Tektronix scope, it comes with an innovative courseware feature that allows students to review lab material, follow step by step instructions and document results, all on the oscilloscope. We couldn't make engineering easier, so we made it easier to teach and learn.

**See page 26**



## AFG1000 Series

The AFG1000 Series Arbitrary/Function Generator offers the best price performance ratio in its class. It's tailored for educational users with 25 MHz bandwidth, 2 output channels, and 1 mVp-p to 10 Vp-p output amplitude across full bandwidth. It generates all kinds of waveforms needed in a lab.

**See page 43**



## 2231A-30-3

The Model 2231A-30-3 Triple Channel DC Power Supply can output a total of 195W of power, providing the power levels needed to energize a wide range of circuits and devices for benchtop work. Two channels can supply up to 30V at 3A each; the third channel can provide up to 5V at 3A. The Model 2231A-30-1 does not compromise on performance or convenience features, offering the versatility and ease of use you need, so it can be the only DC power supply on your bench.

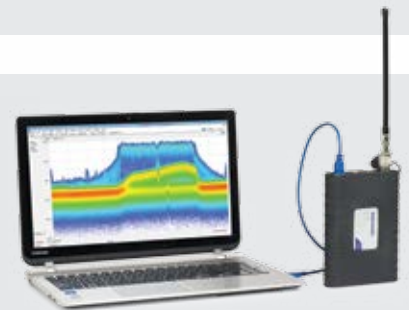
**See page 112**



## DMM2110

These cost effective, high precision instruments offer 5.5- and 6.5-digit accuracy and are ideal for a wide range of manual, semi-automatic, and production test applications. They can be used as stand-alone benchtop instruments and as components in test systems.

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## RSA306

The RSA306 offers full-featured spectrum analysis at an unmatched price. Using the latest in commercial interfaces and available computing power, the RSA306 separates signal acquisition from measurement, dramatically lowering the cost of instrument hardware. Data analysis, storage and replay is performed on your personal computer, tablet or laptop which makes processing upgrades easy.

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# The Tektronix Service Advantage

Tektronix offers unequalled expertise, global reach and a customer-centric approach with every service option. From our full suite of Factory-Certified service plans for Tektronix equipment to our Multi-Vendor Service (MVS) calibration, we can ensure optimal performance for your entire inventory of test and measurement instruments.

## Tektronix Service Highlights

### ▪ Tektronix Factory Experts

Access to the engineering expertise that designed and built your products to ensure they are in peak performance. Our support engineers hold an average of 20 years of training and experience.

### ▪ Comprehensive and Thorough Treatment

Software updates, safety and reliability modifications, and cosmetic enhancements are included if applicable. Products are returned to you in "like-new" condition. The Tektronix network of service centers offers worldwide support.

### ▪ Efficiency and Convenience

Our team of professionals focus on getting your instruments back to you as soon as possible, minimizing your downtime and increasing your operating efficiency.

### ▪ Flexible Repair and Calibration Service

Tektronix offers you the choice of a cost effective, flexible service package to meet your specific business needs.

## Tektronix Factory-Certified Service Plans

Silver Care	Silver Care Packages	Gold Care
<ul style="list-style-type: none"> <li>▪ Choose between a 3- or 5-year extended warranty plan</li> <li>▪ No purchase orders, quotes, or approval delays – one phone call away starts the repair process</li> <li>▪ Covers equipment, parts, labor and transportation</li> <li>▪ Includes applicable software, safety and reliability updates</li> <li>▪ Faster repair time than without coverage (average is 5 days faster)</li> </ul>	<ul style="list-style-type: none"> <li>▪ All the benefits of our popular Silver Care Plan in a convenient take-home package</li> <li>▪ Each package includes a unique activation code to effortlessly initiate and manage your service coverage online</li> <li>▪ May be purchased any time during the original warranty period</li> </ul>	<ul style="list-style-type: none"> <li>▪ Choose between a 3- or 5-year extended warranty plan</li> <li>▪ Loaner product of equal or higher performance shipped within 24 hours</li> <li>▪ Priority access to Global Tektronix Customer Call Center for technical support</li> <li>▪ 30% discount on scheduled factory-certified calibration</li> <li>▪ Coverage of user-caused EOS and ESD damage</li> <li>▪ Typical downtime of 48 hours or less</li> </ul>
Platinum Care	Calibration	
<ul style="list-style-type: none"> <li>▪ Custom-tailored plan with a typical downtime of less than 1 hour</li> <li>▪ Identically configured spare products dedicated to your facility</li> <li>▪ On-site calibration event and repair coverage</li> <li>▪ Priority access to technical support, and flexible contract duration and payment terms</li> </ul>	<ul style="list-style-type: none"> <li>▪ Choose from multi-year contracts and single event calibrations</li> <li>▪ Accredited and traceable calibration</li> <li>▪ Adjustments included to restore performance</li> <li>▪ Applicable software, safety, and reliability updates</li> <li>▪ Calibration records retention</li> </ul>	



## Multi-Vendor Service

Comprehensive Calibration and Repair for All Your Test, Measurement and Control Equipment

- Service for more than 140,000 instruments from over 9,000 manufacturers
- Broadest scope of accreditation
- 100+ global points of service
- 1 million calibrations annually

### Performance

Calibration is the cornerstone of measurement confidence. Now Tektronix can manage 100% of your calibration requirements, irrespective of product brand or origin. Our multi-vendor service tools simplify your calibration management program, minimizing downtime and improving operational efficiency.

### Optimize Asset Availability & Utilization

Tektronix provides industry-leading calibration and repair turnaround time on more than 140,000 products from over 9,000 manufacturers. The CalWeb® Asset Management System allows you to actively manage any downtime required for regular equipment maintenance and provides you with online, enterprise-wide instrument visibility.

### Global Reach with Local Presence

Tektronix has the most extensive global network of resources. With more than 100 points of service and 1,100 highly trained experts, our unmatched suite of capabilities and services are available locally to most of the world's research and manufacturing centers.

### Quality & Accuracy

Our comprehensive quality system is unmatched. Choose from multiple NIST traceable certificate options, including ANSI Z540.1, ISO/IEC 17025 and ISO 9001:2008. Our customers have direct access to the quality they expect from Tektronix' 65 years as an industry leader in test, measurement and monitoring solutions.

### Industry Leader

Tektronix is the industry leading provider of calibration services for the life science, aerospace, and defense industries. With consistent high quality and comprehensive service, customers have turned to Tektronix, making us their first choice for outsourced calibration needs.

For more information on Tektronix multi-vendor service, visit  
**[service-solutions.tektronix.com](http://service-solutions.tektronix.com)**

Or call us at 1-800-438-8165





# Oscilloscopes

## Oscilloscope Selection Guides, Pages 9–15

### Choosing Your Oscilloscope

Tektronix offers oscilloscopes for many different applications and uses. To help you choose the right scope for your needs, the most common criteria for selecting a scope are listed below, along with helpful tips for determining your requirements.

#### 1 Bandwidth

All oscilloscopes have a low-pass frequency response that rolls off at higher frequencies. Oscilloscope bandwidth is specified as being the frequency at which a sinusoidal input signal is attenuated to 70.7% of the signal's true amplitude – the -3 dB point. Your oscilloscope must have sufficient bandwidth to capture all relevant frequency components of your signal. If you regularly work with digital signals, it may be easier to consider bandwidth by comparing signal and oscilloscope rise time specifications. Use an oscilloscope with a rise time specification five times faster than your signal rise time to keep error below 2%.

**Rule: Bandwidth > 5 x Highest Signal Frequency**

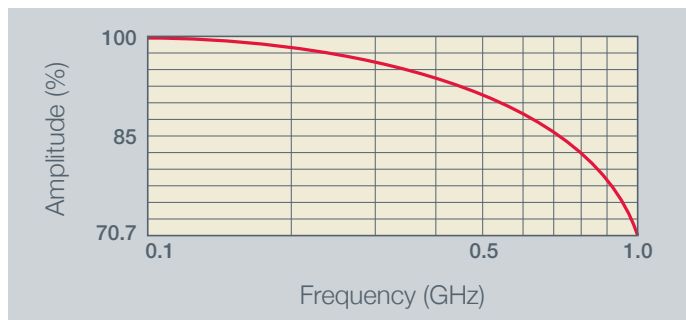


Figure 1: Typical frequency response curve for a general purpose oscilloscope

#### 2 Sample Rate

The faster an oscilloscope samples, the greater the resolution and detail of the displayed waveform, and the less likely that critical information or events will be lost. Tektronix recommends at least 5X oversampling to ensure signal details are captured and to avoid aliasing.

**Rule: Sample Rate > 5 x (Highest Frequency Component)**

#### 3 Record Length

Record length is the number of samples the oscilloscope can digitize and store in a single acquisition. Since an oscilloscope can store only a limited number of samples, the waveform duration – or length of “time” captured – will be inversely proportional to the oscilloscope's sample rate. A longer record length enables a longer time window to be captured with high resolution.

**Rule: Captured Time = (Record Length) / (Sample Rate)**

#### 4 Digital Channels and Spectrum Analyzer Input

Today's oscilloscopes offer more than just analog channels for system-level troubleshooting of complex designs.

- If you need to analyze a parallel bus or multiple serial buses, the Tektronix MSO Series of mixed signal oscilloscopes and MDO Series of mixed domain oscilloscopes offer 16 digital channels and up to 4 analog channels for analyzing multiple signals at once.
- If you are working with RF signals, the Tektronix MDO Series of mixed domain oscilloscopes offers a built-in spectrum analyzer for time-correlated analysis of analog, digital and RF signals.

#### 5 Features and Analysis Capability

Tektronix oscilloscopes offer a range of features and analysis capabilities. When choosing your scope, you should review available triggers, waveform search tools, automated measurements, and analysis packages such as serial bus analysis, jitter and power analysis to ensure they meet your needs.



## Mixed Signal and Mixed Domain Oscilloscopes



	MSO/DPO2000B	MDO3000
Additional Resources		
Channels	2, 4 analog channels; 16 digital channels (MSO2000B)	2, 4 analog channels; 16 digital channels (with MDO3MSO option)
Bandwidth	70 MHz to 200 MHz	100 MHz to 1 GHz
Spectrum Analyzer Frequency Range	--	Standard: 9 kHz to Analog Bandwidth Optional: 9 kHz to 3 GHz
Sample Rate	1 GS/s (analog); 1 GS/s (digital, only 1 pod); 500 MS/s (digital, both pods)	2.5 GS/s to 5 GS/s (analog); 121.2 ps (8.25 GS/s) MagniVu™ (digital)
Max Record Length	1 Mpoints	10 Mpoints
Trigger Types	Edge, Logic, Pulse Width, Runt, Set-up and Hold, Rise/Fall Time, Video, I <sup>2</sup> C*, SPI*, CAN*, LIN*, RS-232/422/485/UART*, Parallel (MSO2000B) *Optional	Edge, Sequence, Logic, Pulse Width, Runt, Timeout, Set-up and Hold, Rise/Fall Time, Video, Extended Video, I <sup>2</sup> C*, SPI*, CAN*, LIN*, FlexRay*, RS-232/422/485/UART*, I <sup>2</sup> S/LJ/RJ/TDM*, MIL-STD-1553*, USB 2.0*, Parallel (with MDO3MSO option) *Optional
Optional Serial Bus Decode and Analysis	DPO2AUTO: CAN and LIN DPO2COMP: RS-232/422/485/UART DPO2EMBD: I <sup>2</sup> C, SPI DPO2BND: Enables DPO2AUTO, DPO2COMP, DPO2EMBD	MDO3AERO: MIL-STD-1553 MDO3AUDIO: I <sup>2</sup> S, LJ, RJ, TDM MDO3AUTO: CAN and LIN MDO3COMP: RS-232/422/485/UART MDO3EMBD: I <sup>2</sup> C, SPI MDO3FLEX: FlexRay MDO3USB: USB2.0 MDO3BND: Enables MDO3AERO, MDO3AUDIO, MDO3AUTO, MDO3COMP, MDO3EMBD, MDO3FLEX, MDO3LMT, MDO3PWR, MDO3USB
Connectivity	USB Host, USB Device, GPIB*, Optional DPO2CONN Module: LAN (10/100 Base-T Ethernet) and Video Out *Optional	USB Host (x2), USB Device, LAN (10/100 Base-T Ethernet), Video Out, GPIB* *Optional
Waveform Math and Analysis	29 Automated Measurements, Waveform and Screen Cursors: Arithmetic Waveform Math, FFT	30 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics <b>Optional:</b> MDO3PWR: Power Analysis MDO3LMT: Limit/mask test MDO3BND: Enables MDO3AERO, MDO3AUDIO, MDO3AUTO, MDO3COMP, MDO3EMBD, MDO3FLEX, MDO3LMT, MDO3PWR, MDO3USB
Software	PC communications software: OpenChoice® Desktop	PC Communications Software: OpenChoice® Desktop
Battery Operation	--	--
Available Upgrades	<ul style="list-style-type: none"> <li>▪ Add serial bus triggering and decode</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increase bandwidth</li> <li>▪ Add Arbitrary/Function generator</li> <li>▪ Add 16 digital channels</li> <li>▪ Increase spectrum analyzer maximum frequency to 3 GHz</li> <li>▪ Add measurements and analysis (power, limit/mask)</li> <li>▪ Add serial bus triggering and decode</li> </ul>



## Mixed Signal and Mixed Domain Oscilloscopes



## Advanced Signal Analysis Oscilloscopes



	MDO4000B; MSO/DPO4000B	MSO/DPO5000B
Additional Resources		
Channels	4 analog channels; 16 digital channels (MDO/MSO4000B); 1 spectrum analyzer input (MDO4000B only)	4 analog channels; 16 digital channels (MSO5000B)
Bandwidth	100 MHz to 1 GHz (analog)	350 MHz to 2 GHz
Spectrum Analyzer Frequency Range	9 kHz - 3 GHz or 9 kHz - 6 GHz (MDO4000B only)	--
Sample Rate	2.5 GS/s to 5 GS/s (analog); 60.6 ps (16.5 GS/s) MagniVu™ (digital)	5 GS/s to 10 GS/s (analog); 60.6 ps (16.5 GS/s) MagniVu™ (digital)
Max Record Length	Up to 20 Mpoints	Up to 250 Mpoints
Trigger Types	RF Power Level**, Edge, Sequence, Logic, Pulse Width, Runt, Timeout, Set-up and Hold, Rise/Fall Time, Video, Extended Video*, I <sup>2</sup> C*, SPI*, USB*, Ethernet*, CAN*, LIN*, FlexRay*, RS-232/422/485/UART*, I <sup>2</sup> S/LJ/RJ/TDM*, MILSTD-1553*, Parallel *Optional **With optional MDO4TRIG module, RF power level can be used as source for Pulse Width, Timeout, Runt, Logic, Sequence	Edge, Sequence, Logic, Pulse Width, Glitch, Runt, Timeout, Transition, Set-up and Hold, Rise/Fall Time, Video, I <sup>2</sup> C*, SPI*, USB (Low, Full, High)*, RS-232/422/485/UART*, I <sup>2</sup> C*, SPI*, USB*, Ethernet*, CAN*, LIN*, FlexRay*, RS-232/422/485/UART*, MILSTD-1553*, Parallel (MSO5000B), Visual Trigger *Optional
Optional Serial Bus Decode and Analysis	DPO4AERO: MIL-STD-1553 DPO4AUDIO: I <sup>2</sup> S, LJ, RJ, TDM DPO4AUTO: CAN and LIN DPO4AUTOMAX: CAN, LIN and FlexRay DPO4COMP: RS-232/422/485/UART DPO4EMBD: I <sup>2</sup> C, SPI DPO4ENET: Ethernet DPO4USB: USB DPO4BND: Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PWR, DPO4USB, DPO4VID	SR-AERO: MIL-STD 1553 SR-AUTO: CAN/LIN/FlexRay SR-COMP: RS-232/422/485/UART SR-DPHY: MIPI D-PHY SR-EMBD: I <sup>2</sup> C, SPI SR-ENET: 10/100Base-T Ethernet SR-USB: USB
Connectivity	USB Host (x4), USB Device, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), Video Out, GPIB* *Optional	USB Host (x6), USB Device, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), Video Out, GPIB* *Optional
Waveform Math and Analysis	44 Automated Measurements, Waveform and Screen Cursors, Arithmetic Waveform Math, Spectrum Math, FFT, Advanced Math, Measurement Statistics, Waveform Histograms <b>Optional:</b> DPO4LMT: Limit and Mask Testing MDO4TRIG: Adv. RF Power Level Trigger DPO4PWR: Power Analysis DPO4VID: HDTV and Custom Triggering DPO4BND: Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PWR, DPO4USB, DPO4VID	53 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics, Waveform Histograms, Waveform Limit Testing <b>Optional:</b> BRR: BroadR-Reach Compliance Test; DDRA: DDR Memory Bus Analysis; DJA: DPOJET Advanced Jitter and Eye Diagram Analysis; ET3: Ethernet Compliance Test Solution; MTM: Mask Testing; PWR: Power Analysis; SignalVu Vector Signal Analysis; USB2: USB Compliance Test Solution; MOST: MOST 50/150 Compliance Test Solution; HSIC: HSIC Electrical Validation; USBPWR: USB Power Adapter/ EPS Compliance Automated Test Solution
Software	PC Communications Software: OpenChoice® Desktop Vector Signal Analysis Software: SignalVu-PC (MDO4000B only)	<b>Optional:</b> TekScope Anywhere™
Battery Operation	--	--

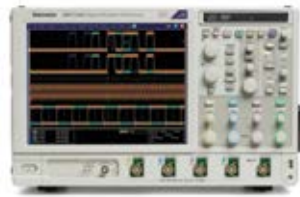
### Available Upgrades

- Add measurements and analysis (power, limit/mask, video, RF trigger)
- Add serial bus triggering and decode

- Add 16 digital channels
- Add extended record length, up to 250 Mpoints
- Add serial bus compliance testing
- Add measurements and analysis (power, jitter, mask, RF)
- Add serial bus triggering and decode



## Advanced Signal Analysis Oscilloscopes



	DPO7000C Series	MSO/DPO70000 Series
Additional Resources		
Channels	4 analog channels	4 analog channels; 16 digital channels (MSO70000)
Bandwidth	500 MHz to 3.5 GHz	4 GHz to 33 GHz Analog
Sample Rate	10 GS/s to 40 GS/s	25 GS/s to 100 GS/s (analog); 80 ps (12.5 GS/s) (digital)
Max Record Length	Up to 500 Mpoints	Up to 1 Gpoints
Trigger Types	Pinpoint™ Triggering, Edge, Glitch, Pulse Width, Runt, Time-out, Transition, Setup/Hold, Pattern, State, Window, Trigger Delay (by Time and by Event), I <sup>2</sup> C*, SPI*, USB (Low, Full)*, RS-232/422/485/UART*, I <sup>2</sup> C*, SPI*, USB*, Ethernet*, CAN*, LIN*, FlexRay*, RS-232/422/485/UART*, MILSTD-1553, Visual Trigger *Optional	Pinpoint™ Triggering, Edge, Glitch, Pulse Width, Runt, Time-out, Transition, Setup/Hold, Pattern, State, Window, Trigger Delay (by Time and by Event), I <sup>2</sup> C*, SPI*, USB (Low, Full)*, RS-232/422/485/UART*, Serial Pattern*, Visual Trigger* *Optional
Optional Serial Bus Decode and Analysis	SR-AERO: MIL-STD 1553 SR-AUTO: CAN/LIN/FlexRay SR-COMP: RS-232/422/485/UART SR-DPHY: MIPI D-PHY SR-EMBD: I <sup>2</sup> C, SPI SR-ENET: 10/100Base-T Ethernet SR-PCIE: PCI Express SR-USB: USB	SR-AERO: MIL-STD 1553; SR-AUTO: CAN/LIN/FlexRay; SR-COMP: RS-232/422/485/UART; SR-DPHY: MIPI D-PHY; SR-EMBD: I <sup>2</sup> C, SPI; SR-ENET: 10/100Base-T Ethernet; SR-PCIE: PCI Express; SR-USB: USB; SR-810B: 8b/10b; 10G-KR: 10GBASE-KR/KR4
Connectivity	USB Host (x5), LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), GPIB, eSATA, DVI, VGA	USB Host (x5), LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), GPIB, eSATA, DVI, VGA
Waveform Math and Analysis	53 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics, Waveform Histograms, Waveform Limit Testing <b>Optional:</b> BRR: BroadR-Reach Compliance Test; DDRA: DDR Memory Bus Analysis; DJA: DPOJET Advanced Jitter and Eye Diagram Analysis; D-PHY: MIPI D-PHY Essentials; ET3: Ethernet Compliance Test Solution; MTM: Mask Testing; PWR: Power Analysis; SignalVu Vector Signal Analysis; USB2: USB Compliance Test Solution; MOST: MOST 50/150 Compliance Test Solution; HSIC: HSIC Electrical Validation; USBPWR: USB Power Adapter/ EPS Compliance Automated Test Solution	53 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics, Waveform Histograms <b>Optional:</b> BRR: BroadR-Reach Compliance Test; DDR Memory Bus Analysis; DPOJET Advanced Jitter and Eye Diagram Analysis; Ethernet Compliance; Waveform Limit Testing; Mask Testing; Power Analysis; USB2 and USB3 Compliance and Analysis; USB Power Adapter/ EPS Compliance Automated Test Solution; MOST 50/150 Compliance Test; SignalVu Vector Signal Analysis; HDMI Compliance Test; HSIC Electrical Validation; MIPI D-PHY and M-PHY Characterization and Analysis; SAS Testing; SFP+ Compliance and Debug; Serial Data Link Analysis; 10G-KR Compliance and Debug; PCIe Compliance and Debug; Thunderbolt Characterization, Compliance and Debug; UHS Measurements
Software	<b>Optional:</b> TekScope Anywhere™	<b>Optional:</b> TekScope Anywhere™
Battery Operation	--	--
Available Upgrades	<ul style="list-style-type: none"> <li>Trade in older DPO7000 Series models for credit toward the newest DPO7000C version (50% credit of the old scope price)</li> <li>Add extended record length, up to 500 Mpoints</li> <li>Add serial bus compliance testing</li> <li>Add measurements and analysis (power, jitter, mask, RF)</li> <li>Add serial bus triggering and decode</li> </ul>	
	<ul style="list-style-type: none"> <li>Increase bandwidth</li> <li>Add 16 digital channels</li> <li>Upgrade older platforms to the latest platforms</li> <li>Add extended record length, up to 1 Gpoints</li> <li>Add serial bus compliance testing</li> <li>Add measurements and analysis (jitter, DDR, mask, RF)</li> <li>Add serial bus triggering and decode</li> </ul>	





## Advanced Signal Analysis Oscilloscopes

## Sampling Oscilloscopes



	DPO70000SX Series	DSA8300
Additional Resources		
Channels	2 or 4 analog channels	Six modules support up to 8 single ended or 4 differential channels and/or 2 optical channels
Bandwidth	33 GHz to 70 GHz	Up to 70+ GHz Electrical bandwidth and 80+ Optical bandwidth modules available with intrinsic jitter as low as <100 fs RMS
Sample Rate	50 GS/s to 200 GS/s	300 ks/s Maximum sample rate
Max Record Length	Up to 1Gpoints	50 to 16,000 per channel native record length; with up to 1M points when using available IConnect Signal Integrity Software, 10M samples (100k unit intervals, 100 samples per unit interval) when equipped with available 80SJNB Jitter, Noise and BER Analysis software
Trigger Types	Pinpoint™ Triggering, Edge, Glitch, Pulse Width, Runt, Time-out, Transition, Setup/Hold, Pattern, State, Window, Trigger Delay (by Time and by Event), Visual Trigger* *Optional	Clock Input/Prescale Trigger, TDR clock (generated internally), Clock Recovery from Optical Sampling modules and Electrical Clock Recovery modules, and Phase Reference time base supports acquisitions Free Run mode and Trigger Direct Input for <100 fs RMS intrinsic jitter typical
Optional Serial Bus Decode and Analysis	--	80SJNB Jitter, Noise, BER, and Serial Data Link Analysis Software; IConnect Signal Integrity Software
Connectivity	USB2.0/3.0 Host, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), DVI, VGA	3 USB 2.0 Port(s) connector on the front panel, 4 USB 2.0 Ports on the rear panel; LAN PORT, RJ-45 connector, supports 10BASE-T, 100BASE-T, 1000BASE-T on rear panel; 1 Serial Port, DB-9 COM1, COM2 ports; 1 DVI IEEE488.2 connector on rear panel; 1 DVI connector, female on rear panel, DVI to VGA 15-pin D-sub connector adapter provided; PS2 Serial Ports Mouse and keyboard inputs; Audio Ports 1/8 in. microphone input and line output
Waveform Math and Analysis	53 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics, Waveform Histograms <b>Optional:</b> DPOJET Advanced Jitter and Eye Diagram Analysis; SignalVu Vector Signal Analysis; Serial Data Link Analysis	Over 120 automated measurements include RZ,NRZ, and pulse signal types, and the following measurement types, plus 8 math waveforms using the following math functions: Add, Subtract, Multiply, Divide, Average, Differentiate, Exponential, Integrate, Natural Log, Log, Magnitude, Min, Max, Square Root, and Filter. In addition, measurement values can be utilized as scalars in math waveform definitions; Mask support for many applications, standard masks are available as predefined, built-in masks; Automated Masked Margin based on Mask Hit Ratio as required by many standards.
Software	<b>Optional:</b> TekScope Anywhere™	Windows® 7 Ultimate (32-bit) Operating System; IConnect Signal Integrity Software for frequency domain analysis, S-parameter measurements, and impedance characterization 80SJNB Jitter, Noise, BER, and Serial Link analysis including Cross-Talk aware TJ (BUJ); 80SJARB Jitter Analysis of Arbitrary Data with J2-J9 measurements, and support for pattern lengths to PRBS31
Battery Operation	--	--

For more information on sampling topics:

1. Physical Layer Tests of 100 Gb/s Communications Systems
2. Equalization and Serial Data Link Analysis Methods (SDLA) with 80SJNB Advanced Application Note
3. TDR and S-parameter Measurements - How Much Performance Do You Need?
4. TDR Impedance Measurements: A Foundation for Signal Integrity
5. Practices for Measurements on 25 Gb/s Signaling

### Available Upgrades

- Increase bandwidth
- Upgrade older platforms to the latest platforms
- Add extended record length, up to 1 Gpoints
- Add measurements and analysis (jitter, DDR, mask, RF)
- Modular architecture lets you add channels or bandwidth
- Add TDR, optical and electrical standards support
- Add advanced analysis, compliance test, frequency domain analysis software
- Add clock recovery trigger pickoff (CRTP) to select optical modules
- Enhance system jitter floor performance to <100 fs RMS

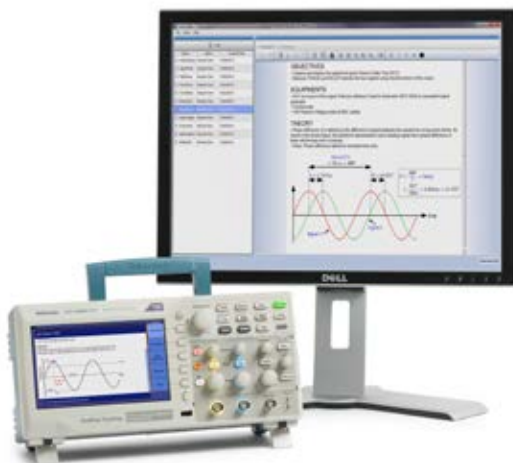


## Basic Oscilloscopes

## Battery Powered Oscilloscopes with Isolated Channels



	TBS1000	TBS1000B/ TBS1000B-EDU	THS3000	TPS2000B
Additional Resources				
Channels	4	2	4 (isolated)	2, 4 (isolated)
Bandwidth	60 MHz to 150 MHz	50 MHz to 200 MHz	100 MHz to 200 MHz	100 MHz to 200 MHz
Sample Rate	1 GS/s	1 GS/s to 2 GS/s	2.5 GS/s to 5 GS/s	1 GS/s to 2 GS/s
Max Record Length	2.5 k points	2.5 k points	10 k points	2.5 k points
Trigger Types	Edge, Pulse (width), Video	Edge, Pulse (width), Video	Edge, Pulse (width), Event, Video, Non-interlaced	Edge, Pulse (width), Video
Optional Serial Bus Decode and Analysis	--	--	--	--
Connectivity	USB Host, USB Device, GPIB* *Optional	USB Host, USB Device, GPIB* *Optional	USB Host, USB Device	RS-232 (includes RS-232-to-USB Host Serial Cable), Centronics, CompactFlash
Waveform Math and Analysis	16 Automated Measurements, Arithmetic Waveform Math, FFT, Waveform Limit Testing, Automated Datalogging	34 Automated Measurements, Arithmetic Waveform Math, FFT, Dual channel Frequency Counter, Waveform Limit Testing*, TrendPlot™ function*, Automated Datalogging* * Not available on EDU models	21 Automated Measurements, Arithmetic Waveform Math, FFT	11 Automated Measurements, Arithmetic Waveform Math, FFT <b>Optional:</b> TPS2PWR1: Power Measurement and Analysis
Software	PC Communications Software: OpenChoice® Desktop, Educator Classroom and Lab Resource CD	PC Communications Software: OpenChoice® Desktop Software, PC Courseware Editor Tool, Product Documentation and Lab Resource CD	PC Communications Software: OpenChoice® Desktop	PC Communications Software: OpenChoice® Desktop
Battery Operation	--	--	One THSBAT Battery Pack Included Standard	One TPSBAT Battery Pack Included Standard



## The World's First Dedicated Teaching Oscilloscope

The TBS1000B-EDU Digital Storage Oscilloscope Series is designed specifically to meet the needs of today's schools and universities. It's the first oscilloscope to use the innovative new courseware system that enables educators to seamlessly integrate teaching materials onto an oscilloscope. Along with a powerful PC Courseware Editor Tool and a courseware website, the TBS1000B-EDU supports a complete education ecosystem that uncovers new ways of enhancing the teaching and learning experience.



## TDS Series Oscilloscopes



	TDS2000C	TDS3000C
Additional Resources		
Channels	2, 4	2, 4
Bandwidth	50 MHz to 200 MHz	100 MHz to 500 MHz
Sample Rate	500 MS/s to 2 GS/s	1.25 GS/s to 5 GS/s
Max Record Length	2.5 k points	10 k points
Trigger Types	Edge, Pulse (width), Video	Edge, Logic (Pattern, State), Pulse (Glitch, Width, Runt, Slew Rate), Video, Extended Video*, Comm* *Optional
Optional Serial Bus Decode and Analysis	--	--
Connectivity	USB Host, USB Device, GPIB* *Optional	USB Host, LAN (10Base-T Ethernet) <b>Optional:</b> TDS3GV Module: GPIB, RS-232, and Video Out
Waveform Math and Analysis	16 Automated Measurements, Arithmetic Waveform Math, FFT, Waveform Limit Testing, Automated Datalogging	25 Automated Measurements, Arithmetic Waveform Math, FFT <b>Optional:</b> TDS3LIM: Limit Testing TDS3TMT: Telecom Mask Testing TDS3VID: HDTV and Custom Video Triggering
Software	PC Communications Software: OpenChoice® Desktop	PC Communications Software: OpenChoice® Desktop
Battery Operation	--	Requires Optional TDS3BATC Battery Pack

### Tektronix Reference Library

With over 20,000 items in our premium content library, it is likely you can find answers on our website to whatever questions you have. Here is a list of our most popular downloaded content for oscilloscopes. Visit [www.tektronix.com](http://www.tektronix.com) to download your copy.

1. XYZs of Oscilloscopes Primer
2. ABCs of Probes Primer
3. Fundamentals of the MDO4000B Series Mixed Domain Oscilloscopes
4. Fundamentals of Signal Integrity Primer
5. Debugging Serial Buses in Embedded Systems Designs Application Note
6. Power Supply Measurement and Analysis Primer

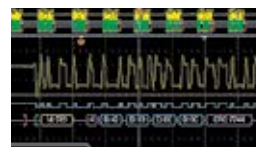


## MSO/DPO2000B Series

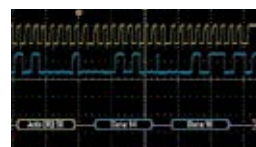
Test more, spend less with an oscilloscope that's packed with features and is also light on price. Measure as many as 20 channels of analog and digital signals. Speed debug with automated serial and parallel bus analysis. Search your entire record instantly with Wave Inspector®. Entry level has never been so powerful.

### Product Highlights

- 1 Mpoint record length on all channels
- Over 125 available trigger combinations, including setup/hold, serial packet and parallel data
- Automated search and easy waveform navigation with Wave Inspector®
- 29 automated measurements and FFT analysis
- 5-year warranty



Quickly pan/zoom and automatically search your waveforms with Wave Inspector®.



Automatically trigger, decode and search your serial buses with optional analysis modules.

Models	Analog Channels	Digital Channels	Analog Bandwidth	Analog Sample Rate
DPO2002B	2	--	70 MHz	1 GS/s
MSO2002B	2	16	70 MHz	1 GS/s
DPO2004B	4	--	70 MHz	1 GS/s
MSO2004B	4	16	70 MHz	1 GS/s
DPO2012B	2	--	100 MHz	1 GS/s
MSO2012B	2	16	100 MHz	1 GS/s
DPO2014B	4	--	100 MHz	1 GS/s
MSO2014B	4	16	100 MHz	1 GS/s
DPO2022B	2	--	200 MHz	1 GS/s
MSO2022B	2	16	200 MHz	1 GS/s
DPO2024B	4	--	200 MHz	1 GS/s
MSO2024B	4	16	200 MHz	1 GS/s

### Application Modules

#### Serial Bus Triggering and Protocol Analysis

DPO2BND	Enables DPO2AUTO, DPO2COMP, DPO2EMBD
DPO2AUTO	Automotive (CAN, LIN)
DPO2COMP	Computer (RS-232)
DPO2EMBD	Embedded (I <sup>2</sup> C, SPI)

### Recommended Accessories

DPO2CONN	Ethernet and Video Out Connectivity Module
119-7465-xx	TekVPI External Power Supply
ACD2000	Soft Carrying Case

### Recommended Probes

#### Passive Voltage Probes

TPP0200	200 MHz, 300 V CAT II
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#### Active Voltage Probes

TAP1500 <sup>1</sup>	10X, 1.5 GHz, ± 8 V
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#### Differential Voltage Probes

TDP0500 <sup>1</sup>	500 MHz, ± 42 V/± 4.25 V
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#### High Voltage Probes

THDP0200 <sup>1</sup>	200 MHz, ± 1500 V/± 150 V
TMDP0200 <sup>1</sup>	200 MHz, ± 750 V/± 75 V
THDP0100 <sup>1</sup>	100 MHz, ± 6000 V/± 600 V

#### Current Probes

TCP0200	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
TCP0030A <sup>1</sup>	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
TCP0150 <sup>1</sup>	20 MHz, 150 A DC/150 A RMS/500 A Peak/5 mA Min

<sup>1</sup> Requires 119-7465-xx TekVPI External Power Supply

### Another Product for Consideration

Need an arbitrary/function generator for your project? The MDO3000 Series features six integrated instruments to capture analog, digital and RF signals with one scope.

Need more bandwidth? The MDO3000 Series offers up to 1 GHz analog bandwidth.

### Ships with Product

- One TPP0100 100MHz, 10X Passive Probe Per Analog Channel (70 MHz model)
- One TPP0200 200 MHz, 10X Passive Probe Per Analog Channel (100 MHz & 200 MHz models)
- One P6316 16 Channel Logic Probe (MSO only)
- OpenChoice® Desktop Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD, Power Cord
- 5-year Warranty



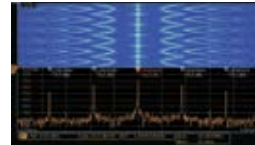


## MDO3000 Series

This scope features six integrated instruments to capture analog, digital and RF signals with one scope. And add instruments, analysis functions and bandwidth as your needs change.

### Product Highlights

- Integrated 6-in-1 oscilloscope that offers a spectrum analyzer, arbitrary function generator, logic analyzer, protocol analyzer and digital voltmeter
- Spectrum Analyzer standard on all models
- 10 Mpoint record length on all channels
- >280,000 wfm/s max. waveform capture rate with FastAcq
- Automated search and waveform navigation with Wave Inspector®



Monitor slowly changing RF events at a glance with spectrogram display.

Models	Analog Channels	Digital Channels (Optional)	Analog Bandwidth	Analog Sample Rate	Digital Sample Rate Main/MagniVu™	Spectrum Analyzer Input	Spectrum Analyzer Frequency Range Standard/Optional
MDO3012	2	16	100 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 100 MHz / 9 kHz - 3 GHz
MDO3014	4	16	100 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 100 MHz / 9 kHz - 3 GHz
MDO3022	2	16	200 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 200 MHz / 9 kHz - 3 GHz
MDO3024	4	16	200 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 200 MHz / 9 kHz - 3 GHz
MDO3032	2	16	350 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 350 MHz / 9 kHz - 3 GHz
MDO3034	4	16	350 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 350 MHz / 9 kHz - 3 GHz
MDO3052	2	16	500 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 500 MHz / 9 kHz - 3 GHz
MDO3054	4	16	500 MHz	2.5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 500 MHz / 9 kHz - 3 GHz
MDO3102	2	16	1 GHz	5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 1 GHz / 9 kHz - 3 GHz
MDO3104	4	16	1 GHz	5 GS/s	500 MS/s / 8.25 GS/s	1	9 kHz - 1 GHz / 9 kHz - 3 GHz

### Instrument Options\*\*

MDO3AFG	Arbitrary function generator
MDO3MSO	16 digital channels; includes P6316 digital probe and accessories
MDO3SA	Increase spectrum analyzer input frequency range to 9 kHz - 3 GHz
MDO3SEC	Add password protected security to enable or disable all communication ports and firmware upgrades

### Application Modules

MDO3BND	Enables MDO3AERO, MDO3AUDIO, MDO3AUTO, MDO3COMP, MDO3EMBD, MDO3FLEX, MDO3LMT, MDO3PWR, MDO3USB
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### Serial Bus Triggering and Protocol Analysis

MDO3AERO	Aerospace (MIL-STD-1553)
MDO3AUDIO	Audio (I <sup>2</sup> S, LJ, RJ and TDM)
MDO3AUTO	Automotive (CAN, LIN)
MDO3COMP	Computer (RS-232)

### Application Modules

#### Serial Bus Triggering and Protocol Analysis

MDO3EMBD	Embedded (I <sup>2</sup> C, SPI)
MDO3FLEX	Automotive (FlexRay)
MDO3USB*	USB 2.0 (LS, FS, HS)

#### Additional Analysis

MDO3PWR	Power Analysis
MDO3LMT	Limit/Mask Test

### Recommended Probes

#### Passive Voltage Probes

TPP0502	2X, 500 MHz, 300 V CAT II
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#### High Voltage Probes

TMDP0200	250X/25X, 200 MHz, ± 750 V / ± 75 V
THDP0200	1000X/100X, 100 MHz, ± 6000 V / ± 600 V
TPP0850	50X, 800 MHz, 2500 V Peak

\* USB 2.0 HS only available on 1 GHz analog bandwidth models and only for HS analysis.

\*\* Can be preconfigured from the factory or ordered as stand-alone upgrade kits.

### Recommended Probes

#### Current Probes

TCP0020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
TCP0030A	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
TCP0150	20 MHz, 150 A DC/150 A RMS/500 A Peak/5 mA Min

### Ships with Product

- One Low C Passive Probe Per Channel, TPP1000 on 1 GHz Models, TPP0500B on 350 and 500 MHz Models, TPP0250 on all 100 and 200 MHz Models
- One P6316 16 Channel Logic Probe (with option MDO3MSO only)
- N-to-BNC Adapter
- OpenChoice® Desktop
- Calibration Certificate, Installation and Safety Manual, & Documentation on CD
- Accessory Bag
- Front Panel Language Overlay (if other than English)
- Power Cord
- 3-year Warranty



## MDO4000B Series

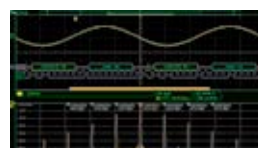
The new revolutionary oscilloscope with a built-in spectrum analyzer. Capture synchronized analog, digital and RF signals for a complete, time correlated system view of your device. See both time and frequency domains in one glance. View the RF spectrum at any point in time to see how it changes. Quickly and efficiently solve the most complicated design issues—with an oscilloscope as integrated as your designs.

### Product Highlights

- The world's first oscilloscope with a built-in spectrum analyzer
- Up to 3 GHz capture bandwidth on the spectrum analyzer input
- Integrated spectral analysis tools: automated and manual markers, spectrogram display, RF vs. time traces
- Advanced modulation analysis: MDO4000B with [SignalVu-PC](#) offers industry's widest bandwidth vector signal analyzer
- >340,000 wfms max. waveform capture rate with FastAcq



Use it as an oscilloscope  
OR a spectrum analyzer  
OR combined to capture  
synchronized analog, digital  
and RF signals.



See how your RF spectrum  
changes over time or device  
state.

Models	Analog Channels	Digital Channels	Analog Bandwidth	Analog Sample Rate	Digital Sample Rate Main/MagniVu™	Spectrum Analyzer Input	Spectrum Analyzer Frequency Range
MDO4014B-3	4	16	100 MHz	2.5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 3 GHz
MDO4034B-3	4	16	350 MHz	2.5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 3 GHz
MDO4054B-3	4	16	500 MHz	2.5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 3 GHz
MDO4054B-6	4	16	500 MHz	2.5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 6 GHz
MDO4104B-3	4	16	1 GHz	5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 3 GHz
MDO4104B-6	4	16	1 GHz	5 GS/s	500 MS/s /16.5 GS/s	1	9 kHz – 6 GHz

### Application Modules

**DPO4BND** Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PWR, DPO4USB, DPO4VID

#### Serial Bus Triggering and Protocol Analysis

DPO4-AERO	Aerospace (MIL-STD 1553)
DPO4-AUDIO	Audio (I <sup>2</sup> S, LJ, RJ and TDM)
DPO4AUTO	Automotive (CAN, LIN)
DPO4-AUTOMAX	Automotive (CAN, LIN, FlexRay)
DPO4COMP	Computer (RS-232)
DPO4EMBD	Embedded (I <sup>2</sup> C, SPI)
DPO4ENET	Ethernet (10BASE-T, 100BASE-TX)
DPO4USB <sup>1</sup>	USB 2.0 (LS, FS, HS)

#### Additional Analysis

MDO4TRIG	Adv. RF Power Level Triggering
DPO4PWR	Power Analysis
DPO4LMT	Limit and Mask Testing
DPO4VID	HDTV & Custom Video Triggering
Signal-Vu-PC	Vector Signal Analysis Software

### Recommended Probes

#### Passive Voltage Probes

TPP1000	10X, 1 GHz, 300 V CAT II
TPP0500B	10X, 500 MHz, 300 V CAT II
TPP0502	2X, 500 MHz, 300 V CAT II

#### Active Voltage Probes

TAP1500	10X, 1.5 GHz, ± 8 V
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#### Differential Voltage Probes

TDP0500	50X/5X, 500 MHz, ± 42 V/± 4.2 V
TDP1000	50X/5X, 1 GHz, ± 42 V/± 4.2 V

#### High Voltage Probes

THDP0200	500X/50X, 200 MHz, ± 1500 V/± 150 V
TPP0850	50X, 800 MHz, 2500 V Peak

#### Current Probes

TCP0030A	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
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### Ships with Product

- Four TPP0500B (≤500 MHz models) or TPP1000 (1 GHz models) Passive Voltage Probes
- One P6616 16 Channel Logic Probe
- N-to-BNC Adapter (103-0045-00)
- OpenChoice® Desktop Software, SignalVu PC Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Front Panel Cover, Accessory Bag, Power Cord
- 3-year Warranty

<sup>1</sup> USB 2.0 HS only available on 1 GHz analog bandwidth models.

### Recommended Service

SILV900	5-year Extended Warranty
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## MSO/DPO4000B Series

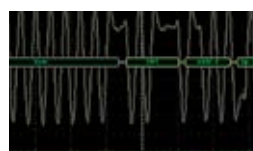
Debug complex designs faster with an oscilloscope that's as versatile as it is powerful. Measure up to 20 channels of analog and digital signals. Analyze serial and parallel buses. Instantly search your entire record with the time-saving Wave Inspector®. Finally, an oscilloscope that multitasks as well as you do.

### Product Highlights

- Up to 20 Mpoint record length on all channels
- >340,000 wfm/s max. waveform capture rate with FastAcq
- Over 125 available trigger combinations, including setup/hold, serial packet and parallel data
- Automated search and easy waveform navigation with Wave Inspector®
- 41 automated measurements and FFT analysis



Ships with one passive probe per analog channel, with up to 1 GHz bandwidth and an industry-best 3.9 pF of capacitive loading.



Automatically trigger, decode and search your serial and parallel bus.

Models	Analog Channels	Digital Channels	Bandwidth	Record Length (Max)	Analog Sample Rate (Max)	Digital Sample Rate Main/MagniVu™
DPO4014B	4	--	100 MHz	20M	2.5 GS/s	--
MSO4014B	Replaced by MDO4014B-3. All the capabilities of MSO + Spectrum Analyzer					
DPO4034B	4	--	350 MHz	20M	2.5 GS/s	--
MSO4034B	Replaced by MDO4034B-3. All the capabilities of MSO + Spectrum Analyzer					
DPO4054B	4	--	500 MHz	20M	2.5 GS/s	--
MSO4054B	Replaced by MDO4054B-3. All the capabilities of MSO + Spectrum Analyzer					
DPO4102B-L	2	--	1 GHz	5M	5 GS/s	--
DPO4102B	2	--	1 GHz	20M	5 GS/s	--
DPO4104B-L	4	--	1 GHz	5M	5 GS/s	--
DPO4104B	4	--	1 GHz	20M	5 GS/s	--
MSO4102B-L	2	16	1 GHz	5M	5 GS/s	500 MS/s /16.5 GS/s
MSO4102B	2	16	1 GHz	20M	5 GS/s	500 MS/s /16.5 GS/s
MSO4104B-L	4	16	1 GHz	5M	5 GS/s	500 MS/s /16.5 GS/s
MSO4104B <sup>1</sup>	4	16	1 GHz	20M	5 GS/s	500 MS/s /16.5 GS/s

### Application Modules

DPO4BND Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PWR, DPO4USB, DPO4VID

#### Serial Bus Triggering and Analysis

DPO4AERO	Aerospace (MIL-STD 1553)
DPO4-AUDIO <sup>2</sup>	Audio (I <sup>2</sup> S, LJ, RJ and TDM)
DPO4AUTO	Automotive (CAN, LIN)
DPO4-AUTOMAX	Automotive (CAN, LIN, FlexRay)
DPO4COMP	Computer (RS-232)
DPO4EMBD <sup>3</sup>	Embedded (I <sup>2</sup> C, SPI)
DPO4ENET	Ethernet (10Base-T, 100Base-Tx)
DPO4USB <sup>4</sup>	USB 2.0 (LS, FS, HS)

### Application Modules

#### Serial Bus Triggering and Analysis

DPO4PWR	Power Analysis
DPO4LMT	Limit and Mask Testing
DPO4VID	HDTV & Custom Video Triggering

### Recommended Probes

#### Passive Voltage Probes

TPP0502	2X, 500 MHz, 300 V CAT II
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#### High Voltage Probes

TMDP0200	200 MHz, ± 750 V/± 75 V
TPP0850	50X, 800 MHz, 2500 V Peak

#### Current Probes

TCP0030A	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
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### Another Product for Consideration

Working with RF? The MDO4000B Series is the world's only oscilloscope with a built-in spectrum analyzer for capturing and analyzing synchronized analog, digital and RF signals.

### Ships with Product

- One TPP0500B (≤ 500 MHz models) or TPP1000 (1 GHz models) Passive Voltage Probe Per Analog Channel
- One P6616 16 Channel Logic Probe (MSO only)
- OpenChoice® Desktop Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Front Panel Cover, Accessory Bag, Power Cord
- 3-year Warranty

<sup>1</sup> See the MDO4104B-3 for an MSO + Spectrum Analyzer.

<sup>2</sup> Not available on DPO4102B, DPO4102B-L models.

<sup>3</sup> For SPI, only 2-wire support is available on DPO4102B, DPO4102B-L.

<sup>4</sup> USB 2.0 HS only available on 1 GHz analog bandwidth models.

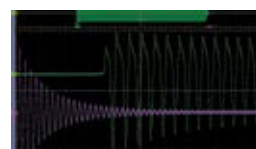


## MSO/DPO5000B Series

Today's faster data rates and tighter timing margins requires an oscilloscope with outstanding signal acquisition performance and analysis capabilities. Tektronix MSO/DPO5000B Series oscilloscopes provide exceptional signal fidelity, with 2 GHz and 10 GS/s sample rate, along with advanced analysis and math capabilities. MSO models include 16 digital timing channels, and all models can be equipped to decode common serial protocols, to provide a comprehensive view of your systems.

### Product Highlights

- 350 MHz, 500 MHz, 1 GHz, and 2GHz models
- >250,000 wfms max. waveform capture rate with FastAcq™ technology
- 10 GS/s max sampling and 250 Mpoints memory (optional)
- Extensive analysis including jitter/timing and user defined math (i.e., MATLAB)
- Visual triggering standard with search and mark



Achieve greater than 11 bits vertical resolution with Hi-Res sampling and reduce unwanted noise while capturing signal details.



Perform advanced protocol triggering and decode on mid-speed and low-speed serial and buses (optional).

Models	Analog Channels	Digital Channels	Analog Bandwidth	Analog Sample Rate (4 Channels/2 Channels)	Digital Sample Rate Main/MagniVu™
DPO5034B	4	--	350 MHz	5 GS/s	--
MSO5034B	4	16	350 MHz	5 GS/s	500 MS/s /16.5 GS/s
DPO5054B	4	--	500 MHz	5 GS/s	--
MSO5054B	4	16	500 MHz	5 GS/s	500 MS/s /16.5 GS/s
DPO5104B	4	--	1 GHz	5 GS/s /10 GS/s	--
MSO5104B	4	16	1 GHz	5 GS/s /10 GS/s	500 MS/s /16.5 GS/s
DPO5204B	4	--	2 GHz	5 GS/s /10 GS/s	--
MSO5204B	4	16	2 GHz	5 GS/s /10 GS/s	500 MS/s /16.5 GS/s

### Software Packages

#### Serial Bus Triggering and Protocol Analysis

SR-AERO	MIL-STD-1553B
SR-AUTO	CAN/LIN/FlexRay
SR-COMP	Computer (RS-232)
SR-DPHY	MIPI D-PHY
SR-EMBD	Embedded (I <sup>2</sup> C, SPI)
SR-ENET	Ethernet
SR-USB	USB 2.0 (LS, FS, HS)

#### Compliance Test

BRR	BroadR-Reach
ET3	Ethernet
MOST	MOST50/150
USB2	USB 2.0

#### Additional Analysis

DDRA	DDR Memory
DJA	Advanced Jitter Analysis
HSIC	HSIC Electrical Characterization
PS2, PS3	Power Solution Bundles
PWR	Power Analysis
SVE	SignalVu RF Analysis
USBPWR	USB Power Compliance

Additional software packages are available. For a complete listing, please visit [www.tektronix.com/mso5000](http://www.tektronix.com/mso5000)

### Recommended Probes

#### Passive Voltage Probes

TPP1000	10X, 1 GHz, 300 V CAT II
TPP0502	2X, 500 MHz, 300 V CAT II

#### Active Voltage Probes

TAP1500	10X, 1.5 GHz, ± 8 V
TAP2500	10X, 2.5 GHz, ± 4 V

#### Differential Voltage Probe

TDP0500	500 MHz, ± 42 V/± 4.2 V
TDP1000	1 GHz, ± 42 V/± 4.2 V
TDP1500	1.5 GHz, ± 8.5 V/± 850 mV

#### High Voltage Probes

TMDP0200	200 MHz, ± 750 V/± 75 V
THDP0200	200 MHz, ± 1500 V/± 150 V
THDP0100	100 MHz, ± 6000 V/± 600 V
TPP0850	50X, 800 MHz, 2500 V Peak

#### Current Probes

TCP0020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
TCP0030A	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
TCP0150	20 MHz, 150 A DC/150 A RMS/500 A Peak/5 mA Min

### Ships with Product

- Four TPP0500B (350 MHz and 500 MHz models) or TPP1000 (1 GHz and 2 GHz models) Passive Voltage Probes
- One P6616 16 Channel Logic Probe (MSO only)
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Front Panel Cover, Accessory Bag, Power Cord
- 1-year Warranty

### Instrument Options

#### Record Length

Opt. 5RL	50M/Ch
Opt. 10RL	125M/Ch

Limitations apply. See data sheet for full details.

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty



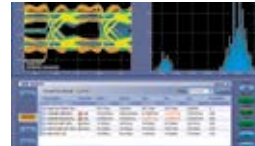


## DPO7000C Series

Get into the details of critical high-speed signals and find the most elusive signal anomalies. These oscilloscopes offer measurement and decoding packages for many of today's communications and memory bus standards. Fast waveform capture rate, Pinpoint® triggering, and Visual Trigger & Search will help you solve the most frustrating troubleshooting mysteries, fast. And jitter analysis comes in every box.

### Product Highlights

- 500 MHz, 1 GHz, 2.5 GHz, and 3.5 GHz models
- Windows 7 Ultimate 64-bit operating system and touch-screen display
- >250,000 wfms max. waveform capture rate with FastAcq™ technology
- Over 1400 available trigger combinations with Pinpoint® triggering
- Automated search and mark for waveform events
- 53 automated measurements and FFT analysis



Includes the DPOJET essentials jitter and eye pattern analysis software package - free.



Over 30 optional software packages available for specialized applications.

Models	Analog Channels	Bandwidth	Record Length (1/2/4 Channels)	Analog Sample Rate
DPO7054C	4	500 MHz	125/50/25 M	20/10/5 GS/s
DPO7104C	4	1 GHz	125/50/25 M	20/10/5 GS/s
DPO7254C	4	2.5 GHz	125/50/25 M	40/20/10 GS/s
DPO7354C	4	3.5 GHz	125/50/25 M	40/20/10 GS/s

### Software Packages

#### Serial Bus Triggering and Protocol Analysis

SR-AERO	MIL-STD-1553B
SR-AUTO	CAN/LIN/FlexRay
SR-COMP	Computer (RS-232)
SR-DPHY	MIPI D-PHY
SR-EMBD	Embedded (I <sup>2</sup> C, SPI)
SR-ENET	Ethernet
SR-PCIE	PCI Express
SR-USB	USB 2.0 (LS, FS, HS)

#### Compliance Test

BRR	BroadR-Reach
ET3	Ethernet
MOST	MOST50/150
USB2	USB 2.0

#### Additional Analysis

DDRA	DDR memory
DJA	Advanced Jitter Analysis
HSIC	HSIC Electrical Characterization
PS2, PS3	Power Solution Bundles
PWR	Power Analysis
SVE	SignalVu RF Analysis
USBPWR	USB Power Compliance

Additional software packages are available. For a complete listing, please visit [www.tektronix.com/dpo7000](http://www.tektronix.com/dpo7000)

### Recommended Probes

#### Active Voltage Probes

TAP1500	10X, 1.5 GHz, ± 8 V
TAP2500	10X, 2.5 GHz, ± 4 V
TAP3500	10X, 3.5 GHz, ± 4 V

#### Differential Voltage Probe

TDP0500	500 MHz, ± 42 V/± 4.2 V
TDP1000	1 GHz, ± 42 V/± 4.2 V
TDP1500	1.5 GHz, ± 8.5 V/± 850 mV
TDP3500	3.5 GHz, ± 2 V

#### High Voltage Probes

TMDP0200	200 MHz, ± 750 V/± 75 V
THDP0200	200 MHz, ± 1500 V/± 150 V
THDP0100	100 MHz, ± 6000 V/± 600 V

#### Current Probes

TCP0020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
TCP0030A	120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
TCP0150	20 MHz, 150 A DC/150 A RMS/500 A Peak/5 mA Min

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty

### Ships with Product

- Four P6139B 500 MHz, 10X Passive Voltage Probes
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Front Panel Cover, Power Cord
- 1-year Warranty

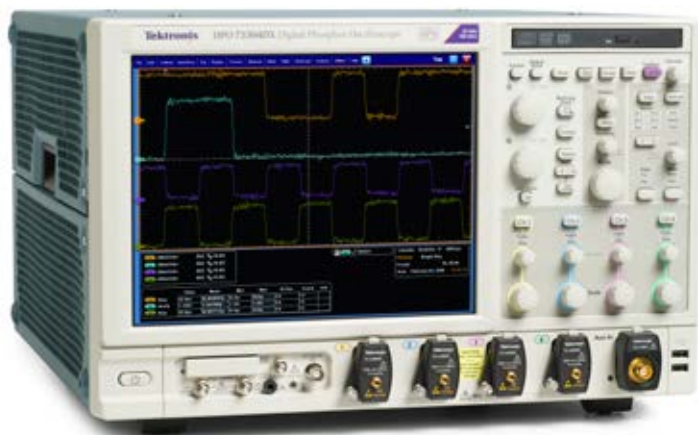
### Instrument Options

#### Record Length

Opt. 5RL	50M/Ch
Opt. 10RL <sup>1</sup>	125M/Ch

Limitations apply. See data sheet for full details.

<sup>1</sup> Not available on DPO7054C, DPO7104C

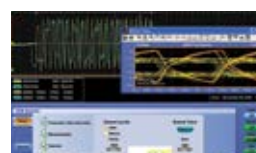


## MSO/DPO70000C and DX Series

Whether you're at first power-up on your latest design, verifying compliance to the fastest standards, or researching fundamentals of the universe, you have the performance, precision, and tools to get your job done faster.

### Product Highlights

- 4 to 33 GHz true analog bandwidth for measurements on the latest high-speed serial standards
- 100 GS/s Sample Rate on 2 Channels
- 16 Logic Channels with 80 ps Timing Resolution for Debug of Digital and Analog Signals (MSO70000 models)
- iCapture – One Connection for both Analog and Digital Signals (MSO70000 models)
- Fastest Waveform Capture Rate with >300,000 wfms/s Maximum
- Up to 1 Gpoints Record Length with MultiView Zoom™ for Quick Navigation and Advanced Search
- Visual Trigger to Precisely Qualify Triggers and Find Unique Events in Complex Waveforms



Nearly 50 Application-specific Solutions Enable Standard-specific Certification, Measurement Automation, and Extended Signal Analysis.

Models	Analog Channels + Digital Channels	Analog Bandwidth	Sample Rate (2/4 Channels)	Record Length (Std/Opt)
MSO/DPO70404C	4 (DPO), 4 + 16 (MSO)	4 GHz	25 GS/s	31 Mpoints/125 Mpoints
MSO/DPO70604C	4 (DPO), 4 + 16 (MSO)	6 GHz	25 GS/s	31 Mpoints/125 Mpoints
MSO/DPO70804C	4 (DPO), 4 + 16 (MSO)	8 GHz	25 GS/s	31 Mpoints/125 Mpoints
MSO/DPO71254C	4 (DPO), 4 + 16 (MSO)	12.5 GHz	100/50 GS/s	31 Mpoints/250 Mpoints
MSO/DPO71604C	4 (DPO), 4 + 16 (MSO)	16 GHz	100/50 GS/s	31 Mpoints/250 Mpoints
MSO/DPO72004C	4 (DPO), 4 + 16 (MSO)	20 GHz	100/50 GS/s	31 Mpoints/250 Mpoints
MSO/DPO72304DX	4 (DPO), 4 + 16 (MSO)	23 GHz	100/50 GS/s	31 Mpoints/1 Gpoints
MSO/DPO72504DX	4 (DPO), 4 + 16 (MSO)	25 GHz	100/50 GS/s	31 Mpoints/1 Gpoints
MSO/DPO73304DX	4 (DPO), 4 + 16 (MSO)	33 GHz	100/50 GS/s	31 Mpoints/1 Gpoints

### Software Packages

#### Serial Bus Triggering and Protocol Analysis

SR-AERO	MIL-STD-1553B
SR-AUTO	CAN/LIN/FlexRay
SR-COMP	Computer (RS-232)
SR-DPHY	MIPI D-PHY
SR-EMBD	Embedded (I <sup>2</sup> C, SPI)
SR-ENET	10/100Base-T Ethernet
SR-PCIE	PCI Express
SR-USB	USB 2.0 (LS, FS, HS), USB 3.0

#### Compliance Test

DisplayPort, Ethernet, HDMI, HSIC, MDL, MIPI D-PHY/M-PHY, SATA/SAS, SFP+, Thunderbolt, MOST50/150, USB 2.0/USB 3.0/USB 3.1, USB Power Adapter/EPS, 10GBASE-KR/KR4

#### Additional Analysis

MTH	Communications Mask Testing
DDRA	DDR Memory
DJA	Advanced Jitter and Eye Diagram
PWR	Power Analysis
SDL64	Serial Data Link Analysis Visualizer
SVE	SignalVu RF Analysis
VET	Visual Trigger/Search

### Recommended Probes

P7600	25 GHz to 33 GHz TriMode with Remote Head Design
P7500	4 GHz to 25 GHz TriMode
P7300	4 GHz to 13 GHz Z-Active
P6780	Differential Input Digital Probe (MSO Models)
P6750	D-Max Technology Digital Probe (MSO Models)
P6717A	General-purpose Digital Probe (Included with MSO Models)
P6250/ P6251	500 MHz/1 GHz 42 V Differential
TCPA300/ TCPA400	Series Current Measurement Systems

### Recommended Service

G3	Gold Care 3-year Extended Warranty
G5	Gold Care 5-year Extended Warranty
R3	3-year Extended Warranty
R5	5-year Extended Warranty

### Instrument Options

Opt. ERRDT	Frame and Bit Error Rate Detector for High-speed Serial Standards
Opt. ST6G	Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals up to 6.25 Gb/s
Opt. SSD	Solid State Drive (Standard on DX models)
Opt. 5XL	62.5M/Ch Record Length (Standard on MSO Models)
Opt. 10XL	125M/Ch Record Length
Opt. 20XL	250M/Ch Record Length
Opt. 50XL	500M/Ch Record Length/1G on 2 Channels (DX Models Only)

### Ships with Product

- Accessory pouch, front cover, mouse, keyboard, user manual, (4) TekConnect® to 2.92 mm adapters and (1) TekConnect-to-BNC adapter, static protection wrist strap, MSO/DPO70000 software/GPIB reference on instrument HDD, performance verification procedure PDF file, calibration certificate documenting NIST traceability, Z 540-1 compliance and ISO9001, power cord, one-year warranty, MSO Models Include: P6717A Logic Probe, Logic Probe Deskew Fixture

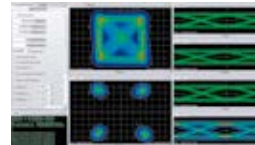


## DPO70000SX Series

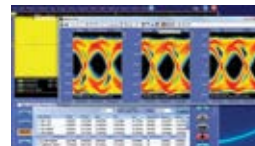
DPO70000SX 70 GHz Oscilloscope provides lowest-noise, real-time acquisition using Tektronix' patented Asynchronous Time Interleaving technology. Its compact, scalable package allows flexible system configurations. Get the most accurate real-time performance for ultra-bandwidth applications like coherent optical systems and leading-edge research.

### Product Highlights

- 70 GHz bandwidth with the industry's lowest noise, highest ENOB
- Compact, scalable package allows you to position units very close to the device under test
- UltraSync ensures precise data synchronization and convenient Master/Extension operation in multi-unit systems
- 200 GS/s sample rate for 5 ps timing resolution
- Up to 1 Gpoints Record Length with MultiView Zoom™ for Quick Navigation and Advanced Search



Enable comprehensive analysis and presentation of optical modulation systems with Coherent Optical Modulation Analysis software.



Precisely characterize your system's performance with DPOJET Advanced Jitter and Eye Diagram measurement application.

Models	Analog Channels	Analog Bandwidth	Sample Rate	Record Length (Std/Opt)
DPO77002SX	1, 2	70 GHz, 33 GHz	200GS/s, 100GS/s	62.5 Mpoints/1 Gpoints
DPS77004SX (2-unit system)	2, 4	70 GHz, 33 GHz	200GS/s, 100GS/s	62.5 Mpoints/1 Gpoints
DPO73304SX	2, 4	33 GHz, 23 GHz	100GS/s, 50GS/s	62.5 Mpoints/1 Gpoints
DPS73308SX (2-unit system)	4, 8	33 GHz, 23 GHz	100GS/s, 50GS/s	62.5 Mpoints/1 Gpoints

### Software Packages

DJA	Advanced Jitter and Eye Diagram
SDLA64	Serial Data Link Analysis Visualizer
SVE	SignalVu RF Analysis
VET	Visual Trigger/Search

### Recommended Service

G3	Gold Care 3-year Extended Warranty
G5	Gold Care 5-year Extended Warranty
R3	3-year Extended Warranty
R5	5-year Extended Warranty

### Ships with Product

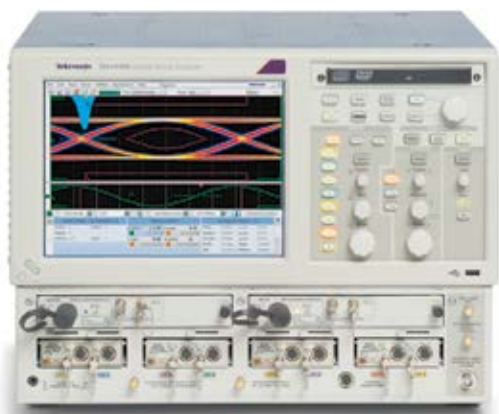
- Accessory pouch, front cover, mouse, keyboard, user manual, TekConnect® to 2.92 mm adapters, static protection wrist strap, DPO70000SX software/GPIB reference on instrument SSD, performance verification procedure PDF file, calibration certificate documenting NIST traceability, Z 540-1 compliance and ISO9001, power cord, one-year warranty

### Recommended Probes

TekConnect Channels Only	
P7600	25 GHz to 33 GHz TriMode with Remote Head Design

### Instrument Options

Opt. 10XL	125M/Ch Record Length
Opt. 20XL	250M/Ch Record Length
Opt. 50XL	500M/Ch Record Length/1G on 2 Channels

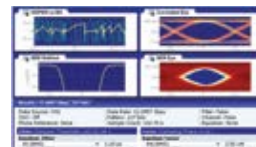


## DSA8300 Series

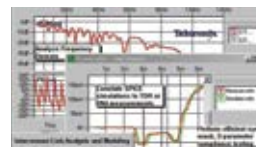
With an industry-leading intrinsic jitter of less than 100 femtoseconds for extremely accurate device characterization, the DSA8300 Series provides comprehensive support for Optical Communications Standards, Time Domain Reflectometry and S-parameters. The DSA8300 Digital Sampling Oscilloscope is a complete high-speed PHY Layer testing platform for data communications from 155Mb/sec to 100Gb/sec.

### Product Highlights

- High Optical Sensitivity, Low Noise, and Wide Dynamic Range of the Optical Sampling Modules
- Remote Samplers\* or Compact Sampling Extender Module Cables allowing the Sampler to be located at the DUT
- Fully Calibrated Clock Recovery Solutions – No need to manually calibrate for data pick-off losses



SSC support: Analysis of systems with spread spectrum clocking, with profile and frequency



Easily Analyze Sources of Interconnect Jitter, Losses, Crosstalk

Optical Modules	Channels	Bandwidth	Clock Recovery (Min/Max)	Filter Rates Supported (Min/Max)
80C07B	1	2.5 GHz	155 Mb/s - 2.666 Gb/s	155 Mb/s - 2.5 Gb/s
80C08D	1	12.5 GHz	9.8 Gb/s - 12.6 Gb/s	9.953 Gb/s - 12.5 Gb/s
80C10C	1	80+ GHz	Provided by Opt. CRTP and CR286A	25.8 Gb/s - 43.018 Gb/s
80C11B	1	30 GHz	9.8 Gb/s - 12.6 Gb/s	9.953 - 12.5 Gb/s
80C12B	1	12 GHz	Provided by CR125A	155 Mb/s - 11.3 Gb/s
80C14	1	14 GHz	Provided by CR175A or CR286A	8.500 Gb/s - 14.025 Gb/s
80C15	1	32 GHz	NA	25.781 Gb/s - 28.05 Gb/s

TDR / Electrical Modules	Channels	Vertical Resolution	Bandwidth	TDR System Incident Rise Time (10%-90%)	TDR System Reflected Rise Time (10%-90%)	Monolithic or Remote
80E04	2	16 bits	20 GHz	23 ps	28 ps	Monolithic
80E08B	2	16 bits	30 GHz	18 ps	20 ps	Remote (2 meter)
80E10B	2	16 bits	50 GHz	12 ps	15 ps	Remote (2 meter)

Electrical Modules	Channels	Vertical Resolution	Bandwidth	Rise Time (10%-90%)	Monolithic or Remote
80E03	2	16 bits	20 GHz	17.5 ps	Monolithic
80E06	1	16 bits	70+ GHz	5 ps	Monolithic
80E07B	2	16 bits	30 GHz	11.7 ps	Remote (2 meter)
80E09B	2	16 bits	60 GHz	5.8 ps	Remote (2 meter)
80E11	2	16 bits	70+ GHz	5 ps	Monolithic
80E11X1	1	16 bits	70+ GHz	5 ps	Monolithic

Accessories Modules	Description	Functionality
82A04B	Phase Reference Module	<100 fs RMS timebase jitter
80A02	EOS/ESD Protection Module	EOS/ESD protection
80A03	Probe Adapter Module	Sampling Scope Probe Connectivity
80X01	1 Meter Extender Cable	Clock Recovery Phase Alignment
80X02	2 Meter Extender Cable	Position Module Close To DUT
80A05	Clock Recover Module	Trib. Rate and 10G Clock Recovery, Fixed Rates
80A08	Accessory Kit	Connection to DUT and CRU @ 25G
CR125A, CR175A, CR286A	Clock Recovery Instrument	Continues Clock Recovery, 150 Mb/s to 28.6 Gb/s
80A09	EOS/ESD Static Protection Device	26 GHz EOS/ESD Static Protection



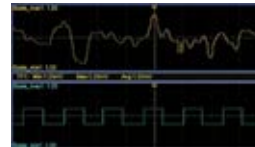


## TBS1000B Series

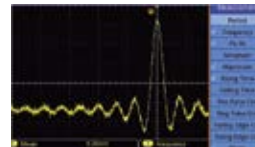
More features, more scope; the TBS1000B is in a class all its own. With up to 200 MHz bandwidth, 34 automated measurements, limit testing, data logging, dual channel frequency counters, waveform trending and sample rates of up to 2 GS/s, the TBS1000B Series is designed for extensive monitoring and analysis activities. It can handle everyday test challenges without challenging your budget.

### Product Highlights

- Two channel instruments
- Extensive monitoring capability using TrendPlot™ testing
- Pass/Fail analysis with built in waveform limit testing
- Automated data logging feature
- Up to 2 GS/s sample rate on all channels
- Dual channel frequency counters
- Front-panel USB host port and rear-panel USB device port
- TekSmartLab™ supported



Use the TrendPlot™ function to evaluate signal behavior over extended time periods.



Thoroughly analyze your waveforms with convenient math tools and 34 automated measurements.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate (per channel)
TBS1052B	2	50 MHz	1 GS/s
TBS1072B	2	70 MHz	1 GS/s
TBS1102B	2	100 MHz	2 GS/s
TBS1152B	2	150 MHz	2 GS/s
TBS1202B	2	200 MHz	2 GS/s

### Recommended Probes

#### Passive Voltage Probes

TPP0201	10X, 200 MHz, 300 V CAT II
TPP0101	10X, 100 MHz, 300 V CAT II
TPP0051	10X, 50 MHz, 300 V CAT II
P2220	10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II

#### High Voltage Probes

P5200A	500X/50X, 50 MHz, ± 1300 V/± 130 V
P5100A	100X, 500 MHz, 2500 V Peak
P6015A	1000X, 75 MHz, 20 kV Peak

### Recommended Probes

#### Current Probes

P6021A	60 MHz, 10.6 A RMS/250 A Peak/10 mA Min
P6022	120 MHz, 4 A RMS/100 A Peak/1 mA Min
A621	5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min
A622	100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min

### Recommended Accessories

TEK-USB-488	GPIO-to-USB converter
AC2100	Soft Carrying Case

### Another Product for Consideration

Need an oscilloscope that simplifies the way you distribute lab work to students? The TBS1000B-EDU models have many of the same features and include integrated courseware capabilities.

### Ships with Product

- Two TPP0xx1 200 MHz, 100 MHz or 50 MHz Passive Probes
- Certificate of Calibration
- CD with Customer Documentation
- Installation & Safety Manual
- Power Cord
- 5-year Warranty



## TBS1000B-EDU Series

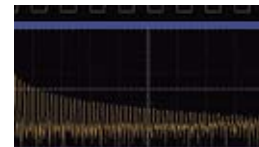
Meet the world's first dedicated teaching oscilloscope; the TBS1000B-EDU. Not only does it deliver the performance you expect to see in a Tektronix scope, it comes with an innovative courseware feature that allows students to review lab material, follow step by step instructions and document results, all on the oscilloscope. We couldn't make engineering easier, so we made it easier to teach and learn.

### Product Highlights

- Two channel instruments
- Integrated courseware feature - perform labs directly on the oscilloscope
- Autoset enable/disable capability
- Included PC editor tool for easy lab creation
- Up to 2 GS/s sample rate on all channels
- Dual channel frequency counters
- 34 automated measurements and FFT analysis
- TekSmartLab™ supported



The Courseware Resource Center is an interactive, multi-lingual website where educators can share lab material and ideas.



The FFT function can show both frequency and time domain waveforms simultaneously.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate (per channel)
TBS1052B-EDU	2	50 MHz	1 GS/s
TBS1072B-EDU	2	70 MHz	1 GS/s
TBS1102B-EDU	2	100 MHz	2 GS/s
TBS1152B-EDU	2	150 MHz	2 GS/s
TBS1202B-EDU	2	200 MHz	2 GS/s

### Recommended Probes

#### Passive Voltage Probes

TPP0201	10X, 200 MHz, 300 V CAT II
TPP0101	10X, 100 MHz, 300 V CAT II
TPP0051	10X, 50 MHz, 300 V CAT II
P2220	10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II

#### High Voltage Probes

P5200A	500X/50X, 50 MHz, $\pm 1300$ V/ $\pm 130$ V
P5100A	100X, 500 MHz, 2500 V Peak
P6015A	1000X, 75 MHz, 20 kV Peak

### Recommended Probes

#### Current Probes

P6021A	60 MHz, 10.6 A RMS/250 A Peak/10 mA Min
P6022	120 MHz, 4 A RMS/100 A Peak/1 mA Min
A621	5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min
A622	100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min

### Recommended Accessories

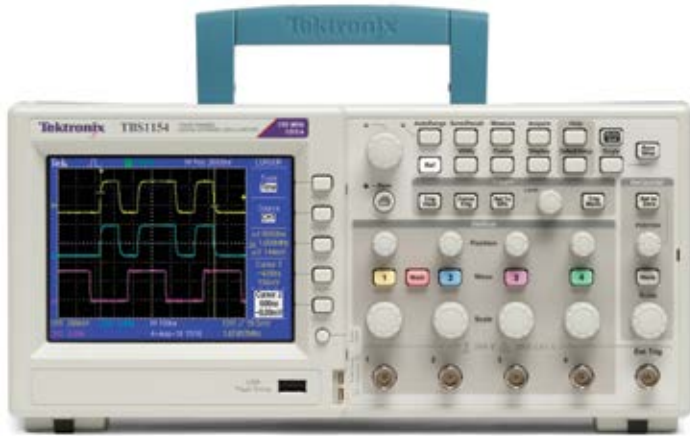
TEK-USB-488	GPIO-to-USB converter
AC2100	Soft Carrying Case

### Another Product for Consideration

Need more analysis features? The TBS1000B models offer the same great performance and include Trendplot™, data logging and limit test capability.

### Ships with Product

- Two TPP0xx1 200 MHz, 100 MHz or 50 MHz, Passive Probes
- Certificate of Calibration
- CD with Customer Documentation
- Education CD with Course Editor SW and Lab Examples
- Installation & Safety Manual
- Power Cord
- 5-year Warranty

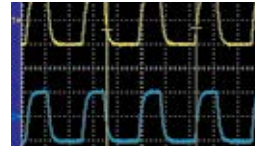


## TBS1000 Series

Usually, entry-level instruments are as light in features as they are in price. But Tektronix TBS1000 Series aren't usual instruments. Ideal for students, hobbyists or any person or organization on a tight budget, TBS1000 Series oscilloscopes deliver outstanding performance, including best-in-class digital real-time sampling, pass/fail testing, and familiar, easy-to-use controls. All at a price that's equally impressive.

### Product Highlights

- Four channel instruments
- 1 GS/s sample rate on all channels
- 7 inch WVGA high-res display
- 16 automated measurements, and FFT analysis
- Built-in waveform limit testing
- Built-in help system and probe check wizard
- Front-panel USB host port and rear-panel USB device port
- TekSmartLab™ supported



Accurately capture signals with at least 10X oversampling on all channels with Digital Real-Time Sampling technology.



Quickly store and transfer your waveforms and settings with the front panel USB port.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate (per channel)
TBS1064	4	60 MHz	1 GS/s
TBS1104	4	100 MHz	1 GS/s
TBS1154	4	150 MHz	1 GS/s

### Recommended Probes

#### Passive Voltage Probes

TPP0201	10X, 200 MHz, 300 V CAT II
TPP0101	10X, 100 MHz, 300 V CAT II
P2220	10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II

#### High Voltage Probes

P5200A	500X/50X, 50 MHz, $\pm 1300$ V/ $\pm 130$ V
P5100A	100X, 500 MHz, 2500 V Peak
P6015A	1000X, 75 MHz, 20 kV Peak

### Recommended Probes

#### Current Probes

P6021A	60 MHz, 10.6 A RMS/250 A Peak/10 mA Min
P6022	120 MHz, 4 A RMS/100 A Peak/1 mA Min
A621	5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min
A622	100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min
TCP2020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min

### Recommended Accessories

1103	TEKPROBE Power Supply
AC2100	Soft Carrying Case

### Another Product for Consideration

Need a Lifetime Warranty? The TDS2000C Series offers the same great performance as the TBS1000 and includes a Lifetime Warranty.

### Ships with Product

- Four TPP0x01 100 MHz or 200 MHz, 10X Passive Probes
- OpenChoice® Desktop Software
- Educator Classroom and Lab Resource CD
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Power Cord
- 5-year Warranty

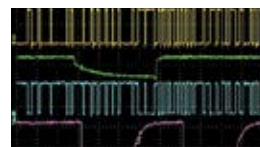


## THS3000 Series

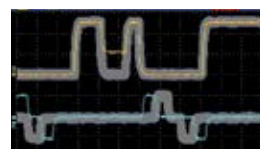
Affordable performance in a rugged, portable design. This handheld, battery-powered oscilloscope is packed with features and analysis tools. With up to 5 GS/s sampling rate and four isolated channels that can measure up to 1000 Volts, you can quickly, reliably and accurately evaluate your signal characteristics on the bench or in the field.

### Product Highlights

- 4 fully isolated and floating channels
- 21 automated measurements
- 600 VRMS CAT III, 1000 VRMS CAT II rated inputs
- Measurement data logging with Trendplot™ testing
- 7 hours of continuous battery operation



Four isolated input channels easily handle any type of mixed signal inputs.



User-defined limit testing can automatically monitor your signals and output Pass or Fail results.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate
THS3014	4	100 MHz	2.5 GS/s
THS3014-TK	4	100 MHz	2.5 GS/s
THS3024	4	200 MHz	5 GS/s
THS3024-TK	4	200 MHz	5 GS/s

### Recommended Probes

#### Passive Voltage Probes

THP0301 - 300 MHz, 10X,  
Y/B/M/G 300 V CAT III

#### High Voltage Probes

P5150<sup>1</sup> 50X, 500 MHz, 2500  
V Peak, 1000 V RMS  
CAT II

P5122 100X, 200 MHz,  
1000 V RMS CAT II

#### Current Probes

P6021A 60 MHz, 10.6 A  
RMS/250 A Peak/10  
mA Min

P6022 120 MHz, 4 A  
RMS/100 A Peak/1  
mA Min

A621 5 Hz to 50 kHz, 1000 A  
RMS/2000 A Peak/10  
mA Min

A622 100 kHz, 100 A DC/71  
A RMS/100 A Peak/10  
mA Min

TCP2020 50 MHz, 20 A DC/20  
A RMS/100 A Peak/10  
mA Min

<sup>1</sup>The P5150 is compatible with THS oscilloscopes, but 50X vertical scaling is not offered.

### Recommended Accessories

THSBAT	Additional Spare Battery
THSCHG <sup>2</sup>	Battery Charger
119-7900-00	AC Power Adapter

<sup>2</sup> Does not include AC power adapter.

### Recommended Service

SILV400	5-year Extended Warranty
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### Another Product for Consideration

For very accurate ripple measurements on high voltage signals, the P5122 probe offers high impedance with minimal capacitive loading.

### Ships with Product

- Four THP0301-Y/B/M/G 300 V CAT III, 300 MHz 10X Passive Probes
- OpenChoice® Desktop Software
- USB-A to Mini USB-B Cable for PC Communication
- Lithium-ion Battery with 7 Hour Battery Life
- Calibration Certificate, Installation/Safety Manual, Documentation on CD
- Carrying Handle, Hanging Strap
- ACHHS Soft-sided Carry Case<sup>3</sup>, AC Power Adapter with Power Cord
- Hard-sided Travel Case<sup>4</sup>
- Soft-sided Probe Case, Two Probe Replacement Accessory Kits<sup>4</sup>
- 3-year Warranty

<sup>3</sup> Non-TK models only

<sup>4</sup> TK models only



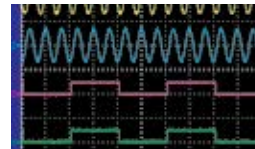


## TPS2000B Series

Great performance goes beyond the lab. Make floating or differential measurements with up to four isolated channels. Tackle challenging environments with backlit buttons and optional power analysis software. Capture signals with Digital Real-Time Sampling.

### Product Highlights

- 10X oversampling on all channels
- 4 isolated analog channels
- 11 automated measurements and FFT analysis
- Optional power analysis software



Safely and easily make floating measurements with the four isolated channels.



Battery pack gives you up to 4 hours of portable operation. Hot-swap the pack for 4 more hours!

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate
TPS2012B	2	100 MHz	1 GS/s
TPS2014B	4	100 MHz	1 GS/s
TPS2024B	4	200 MHz	2 GS/s

### Application Modules

TPS2PBD2	TPS2PWR1 Module and Four P5122 Probes
TPS2PWR1	Power Measurement and Analysis Module

### Recommended Accessories

1103	TEKPROBE Power Supply
AC2100	Soft Carrying Case
TPSBAT	Additional Lithium-Ion Battery Pack (one included standard with instrument)
TPSCHG	External Battery Charger

### Recommended Service

SILV200	5-year Extended Warranty
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### Recommended Probes

#### Passive Voltage Probes

TPP0201	10X, 200 MHz, 300 V CAT II
TPP0101	10X, 100 MHz, 300 V CAT II
P2220	10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II

#### High Voltage Probes

P5150	50X, 500 MHz, 2500 V Peak, 1000 V RMS CAT II
P5122	100X, 200 MHz, 1000 V RMS CAT II

#### Current Probes

P6021A	60 MHz, 10.6 A RMS/250 A Peak/10 mA Min
P6022	120 MHz, 4 A RMS/100 A Peak/1 mA Min
A621	5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min
A622	100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min
TCP2020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min

### Another Product for Consideration

For very accurate power measurements, the PA1000 Power Analyzer offers 0.05% basic accuracy.

### Ships with Product

- One TPP0101 100 MHz, 10X Passive Probe Per Analog Channel (TPS2012B & TPS2014B)
- One TPP0201 200 MHz, 10X Passive Probe Per Analog Channel (TPS2024B)
- OpenChoice® Desktop Software
- RS-232 to USB Adapter Cable
- One Lithium-Ion Battery with 4-hour Battery Life
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Front Panel Cover, AC Adapter with Power Cord
- 3-year Warranty

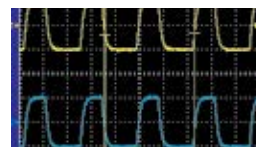


## TDS2000C Series

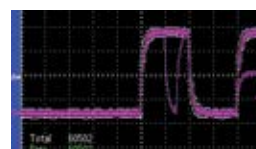
Big performance has never been so small. Featuring Digital Real-Time Sampling, you can trust your scope to accurately capture your signal. Add in USB connectivity, 16 automated measurements and even a built-in help system; this compact oscilloscope helps you get more done in less time. It's true: big things do come in small packages.

### Product Highlights

- 10X oversampling on all channels
- Bright color display
- 16 automated measurements and FFT analysis
- Built-in help system and probe check wizard
- Front-panel USB host port and rear-panel USB device port
- Lifetime Warranty<sup>1</sup>
- TekSmartLab™ supported



Accurately capture signals with at least 10X oversampling on all channels with Digital Real-Time Sampling technology.



Easily check if your waveforms pass or fail your specifications with built-in waveform limit testing.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate
TDS2001C	2	50 MHz	500 MS/s
TDS2002C	2	70 MHz	1 GS/s
TDS2004C	4	70 MHz	1 GS/s
TDS2012C	2	100 MHz	2 GS/s
TDS2014C	4	100 MHz	2 GS/s
TDS2022C	2	200 MHz	2 GS/s
TDS2024C	4	200 MHz	2 GS/s

### Recommended Probes

#### Passive Voltage Probes

TPP0201	10X, 200 MHz, 300 V CAT II
TPP0101	10X, 100 MHz, 300 V CAT II
P2220	10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II

#### High Voltage Probes

P5200A	500X/50X, 50 MHz, ±1300 V/±130 V
P5100A	100X, 500 MHz, 2500 V Peak
P6015A	1000X, 75 MHz, 20 kV Peak

### Recommended Probes

#### Current Probes

P6021A	60 MHz, 10.6 A RMS/250 A Peak/10 mA Min
P6022	120 MHz, 4 A RMS/100 A Peak/1 mA Min
A621	5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min
A622	100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min
TCP2020	50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min

### Recommended Accessories

1103	TEKPROBE Power Supply
AC2100	Soft Carrying Case

### Ships with Product

- One TPP0x01 100 MHz or 200 MHz, 10X Passive Probe Per Analog Channel
- OpenChoice® Desktop Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Power Cord
- Lifetime Warranty<sup>1</sup>

<sup>1</sup> For complete details visit [www.tektronix.com/lifetime warranty](http://www.tektronix.com/lifetime warranty)

### TDS2000 Series

The **TDS2000 Series** is one of the most popular oscilloscopes of all time. It has a proven track record and comes with a lifetime warranty. We are pleased to continue to offer it.

For new applications, make sure you learn about: MSO/DPO2000B Series Oscilloscopes



- 70, 100 and 200 MHz models
- 2 or 4 analog channels
- 16 digital channels (MSO models)
- 1 Mpoint record length
- Serial bus decoding and triggering options
- 5-year warranty



## TDS3000C Series

Performance meets portability. Featuring up to 500 MHz bandwidth and optional battery-powered operation, this oscilloscope is as capable as it is convenient. Capture fast-changing signals with Digital Real-Time Sampling. Maximize efficiency with WaveAlert® Anomaly Detection and 25 automated measurements. Performance and versatility--turns out you can take it with you.

### Product Highlights

- 10 kpoints record length on all channels, all the time
- 3,600 wfms/s max. waveform capture rate with DPO technology
- 25 automated measurements and FFT analysis
- Front-panel USB host port and optional rear-panel Ethernet, GPIB, and RS-232 ports



Optional battery pack gives you up to 3 hours of portable operation.



Accurately capture signals with at least 5X over-sampling on all channels with Digital Real-Time Sampling technology.

Models	Analog Channels	Analog Bandwidth	Analog Sample Rate
TDS3012C	2	100 MHz	1.25 GS/s
TDS3014C	4	100 MHz	1.25 GS/s
TDS3032C	2	300 MHz	2.5 GS/s
TDS3034C	4	300 MHz	2.5 GS/s
TDS3052C	2	500 MHz	5 GS/s
TDS3054C	4	500 MHz	5 GS/s

### Application Modules

TDS3LIM	Limit Testing
TDS3TMT	Telecom Mask Test Triggering
TDS3VID	HDTV and Custom Video Triggering

### Recommended Accessories

1103	TEKPROBE Power Supply
TDS3GV	GPIB, RS-232, and VGA Communications Module
TDS3BATC	Lithium-ion Battery
TDS3ION	Battery Charger
AC3000	Soft Carrying Case
HCTEK4321	Hard Carrying Case (requires AC3000)

### Recommended Service

SILV400	5-year Extended Warranty
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### Recommended Probes

#### Passive Voltage Probes

P6139B	10X, 500 MHz, 300 V CAT II
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#### Active Voltage Probes

P6243	10X, 1 GHz, $\pm 8$ V
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#### Differential Voltage Probes

P6246 <sup>1</sup>	10X/1X, 400 MHz, $\pm 8.5$ V/ $\pm 850$ mV
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#### High Voltage Probes

P5205A	500X/50X, 100 MHz, $\pm 1300$ V/ $\pm 130$ V
P5210A	1000X/100X, 50 MHz, $\pm 5600$ V/ $\pm 560$ V
P5100A	100X, 500 MHz, 2500 V Peak

#### Current Voltage Probes

TCP202A	50 MHz, 15 A DC/10.6 A RMS/50 A Peak/10 mA Min
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<sup>1</sup> Requires 1103 TEKPROBE Power Supply

### Ships with Product

- One P6139B 500 MHz, 10X Passive Probe Per Analog Channel
- OpenChoice® Desktop Software
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Front Panel Cover, Power Cord
- 3-year Warranty

### TDS3000 Series

The **TDS3000C Series** performs reliably in test stations around the world. It is also available with a battery pack, making it especially well-suited for field applications that require high bandwidth. We are pleased to continue to offer it.

**For new applications, make sure you learn about:**  
MDO3000 Series Mixed Domain Oscilloscopes



- 100, 200, 350, 500 MHz, and 1 GHz models
- 2 or 4 analog channels
- 16 digital channels (optional)
- 10 Mpoint record length
- Integrated arbitrary/function generator (optional)
- Serial bus decoding and triggering options



# Application Software

The newest wireless, embedded systems technologies, serial data and video designs present you with unprecedented measurement challenges. Our standards expertise and measurement tools help you meet them all. You can shorten your design cycle, gain greater technical insight and improve team productivity to bring new products and services to market much faster.

## Advanced Analysis Applications

### Jitter and Eye Diagram Analysis

- DPOJET provides timing measurements, amplitude measurements, jitter decomposition and eye diagrams and plots to speed root cause analysis of timing issues

### Serial Data Link Analysis

- SDLA Visualizer provides channel de-embed, emulation and equalization tools required for next generation high speed designs

### Vector Signal Analysis

- SignalVu allows users to characterize wideband spectral events and verify designs such as wideband radar, high data rate satellite links and frequency hopping radios, WLAN or Bluetooth devices

### Power Analysis

- DPOPWR provides automated measurements for analyzing power quality, current harmonics, switching loss, slew rate, modulation and ripple

### DDR Memory Bus Analysis

- DDRA provides a comprehensive validation and debug suite for most DDR versions, speeding the resolution of complex memory signaling issues

### Visual Trigger

- Precisely qualify triggers and find unique events in complex waveforms

### Protocol Decode and Triggering

- Observe specific system behavior to isolate specific states or locate invalid bus sequences
- Automotive
- Wi-Fi

## Compliance and Debug Applications

TekExpress Automation software provides automated instrument setup, multi-instrument control, test execution, and reporting to characterize Transmitter/Receiver performance and easily verify designs comply with the latest High Speed Serial Standards. Additionally, standard specific DPOJet software allows the user to seamlessly debug designs in the event of compliance failure.

A sample of the supported technologies are:

### Computer Peripherals

- PCI Express
- USB
- Thunderbolt

### Storage

- SATA
- SAS

### Mobile

- MIPI M-PHY
- MIPI D-PHY

### Display

- HDMI
- MHL
- DisplayPort

### Data Communications

- 10/100/1000 BaseT
- 10G BaseT
- SFP+,
- 10GKR
- 16G FibreChannel
- 100G/400G
- QSFP







## Jitter/Noise Analysis

### Solving Jitter Debug and Analysis Challenges Made Easy

Tektronix offers jitter measurement solutions for signals ranging from low-speed digital to ultra-high speed serial data. MSO/DPO70000 Series real-time oscilloscopes provide electrical measurement and debug capability to support standards up to 20 Gb/s.

For electrical standards above 20 Gb/s, Tektronix offers the DSA8300 Series sampling oscilloscope with optical and electrical capabilities for 40 Gigabit OC-768 and beyond as well as the BERTScope Bit Error Rate Analyzers for speeds up to 28.6 Gb/s.

For solving jitter problems on low level and low noise signals, or for measuring the very small amounts of jitter often found on clocks, Tektronix offers Real-Time Spectrum Analyzers (RTSA) that enable engineers to measure and characterize jitter over a wide dynamic range.

### Recommended Products

#### Oscilloscopes and Application Software:

- MSO/DPO70000, DPO7000, MSO/DPO5000 Series Real-time Oscilloscopes
- DPOJET Jitter, Timing and Eye Diagram and Analysis software
- DSA8300 Sampling Oscilloscopes
- 80SJNB Jitter, Noise and BER Analysis software
- IConnect® and MeasureXtractor™ Signal Integrity TDR and S-parameter software

#### Bit Error Rate Analyzers:

- BSA Series Bit Error Rate Analyzers
- CR Series Clock Recovery Modules

#### Probing:

- P7313/P7313SMA Differential Probes
- P7500 TriMode Probes

#### Real-Time Spectrum Analyzers:

- RSA5000 Series

For more information visit:

[www.tektronix.com/jitter](http://www.tektronix.com/jitter)



## Signal Integrity, Time Domain Reflectometry (TDR) and S-parameter Measurements

### Improve Connector and Channel Visibility

Signal integrity measurements are a critical step in the process of developing digital systems. The task of isolating and eliminating signal integrity problems anywhere in the system is challenging. These solutions let you quickly locate and trace faults back to their source, eliminating schedule delays and reliability issues.

### Recommended Products:

#### Oscilloscopes and Application Software:

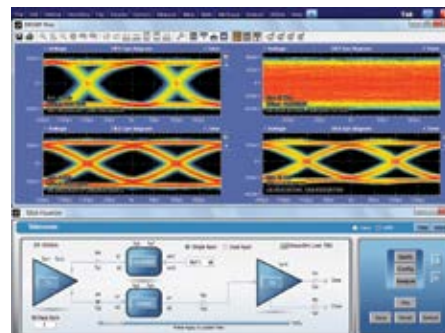
- DSA8300 Sampling Oscilloscope
  - True-differential TDR up to 50 GHz bandwidth
  - 15 ps reflected rise time and 12 ps incident rise time
  - Up to 4 dual-channel TDR modules for fast, accurate multi-lane impedance and S-parameter characterization
- IConnect® advanced and MeasureXtractor™
- Signal Integrity TDR and S-parameter software
- 80SJNB Jitter, Noise and BER Analysis software

#### Probing:

- P8018 Single Ended/P80318 Differential Hand-Held TDR Probes

For more information visit:

[www.tektronix.com/signal\\_integrity](http://www.tektronix.com/signal_integrity)



## Serial Data Link Analysis Solutions

### Unmatched Visibility for Greater Insight into Your Design

Tektronix offers serial data link analysis solutions for high speed serial and memory interfaces for both real-time and sampling oscilloscopes. Reflections, loss, and cross-coupling resulting from the measurement setup can be accurately removed from the acquired signal using Serial Data Link Analysis (SDLA) Visualizer. SDLA Visualizer also provides the functionality to model transmitter equalization, embed channel models, and apply receiver equalization to open closed eyes. Jitter and Eye measurements can be taken at any point in the measurement or simulated link using DPOJET Jitter and Eye Analysis software. SDLA Visualizer and DPOJET are Tektronix' advanced analysis solutions for MSO/DPO70000 Series real-time oscilloscopes.

For those applications that require a sampling scope, Tektronix offers the DSA8300 sampling oscilloscope with 80SJNB Jitter, Noise, and BER analysis software. 80SJNB provides the capability to specify a de-embed filter, Time Domain Waveform or S-Parameter for channel de-embedding and DFE/FFE Equalization. 80SJNB analysis software also performs timing and noise-based analysis to get a 3-D view of the eye diagram performance for deep, accurate evaluation on signals with speeds up to and beyond 50 GHz.

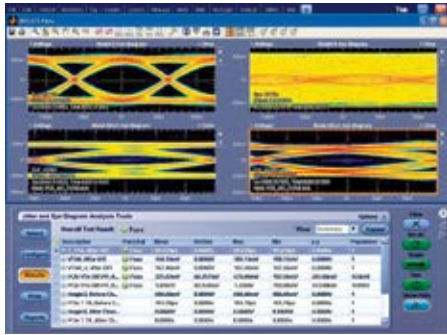
### Recommended Products:

#### Oscilloscopes and Application Software:

- MSO/DPO70000 Series Real-time Oscilloscopes
- SDLA Visualizer
- DPOJET Jitter and Eye Diagram Analysis Tools
- DSA8300 Sampling Oscilloscopes
- 80SJNB Jitter, Noise and BER Analysis software

For more information visit:

[www.tektronix.com/sdla](http://www.tektronix.com/sdla)



## PCI Express®

### PCI Express Design Challenges Need Fast, Accurate Answers

PCI Express 3.0 testing requires dual-port acquisition and million unit interval analysis. Tektronix oscilloscopes provide full sample rate and deep record length on all channels required for compliance testing. The MSO/DPO70000 features channel emulation, equalization and up to 33 GHz Bandwidth which enables accurate measurements on 3rd generation data rates beyond 8 Gb/s.

#### Recommended Products:

##### Oscilloscopes and Application Software:

- MSO/DPO5000 Series
- DPO7000C Series
- MSO/DPO70000C/DX Series Real-Time Oscilloscopes
- Opt PCE3 Automated Compliance & Debug Software
- Opt DJA Advanced eye diagram, jitter and timing analysis
- Opt SDLA64 Serial Data Link Analysis
- DSA8300 Sampling Oscilloscope with 80E08 module
- IConnect® S-parameters and Z-Line software 80SSPAR

##### Probing:

- P7300SMA Series SMA Differential Probing System
- P7300, P7500, and P7600 Series TriMode Differential Probes
- P80318 TDR hand Probes

##### Logic/Protocol Analyzers:

- TLA7012/16 Mainframes
- TLA7SA00 Series Logic Protocol Analyzer Modules
- P67SA00 Series of Slot Interposers, Midbus and Solder Down Probes

##### Bit Error Rate Analyzers:

- BSA C-Series Models, DPP125C Option ECM, BSAITS125, CR125A Opt PCIe8, BSAPCI3 SW

##### Signal Generators:

- AWG70000 Series, AWG7000 Series, AFG3000 Series

##### Spectrum Analyzers:

- RSA6000 Series

#### For more information visit:

[www.tektronix.com/pci\\_express](http://www.tektronix.com/pci_express)



## Serial ATA/SAS

### Powerful Serial ATA/SAS Automated Compliance Toolset Saves Time and Effort

Serial ATA/SAS test requirements are some of the most complex among current serial data standards. With a full toolset for characterization you will know how much margin your design really has.

Tektronix' one-button SATA solution for device state control and test automation allows you to focus your attention on other priorities. SAS characterization and conformance testing requires voltage, equalization, and jitter analysis across multiple data rates and operating conditions. Tektronix' SAS test solution provides powerful design insight with end to end link analysis including ISI and crosstalk effects.

#### Recommended Products:

##### Oscilloscopes and Application Software:

- MSO/DPO70000 Series Real-Time Oscilloscopes
- TekExpress SATA/SAS Compliance Automation software
- DPOJET Jitter and Eye Analysis software

##### Signal Generators:

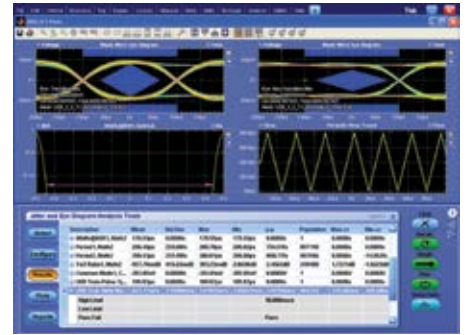
- AWG7000 Series Arbitrary Waveform Generators

##### Bit Error Rate Analyzers:

- BSA125C

#### For more information visit:

[www.tektronix.com/technology/sata-sas](http://www.tektronix.com/technology/sata-sas)



## USB

### Flexible Tools for Compliance and Debug of USB Hosts and Peripherals

Tektronix provides comprehensive tool sets to serve the validation and compliance needs of engineers designing USB2.0, USB3.0, and USB3.1 based systems, which are compliant to the USB-IF test standards. Integrated triggering, protocol decoding and analysis capabilities help speed the debug of your design.

#### Recommended Products:

##### Oscilloscopes and Application Software:

- MDO3000 Series
- MDO/MSO/DPO4000B Series
- MSO/DPO5000 Series
- DPO7000C Series
- MSO/DPO70000 Series Real-Time Oscilloscopes
- TekExpress USB Compliance Automation Software
- DPOJET Jitter and Eye Analysis Software

##### Signal Generators:

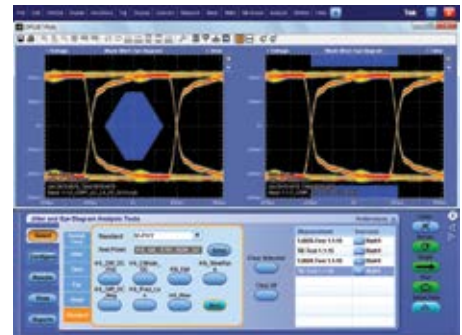
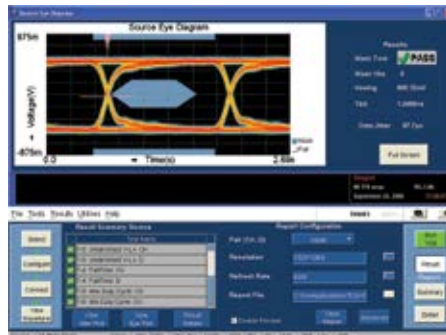
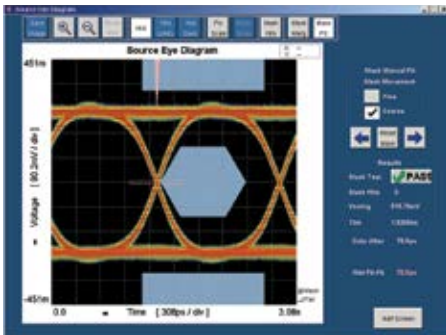
- AWG7000 Series Arbitrary Waveform Generators

##### Bit Error Rate Analyzers:

- BSA85C, DPP125C, CR125A

#### For more information visit:

[www.tektronix.com/usb](http://www.tektronix.com/usb)



## HDMI, MHL and DisplayPort

### Complete HDMI Compliance Test Solution for CTS V1.4b

Tektronix' comprehensive automated sink, source and cable test solution addresses all requirements of the latest revision of the HDMI test specification CTS V1.4b, 1.2/2.0 and DisplayPort 1.2b and MHL specifications. Four channel testing capability enables faster and more reliable testing with the results easily generated in a consolidated HTML report.

### Recommended Products:

#### Oscilloscopes and Application Software:

- MSO/DPO70000 Series Real-Time Oscilloscope with TDSHT3 Compliance Test software for HDMI, and Option DP12/ Option eDP DPOJET and Option MHD for MHL Compliance testing.
- DSA8300 Sampling Oscilloscope
- TDR and S-Parameter software 80SSPAR
- Pattern Sync Module 80A06
- Jitter Analysis software 80SJNB

#### Probing:

- P7313SMA for HDMI, MHL and Display Port
- P7240 for MHL clock
- P7380SMA for RBR and HBR Display port testing only
- P7380 for solder-in probing for RBR/HBR Display port testing
- P7313 for solder-in probing for RBR/HBR/HBR2 Display port

#### Signal Generators:

- AWG7000 and AWG70000 Series Arbitrary Waveform Generators for HDMI and MHL
- BERTSCOPE for DisplayPort

#### Test Fixtures:

- HDMI:
  - TF-HDMI-TPA-S/STX
  - TF-HDMIC-TPA-S/STX
  - TF-HDMID-TPA-P/R
  - TF-HDMIE-TPA-KIT
  - TF-HEAC-TPA-KSET
- MHL:
  - TF-MHL-TPA-TEK
  - TF-DP-TPA-P/TF-DP-TPA-R

#### For more information visit:

HDMI: [www.tektronix.com/technology/hdmi-dvi](http://www.tektronix.com/technology/hdmi-dvi)

MHL: [www.tektronix.com/technology/mhl](http://www.tektronix.com/technology/mhl)

DisplayPort: [www.tektronix.com/technology/displayport](http://www.tektronix.com/technology/displayport)

## Memory

### Comprehensive Tools for Memory Interface Verification and Debug

Each new generation of memory technology brings in higher speeds, lower I/O voltage for reduced power consumption, and form factors for different applications. These factors result in debug and validation challenges as new, more complex tests are required to validate and debug devices operating with tighter margins, faster edge rates, and more complex bus protocols.

The sophisticated triggering and analysis packages on the DPO Series oscilloscopes provide broad coverage by supporting verification of multiple memory standards with each package.

The TLA7000 Series logic analyzers with their 20ps high speed timing combined with analog mux and various types of protocol views enable logic debug and protocol validation of memory interfaces.

Easy signal access is provided by a wide variety of probing solutions that support various memory standards and package types with minimal signal loading.

### Recommended Products:

#### Logic Analyzers:

- TLA7000 Series
- TLA7BB4 Logic Analyzer Module
- Memory Support Package
- Memory Compliance Software

#### Oscilloscopes:

- MSO/DPO5000, DPO7000C, MSO/DPO70000 Series Real-Time Oscilloscope
- Visual Trigger Option (Opt. VET)
- DDR Analysis Option (Opt. DDRA)
- DPOJET Jitter and Eye Diagram Analysis Tool
- SDLA Serial Data Link Analysis ToolKit

#### Probing Solutions:

- P7500 TriMode Differential Probes
- P6780 Differential Logic Probes
- Oscilloscope and Logic Analyzer Interposers for standard BGA and PoP packages, DIMM's and SODIMM's for all popular memory standards

#### For more information visit:

[www.tektronix.com/memory](http://www.tektronix.com/memory)

## MIPI®

### Simple Setups, with One-Button Automation to Fully Customizable tools for M-PHY and D-PHY

M-PHY characterization and conformance testing requires more than 1000 tests, including Power Spectral Density, PWM measurements and Bit-Error counting, validated in different test configurations.

Tektronix M-PHY Transmitter Automated Solution provides Simple One-box setup, with Power Spectral Density tests performed on the Oscilloscope, along with Seamless Debug Analysis of failing tests. Tektronix M-PHY Receiver Automated Solution provides Simple Two-box setup, based on integrated Bit Error counting on the oscilloscope.

D-PHY characterization and conformance testing requires accurately identifying the low power and high speed test regions, for more than 50 tests across different test modes, multiple-lanes and temperature conditions. Tektronix D-PHY One-button automation allows you to test your designs faster and more accurately.

### Recommended Products:

#### Oscilloscopes and Application Software:

- MSO/DPO70000 Series Real-Time Oscilloscopes

#### M-PHY software:

- Opt.M-PHYRX, Opt.M-PHYTX, Opt.M-PHY, PGY-LLI, PGY-UPRO and MPHYVIEW.

#### D-PHY software:

- Opt.D-PHYTX, Opt.D-PHY, Opt.SR-DPHY.

#### Probing:

- P7300, and P7500 Series TriMode Differential Probes
- P7300SMA Series SMA Differential Probes

#### Logic Analyzers:

- TLA7000 Series with DPHYPRE, and P6980 or P6982 probe

#### Signal Generators:

- AWG70000 and AWG7000 Arbitrary Waveform Generators
- PG3A-B Series Patterns Generators with P338 probe

#### For more information visit:

[www.tektronix.com/mipi](http://www.tektronix.com/mipi)





## Data Communications

**TWDPc measurement in SFP-TX software Option.** Tektronix offers comprehensive, integrated tool sets for validating the physical layer of IEEE 802.3 Ethernet devices, and for developing and debugging Ethernet-based systems from 10BASE-T up to 40/100GB. Tektronix also provides comprehensive Compliance and Debug solutions for technologies that don't fall into IEEE brackets like SFF 8431 SFP+ and FC-16G.

### Recommended Products:

#### Software Solution:

- SR-ENET – Ethernet Decoding and Analysis
- TDSET3 – 10/100/1000BASE-T Ethernet Compliance Testing
- DPO4ENET – Ethernet Triggering and Analysis TekExpress
- 10GBASE-T Automated Compliance Software
- SFP-TX & SFP-WDP - Compliance and Debug solution for SFF 8431 SFP+
- 10G-KR - 10GBASE-KR/KR4 Compliance, Debug & Decode Solution
- FC-16G – Compliance and Debug solution for FC-PI-5 Clause 9 Electrical Physical Layer Testing
- DPOJET Jitter and Eye Diagram Analysis Tool
- SDLA Serial Data Link Analysis ToolKit

#### Oscilloscopes:

- MSO/DPO70000 Series Real-Time Oscilloscopes
- DPO7000 Series Real-Time Scopes
- MSO/DPO5000 Series Oscilloscopes
- MDO/MSO/DPO4000B Series

#### Test Fixtures:

- TF-GBE-ATP
- TF-GBE-EE
- TF-XGbT
- TF-SFP-TPA-HCB-PK

#### For more information visit:

[www.tektronix.com/technology/ethernet-test](http://www.tektronix.com/technology/ethernet-test)



## 100G Rx/Tx Technology/ Application Solutions

**Tektronix Comprehensive System and Physical layer validation solution for new 25/28 and 100 Gigabit standards.**

### IEEE802.3ba, 32GFibre Channel and OIF/VSR standards.

- High precision jitter characterization and impaired receiver stimulus system. This test solution is effective in silicon, systems and component/transceivers or transponder physical layer validation and debug.
- Sub 100 fs total jitter measurement capabilities on Tx systems as well as key standards specific measurements such as J2/J9.
- The DSA8300's exceptionally high dynamic range makes it well-suited for Vertical Eye Closure Penalty (VECP) and low amplitude eye diagrams.
- DSA8300, CEI-VSR lets you easily automate measurements for CEI-28G-VSR testing. With a simple measurement setup, you can perform all the measurements with a single button click. CEI-VSR automation reduces measurement errors, helps reduce compliance verification testing time, and generates detailed reports.
- The BSA286C has similarly low jitter noise floor specifications, which make it invaluable to generate stressed eyes and performing Bit Error Ratio analysis.

### NRZ Chip-To-Chip and Silicon Characterization (Electrical)

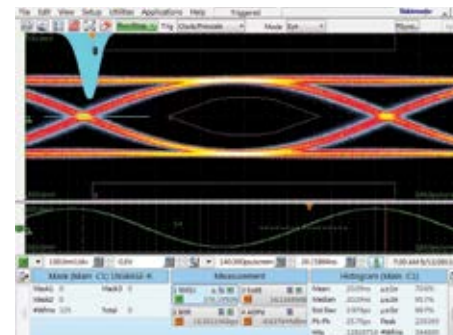
- Requires stimulus and impairment capabilities as well as high bandwidth (70+GHz), ultra low jitter (<100 fs) electrical / TDR acquisition and reference receivers, eye diagram mask testing, precision jitter and noise analysis.
- Ultra low noise BERT Signal Generation and comprehensive impairment capabilities (BUJ, RJ, SJ) at full data rates.
- IConnect provides S-parameters when needed
- All systems can be fully integrated into automation frameworks for PV characterization and test.

### Recommended Products:

- BSA286C 28.6 Gb/s BERTScope
- DSA8300 Sampling Scope with low jitter electrical/TDR modules
- DSA8300 Opt. CEI-VSR
- CR286A 28.6Gbps Clock Recovery Instrument
- IConnect for S-Parameter and Time Domain Network Analysis.

#### For more information visit:

[www.tektronix.com/dsa8300](http://www.tektronix.com/dsa8300)  
[www.tektronix.com/bertscope](http://www.tektronix.com/bertscope)



## Optical Testing

### Tools and Analysis Software for Testing the Latest Short-Haul and Long-Haul Optical Standards and Technologies

The DSA8300 with its highly configurable mainframe and a wide variety of optical modules provide complete optical test solutions with superior system fidelity from 125 Mb/s to 100 Gb/s and beyond. The modules cover a range of wavelengths for both single- and multi-mode fibers. Each module can be optionally configured with a number of selectable Optical Reference Receiver (ORR) filters and/or a full bandwidth path.

The ever-increasing demand for long-haul network bandwidth has driven network operators from the on-off keying used with today's 10G infrastructure to coherent optical modulation that can support 40G, 100G, 400G, and beyond. Coherent modulation is often achieved using formats such as DP-QPSK and 16QAM. Tektronix has hardware and analysis software to allow receiver, transmitter, and system manufacturers to design and debug their next generation long-haul products.

### Recommended Products:

#### Oscilloscopes:

- DSA8300 Series
- 80C15 32 GHz Broad Wavelength Module; supports both SMF and MMF
- 80C10C 80+ GHz Optical Bandwidth Module
- 80C12B 10 Gb/s and Trib Rate Optical Module
- 80C14 14+ GHz Bandwidth Broad Wavelength Optical Module
- 80SJNB Jitter and BER Analysis Software
- 80SJARB Arbitrary Data Jitter Analysis Software

#### Coherent Optical Modulation Analyzers:

- OM5110 Series
- OM4000 Series
- OM2200 Series
- MSO/DPO70000 Series

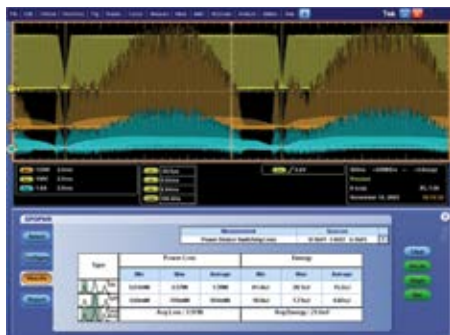
#### Application Software:

- OM1106 Coherent Lightwave Signal Analyzer Software

#### For more information visit:

[www.tektronix.com/optical](http://www.tektronix.com/optical)





## Power Measurements

### Power Analysis and Compliance Solution with Tektronix oscilloscopes, probes, and power analyzers.

Today's power supplies achieve higher levels of efficiency in response to tighter regulations and consumer expectations. Specialized power measurements and compliance tests are time-consuming and critical. Tektronix power measurement solutions help you achieve fast, accurate, repeatable results and compliance reports.

#### Recommended Products:

##### Oscilloscopes and Application Software:

- TPS2000 Series
  - TPS2PWR1 Power Measurement and Analysis Software
- MDO3000 Series
  - MDO3PWR
- MSO/DPO3000 Series
  - DPO3PWR Power Analysis Module
- MDO/MSO/DPO4000B Series
  - DPO4PWR Power Analysis Module
- MSO/DPO5000, DPO7000, MSO/DPO70000 Series
  - DPO4PWR Power Measurement and Analysis software
  - USBPWR Automated Compliance testing for USB EPS Adapter

##### Probing:

- TCP0030A / TCP0150 / TCP202A AC/DC Current Probes
- TCPA300/400 Series Current Probes and Amplifiers
- TMDP0200/THDP0200/THDP0100 High Voltage Differential Probes
- P5100A Passive High Voltage Probe
- TDP0500B/TDP1000 Differential Probes

##### Power Analyzers:

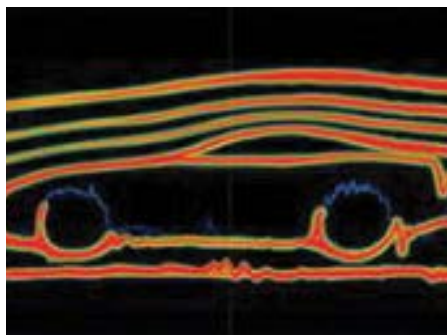
- PA1000 Power Analyzer
- PA4000 Power Analyzer

##### Signal Generators:

- AFG3000 Series Arbitrary Function Generator

#### For more information visit:

[www.tektronix.com/power](http://www.tektronix.com/power)



## Automotive

Intelligent embedded systems are the new driving force in today's automotive designs. The latest safety and efficiency technologies are made possible by the incorporation of an extensive variety of complex embedded devices that make thousands of decisions per second. Efficient verification and debug of common automotive serial buses like CAN, LIN, FlexRay, BroadR-Reach and MOST will speed integration of these embedded technologies and build confidence in test engineering.

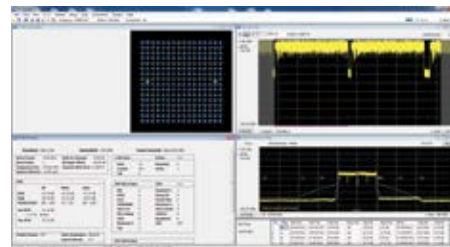
#### Recommended Products:

##### Oscilloscopes and Application Software:

- MSO/DPO2000 Series
  - CAN, LIN
- MDO3000 Series
  - CAN, LIN
  - FlexRay
- MDO/MSO/DPO4000 Series
  - CAN, LIN
  - FlexRay
- MSO/DPO5000 Series
  - CAN, LIN
  - FlexRay
  - BroadR-Reach

#### For more information visit:

[www.tektronix.com/industry/automotive](http://www.tektronix.com/industry/automotive)



## WLAN (IEEE 802.11) and Bluetooth™

Whether you are testing a new chipset, designing a new WLAN module, or integrating a module into your latest design, Tektronix provides Wi-Fi testing solutions to help you get the job done. Speed up your testing with automatic transmitter measurements defined by the standard. Support is available for multiple 802.11 standards, including 802.11a/b/g/j/p/n/ac.

#### Recommended Products:

##### Instruments:

- RSA306 Real-Time Spectrum Analyzer
- RSA5000 Series Real-Time Spectrum Analyzers
- RSA6000B Series Real-Time Spectrum Analyzers
- MDO4000B Series Mixed Domain Oscilloscopes
- MSO/DPO70000 Series Oscilloscopes
- DPO7000 Series Oscilloscopes

##### Software Solutions:

- WLAN options for Real-Time Spectrum Analyzers
- SignalVu Oscilloscope Software with WLAN options
- SignalVu-PC with WLAN options

#### For more information visit:

[www.tektronix.com/wi-fi](http://www.tektronix.com/wi-fi)



## Bluetooth™

Whether you are validating a new chipset, designing a new wireless module or integrating Bluetooth into your latest design, Tektronix provides RF PHY testing solutions to help you get the job done and get your design to market faster.

Support is available for Basic Rate, Enhanced Data Rate and Bluetooth Low Energy.

### Recommended Products:

#### Instruments:

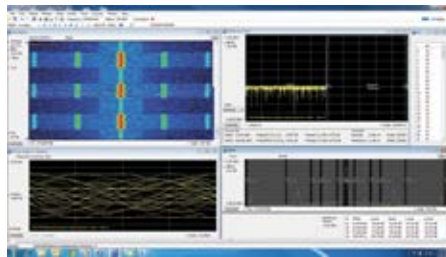
- RSA306 Real-Time Spectrum Analyzer
- RSA5000 Series Real-Time Spectrum Analyzers
- RSA6000B Series Real-Time Spectrum Analyzers
- MDO4000B Series Mixed Domain Oscilloscopes
- MSO/DPO70000 Series Oscilloscopes
- DPO7000 Series Oscilloscopes

#### Software Solutions:

- Bluetooth option 27 for Real-Time Spectrum Analyzers
- SignalVu Oscilloscope Software with Bluetooth option SV27
- SignalVu-PC with Bluetooth option 27

#### For more information visit:

[www.tektronix.com/bluetooth](http://www.tektronix.com/bluetooth)



## APCO Project 25 (P25)

Whether you are testing a P25 mobile, portable radio transmitter, or a base station for Phase 1 or Phase 2, Tektronix provides P25 transmitter testing solutions to help you get the job done. Tektronix solutions give you a simple setup of 28 TIA-102 measurements with pass/fail results so that you can pass performance and compliance tests accurately and quickly.

Support is available for Phase 1 and Phase 2 transmitter compliance test solution.

### Recommended Products:

#### Instruments:

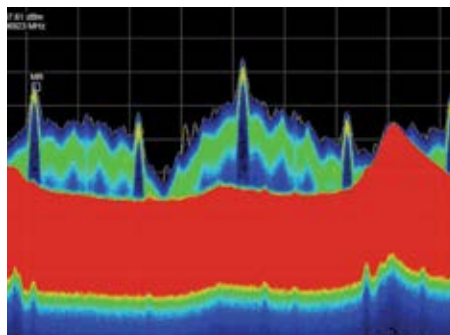
- RSA306 Real-Time Spectrum Analyzer
- RSA5000 Series Real-Time Spectrum Analyzers
- RSA6000B Series Real-Time Spectrum Analyzers
- SPECMON Series Real-Time Spectrum Analyzers
- MDO4000B Series Mixed Domain Oscilloscopes
- MSO/DPO70000 Series Oscilloscopes
- DPO7000 Series Oscilloscopes
- MSO/DPO5000 Series Oscilloscopes

#### Software Solutions:

- P25 option 26 for Real-Time Spectrum Analyzers
- SignalVu Oscilloscope Software with P25 option SV26
- SignalVu-PC with P25 option SV26

#### For more information visit:

[www.tek.com/application/P25-testing-and-analysis](http://www.tek.com/application/P25-testing-and-analysis)



## EMI Diagnostics and Precompliance

### Reduced time to solution for EMI problems

Time-saving solutions for the EMI problems you never planned for. Today's biggest EMI challenges are identifying the location and source of an EMI problem and capturing a transient EMI event. Tektronix MDO4000B Series Mixed Domain Oscilloscopes combine the functionality of a mixed signal oscilloscope with a spectrum analyzer; capture synchronized analog, digital and RF signals, all time correlated for a complete system view of your device.

The MDO3000 Series also feature a built-in spectrum analyzer. Tektronix Real-Time Spectrum Analyzers are able to view, trigger on and analyze the effects of the briefest of signals as they occur in frequency domain and include limit-line scans with pass/fail testing, EMI filter, detectors and averaging for high-confidence precompliance testing.

### Recommended Products:

#### Diagnostics:

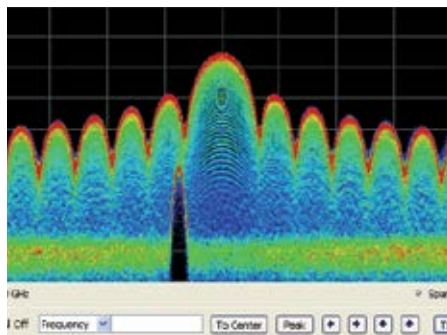
- RSA306 Real-Time Spectrum Analyzer
- MDO3000 Series Mixed Domain Oscilloscope
- MDO4000B Series Mixed Domain Oscilloscopes + Spectrum Analyzer
- RSA5000 Series Real-Time Spectrum Analyzers
- RSA6000 Series Real-Time Spectrum Analyzers

#### Precompliance:

- RSA5000 Series Real-Time Spectrum Analyzers
- RSA6000 Series Real-Time Spectrum Analyzers

#### For more information visit:

[www.tektronix.com/rf](http://www.tektronix.com/rf)



## Radar/EW

### Performance, Precision and Insight for Your Radar/Electronic Warfare Design

With today's rapid advances in radar/electronic warfare technology, developing and manufacturing highly specialized and innovative electronic products requires leading-edge technology and tools. Our innovative test equipment reduces uncertainty during the design process and delivers confidence in the integrity of increasingly complex designs.

### Recommended Products:

#### Receiver/Stimulus Test:

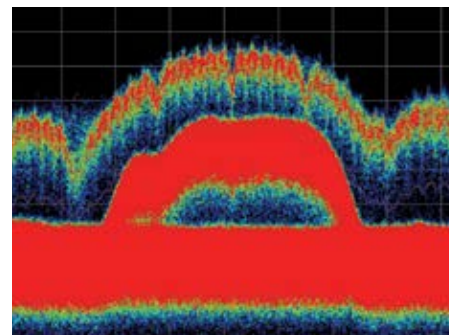
- AWG5000 Series Arbitrary Waveform Generator with RFXpress® software
- AWG7000 Series Arbitrary Waveform Generator with RFXpress® software
- AWG70000 Series Arbitrary Waveform Generator with RFXpress® software

#### Transmitter Analysis:

- RSA6100 Series Spectrum Analyzer
- RSA5000 Series Spectrum Analyzer
- MSO/DPO70000 Series Oscilloscope with SignalVu™ software
- MSO/DPO5000 and DPO7000 Series Oscilloscopes with SignalVu™ software
- MDO4000B Series Mixed Domain Oscilloscope

#### For more information visit:

[www.tektronix.com/radar](http://www.tektronix.com/radar)



## Spectrum Management

### Accuracy and Insight All Across the Spectrum

Solve today's demanding signal detection and exploitation challenges with world-class instrumentation for detection, identification, mapping, and hunting down signals or sources of interference. DPX™ Live RF spectrum display will change the way you search and discover elusive signals.

### Recommended Products:

#### Spectrum Management:

- RSA306 Real-Time Spectrum Analyzer
- H500/SA2500 Series Handheld Spectrum Analyzer
- RSA5000 Series Spectrum Analyzer
- RSA6000 Series Spectrum Analyzer

#### For more information visit:

[www.tektronix.com/surveillance](http://www.tektronix.com/surveillance)



# Probes and Accessories

Tektronix probes and accessories are perfectly matched to our industry-leading oscilloscopes. With over 100 choices available, you will find the probe you need.



## Low Voltage Differential Probes

- Bandwidth up to 33 GHz
- Easily measure differential signals
- Low input capacitance: down to  $< 0.3$  pF
- High common mode rejection ratio (CMRR)
- Wide range of probe tips for easier circuit access

[www.tek.com/differential-probe-low-voltage](http://www.tek.com/differential-probe-low-voltage)



## High Voltage Differential Probes

- Dynamic range to  $\pm 6000$  V
- Bandwidth up to 200 MHz
- Most extensive set of probe accessories

[www.tek.com/differential-probe-high-voltage](http://www.tek.com/differential-probe-high-voltage)



## Current Probes

- Easy to use and accurate AC/DC current measurements
- DC up to 2 GHz
- Amplitude measurements from 1 mA to 2,000 A
- Split core and solid core construction

[www.tek.com/current-probe](http://www.tek.com/current-probe)



## Passive Probes

- Best-in-class bandwidth up to 1 GHz
- Best-in-class input capacitance as low as 3.9 pF, which minimizes probe loading effects
- Dynamic range to 300 V CAT II
- Rugged and reliable

[www.tek.com/passive-probe](http://www.tek.com/passive-probe)



## Low Voltage Single-ended Probes

- Bandwidth up to 4 GHz
- True signal reproduction and fidelity
- Low input capacitance: down to  $< 0.8$  pF
- Small, compact probe heads for probing small geometry circuit elements

[www.tek.com/low-voltage-probe-single-ended](http://www.tek.com/low-voltage-probe-single-ended)



## High Voltage Single-ended Probes

- Bandwidth up to 800 MHz
- Dynamic range to 2500 V
- Best-in-class probe loading with input capacitance as low as 1.8 pF

[www.tek.com/high-voltage-probe-single-ended](http://www.tek.com/high-voltage-probe-single-ended)



## Optical

- Broad Wavelength Response: 500 to 950 nm or 1100 to 1700 nm
- High-bandwidth DC up to 1.2 GHz
- High Gain 1 V/mW
- Low Noise  $< 11$  pW/ $\sqrt{\text{Hz}}$

[www.tek.com/optical-probe](http://www.tek.com/optical-probe)



## Carrying Cases and Accessories

- TekVPI Interface Adapter for TekProbe probes
- Probe holders and positioners
- Probe power supply
- Soft- and hard-sided cases

[www.tektronix.com/probeaccessories](http://www.tektronix.com/probeaccessories)





## Interactive Probe Selector Tool

Need help finding the right probe for your application? The online Tektronix Probe Selector Tool will guide you through a few easy questions to match your need to the right probe. Visit us anytime, anywhere at: [www.tektronix.com/probes](http://www.tektronix.com/probes)

Select your requirements below. The list of matching products will update with each click.

**Probe Recommendation Selector (Start by clicking the arrow to the left or clicking inside this box):** Use this Selector to find out what are the most commonly used probes.

**Select the Instrument Series:**

- |                                       |                                       |   |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> MSO/DPO2000D | <input type="checkbox"/> MSO/DPO3000  | <input type="checkbox"/> MSO/DPO4000D     |
| <input type="checkbox"/> MSO/DPO5000  | <input type="checkbox"/> DPO7000C     | <input type="checkbox"/> DPO/DSA/MSO70000 |
| <input type="checkbox"/> MDO4000      | <input type="checkbox"/> MDO4000 [RF] | <input type="checkbox"/> TDS1000B         |
| <input type="checkbox"/> TDS2000C     | <input type="checkbox"/> TDS3000C     | <input type="checkbox"/> THS3000          |
| <input type="checkbox"/> TPS2000B     | <input type="checkbox"/> TBS1000      | <input type="checkbox"/> RSA5000/6000     |

**Choose the Desired Measurement:**

If an option is grayed out a recommended solution is not available.

- |  |   |
|--|---|
| <input type="checkbox"/> High Voltage Differential | <input type="checkbox"/> Low Voltage Differential |
| <input type="checkbox"/> High Voltage Single-ended | <input type="checkbox"/> Low Voltage Single-ended |
| <input type="checkbox"/> Current                   | <input type="checkbox"/> General Purpose          |

**Probe Compatibility Selector (Start by clicking the arrow to the left or clicking inside this box):** Use this Selector to determine if a probe or accessory is compatible with an Instrument Series.

**122 Matches**[Compare](#)[Start Over](#)THDP0200TMDP0200THDP0100TCP0030TCP0020TCP0150TPP0850P5100AP6015ATAP1500TPP0502TDP1000TCP2020TCPA300TCP312

Images appear for the first 15 matches  
The rest of the matches are listed below.

1103  
80A03  
A621P6243  
P6245  
P6246RM4000  
RMD2000  
RMD3000



# Signal Generators

The definition of versatility, Tektronix signal generators create a virtually unlimited range of standard and custom signals, from sine or pulse to ideal or distorted and anything in between.



	TSG4100A Series	AFG3000C Series	AFG2000	AFG1000
Bandwidth	Internal 6 MHz, External 200 MHz	240 MHz, 100 MHz, 50MHz, 25 MHz, 10 MHz	20 MHz	25 MHz
Channels	1 LF and 1 RF	1 or 2 (independent or synchronized)	1	2
Memory Depth	16M bits	4 x 128 k points	4 x 128 k points	8 k
Standard Waveforms	CW	Sine, Sine(x)/x, Square, DC, Ramp, Gaussian, Exponential Decay, Pulse, Lorentz, Noise, Arbitrary, Haversine, Exponential Rise	Sine, Sine(x)/x, Square, DC, Ramp, Gaussian, Exponential Decay, Pulse, Lorentz, Noise, Arbitrary, Haversine, Exponential Rise	Sine, Square, Pulse, Ramp, Noise, and 45 Frequently Used Arbitrary Waveforms
Modulation	AM/FM/PM/Pulse, ASK/FSK/PSK/QAM/CPM/VSB, GSM, GSM-EDGE, W-CDMA, APCO-25, DECT, NADC, PDC, TETRA, and Audio clip (Analog AM and FM)	AM, FM, PM, FSK, PWM, External	AM, FM, PM, FSK, PWM, External	AM, FM, PM, FSK, External
Additional Modes	External IQ Waveform Input, Custom IQ Waveform Generation, ARB Waveform Generation (Remote Mode), Additive White Gaussian noise	Sweep, Burst, Add Noise Impairment	Sweep, Burst, Add Noise Impairment	Sweep, Burst

## Choosing Your Signal Generator

In electronic test and measurement, more often than not, a signal source is required to generate signals that are not available unless externally provided. Below is a list of common features that you may want to consider when choosing a signal generator for your application.

### 1 Sample (Clock) Rate

Sample rate, usually specified in terms of megasamples or gigasamples per second, denotes the maximum clock or sample rate at which the instrument can operate. The sample rate affects the frequency of the main output signal. In general, you should choose an instrument where the sampling frequency is twice that of the highest spectral frequency component of the generated signal to ensure accurate signal reproduction. The maximum sample rate also determines the smallest time increment that can be used to create waveforms. Typically this figure is simply the result of the calculation;  $T = 1/F$ , where  $T$  is the timing resolution in seconds and  $F$  is the sample rate.

### 2 Memory Depth (Record Length)

Memory depth, or record length, plays an important role in signal fidelity because it determines how many points of data can be stored to define a waveform. Deeper memory enables you to store more waveform detail and/or more cycles of the desired waveform.

### 3 Vertical (Amplitude) Resolution

Vertical resolution pertains to the binary word size, in bits, of the instrument's DAC, with more bits equating to higher resolution. The vertical resolution of the DAC defines the amplitude accuracy and distortion of the re-produced waveform. Although more is better, there is a general trade-off for most arbitrary waveform instruments; the higher the resolution, the lower the sample rate.

### 4 Features and Capabilities

Tektronix signal generators offer a range of features and output capabilities. When choosing your signal generator, you should also evaluate standard waveforms, modulation capabilities, output amplitude and waveform editing software to ensure that the instrument meets your needs.

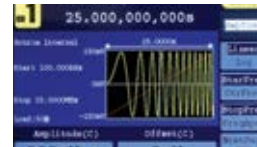


## AFG1000 Series

The AFG1000 Series Arbitrary/Function Generator offers the best price performance ratio in its class. It's tailored for educational users with 25 MHz bandwidth, 2 output channels, and 1 mVp-p to 10 Vp-p output amplitude across full bandwidth. It generates all kinds of waveforms needed in a lab.

### Product Highlights

- Full functional AFG with multiple run modes and a built-in 200 MHz frequency counter
- 1 mVpp to 10 Vpp output amplitude across full frequency range
- Intuitive UI with 3.95" color display provides quick access to functions and parameters, and gives full confidence on settings
- Fully supports TekSmartLab™



A full functional AFG with modulation, sweep and burst modes.



AFG1022 fully supported by TekSmartLab™.

Model	Analog Channels	Output Bandwidth	Analog Sample Rate	Memory Depth	Amplitude (into 50 ohm)	Built-in Frequency Counter
AFG1022	2	25 MHz	125 MS/s	8 k	1 mV <sub>p-p</sub> to 10V <sub>p-p</sub>	200 MHz, 6 digits

### Recommended Accessories

174-4401-00	USB type A to type B cable – three feet
174-5194-00	USB type A to type B cable – six feet
012-1732-00	BNC to BNC CABLE - three feet
159-0107-00	Fuse, cartridge; 5 x 20 mm, 2 A, 250 V, time-delay
159-0397-00	Fuse, cartridge; 5 x 20 mm, 4 A, 250 V, time-delay

### Ships with Product

- Power Cord
- USB Cable
- CD-ROM with Programmer Manual, Service Manual,
- BNC to BNC cables
- Fuses
- Calibration Certificate

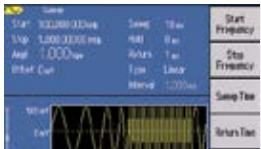


## AFG2000

Usually, generating a range of signals requires investing in a high-end signal generator. But with the Tektronix AFG2000 Arbitrary Function Generator, that's no longer the case. With 20 MHz bandwidth, 14-bit resolution, and 250 MS/s sample rate, it can create simple and complex signals. But perhaps its most impressive feature is its entry-level price.

### Product Highlights

- High sample rate and stable time base ensure signal precision and stability
- Intuitive UI and 3.5" color display provide quick access to functions and parameters, and give full confidence on settings
- Form factor is ideal for both bench top and rack mount applications
- Free ArbExpress software enables an easy way to create, edit and load arbitrary waveforms



Wide frequency range (1  $\mu$ Hz to 20 MHz) supports amplifier and filter testing applications.



Quickly modify, create and transfer waveforms using the included ArbExpress® software.

Models	Analog Channels	Output Bandwidth	Analog Sample Rate	Memory Depth	Amplitude (into 50 $\Omega$ )
AFG2021	1	20 MHz	250 MS/s	4 x 128 k	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>

### Recommended Accessories

#### Cables

012-0482-00 BNC cable shielded, 3 ft.

012-1256-00 BNC cable shielded, 9 ft.

012-0991-00 GPIB cable, double shielded

011-0049-02 50 $\Omega$  BNC Terminator

#### Accessories

RMU2U Rackmount kit

013-0345-00 Fuse adapter, BNC-P to BNC-R

159-0454-00 Fuse set, 3pcs, 0.125 A

### Instrument Options

Opt. GL GPIB/LAN Interface (configured at time of purchase)

### Recommended Service

SILV200 5-year Extended Warranty

### Ships with Product

- User Manual
- Power Cord
- USB Cable
- BNC to BNC cable
- CD-ROM with Programmer Manual, Service Manual, LabVIEW and IVI Drivers
- CD-ROM with ArbExpress® Software
- NIST-traceable Calibration Certificate



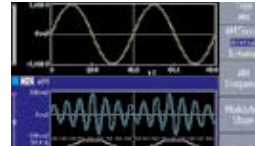


## AFG3000C Series

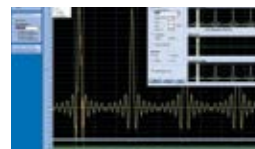
Test complex designs faster with a fully loaded function generator. Featuring 12 standard waveforms, plus arbitrary capability and many modulation options, this generator supports a wide range of application needs. Add in best-in-class performance and 25 shortcut keys and you have a generator that's loaded with features and light on complexity.

### Product Highlights

- High sample rate and stable time base ensure signal precision and stability
- 25 short-cut buttons and 5.6" color display provide quick access to functions and parameters, and give full confidence on settings
- 9 models with up to 240MHz bandwidth and up to 20Vp-p output amplitude cover customer needs in most applications
- Free ArbExpress software enables an easy way to create, edit and load arbitrary waveforms



Large color display shows your settings and waveforms at a single glance.



Create and modify waveforms with ease with the included ArbExpress® software.

Models	Analog Channels	Output Bandwidth	Analog Sample Rate	Memory Depth	Amplitude (into 50 $\Omega$ )
AFG3011C	1	10 MHz	250 MS/s	4 x 128 k	20 mV <sub>p-p</sub> to 20 V <sub>p-p</sub>
AFG3021C	1	25 MHz	250 MS/s	4 x 128 k	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3022C	2	25 MHz	250 MS/s	4 x 128 k	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3051C	1	50 MHz	1 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3052C	2	50 MHz	1 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	10 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3101C	1	100 MHz	1 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	20 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3102C	2	100 MHz	1 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	20 mV <sub>p-p</sub> to 10 V <sub>p-p</sub>
AFG3251C	1	240 MHz	2 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	50 mV <sub>p-p</sub> to 5 V <sub>p-p</sub>
AFG3252C	2	240 MHz	2 GS/s ( $\leq 16k$ ), 250 MS/s ( $>16k$ )	4 x 128 k	50 mV <sub>p-p</sub> to 5 V <sub>p-p</sub>

### Recommended Accessories

#### Cables

- 012-0482-00 BNC cable shielded, 3 ft.
- 012-1256-00 BNC cable shielded, 9 ft.
- 012-0991-00 GPIB cable, double shielded

#### Accessories

- RM3100 Rackmount kit
- 013-0345-00 Fuse adapter, BNC-P to BNC-R
- 159-0454-00 Fuse set, 3pcs, 0.125A

### Recommended Service

- SILV400 5-year Extended Warranty

### Ships with Product

- Quick Start User Manual
- Power Cord
- USB cable
- BNC to BNC cable
- CD-ROM with Specifications and Performance Verification Manual, Programmer Manual, Service Manual, LabVIEW and IVI Drivers
- CD-ROM with ArbExpress™ Software
- NIST-traceable Calibration Certificate



TSG4100A Series

The TSG4100A Series RF Vector Signal Generator offers mid-range performance at an entry-level RF signal generator price, generating both analog and vector/digital signals for most popular applications. It's only 5.6 kg, half a rack wide, and 2U high with LAN/RS-232/USB/GPIB interfaces. A 4.3-inch LCD screen displays the parameters clearly, so you'll understand your results intuitively.

Product Highlights

- True DC to 2/4/6 GHz
- $\leq \pm 0.30$  dB (typ) amplitude accuracy from 10 MHz to 6 GHz
- Phase Noise: -113 dBc/Hz @ 20kHz offset from 0 dBm, 1 GHz CW carrier
- Soft key upgrade to vector/digital modulation at very low cost, supporting 10 widely used formats
- USB, GPIB, RS-232, and LAN interfaces
- I/Q modulation inputs (max 400 MHz RF bandwidth)



A versatile RF solution for the generation, receiving and analysis of both analog and vector signals at budget point.



Good performance and flexible configurations for debug and troubleshooting.

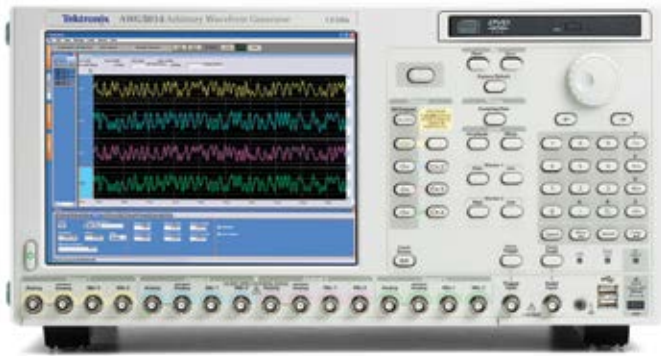
Model	Description	Phase Noise (20kHz offset from 0 dBm, 1 GHz CW carrier)	Amplitude Range	Modulation formats
TSG4102A	0 to 2 GHz RF SG, basic model	-113 dBc/Hz	+16.5 to -110 dBm	AM/FM/PM/Pulse; ASK/FSK/PSK/QAM/CPM/MSK/VSB; GSM/EDGE/TETRA/NADC/W-CDMA/P-25/DECT, etc.
TSG4104A	0 to 4 GHz RF SG, basic model	-113 dBc/Hz	+16.5 to -110 dBm	
TSG4106A	0 to 6 GHz RF SG, basic model	-113 dBc/Hz	+16.5 to -110 dBm (< 4 GHz) +10 to -110 dBm (> 4 GHz)	All the vector/digital modulation formats upgrade by soft keys

Recommended Accessories

TS-G4100A-ATT	30 dB, 5 W RF attenuator up to 6 GHz
Option VM00	Basic vector modulation package with internal 6 MHz modulation bandwidth
Option EIQ	External 200 MHz modulation bandwidth (requires Option VM00)

Ships with Product

- RF Cable
- Documentation CD
- Installation and Safety Instructions
- Calibration Certificate
- Power Cord

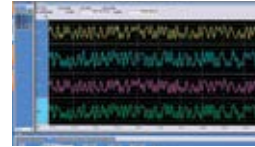


## AWG5000 Series

With 14-bit vertical resolution up to 1.2 GS/s, 4 analog and 32 digital channel outputs, the AWG5000 Series Arbitrary Waveform Generator is the ideal solution for versatile mixed signal generation. The AWG5000 Series gives you a unique combination of analog and digital output performance, allowing you to generate analog and digital IQ, as well as IF signals in a single instrument. With the addition of advance sequencing and dynamic jump capability, extremely complex waveforms can easily be created to more closely simulate real-world environments.

### Product Highlights

- I/Q modulator test
- Consumer electronics
- Serial data
- RF Baseband Signal Generation



4 synchronized channels in a single instrument.



Quickly modify, create and transfer waveforms using either RFXpress or SerialXpress.

### Ships with Product

- Accessory pouch, front cover, USB mouse, compact USB keyboard, lead set for DC output, AWG5000C Series product software CD and instructions, documentation CD with browser, Quick Start User Manual and registration card, Certificate of Calibration, and power cable.

Models	Analog Channel	Analog Bandwidth	Digital Channel	Output Frequency	Record Length	Max Sample Rate	Vertical Resolution
AWG5002C	2	Up to 230 MHz	28	240 MHz	16M point per channel (32M optional)	600 MS/s	14 bits
AWG5012C	2	Up to 300 MHz	28	480 MHz	16M point per channel (32M optional)	1.2 GS/s	14 bits
AWG5014C	4	Up to 300 MHz	--	480 MHz	16M point per channel (32M optional)	1.2 GS/s	14 bits

### Recommended Accessories

#### Cables

012-1690-xx Pin Header Cable, SMA Cable, 40 in. (102 cm)

012-1503-xx SMB Cable, 20 in. (51 cm)

#### Accessories

016-1983-xx Rackmount kit

016-1979-xx Front Removable HDD Bay

### Recommended Service

R3DW Repair Service Coverage 3 Years

R5DW Repair Service Coverage 5 Years

### RFXpress® Software for the AWG5000, AWG7000, AWG70000 (RFX100)

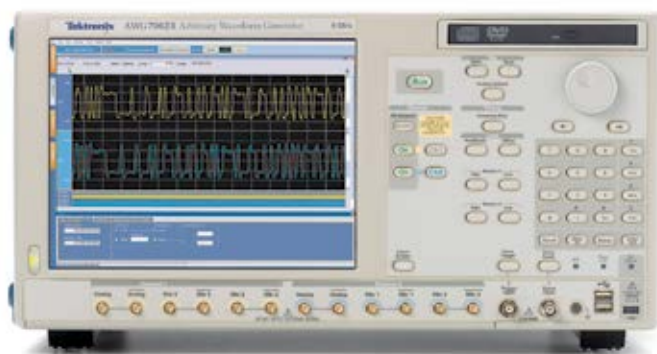
If you are doing RF designs requiring signal modulation, Tektronix' RFXpress software for the AWG Series delivers advanced capabilities to synthesize digitally modulated baseband, IF and RF/microwave signals supporting a wide range of modulation schemes. RFXpress simplifies waveform creation. Special options are available for Radar, OFDM, S-Parameter, and UWB signals specifically.

[www.tektronix.com/rfxpress](http://www.tektronix.com/rfxpress)

### SerialXpress® Software for the AWG5000, AWG7000, AWG70000 (SDX100)

Recreate exact waveforms required for thorough and repeatable design validation, margin/characterization and conformance testing with SerialXpress and AWG Series signal generators. SerialXpress' easy-to-use graphical user interface allows for a combination of test signals and various impairments, including Inter Symbol Interferences (ISI), Duty Cycle Distortion (DCD), Spread Spectrum Clocking (SSC), Pre-emphasis and noise.

[www.tektronix.com/signal\\_generators](http://www.tektronix.com/signal_generators)



## AWG7000 Series

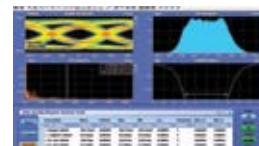
The AWG7000 Series Arbitrary Waveform Generators, with up to 24 GS/s and 10-bit vertical resolution, deliver the industry's best signal stimulus solution for ever-increasing measurement challenges. This allows for easy generation of very complex signals, complete with controllable jitter, noise and other signal impairments. The AWG7000 Series is the ideal solution for wideband signal generation applications, receiver stress testing of high-speed serial data, or any application where complex signal creation is required.

### Product Highlights

- Serial data validation and compliance testing
- Radar signal generation and environmental simulation
- Wideband analog and digital RF signal generation
- Disk drive validation and test



Radar pulses can be created using the AWG7000 and RFXpress.



Easily create digital data impairments with the AWG7000 and SerialXpress.

### Ships with Product

- Accessory pouch, front cover, USB mouse, compact USB keyboard, lead set for DC output, AWG7000C Series product software CD and instructions, documentation CD with browser, Quick Start User Manual and registration card, Certificate of Calibration, power cable, and 50  $\Omega$  SMA terminator (3 ea), one-year warranty.

Models	Analog Channel	Analog Bandwidth	Output Frequency	Record Length	Max Sample Rate	Vertical Resolution
AWG7082C	2	Up to 3.2 GHz, 5.6 GHz (optional)	Max = 3.2 GHz, 6.4 GHz (optional)	32M point, 64M point (optional)	10 MS/s - 8 GS/s (16 GS/s optional)	10 bits
AWG7122C	2	Up to 3.2 GHz, 5.6 GHz (optional)	Max = 4.8 GHz, 9.6 GHz (optional)	32M point, 64M point (optional)	10 MS/s - 12 GS/s (24 GS/s optional)	10 bits

### Recommended Accessories

#### Cables

012-1690-xx Pin Header Cable, SMA Cable, 40 in. (102 cm)

012-1503-xx SMB Cable, 20 in. (51 cm)

#### Accessories

016-1983-xx Rackmount kit

016-1979-xx Front Removable HDD Bay

### Recommended Service

C3 Calibration Service 3 Years

C5 Calibration Service 5 Years

R5DW Repair Service Coverage 5 Years

## Signal Generators Software

See page 51 for information

### RFXpress® Software for the AWG5000, AWG7000, AWG70000 (RFX100)

If you are doing RF designs requiring signal modulation, Tektronix' RFXpress software for the AWG Series delivers advanced capabilities to synthesize digitally modulated baseband, IF and RF/microwave signals supporting a wide range of modulation schemes. RFXpress simplifies waveform creation. Special options are available for Radar, OFDM, S-Parameter, and UWB signals specifically.

[www.tektronix.com/rfxpress](http://www.tektronix.com/rfxpress)

### SerialXpress® Software for the AWG5000, AWG7000, AWG70000 (SDX100)

Recreate exact waveforms required for thorough and repeatable design validation, margin/characterization and conformance testing with SerialXpress and AWG Series signal generators. SerialXpress' easy-to-use graphical user interface allows for a combination of test signals and various impairments, including Inter Symbol Interferences (ISI), Duty Cycle Distortion (DCD), Spread Spectrum Clocking (SSC), Pre-emphasis and noise.

[www.tektronix.com/signal\\_generators](http://www.tektronix.com/signal_generators)





## Product Highlights

- Generate wide bandwidth signals at baseband, IF and RF frequencies with excellent dynamic range
- Accelerate designs and research by generating waveforms that could not previously be created
- Add impairments to waveforms, eliminating the need for additional hardware
- Ability to sync multiple units together to increase transmission bandwidth



Seamlessly import waveforms from MATLAB, Excel and other software packages.



Waveforms captured on scopes or spectrum analyzers can be played back on the AWG.



## AWG70000A Series

The AWG70000A Series is the next generation of the industry-leading Tektronix AWG portfolio, implementing advanced data rate technologies of up to 50 Gs/s with 10-bit vertical resolution.

	AWG70001A	AWG70002A
Sample Rate	1.5KS/s to 50 GS/s	1.5KS/s to 25 GS/s
Maximum Frequency	20.0 GHz	10.0 GHz
Analog Bandwidth	14 GHz	14 GHz
Rise Time	27 ps	22 ps
Dynamic Range (SFDR)	Up to -80 dBc	Up to -80 dBc
DAC Resolution	10 bits	10 bits
Output Voltage	1.0 Vp-p (Differential)	1.0 Vp-p (Differential)
Waveform Memory	Standard: 2 GSamples, Optional: 16GSamples	Standard: 2 GSamples, Optional: 8GSamples
Channels	1 (Differential)	2 (Differential)

## Recommended Accessories

RFXpress  
SerialXpress

## Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

## Ships with Product

- Keyboard
- Mouse
- Power Cord

## Signal Generators Software

See page 51 for information

## RFXpress® Software for the AWG5000, AWG7000, AWG70000 (RFX100)

If you are doing RF designs requiring signal modulation, Tektronix' RFXpress software for the AWG Series delivers advanced capabilities to synthesize digitally modulated baseband, IF and RF/microwave signals supporting a wide range of modulation schemes. RFXpress simplifies waveform creation. Special options are available for Radar, OFDM, S-Parameter, and UWB signals specifically.

[www.tektronix.com/rfxpress](http://www.tektronix.com/rfxpress)

## SerialXpress® Software for the AWG5000, AWG7000, AWG70000 (SDX100)

Recreate exact waveforms required for thorough and repeatable design validation, margin/characterization and conformance testing with SerialXpress and AWG Series signal generators. SerialXpress' easy-to-use graphical user interface allows for a combination of test signals and various impairments, including Inter Symbol Interferences (ISI), Duty Cycle Distortion (DCD), Spread Spectrum Clocking (SSC), Pre-emphasis and noise.

[www.tektronix.com/signal\\_generators](http://www.tektronix.com/signal_generators)



## AWGSYNC01 AWG Synchronization Hub

The AWGSYNC01 enables synchronization of up to four AWG70001A or AWG70002A units, allowing up to eight channels to be aligned to the same clock, pattern jump and trigger inputs.

Model	Description	Key Spec	Key Spec	Key Spec
AWGSYNC01	AWG Synchronization Hub	Random Jitter (typical): 315 fs RMS Skew Repeatability/ Accuracy: ≤5 ps	Total Jitter (typical): 13 ps <sub>p-p</sub>	Instrument to Instrument Skew: ± 10 ps

### Product Highlights

- Synchronize signal output from two to four AWG70000 instruments
- Synchronize each channel to within ±10 ps
- Enable validation and compliance testing of high speed silicon and communications devices

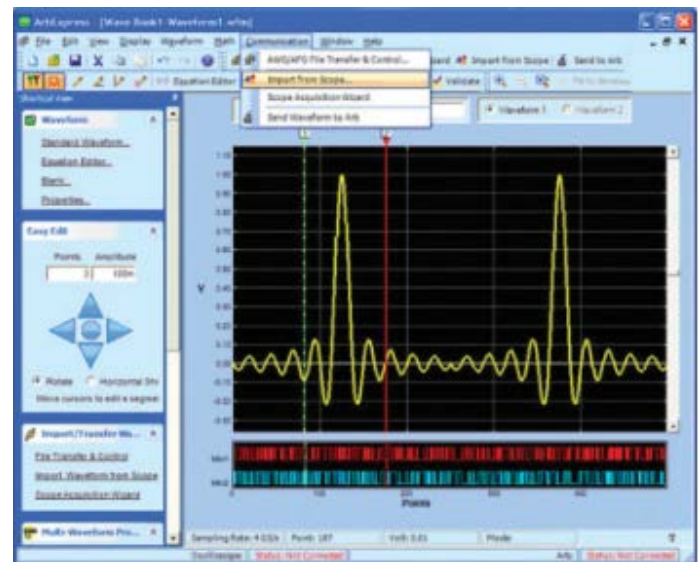
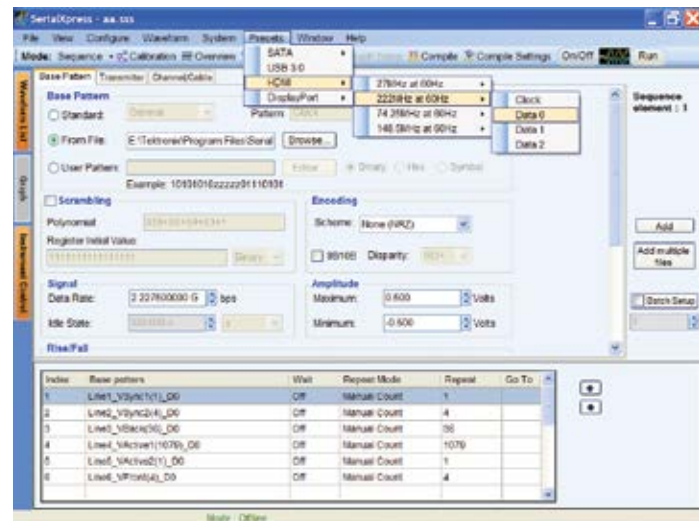
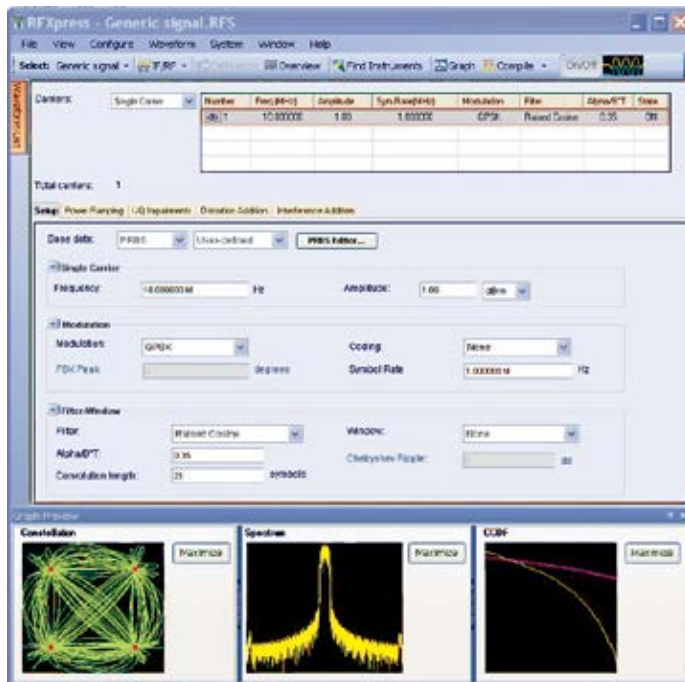


Controlled directly in the AWG and requires no additional AWG software.

### Ships with Product

- AWG Communication Cables
- Phase-matched Clock Cables
- Calibration Deskew Cables
- Power Cord

# Signal Generator Software





# Education Solution – TekSmartLab™

TekSmartLab is the industry's first network-based instrument management solution for teaching labs that brings a more efficient lab experience.



## Instruments Supported

- **Oscilloscope**  
Tektronix TDS1000B, TDS1000C-SC, TDS1000C-EDU, TBS1000, TBS1000B(-EDU), TDS2000C, DPO/MSO2000 (B), MDO3000
- **Arbitrary Function Generators**  
Tektronix AFG1022, AFG2021, AFG3000(C)
- **Digital Multimeters**  
Keithley DMM2110, DMM2100
- **Power Supplies**  
Keithley 2230G(J)-30-1, 2220G(J)-30-1, 2220(J)-30-1, 2230(J)-30-1, 2231A-30-3 (requires Option 2231A-001)



TekSmartLab network diagram



Centralize configuration



Centralize Monitoring and remote assistance



Test Results online retrieving and saving



Automatic Instrument Asset Information Recording

## Sample TekSmartLab Configuration

The following shows a sample setup of a TekSmartLab system with 20 benches and 80 instruments connected through Wi-Fi.

Item	Qty	Supplier	Comments
TSL3000B	1	Tektronix	One per lab
TBX3000A	20	Tektronix	One per bench
Instruments	80	Tektronix	Supported instruments. 1 one oscilloscope, one arbitrary function generator, one digital multimeter, and one power supply per bench. Option 2231A-001 required for the power supply 2231A-30-3.
USB WIFI dongle	20	Provided by customer	Compatible USB-WIFI dongle
Router	1	Provided by customer	WIFI Router that can meet WI-FI networking requirements.
Lab server	1	Provided by customer	





# Logic Analyzers

With Tektronix Logic Analyzers, you can acquire fast edges with the industry's highest acquisition speed. Support packages tuned to your specific application make it easier for you to probe, acquire, decode, analyze, and validate the performance of your microprocessor, FPGA or memory design.



	TLA6400	TLA7000
Description	Pre-configured Portable Logic Analyzer	Modular Portable and Benchtop Logic Analyzers
Channels	34, 68, 102, 136	68, 102, 136 modules 2 – 6 modules per frame
Timing	1.6 GHz on all channels 3.2 GHz on ½ channels	500 MHz to 6.4 GHz (dependent on model)
MagniVu™ Timing	25 GHz	8 GHz or 50 GHz (dependent on model)
State Clock Rate	333 MHz (standard) 667 MHz (optional)	235 MHz to 1.4 GHz (dependent on model)
Maximum State Data Rate	1.33 Gb/s	1.25 Gb/s to 3.0 Gb/s (dependent on model)
Record Length	2Mb, 4Mb, 8Mb, 16Mb, 32Mb, 64Mb	2Mb to 128Mb (dependent on model)
Analog Mux	Available	Available

## Choosing your Logic Analyzer

To help you choose the right logic analyzer for your needs, the most common selection criteria are listed below, along with helpful tips for determining your requirements.

### 1 Number of Channels

Logic Analyzers are available in both modular and pre-configured forms. A modular logic analyzer allows you to add additional acquisition cards to increase the number of available channels. A pre-configured logic analyzer has a fixed number of channels and can't be changed after purchase.

### 2 Timing Resolution

Timing resolution is simply the inverse of the sample rate of the logic analyzer. Higher timing resolution allows you to more precisely place the edges of signals relative to one another, giving more accurate timing measurements.

### 3 State Clock Rate

In addition to timing mode, logic analyzers have a second acquisition mode called state mode. In this mode, a clock from your circuit tells the logic analyzer when to sample the data. The state clock specification indicates the maximum frequency of clock that the logic analyzer can use.

### 4 Record Length

Record length, or memory depth, indicates the number of samples that can be stored. Longer record lengths can be helpful in troubleshooting problems whose cause and symptom are widely separated in time.



## TLA6400 Series

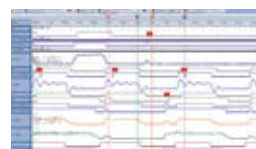
The affordable TLA6400 Series Logic Analyzer offers the performance needed to debug, validate, and optimize the functionality of your digital system. Quickly isolate, identify, and characterize elusive and hard-to-find problems with a comprehensive set of signal integrity debug tools.

### Product Highlights

- 15-inch display, with optional touch screen lets you see more of your data and navigate through it efficiently
- Drag-and-Drop Triggering – Simply drag any one of eight different trigger types onto the waveform
- Drag-and-Drop Measurements – Simply drag an icon from the measurement toolbar and drop it on your signal of interest



iCapture allows you to use one probe for both your logic analyzer and scope, eliminating the need to double-probe.



Integrate the display of digital and analog data with iView.

Model	Channels	State Clock Rate	MagniVu Timing	Timing	Record Length
TLA6401	34	333 MHz (standard) 667 MHz (optional)	25 GHz	1.6 GHz on all channels 3.2 GHz on ½ channels	2Mb, 4Mb, 8Mb, 16Mb, 32Mb, 64Mb
TLA6402	68	333 MHz (standard) 667 MHz (optional)	25 GHz	1.6 GHz on all channels 3.2 GHz on ½ channels	2Mb, 4Mb, 8Mb, 16Mb, 32Mb, 64Mb
TLA6403	102	333 MHz (standard) 667 MHz (optional)	25 GHz	1.6 GHz on all channels 3.2 GHz on ½ channels	2Mb, 4Mb, 8Mb, 16Mb, 32Mb, 64Mb
TLA6404	136	333 MHz (standard) 667 MHz (optional)	25 GHz	1.6 GHz on all channels 3.2 GHz on ½ channels	2Mb, 4Mb, 8Mb, 16Mb, 32Mb, 64Mb

### Recommended Probes

P5910	17-channel General Purpose Probe
P5934	34-channel Mictor Probe
P5960	34-channel DMAX Probe

### Recommended Accessories

PG3L-B	Stand-Alone Digital Pattern Generator
LACART	Accessory Cart
K4000	2 Shelf Accessory Cart
020-2664-xx	Rack Mount Kit

### Ships with Product

- Power Cord
- Quick Start Guide
- Keyboard and Mouse
- Front Cover
- Documentation CD
- Calibration Certificate

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years



## TLA7000 Series

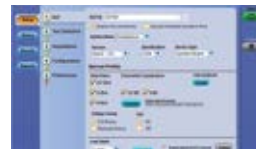
The modular TLA7000 Logic Analyzer Series provides the speed and flexibility you need to capture logic detail on today's fastest microprocessors and memory designs.

### Product Highlights

- Modular mainframes provide flexibility and expandability
- Supports up to 6,528 logic analyzer channels, 48 independent buses
- Trace problems from symptom back to root cause in real time across multiple modules by viewing time-correlated data in a wide variety of display formats
- Choose from a variety of acquisition and stimulus modules



Debug and validate the latest DDR technology with the TLA7000 Series.



PCI Express Debug from Protocol to Physical Layer.

TLA7000 Mainframe Models	Description	Number of Modules	Built-In Computer	Display
TLA7012	Portable Mainframe	2	Yes	15"
TLA7016	Benchtop Mainframe	6	Requires an external computer	none

Acquisition Module Models	Channels	State Clock Rate	MagniVu Timing	Timing
TLA7ACx	68, 102, 136	235 MHz (standard) 450 MHz (optional)	8 GHz	500 MHz on all channels; 1 GHz on ½ channels; 2 GHz on ¼ channels
TLA7BBx	68, 102, 136	750 MHz (standard) 1.4 GHz (optional)	50 GHz	1.6 GHz on all channels; 3.2 GHz on ½ channels; 6.4 GHz on ¼ channels

Pattern Generator Model	Maximum Data Rate	Number of Channels	Memory Depth	Data Models
PG3ACAB-B	300 Mbps 600 Mbps with DDR Option	64 (mergeable to 256 channels)	32M Vectors	Flat or Block Based

### Recommended Probes

#### Acquisition Probes

P6910	34-channel General Purpose Probe
P6960	34-channel Single-Ended DMAX Probe
P6980	34-channel Differential DMAX Probe

#### Pattern Generator Probes

P370	TTL Output
P373	LVDS Output
P375	Output Programmable from -2V to +6.5V

### Recommended Accessories

LACART	Accessory Cart
K4000	2 Shelf Accessory Cart
020-2664-xx	Rack Mount Kit

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Power Cord
- Quick Start Guide
- Keyboard and Mouse
- Front Cover (TLA7012)
- Documentation CD
- Calibration Certificate



# PCI Express Logic Protocol Analyzers

The TLA7SAxx Series logic protocol analyzer modules provide an innovative approach to PCI Express validation that spans all layers of the protocol from the physical layer to the transaction layer. View statistical summary and protocol analysis using innovative Transaction and Summary Profile windows.



	TLA7SAxx
Description	PCI Express Logic Protocol Analyzer, Supports Gen3, Gen2, and Gen1 rates
Differential Inputs	8 or 16
Memory	8M/16M

## Choosing your PCI Express Logic Protocol Analyzer

To help you choose the right PCI Express Logic Protocol Analyzer for your needs, the most common selection criteria are listed below, along with helpful tips for determining your requirements.

### 1 Probing

How you will access your PCIe signals is a critical consideration. There are three possible methods of probing your system: slot interposer, solder down probes, and midbus probes. A slot interposer is the most convenient method if you have access to a PCIe slot. A solder-down probe can be used if you are designing an embedded system where a slot is not available. Finally, a midbus probe can be an easy solution if you can design a probe footprint into your system.

### 2 Number of Lanes

PCI Express Logic Protocol Analyzers are available in different widths to provide cost-effective solutions no matter if you have x1 or a x16 system.

### 3 Triggering

The ability to trigger on packet details along with other resources like counters and timers can significantly speed your debug and validation effort. Consider also the ability to cross trigger with other events in your system such as a memory bus.





## TLA7SAxx Series

The TLA7SAxx PCI Express Protocol Analyzer modules provide powerful trigger and filtering capabilities so you can quickly focus on the data of interest. A complete suite of probing solutions targeted for various form factors and applications.

### Product Highlights

- Three probing options: solder-down, midbus, and interposer
- Resynchronization time <12 FTS1 (PCIe2) or <4 FTS2 (PCIe3) regardless of the Electrical Idle time for Advanced Power State Management performance
- Quickly build a trigger definition to trigger on the most elusive PCIe events occurring on Link



Quickly gain confidence that your setup is correct by routing any signal directly to a high bandwidth Oscilloscope.



Get visibility of system issues involving flow control with the unique Bird's Eye view.

Model	Differential Inputs	Record Length
TLA7SA08	8	4 GB Physical Memory; 160M Symbols per Differential Input
TLA7SA16	16	8 GB Physical Memory; 160M Symbols per Differential Input

### Recommended Probes

P67SA01S	x1 Slot Interposer Probe
P67SA04S	x4 Slot Interposer Probe
P67SA08S	x8 Slot Interposer Probe
P67SA16S	x16 Slot Interposer Probe
P67SA08	x4 Midbus Probe
P67SA16	x8 Midbus Probe
P67SA01SD	x1 Solder Down Probe
P67SA08G2	x4 Midbus Probe for TLA7SAxx Modules to Connect to PCIe2 Midbus Footprints
P67SA16G2	x8 Midbus Probe for TLA7SAxx Modules to Connect to PCIe2 Midbus Footprints

### Recommended Accessories

P67UHDS-MA	x2 PCI Express Probe Lead Set for P67SA00 probe connections to oscilloscopes
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### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Statement of Compliance
- Reference Clock Cable (672-6285-xx)
- Reference Clock Jumper Cable (174-5392-xx)



# Bit Error Rate Testers

## Bridging the Information Gap

Each Tektronix Bit Error Rate Tester delivers unprecedented flexibility and performance to help compress your product development cycles and reduce verification testing costs. Quickly and confidently identify errors in digital bit streams with these highly advanced test and measurement instruments.



	BA Series	BSA Series	PPG/PED Series
Product Series	BA1500, BA1600	BSA85C, BSA125C, BSA175C, BSA286C	PPG1251, PPG1601, PPG1602, PPG1604, PPG3001, PPG3002, PPG3004, PPG3201, PPG3202, PPG3204, PPG4001, PED3201, PED3202, PED4001, PED4002
Channels	1	1	1 (PPG1251, PPG1601, PPG3001, PPG3201, PEG3001); 2 (PPG1602, PPG3002, PPG3202, PED3202); 4 (PPG1604, PPG3004, PPG3204)
Maximum Bitrate	1.5-1.6 Gbps	8.5-28.6 Gbps	40 Gbps
Maximum Native Error Detector Rate	1.6 Gbps	26 Gbps	40 Gbps
Maximum Pattern Length	8Mbits	128Mbits	4Mbits/channel
Stress Impairments	External stressed clock	External stressed clock Internal: (STR) Rj, Sj, Si, Pj, BUJ	External stressed clock Internal: (JIT) Sj, Rj
Output Signal Amplitude	4V Differential	4V Differential	PPG300X 4V Differential, PPG1251, PPG160X, PPG320X 2V Differential, PPG4001 1V (fixed) Differential
Detector Functions	BER, BER Contour, BER Mask, Error Location, Eye Diagram, Jitter Peak	BER, BER Contour, BER Mask, Error Location, Eye Diagram, Jitter Peak, Jitter Map, Jitter Tolerance	BER, Auto Align
Input Sensitivity	40mV Typical	50mV Typical	20mV Typical
Applications	Digital Radio and Satellite test	PCIe, USB, Thunderbolt, SATA, SAS, FC, IEEE802.x, OIF, CEI	FC, IEEE802.x, OIF, CEI
Software		BSAUSB3: USB (Gen3) Automated loopback control, auto impairment calibration and receiver compliance test system; BSAPCI3: PCI Express (Gen3) Automated loopback control, auto impairment calibration and receiver compliance test system.	



## BA/BSA/PPG Series, Bit Error Rate Testers

As high performance SERDES receiver validation is now frequently required as part of industrial conformance programs (SATA, PCIe, USB, etc.) or for the validation and comparison of silicon receiver sensitivity, the BERT is an essential piece of all silicon and system validation labs.

Model	Output Channels	Bit Rate	Maximum User Defined Pattern Length
BA1500	1	1.5 Gbps	8 Mbits
BA1600	1	1.6 Gbps	8 Mbits
BSA85C	1	8.5 Gbps	128 Mbits
BSA125C	1	12.5 Gbps	128 Mbits
BSA175C	1	17.5 Gbps	128 Mbits
BSA286C	1	28.6 Gbps	128 Mbits
PPG1601	1	16 Gbps	4 Mbits
PPG1602	2	16 Gbps	2 Mbits
PPG1604	4	16 Gbps	2 Mbits
PPG3001	1	30 Gbps	2 Mbits
PPG3002	2	30 Gbps	2 Mbits
PPG3004	4	30 Gbps	2 Mbits
PPG3201	1	32 Gbps	2 Mbits
PPG3202	2	32 Gbps	2 Mbits
PPG3204	4	32 Gbps	2 Mbits
PPG4001	1	40 Gbps	4 Mbits
PED3201	-	32 Gbps	2 Mbits
PED3202	-	32 Gbps	2 Mbits
PED4001	-	40 Gbps	4 Mbits
PED4002	-	40 Gbps	2 Mbits

### Recommended Accessories

#### Digital Pre-Emphasis Processor

DPP125C 1-12.5 Gb/s 3-Tap, opt. 4-Tap

#### Clock Recovery Instruments

CR125A 1-12.5 Gb/s

CR175A 1-17.5 Gb/s

CR286A 1-28.6 Gb/s

#### BSA Interference Test System

BSAITS125 Interference Test Set with interference insertion and ISI switching

#### Linear Equalizer

LE160 16Gbps Linear Equalizer

LE320 32Gbps Linear Equalizer

#### Common Options

9T 9 Tap User Configuration (Standard 4 Tap)

CDS Channel Designer SW

SPM S-Parameter Modeler

#### Software Packages

BSAUSB3 USB3 Automation SW and accessories needed for compliance testing

BSAPCI3 PCI Express (Gen3) Automated SW for compliance testing

### Recommended Accessories

#### Adapters

BARACK BA-Rack Mount Kits; BSA12500ISI Differential ISI Board; BSAITS125 Interference Test Set with interference insertion and ISI switching; BSARACK BSA-Rack Mount Kits; BSASATATEE BSA-SATA-Tee for OOB Signaling; BSASWITCH Hardware switch for receiver testing in applications such as USB3 compliance testing allowing attainment of loopback; PMCABLE1M Precision Phase Matched Cable Pair, 1m SMAPOWERDIV SMA Power Dividers

### Instrument Options

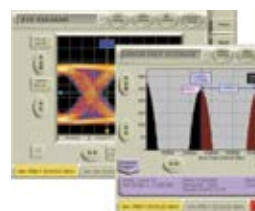
BA1500/BA1600: ECC: Error Correction and Coding Emulation; MAP: Error Mapping Analysis; PL: Physical Layer Test Suite Software.

BSA85C-BSA286C: F2: F/2 Jitter Generation (requires STR); STR Stressed Signal Generation; XSSC Extended Spread Spectrum Clocking; J-MAP Jitter Decomposition SW; ECC Error Correction Coding; LDA Live Data Analysis SW; MAP Error Mapping SW; PL Physical Layer Test Suite; SF Symbol Filtering SW; SLD Stressed Live Data SW

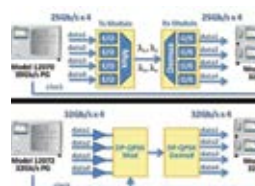
PPG/PED Series: JIT: 150ps Pk-pk of Sinusoidal and Random jitter

### Product Highlights

- BA1500/BA1600:
  - 1.6Gbps performance and low entry cost with full featured analysis capabilities key for telecommunications and satellite systems testing
- BSA85C-BSA286C:
  - 8.5 to 28.6Gbps performance and the industry's most comprehensive precision signal impairments, jitter measurement and error location analysis tools make this family of products key to all validation labs
  - Ultra low noise floor (<300fs RMS Rj) coupled with 28.6Gbps performance makes these instruments key for all forms of receiver characterization and debug.
- PPG/PED Series
  - Driving modern 100G communications system links mandate the ability to operate up to 40Gbps coupled with precision controlled alignment of channel phase over 4 outputs
  - The PPG3204 offers 4 synchronous (user controlled) channels with sub 10pSec edge rates for blazing performance



The BSA offers a complete and continuous analysis of any given bit stream, allowing in-depth BER contouring and examinations of very low probability and infrequent errors, which others instruments overlook.



System validation for coherent QPSK systems and 100G Ethernet testing require precision four channel capable BERTS and complementary error detectors.

### Ships with Product

- All Models Include:
  - Quick Start user manual, power cord, mouse, three (3) short low-loss SMA cables, DVI adapter
  - Standard 1-year warranty
- Certifications:
  - EU EMC Directive (CE-Marked)\*
  - LVD Low Voltage Directive
  - US Listed UL61010-1
  - Canada Certified CAN/CSA 61010-1

\*BSA models only.

### Recommended Service

G3	Gold Care 3-year Extended Warranty
G5	Gold Care 5-year Extended Warranty
R3	3-year Extended Warranty
R5	5-year Extended Warranty



# Spectrum Analyzers

## Choosing your Wireless/RF Test Solution

See an RF world others can't with affordable real-time performance. This guide gives an overview of the signal analysis capabilities required to overcome the most challenging wireless and RF design challenges with confidence. Spend your time fixing the problem, not looking for it. If you need a refresher on Real-Time Spectrum Analysis, download the [Fundamentals of Real-Time Spectrum Analysis Primer](#).



	RSA306 USB Spectrum Analyzer RF signal analysis in your hands	MDO3000 Mixed Domain Oscilloscope Six instruments in one	MDO4000 Mixed Domain Oscilloscope The only instrument that shows time-correlated analog, digital, and RF signals	RSA5000B/ RSA6000B/ SpecmonB Advanced RF performance
Frequency Range	9 kHz to 6.2 GHz	9 kHz to 3 GHz	9 kHz to 6 GHz	1 Hz up to 26.5 GHz
Demod/Capture BW	40 MHz	Up to 3 GHz	Up to 3.75 GHz	Up to 165 MHz
Integrated Instruments	Spectrum Analyzer	Spectrum Analyzer, Oscilloscope, Logic Analyzer, Protocol Analyzer, Digital Voltmeter/ Counter	Spectrum Analyzer, Oscilloscope, Logic Analyzer, Protocol Analyzer	Spectrum Analyzer
Correlation of RF with other analog/digital signals	NA	NA	Yes	NA
Real-Time Spectrum Analysis	Yes	NA	NA	Yes
Vector Signal Analysis Software	SignalVu-PC (Standard)	NA	SignalVu-PC (Optional)	Integrated (Optional)
Commonly used for	General Purpose RF Design, Education, Interference Hunting/Spectrum Management, Field Installation and Maintenance	Basic Embedded Design and Debug, General Purpose RF Design, Education	Advanced Embedded Design and Debug, General Purpose RF Design, EMI Troubleshooting	Advanced RF Design, Interference Hunting/Spectrum Management, Radar/EW

## Choosing your RealTime Spectrum Analyzer

Key items for consideration in selecting your spectrum analyzer

### 1 Frequency Range

Of course, the analyzer chosen must cover all of the frequencies you need to measure. Consider harmonics and spurious signals when making your selection. For example, your fundamental signal may be at 2.4 GHz, but perhaps you will want to see up to 10 harmonics of the signal to meet all the needs of your design.

### 2 Acquisition/Real-Time Bandwidth

In a real-time spectrum analyzer, this sets the maximum bandwidth for guaranteed capture and triggering on brief signals, and is also the limiting factor in modulation measurements. For example, 802.11n signals require a minimum acquisition bandwidth of 40 MHz so that all signal elements can be acquired and demodulated. However, the entire operating frequency of your signal of interest may need to be considered. For example, a Bluetooth signal is relatively narrow band, and may be demodulated with the standard acquisition bandwidth of an RTSA, but you may want to observe the full hopping pattern of the Bluetooth transmitter as it operates, requiring at least 85 MHz bandwidth for your application.

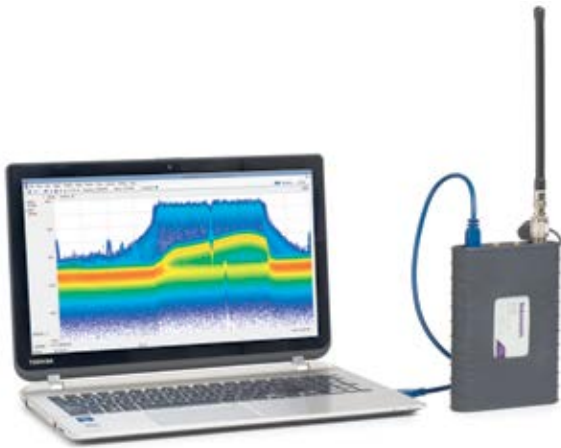
### 3 Dynamic Range

This can be a complex subject. Your definition of dynamic range may be highly specific. Consideration of Adjacent Channel Power Ratio dynamic range, spurious-free dynamic range in a particular frequency range, or harmonic distortion specifications may or may not be important to your application. For example, the RSA6100B Series real-time analyzer has our best ACLR specifications, but the low-frequency (1 Hz – 32 MHz) spurious-free dynamic range of the RSA5100B is the best available.

### 4 Features and Capabilities

Tektronix RTSAs offer a range of features and capabilities, with a wealth of performance and analysis options. Optional features include preamplifiers, acquisition bandwidth options, and analysis options that include WLAN, Bluetooth, P25 and general purpose modulation analysis, pulse measurements and mapping. Consulting with a Tektronix applications engineer can be the best way to learn which optional feature may be useful in your RTSA.





## RSA306 USB Spectrum Analyzer

### RF signal analysis in your hands!

The RSA306 offers full-featured spectrum analysis and deep signal analysis at a price unmatched by any previous offering. Using the latest in commercial interfaces and available computing power, the RSA306 separates signal acquisition from measurement, dramatically lowering the cost of instrument hardware. Data analysis, storage and replay is performed on your personal computer, tablet or laptop. Managing the PC separately from the acquisition hardware makes processing upgrades easy, and minimizes IT management issues.

### SignalVu-PC software and an API for deep analysis and fast programmatic interaction.

The RSA306 operates with SignalVu-PC, a powerful program that is the basis of Tektronix performance signal analyzers. SignalVu-PC offers a deep analysis capability previously unavailable in value-priced solutions and a choice of options to further analyze the signal, for example WLAN or Bluetooth signals, or for general purpose digital modulation analysis. Real-time processing of the DPX spectrum/spectrogram is enabled in your PC, further reducing the cost of hardware. Customers who need programmatic access to the instrument can choose either the SignalVu-PC programmatic interface or use the included application programming interface (API) that provides a rich set of commands and measurements. A MATLAB driver for the API is available, enabling operation with MATLAB and the Instrument Control Toolbox.

### Product Highlights

- Full-featured spectrum analysis capability with included Tektronix SignalVu-PC™ software
- 27 spectrum and signal analysis measurements standard
- Options for mapping, modulation analysis, WLAN and Bluetooth standards support, pulse measurements, and frequency settling
- Real-time Spectrum/Spectrogram display to minimize time spent on transient and interference hunting
- Application programming interface (API) included for Microsoft Windows environments
- MATLAB instrument driver for use with Instrument Control Toolbox
- Streaming capture records long-term event

### Applications

### Ships with Product

- USB 3.0 cable (1 M)
- SignalVu-PC software, documentation, USB key
- Printed safety/installation manual
- One-year Warranty



### Product Highlights

- Spectrum Monitoring and Surveillance
- Interference Detection and Troubleshooting
- Signal Hunting
- Signal Identification
- Signals Intelligence (SIGINT)
- Homeland Security

## H500/SA2500 Handheld Real-Time Spectrum Analyzer

**Interference troubleshooting has never been so easy.**

The H500/SA2500 Handheld Spectrum Analyzer Series will help you easily scan, classify and locate signals of interest in the field environment. Scan the environment to discover spectrum events other analyzers will miss, when using the unique DPX® Live RF spectrum display. Classify signals of interest with the built-in, user-defined signal database. Locate signals quickly using the integrated GPS mapping solution. The ruggedized design, with a hot swappable battery, is optimized to help you in the toughest of environments.

Model	Capture Bandwidth	Frequency Range	Minimum Event Duration for 100% Probability of Intercept (POI)	SFDR at 20 MHz
SA2500	20 MHz	10 kHz - 6.2 GHz	125 $\mu$ s - 500 $\mu$ s	-70 dBc
H500	20 MHz	10 kHz - 6.2 GHz	125 $\mu$ s	-70 dBc

### Instrument Options (SA2500)

Option EP1	Enhances SA2500 DPX™ Live RF spectrum display to 10,000 spectrums/sec
Option EP2	Enhances SA2500 by adding signal classification to the Spectrum Notes capability

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Recommended Accessories

Beam Antennas	
119-6594-xx	824 to 896 MHz
119-6595-xx	896 to 960 MHz
119-6596-xx	1710 to 1880 MHz
119-6597-xx	1850 to 1990 MHz
Cables	
012-0482-xx	50 $\Omega$ , BNC (m) 3 foot
174-4977-xx	50 $\Omega$ , Straight Type-N (m) and angled Type-N (m) connector, 1.6 foot
174-5002-xx	50 $\Omega$ , Type-N (m) to Type-N (m) connector, 3 foot
Accessories	
119-6970-xx	Magnetic Mount Antenna, 824 to 2170 MHz
119-7246-xx	Pre-filter, General Purpose, 824 to 2500 MHz, Type-N (f) Connector
119-7426-xx	Pre-filter, General Purpose, 2400 to 6200 MHz, Type-N (f) Connector
119-6030-xx	External Battery Charger (2-slot, external)
119-7755-xx	AC Power Supply
146-0151-xx	Lithium-ion Battery
016-1882-xx	Display Protector Sheets

### Ships with Product

- H500:  
User Manual (in PDF format), Installation Software, AC Power Adapter, Lithium-ion Battery, GPS Antenna, Flexible monopole antenna, Type-N (m) to BNC (f) adapter, USB A-B cable, Tilt Stand, Soft Carry Case, Audio Jack Mute Plug (mute all audio output from the instrument speaker), One-year Warranty
- SA2500:  
User Manual (in PDF format), Installation Software, AC Power Adapter, Lithium-ion Battery, GPS Antenna, Flexible monopole antenna, Type-N (m) to BNC (f) adapter, USB A-B cable, Tilt Stand, Soft Carry Case, Audio Jack Mute Plug (mute all audio output from the instrument speaker), One-year Warranty



## Product Highlights

- DPX® Live RF spectrum display
- Triggering expertise
- Seamless data capture
- Multi-domain time correlation
- Automatic pulse measurement and detection



## RSA5000B Real-Time Spectrum Analyzer

The RSA5000 Series mid-range Real-Time Spectrum Analyzer combines best-in-class RF performance with up to 165 MHz bandwidth and 4th Generation DPX® Technology. This provides the measurement confidence and functionality you demand for everyday tasks and gives you the dynamic range you expect for challenging spectrum analysis measurements.

Model	Capture Bandwidth	Frequency Range	Minimum Event Duration for 100% POI	SFDR at 165 MHz BW (typical)
RSA5103B	25 MHz, 40 MHz, 85 MHz, 125 MHz, 165 MHz	1 Hz - 3 GHz	0.43 $\mu$ s	80 dBc
RSA5106B	25 MHz, 40 MHz, 85 MHz, 125 MHz, 165 MHz	1 Hz - 6.2 GHz	0.43 $\mu$ s	80 dBc
RSA5115B	25 MHz, 40 MHz, 85 MHz, 125 MHz, 165 MHz	1 Hz - 15 GHz	0.43 $\mu$ s	80 dBc
RSA5126B	25 MHz, 40 MHz, 85 MHz, 125 MHz, 165 MHz	1 Hz - 26.5 GHz	0.43 $\mu$ s	80 dBc

## Instrument Options

Opt. 09	Enhanced Real-Time (Check Export Control Requirements)
Opt. 10	AM/FM/PM Modulation and Audio Measurements
Opt. 11	Phase Noise / Jitter Measurement
Opt. 12	Settling Time (Frequency and Phase)
Opt. 14	Noise Figure and Gain
Opt. 20	Advanced Signal Analysis
Opt. 21	General Purpose Modulation Analysis
Opt. 22	Flexible OFDM Analysis
Opt. 23	WLAN 802.11a/b/g Measurements
Opt. 24	WLAN 802.11n Measurements
Opt. 25	WLAN 802.11ac Measurements
Opt. 26	APCO P25 measurement application
Opt. 27	Bluetooth Basic LE TX SIG measurements
Opt. MAP	Mapping and signal Strength
Opt. 53	Memory Extension, 4 GB Acquisition Memory Total
Opt. 65	Digital I and Q output

## Instrument Options

Opt. B85	85 MHz Acquisition Bandwidth
Opt. 300	High Performance Real-Time
Opt. B16x	165 MHz Acquisition Bandwidth
Opt. B16xHD	High Dynamic Range, 85 MHz acquisition bandwidth
Opt. B25	25 MHz Acquisition Bandwidth (no charge option)
Opt. B40	40 MHz Acquisition Bandwidth
Opt. B85HD	High Dynamic Range, 85 MHz acquisition bandwidth
Opt. B125	125 MHz Acquisition Bandwidth
Opt. B125HD	High Dynamic Range, 125 MHz acquisition bandwidth

## Recommended Accessories

RTPA2A	Spectrum Analyzer Probe Adapter
SignalVu-PC	Vector Signal Analysis Software for your PC

## Ships with Product

- Quick Start Manual, Application Guide, Printable Online Help File, Programmer's manual (on CD), power cord, BNC-N adapter, USB Keyboard, USB Mouse, Front Cover, One-year Warranty

## Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years



### Product Highlights

- DPX® Live RF spectrum display
- Triggering expertise
- Seamless data capture
- Multi-domain time correlation
- Automatic pulse measurement and detection

## RSA6000B Real-Time Spectrum Analyzer

The high-performance RSA6000 Real-Time Spectrum Analyzer Series will help you easily discover design issues that other spectrum analyzers will miss. Its industry-leading dynamic range and bandwidth combination, coupled with the unique DPX™ Live RF spectrum display, gives you immediate confidence in the stability of your design, or instantly displays a fault when it occurs.

Model	Capture Bandwidth	Frequency Range	Minimum Event Duration for 100% POI	SFDR at 110 MHz BW (typical)
RSA6106B	40 MHz - 110 MHz	9 kHz - 6.2 GHz	3.7 $\mu$ s	75 dBc
RSA6114B	40 MHz - 110 MHz	9 kHz - 14 GHz	3.7 $\mu$ s	75 dBc
RSA6120B	40 MHz - 110 MHz	9 kHz - 20 GHz	3.7 $\mu$ s	75 dBc

### Instrument Options

Opt. 05	Digital IQ Output and 500 MHz Analog IF Output
Opt. 10	AM/FM/PM Modulation and Audio Measurements
Opt. 11	Phase Noise and Jitter Measurement
Opt. 12	Settling Time Measurements (Frequency and Phase)
Opt. 20	Advanced Signal Analysis
Opt. 21	General Purpose Digital Modulation Analysis
Opt. 22	Flexible OFDM
Opt. 23	WLAN analysis 802.11a/b/g/j/p
Opt. 24	WLAN analysis 802.11n
Opt. 25	WLAN analysis 802.11ac
Opt. 26	APCO P25 measurement application
Opt. 27	Bluetooth Basic LE TX SIG measurements
Opt. 50	Preamp, 1 MHz - 6.2 GHz, 20 dB Gain (RSA6106B only)
Opt. 51	Preamp, 100 kHz - 20 GHz, 30 dB Gain (RSA6114B and RSA6120B only)
Opt. 52	Frequency Mask Trigger
Opt. 53	Memory Extension, 4 GB Total Acquisition Memory

### Recommended Accessories

RTPA2A	Spectrum Analyzer Probe Adapter
SignalVu-PC	Vector Signal Analysis Software for your PC

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Product Documentation CD (Quick Start User Manual, Application Examples Manual, Printable Online Help, Programmer Manual, Service Manual, Specification and Performance Verification Manual, Declassification and Security Instructions), Front Cover, USB Keyboard, USB Mouse, Planar Crown™ RF Input Connector – Type-N (RSA6106B and RSA6114B) / 3.5 mm (RSA6120B only) / SMA (m) to SMA (f) adapter (RSA6120B only), and One-year Warranty





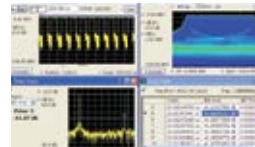
## SPECMONB Real-Time Spectrum Analyzer

### Fast and Versatile Solution for Field Interference Hunting.

Discover, capture, locate and analyze elusive events in the field faster than ever before with the SPECMON Spectrum Analyzer.

### Product Highlights

- Leading real-time technologies help to troubleshoot the toughest transient interferences in the field
- Integrated solution design reduces total cost of ownership with lower initial purchase cost and annual maintenance cost
- Open data format improves asset utilization through compatibility with industry-standard products



Swept DPX and Advanced Triggering for the SPECMON Series.



Built-in Mapping for Interference Hunting in SPECMON Series.

Model	Capture Bandwidth	Frequency Range	Minimum Event Duration for 100% POI	SFDR at 110 MHz BW (typical)
SPECMON3B	25 MHz, 40 MHz, 85 MHz, 125MHz, 165 MHz	1 Hz - 3 GHz	0.43 $\mu$ s	80 dBc
SPECMON6B	40 MHz, 85 MHz, 125MHz, 165 MHz	1 Hz - 6.2 GHz	0.43 $\mu$ s	80 dBc
SPECMON26B	40 MHz, 85 MHz, 125MHz, 165 MHz	1 Hz - 26.5 GHz	0.43 $\mu$ s	80 dBc

### Recommended Accessories

RTPA2A Spectrum Analyzer Probe Adapter	Supports TekConnect® probes P7225, P7240, P7260, P7330, P7313, P7313SMA, P7340A, P7350, P7350SMA, P7360A, P7380A, P7380SMA, P7500 Series
119-4146-xx	E and H Near-field Probes for EMI troubleshooting

### Recommended Accessories

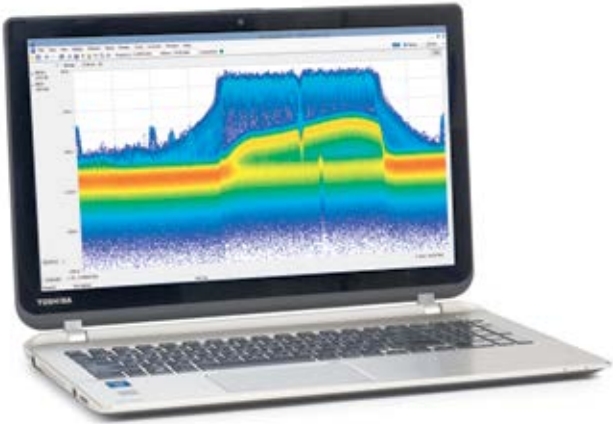
065-0924-xx	Additional Removable Hard Drive. Windows 7 and instrument SW preinstalled.
016-2026-xx	Transit Case
RSA56KR	Rackmount Retrofit Kit
071-3064-xx	Additional Quick Start User Manual (Paper)

### Ships with Product

- Quick Start Manual (Printed), Application Guide (Printed), Printable Online Help File (on CD), Programmer's manual (on CD), power cord, BNC-N adapter, USB Keyboard, USB Mouse, Front Cover, 3-year Warranty.

### Recommended Service

R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R5DW	Repair Service Coverage 5 Years



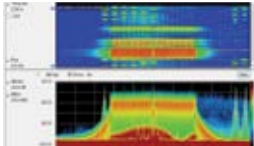
## SignalVu-PC

SignalVu-PC vector signal analysis software helps you easily validate wideband designs. Using the signal analysis engine of the RSA5000/6000 Series on your computer or Windows tablet, you can now move your analysis of acquisitions off the instrument, and anywhere. SignalVu-PC directly controls the RSA306 USB Spectrum Analyzer or the MDO4000B Mixed Domain Oscilloscope RF acquisition, enabling powerful measurements for spectrum analysis, vector signal analysis, pulse measurements, commercial wireless standards, and more. Whether your design validation needs include wideband radar, high data rate satellite links, wireless LAN or frequency-hopping communications, SignalVu-PC vector signal analysis software can speed your time-to-insight by showing you the time-variant behavior of these wideband signals.

Model	SFDR at 110 MHz BW (typical)
Opt SVM	General Purpose Vector Signal Analysis
Opt SVP	Pulse Measurement Suite
Opt SVA	AM/FM/PM/Direct Audio Analysis
Opt SVT	Settling Time (Frequency and Phase) Measurement
Opt SVO	Flexible OFDM Analysis
Opt SV23	WLAN 802.11a/b/g/j/p measurement application
Opt SV24	WLAN 802.11n measurement application
Opt SV25	WLAN 802.11ac measurement application
Opt SV26	APCO P25 measurement application
Opt SV27	Bluetooth Basic LE TX SIG measurements
Opt CON	SignalVu-PC live link to MDO4000B Series
Opt MAP	Mapping and Signal Strength

### Product Highlights

- Extensive time-correlated, multi-domain displays connect problems in time, frequency, phase, and amplitude for quicker understanding of cause and effect when troubleshooting.
- Power measurements and signal statistics help you characterize components and systems: ACLR, Multicarrier ACLR, Power vs. Time, CCDF, and OBW/EBW.
- PC-based multi-domain vector signal analysis for waveforms acquired by Tektronix real-time signal analyzers and oscilloscopes.



DPX Spectrum



Mapping and Signal Geolocation



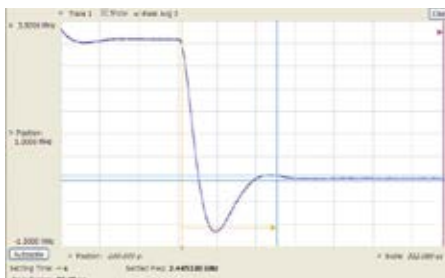
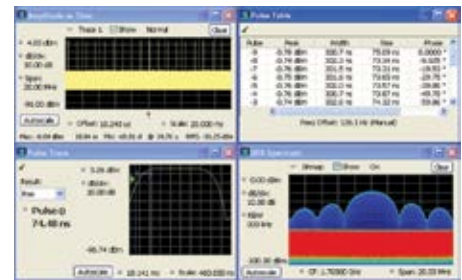
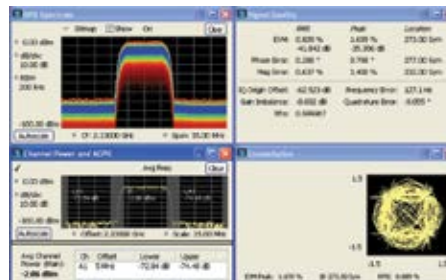
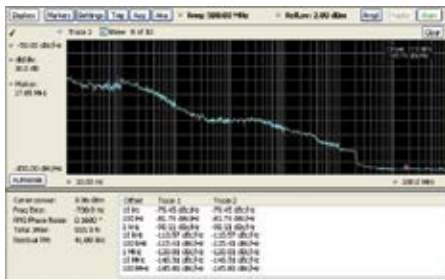
Bluetooth Signal Analysis

### Free Download

- Free download available on Tek.com: [www.tek.com/model/rsa306-software](http://www.tek.com/model/rsa306-software)

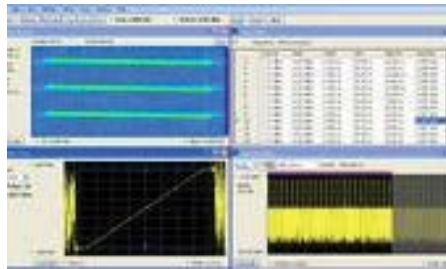
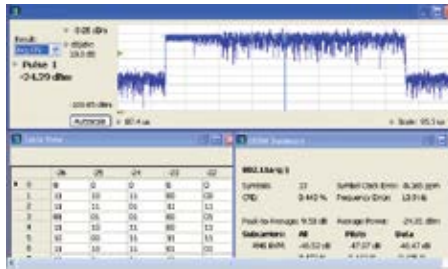


## Spectrum Analyzers RSA5000/6000 Series

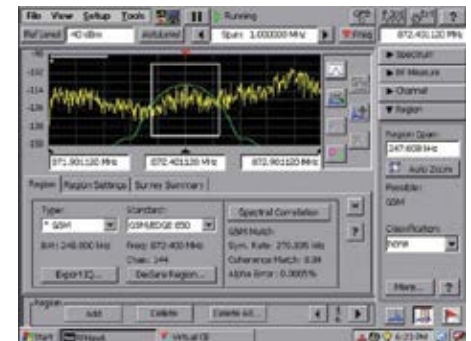
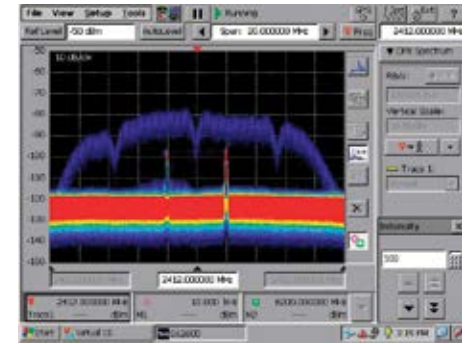




## Spectrum Analyzers RSA5000/6000 Series



## H500/SA2500 Series







# RF Power Meters

Tektronix PSM Power Meter Series delivers the precision accuracy you need and the features you want, including exceptional temperature stability and throughput. Plus, with 13 models to choose from, it also delivers exceptional versatility.



	PSM3000	PSM4000	PSM5000
Description	Power Meter Average Power	Power Meter Average / Peak / Pulse	Power Meter Average / Peak / Pulse + Profiling
Frequency Range	10 MHz - 8 / 18 / 26.5 GHz	10 MHz - 8 / 18.6 / 20 GHz	50 MHz - 8 / 18.6 / 20 GHz
Dynamic Range	-55 to +20 dBm	-60 to +20 dBm	-60 to +20 dBm
Data Transfer Rate	2000 Reads/sec	2000 Reads/sec	2000 Reads/sec
Measurements	True Average Power; Duty Cycle Corrected Pulse Power; Measurement Logging	Average Power (CW); Duty Cycle Corrected Pulse Power; Peak Power; Duty Cycle; Peak and Average Burst Power; Measurement Logging	Average Power (CW); Duty Cycle Corrected Pulse Power; Peak Power; Pulse Power; Duty Cycle; Peak and Average Burst Power; Measurement Logging; Pulse Width, Rise/Fall, Overshoot, Droop, Time Gated Measurements, Pulse Waveform Display with Markers

## Choosing Your RF Power Meter

Power measurements are fundamental to the development cycle of any RF or microwave product, from radios to radars. To help you choose the right Power Sensor/Meter combination, the most common selection criteria are listed below, along with helpful tips for determining your requirements.

### 1 Measurement Integrity

Measurement integrity is a combination of the cumulative measurement uncertainty and instrument stability. While the measurement uncertainty is usually specified, the instrument stability includes several factors. By providing calibration over the entire temperature operating ranges and not requiring zeroing prior to measurement, the improved stability of the power sensor/meter reduces possible human errors and assures the integrity of measured results.

### 2 Performance and Functionality

Basic power measurements of continuous wave (CW) signals are fundamental to power sensor/meters. However, today's modern signals include modulation, pulses, or other time-varying attributes. Being able to correct for duty cycle, measure peak power, signal statistics, and trigger inputs and outputs increases the utility of the power sensor/meter combination.

### 3 Speed and Connectivity

Power measurements tend to dominate the test process of wireless device test. The speed of measurement should remain constant over the entire dynamic range of the sensor. USB connectivity and power enable high speed measurement throughput and help reduce system rack space.

### 4 Analysis

When integrating power measurements into a full system measurement process, you should review the available analysis software and hardware capabilities to determine if equipment redundancies can be eliminated. Advanced measurement analysis, like trend graphing, statistical measurements, measurement logging, and pulse profiling can replace more complex and expensive equipment needs and simplify device test.



### Product Highlights

- 8 GHz, 18 GHz, 20 GHz, and 26.5 GHz models
- Models available with N and 3.5 mm connectors
- Dynamic range as low as -60 dBm and as high as +20 dBm
- Uncertainty as low as 2.6%
- Reading rates up to 2000 readings/sec

## PSM3000, 4000 and 5000 Series

The PSM3000, PSM4000, and PSM5000 Series are compact power sensors/meters that deliver fast, accurate RF and microwave power measurements. A broad range of CW and pulse modulation measurements are available, depending on the series you choose.

Models	Description	Frequency Range	Dynamic Range	Connector Style
PSM3110	True RMS Average	10 MHz - 8 GHz	-55 to +20 dBm	3.5mm male
PSM3120	True RMS Average	10 MHz - 8 GHz	-55 to +20 dBm	N-Male
PSM3310	True RMS Average	10 MHz - 18 GHz	-55 to +20 dBm	3.5mm male
PSM3320	True RMS Average	10 MHz - 18 GHz	-55 to +20 dBm	N-Male
PSM3510	True RMS Average	10 MHz - 26.5 GHz	-55 to +20 dBm	3.5mm male
PSM4110	Power Meter (Avg / Peak / Pulse)	10 MHz - 8 GHz	-60 to +20 dBm	3.5mm male
PSM4120	Power Meter (Avg / Peak / Pulse)	10 MHz - 8 GHz	-60 to +20 dBm	N-Male
PSM4320	Power Meter (Avg / Peak / Pulse)	50 MHz - 18.6 GHz	-40 to +20 dBm	N-Male
PSM4410	Power Meter (Avg / Peak / Pulse)	50 MHz - 20 GHz	-40 to +20 dBm	3.5mm male
PSM5110	Power Meter (Avg / Peak / Pulse + Profiling)	100 MHz - 8 GHz	-60 to +20 dBm	3.5mm male
PSM5120	Power Meter (Avg / Peak / Pulse + Profiling)	100 MHz - 8 GHz	-60 to +20 dBm	N-Male
PSM5320	Power Meter (Avg / Peak / Pulse + Profiling)	50 MHz - 18.6 GHz	-40 to +20 dBm	N-Male
PSM5410	Power Meter (Avg / Peak / Pulse + Profiling)	50 MHz - 20 GHz	-40 to +20 dBm	3.5mm male

### Recommended Accessories

174-6150-xx	USB Cable, 2 m, 20 AWG
174-6164-xx	SMB Female to BNC Male, 1 m Trigger Cable
348-2013-xx	Replacement Rubber Boot

### Recommended Service

SILV200	5-year Extended Warranty (PSM3110, PSM3120)
SILV400	5-year Extended Warranty (PSM3310, PSM3320)
SILV600	5-year Extended Warranty (PSM3510)

### Ships with Product

- 2-meter USB Cable
- Calibration Certificate, USB flash drive with User and Safety Manual, Technical Reference Manual and the Programmer Manual
- 3-year Warranty



# Coherent Optical Solutions

## Characterization of signals at 100 Gb/s, 400 Gb/s, and beyond

As network demands increase, long-haul communications are becoming more complex. Advanced test tools are required to test the latest communication systems for 100G, 400G, 1Tb/s and beyond. Tektronix is the only test and measurement vendor that can offer a complete coherent optical test system from signal generation to modulation, acquisition, and analysis.



	OM5110 46GBaud Multi-Format Optical Transmitter	OM4225 Optical Modulation Analyzer	OM4245 Optical Modulation Analyzer	OM2210 Coherent Receiver Calibration Source	OM2012 Tunable Laser Source
Bandwidth	23 GHz	25 GHz	45 GHz	N/A	N/A
Band Options	C or L	C or C+L	C or C+L	C, L, or C+L	C, L, or C+L
Description	Coherent optical transmitter capable of modulating binary and multi-level signals	Optical modulation analyzer compatible with both real-time and equivalent time oscilloscopes	Optical modulation analyzer compatible with both real-time and equivalent time oscilloscopes	Measures key performance parameters for receiver calibration	Low-noise, single-mode tunable laser source

## Choosing your Optical Modulation Analyzer

Tektronix Optical Modulation Analyzer solutions enable efficient and accurate characterization of serial communications in fiber at 100 Gb/s and beyond. With coherent optical modulation analysis capabilities, Tektronix provides the acquisition and display of constellation diagrams, Q plots, polarization analysis, and source laser stability to better understand fiber-based signal quality. The Tektronix Optical Modulation Analyzer series are tightly coupled with the DPO70000SX performance oscilloscopes series to enable comprehensive analysis and presentation of your data, so you're no longer in the dark.

### 1 Receiver Bandwidth

Receiver bandwidth determines the maximum baud rate that can be accurately measured by the optical modulation analyzer (OMA). A receiver bandwidth of 25GHz can accurately measure signals up to 40GBaud. Using the 45Hz OMA, signals as high as 80GBaud can be measured.

### 2 Frequency Band

100G communications typically occur in the C-band, however L-band is also supported. The Tektronix coherent optical products support testing in C-band, L-band, or both. Accompanying coherent receiver calibration sources also support flexible choices of frequency band.

### 3 Homodyne or Heterodyne Measurements

Homodyne measurements can often be conducted with equivalent-time oscilloscopes offering superior oscilloscope bandwidth and very low noise. When used in this mode and externally referenced local oscillator is required (option EXT). Heterodyne measurements do not require an external local oscillator and can utilize the high sample rate offered by real-time oscilloscopes.



## Product Highlights

- Measure key performance parameters for coherent receivers such as quadrature phase angle, path gains, and channel skew.
- Obtain calibration data over wavelength for use in calibrated optical field measurements.
- Calibrate any sufficiently stable coherent receiver to make it capable of optical field measurements.
- Measure receiver hybrid parameters at any heterodyne frequency within the oscilloscope bandwidth.
- Measure optical hybrid properties in higher-level receiver modules.

## OM2210 Coherent Receiver Calibration Source

The OM2210 Coherent Receiver Calibration Source includes the capability and software needed for coherent optical receiver calibration. Equipped with two independent free-running lasers and a precision polarization switch, the OM2210 is able to excite the coherent receiver with a known-polarization signal so that the receiver's linear transfer function can be extracted.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Optical Output Power Adjustment Range (BOL set points)	PcwBOL	+7	--	+13.5	dBm
Operating Frequency Range (50 GHz channel spacing on ITU grid)	$\nu$ (C-band)	196.25	--	191.50	THz
	$\nu$ (L-band)	190.95	--	186.35	nm
Operating Wavelength Range (50 GHz channel spacing on ITU grid)	$\lambda$ (C-band)	1527.60	--	1565.50	nm
	$\lambda$ (L-band)	1570.01	--	1608.76	nm
Wavelength Accuracy EOL	$\Delta\lambda_{acc}$	--	--	$\pm 2.5$	GHz
Linewidth [FWHM (–3 dB), instantaneous]	$\Delta\lambda$	--	--	100	kHz
Side Mode Suppression Ratio	SMSR	40	55	--	dB
Polarization Extinction Ratio (Unconnectorized)	Er, p	20	--	--	dB

### Instrument Options

Opt. C	Single C-band laser with polarization switch
Opt. L	Single L-band laser with polarization switch
Opt. CC	Dual C-band lasers with polarization switch
Opt. LL	Dual L-band lasers with polarization switch
Opt. CL	Coupled C- and L-band lasers with polarization switch
Opt. NL	No lasers, polarization switch only

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Coherent Receiver Calibration Source. Contains the laser source(s), polarization switch, optical power meter, power splitter, hardware control drivers, and calibration software needed for optical receiver characterization. It is used together with the OM4000 or OM1106 products to provide calibrated optical signal measurements.





## Product Highlights

- Supports both real-time and equivalent-time oscilloscopes for the greatest system flexibility.
- Complete system for polarization-multiplexed QPSK, offset QPSK, QAM, differential BPSK/QPSK, and other advanced modulation formats.
- Displays constellation diagrams, phase eye diagrams, Q-factor, Q-plots, spectral plots, Poincaré sphere, signal vs. time, laser phase characteristics, BER, with additional plots and analyses available through the MATLAB interface
- Supports automated testing of multi-carrier “superchannels” with a user-definable number of carriers, carrier spacing, and modulation formats.
- User access to internal functions and full extensibility with a direct MATLAB interface
- Coherent Optical Modulation Analysis software available with the OM4000 Series instruments or standalone via OM1106



## OM4000 Coherent Lightwave Signal Analyzer

OM4245 Coherent Lightwave Signal Analyzer, tightly integrated with the DPO70000SX Series Oscilloscopes, uses coherent detection to acquire fiber signals carrying up to 80GBaud per wavelength, then analyzes both modulation and source properties using the power of optical-industry tested DSP, presenting a rich library of results and graphical plots with the ease of use offered by a dedicated graphical user interface.

Model	Option	Description	C-band Lasers Included	L-band Lasers Included	Wavelength Range
OM4225	CC	25 GHz Optical Modulation Analyzer, C-band	2	0	1527.6 nm to 1567.5 nm
OM4225	CL	25 GHz Optical Modulation Analyzer, C-band + L-band	1	1	1527.6 to 1609.6 nm
OM4245	CC	45 GHz Optical Modulation Analyzer, C-band	2	0	1527.6 nm to 1567.5 nm
OM4245	CL	45 GHz Optical Modulation Analyzer, C-band + L-band	1	1	1527.6 to 1609.6 nm
OM1106	--	Coherent Optical Modulation Analysis software (included with OM4000-Series instruments)	--	--	--

## Recommended Accessories

Configuration Recommendations	Receiver Bandwidth	Receiver Options	Receiver Bandwidth	Recommended Scope Model	Scope Bandwidth
Real-time Systems	OM4225	Recommended: Opt. CC, MCS, QAM	25 GHz	DPO73304SX	33 GHz
	OM4245	Recommended: Opt. CC, MCS, QAM	45 GHz	DPS77004SX	70 GHz
Equivalent-time Systems	OM4225	Recommended: Opt. CC, MCS, QAM Required: Opt. EXT	25 GHz	DSA8300 with Opt. ADVTRIG and 2 each 80E07	30 GHz
	OM4245	Recommended Opt. CC, MCS, QAM Required: Opt. EXT	45 GHz	DSA8300 with Opt. ADVTRIG and 2 each 80E09	60 GHz



### Product Highlights

- Multi-format optical transmitter supports modulation of formats such as BPSK, PM-QPSK, and PM-16QAM.
- Excellent linearity supports modulation of multi-level signals.
- Modulates single or dual-polarization signals.
- Built-in C or L-band lasers for setup convenience.
- Supports external laser sources.
- Supports manual and automatic bias control of amplifiers and modulator.
- All setup and operation controlled remotely via Ethernet.

## OM5110 46GBd Multi-Format Optical Transmitter

The OM5110 Multi-format Optical Transmitter provides the flexibility to modulate all of the most common coherent optical formats at rates up to 46GBaud. The OM5110 Multi-Format Optical Transmitter is a C-and L-Band dual polarization transmitter capable of modulating the most common coherent optical modulation formats such as PM-QPSK and PM-16QAM.

Model	Description	Maximum Baud Rate	Modulator Bandwidth, 6dB	Supported Modulation Formats
OM5110	46GBaud Multi-Format Optical Transmitter	34GBaud: multi-level formats 46GBaud: binary formats	30 GHz	BPSK, PM-BPSK, QPSK, PM-QPSK, QAM, PM-QAM

### Recommended Service

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R3	Repair Service 3 Years
Opt. R5	Repair Service 5 Years

### Instrument Options

Opt. C	Built-in C-band laser
Opt. L	Built-in L-band laser
Opt. NL	No built-in lasers. Requires external laser source



## Long-haul Communications Solutions

From I & Q signal generation and coherent optical modulation to coherent optical detection, acquisition, and analysis, Tektronix offers a complete suite of instruments to test the latest developments in long-haul communications such as PM-QPSK and PM-16QAM.

Function	Model	Description
Signal Generation	AWG70001A	Arbitrary Waveform Generator
	PPG3204	Programmable Pattern Generator
Optical Modulation	OM5110	Multi-Format Optical Transmitter
Coherent Detection	OM4245	Coherent Lightwave Signal Analyzer
Signal Acquisition	DPO70000SX	Digital Phosphor Oscilloscope



# SourceMeter® SMU Instruments

Keithley Instruments SourceMeter® SMU instruments source current or voltage and simultaneously measure current, voltage and resistance with high speed and accuracy. SourceMeter® SMU instruments offer a smart alternative to separate power supplies and DMMs, saving money and limited test bench space.



	Model 2450/2460 Touchscreen SourceMeter® Instruments	Series 2400 Bench SourceMeter® SMU Instruments	Series 2600B System SourceMeter® SMU Instruments	2650A High Power System SourceMeter® SMU Instruments
Channels	1	1	1-2 (optional expansion to 64 via TSP-Link®)	1 (optional expansion to 32 via TSP-Link®)
Accuracy	6½-digit measurements	6½-digit measurements	6½-digit measurements	6½-digit measurements
Max. Readings / Second	3,000	2,000	20,000	38,500 1µSec/pt., 18-bit digitizer
Interface	GPIO, USB 2.0, LXI/Ethernet, Digital I/O	GPIO, RS-232, Digital I/O	GPIO, LAN (LXI), USB, RS-232, Digital I/O	GPIO, LAN (LXI), RS-232, Digital I/O
Application Features	Capabilities of analyzers, curve tracers, and I-V systems at a fraction of their cost; touchscreen and icon menu system; built-in graphing	Convenient DMM-like user interface; 2/4/6 wire resistance with force I or V source modes, V-Force from 1ΩV to 1.1KV, 10pA to 5A cont., 10A pulsed, 2W to 110W	True multi-channel parallel test via TSP-Link. Up to 0.1 fA resolution.	2 pairs of A/D converters for simultaneous V and I measurement; up to 2000W pulsed power
Test Sequencing / Scripting	TSP® (Test Script Processing) technology embeds complete test programs inside the instrument for unmatched system-level speed	Built-In ramp generator and list sweep modes, 100 point global machine state sequencer for fast test setup and execution	TSP® (Test Script Processing) technology embeds complete test programs inside the instrument for unmatched system-level speed	TSP® (Test Script Processing) technology embeds complete test programs inside the instrument for unmatched system-level speed
Software	Test Script Builder and KickStart Startup Software, LabVIEW and IV Drivers.	LabTracer 2.0 I-V curve utility and IVI and LabVIEW drivers included.	Built-in, web browser-based characterization software, IVI, LabVIEW, and IC-CAP drivers.	Built-in, web browser-based characterization software, IVI, LabVIEW, and IC-CAP drivers.

## Choosing Your Source Measure Unit (SMU) Instrument

A SMU instrument integrates precision power supply and digital multimeter (DMM) capabilities in one instrument while covering a wide dynamic range. SMUs source and measure simultaneously, making them ideal for characterizing and testing semiconductors and other non-linear devices and materials.

### 1 System-Level Speed or Throughput

The true measure of speed is how quickly a final measurement or set of measurements (such as a suite of current vs. voltage parameters) is returned to the PC controller. This involves not only the number of readings/second, but also range and function change times.

### 2 Sourcing Resolution and Output Stability

An SMU's usable maximum resolution depends on its overall accuracy and the resolution of its analog-to-digital converter (ADC). In general, the higher the resolution is, the higher the bit count on the ADC and the higher the accuracy will be.

### 3 Measurement Settling Time, Offset Error, and Noise

When choosing between instruments, compare the time it takes a SMU to settle the specified offset error. This can be seen in the “bumpiness” of the resulting data curve, which indicates measurement noise; the smoother the data curve the less measurement noise. SMUs having a fast, flat, and noise-free settling time achieve more consistent results during a series of measurements taken over time.

### 4 Cabling

Triaxial cables offer significant advantages over coaxial cables when making low current measurements. Triaxial cables have an extra shield that ensures lower leakage, better response, and greater noise immunity.



## Model 2450/2460 Advanced Touchscreen SourceMeter® SMU Instruments

Touch, Test, Invent® with the intuitively smart, interactive SMU Instruments. The Models 2450 and 2460 SMU Instruments are innovative, compact I-V solutions that offer the capabilities of I-V systems, curve tracers, and semiconductor analyzers at a fraction of their cost. With the intuitive touchscreen and icon-based control that novice SMU users can appreciate and the exceptional versatility that experienced users need, the Models 2450 and 2460 enable users to learn faster, work smarter, and invent easier. Their user experience, performance, and application versatility, combined with proven Keithley precision and accuracy, will make the 2450 and 2460 the favorite go-to instruments in the lab for years to come.

### A Smart Toolkit Beyond the Touchscreen

Speed, ease of use, and learnability don't stop with the 2450 and 2460 advanced touchscreen. Each instrument's front panel features a context-sensitive HELP system, rotary navigation/control knob, front/rear input selector button, and banana jacks for basic bench applications. A USB 2.0 memory I/O port makes it easy to store data, save instrumentation configurations, load test scripts, and upgrade the system.

### Product Highlights

- Highly flexible, source and sink (four-quadrant) operation simultaneously measures voltage, current, and resistance in a single, integrated I-V instrument
- Advanced, five-inch touchscreen user interface with multi-point, pan-pinch-zoom-swipe operation minimizes the learning curve and improves productivity
- Graphical interface provides I-V curve tracing functionality for much less than the cost of traditional curve tracers
- Lower current and voltage measurements ranges (100nA, 10nA, 20mV) reduce need for additional expensive low level instruments (Model 2450)
- High current and high power ranges (7A, 100W) for characterizing and testing high power materials and devices (Model 2460)
- Front panel banana jack inputs and rear panel connections (triaxial connectors on 2450, mass terminated screw terminal on 2460) optimize signal integrity and convenience and save money on adapter accessories
- PC-based instrument and control software enable instrument control without programming hassles
- Four programming modes provide unmatched programming flexibility and system integration



Home page advanced source and measure display enables faster speed to answer.



Icon-based, flat menu system can reduce configuration steps by 50% and eliminates cumbersome, multi-layer menu structures.

The Models 2450 and 2460 are ideal for I-V functional test and characterization of a wide range of today's modern devices, including:

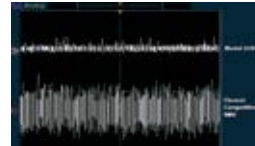
- Low and High Power Semiconductors
- LEDs, High Brightness LEDs
- Solar Cells, Solar Panels
- Nanomaterials and Devices
- Graphene
- Printed/Flexible Electronics
- Batteries/Electrochemistry
- Sensors
- Biotechnology



## Model 2450/2460 Advanced Touchscreen SourceMeter® SMU Instruments

### Trusted Precision, Accuracy, and Performance

The 2450 and 2460 are based on the trusted analog performance of Keithley's Model 2400 SourceMeter SMU Instruments and offer a highly flexible, four-quadrant voltage and current source/load coupled with precision voltage and current meters. These fourth-generation members of Keithley's award-winning SMU family provide the superior precision, resolution, accuracy, and dependability that users have come to expect from Keithley SMU instruments.



With significantly lower wideband noise than its closest competitor, the 2450 is the perfect solution for I-V testing of next-generation devices.

### Ships with Product

- 8608 High Performance Test Leads
- 2460-KIT Rear Panel Mating Mass Terminated Screw Connector (Model 2460 ONLY)
- USB-B-1 USB Cable, Type A to Type B, 1m (3.3 ft)
- CS-1616-3 Safety Interlock Mating Connector
- CA-180-3A TSP-Link®/Ethernet Cable
- Documentation CD
- QuickStart Guide
- Test Script Builder Software (available at [www.keithley.com](http://www.keithley.com))
- KickStart Startup Software (available at [www.keithley.com](http://www.keithley.com))
- LabVIEW® and IVI Drivers (available at [www.keithley.com](http://www.keithley.com))

Model	Current Max / Min	Voltage Max / Min	Power
2450	1.000000A / 10.00000nA	200.0000V / 20.00000mV	20W
2450-NFP (with No Front Panel)			
2450-RACK (without Handle)			
2450-NFP (with No Front Panel or Handle)			
2460	7.000000A / 1.000000μA	100.0000V / 200.0000mV	100W
2460-NFP (with No Front Panel)			
2460-RACK (without Handle)			
2460-NFP (with No Front Panel or Handle)			

### Recommended Service

#### 2450

2450-3Y-EW	1-year factory warranty extended to 3 years from date of shipment
2450-5Y-EW	1-year factory warranty extended to 5 years from date of shipment
C/2450-3Y-17025	KeithleyCare® 3-year ISO 17025 Calibration Plan
C/2450-3Y-DATA	KeithleyCare® 3-year Calibration w/Data Plan
C/2450-3Y-STD	KeithleyCare® 3-year Std. Calibration Plan
C/2450-5Y-17025	KeithleyCare® 5-year ISO 17025 Calibration Plan
C/2450-5Y-DATA	KeithleyCare® 5-year Calibration w/Data Plan
C/2450-5Y-STD	KeithleyCare® 5-year Std. Calibration Plan

### Recommended Service

#### 2460

2460-3Y-EW	1-year factory warranty extended to 3 years from date of shipment
2460-5Y-EW	1-year factory warranty extended to 5 years from date of shipment
C/2460-3Y-17025	KeithleyCare® 3-year ISO 17025 Calibration Plan
C/2460-3Y-DATA	KeithleyCare® 3-year Calibration w/Data Plan
C/2460-3Y-STD	KeithleyCare® 3-year Std. Calibration Plan
C/2460-5Y-17025	KeithleyCare® 5-year ISO 17025 Calibration Plan
C/2460-5Y-DATA	KeithleyCare® 5-year Calibration w/Data Plan
C/2460-5Y-STD	KeithleyCare® 5-year Std. Calibration Plan



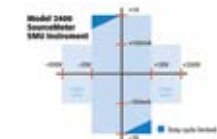


## Series 2400 SourceMeter® SMU Instruments

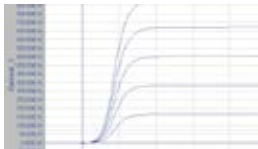
Series 2400 SourceMeter® SMU instruments are single-channel models with I-V capability from 1100V to 100nV and 10.5A pulse to 1pA. They offer a smart alternative to separate power supplies and digital multimeters (DMMs) and provide a convenient DMM-like user interface.

### Product Highlights

- Wide I-V range from 1100V to 100nV and 10.5A pulse to 1pA
- 4-quadrant design simultaneously measures voltage, current, and resistance
- Remote sense on V-source and measure plus guarded ohms mode
- Built-In test sequencer
- Includes LabTracer 2.0 I-V curve utility and IVI and LabVIEW drivers
- Standard GPIB and RS-232 interfaces; Banana (front / rear) Connectors



Model 2400 four-quadrant operation characteristics, a feature of all SourceMeter SMU instruments.



Free LabTracer2 software for remote control and data sharing for applications ranging from the simple to complex.

Model	Current Max / Min	Voltage Max / Min	Power
2400 / 2401	1.05A / 10pA	200V/1μV (20V 2401)	20W
2410	1.05A / 10pA	1100V/1μV	20W
2440	5.25A / 100pA	40V/1μV	50W
2420 / 2425	3.15A / 100pA	Up to 100V/1μV	60W/100W
2430	10.5A pulse / 100pA	100V/1μV	1000W

### Recommended Accessories

C/2400-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2400\*

C/2401-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Model 2401\*

C/2410-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2410\*

C/2420-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2420\*

C/2425-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2425\*

C/2430-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2430\*

C/2440-3Y-17025 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2440\*

\*Not available in all countries.

### Ships with Product

- Model 8605 Test Leads
- LabVIEW Software Driver (downloadable)
- LabTracer Software (downloadable)
- Calibration Certificate (Basic)
- Manual CD
- Power Cord
- Warranty



## Series 2600B System SourceMeter® SMU Instruments

Series 2600B SourceMeter® SMU instruments are the industry's most powerful, fastest, and highest resolution SMU instruments. Now they're easier than ever to use with USB 2.0 connectivity, Model 2400 software emulation, and Java-based plug & play test software. Series 2600B models offer the industry's widest dynamic range: 10A pulse to 0.1fA and 200V to 100nV.

### Product Highlights

- 4-quadrant design simultaneously sources and measures voltage, current, and resistance
- TSP® (embedded Test Script Processor) architecture enables industry-best system-level speed
- TSP-Link® for true SMU-per-pin and parallel test
- Built-in software for quick and easy I-V test through web browser
- GPIB, LAN (LXI), USB and RS-232



Built-in, Java-based test software runs directly from any web browser to boost productivity.



TSP technology executes complete test programs from the 2600B's non-volatile memory.

Model	Current Max / Min	Voltage Max / Min	Max Readings / Sec	No. of Channels
2601B	3A DC, 10A pulse/100 fA	40V/100nV	20,000	1
2602B	3A DC, 10A pulse/100 fA		20,000	2
2604B	3A DC, 10A pulse/100 fA		20,000	2
2611B	1.5A DC, 10A pulse/100 fA	200V/100nV	20,000	1
2612B	1.5A DC, 10A pulse/100 fA		20,000	2
2614B	1.5A DC, 10A pulse/100 fA		20,000	2
2634B	1.5A DC, 10A pulse/1fA		20,000	2
2635B	1.5A DC, 10A pulse/0.1 fA		20,000	1
2636B	1.5A DC, 10A pulse/0.1 fA		20,000	2

### Recommended Accessories

2600-BAN	Banana Test Leads Adapter
8606	Probe Kit for 2600-BAN
2600-Std-Res	Calibration Standard 1G ohm Resistor

### Recommended Service

26XXB-3Y-EW_	3-Year KeithleyCare Gold Plan
26XXB-5Y-EW_	5-Year KeithleyCare Gold Plan
C/26xxB-3Y-XXXX	Calibration Service 3 Years (17025 or DATA or STD)
C/26xxB-5Y-XXXX	Calibration Service 5 Years (17025 or DATA or STD)

### Ships with Product

- Operators and Programming Manuals
- 2600-ALG-2: Low Noise Triax Cable with Alligator Clips, 2m (6.6 ft.) (two supplied with 2634B and 2636B, one with 2635B)
- 2600-Kit: Mating Screw Terminal Connectors with strain relief and covers (2601B/2602B/2604B/2611B/2612B/2614B)
- CA-180-3A: TSP-Link/Ethernet Cable (two per unit)
- TSP Express Software Tool (embedded)
- Test Script Builder Software (downloadable)
- LabVIEW Driver (downloadable)
- ACS Basic Edition Software (optional)

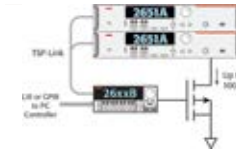


## 2650A High Power System SourceMeter® SMU Instruments

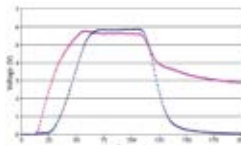
The high current Model 2651A and high voltage Model 2657A High Power System SourceMeter SMU instruments address such applications as testing power semiconductor devices, including diodes, FETs, and IGBTs, as well as characterizing newer materials such as gallium nitride, silicon carbide, and other compound semiconductor materials or devices.

### Product Highlights

- Source and measure up to 3kV or 50A pulse, with best-in-class low current resolution
- Up to 2000W pulse or 200W DC power per instrument
- Optimized for characterizing and testing high power semiconductors, electronics, and materials



TSP and TSP-Link technology enables SMU-per-pin parallel testing without the channel limits of a mainframe-based system.



The dual digitizing A/D converters sample at up to 1μs/point, enabling full simultaneous characterization of both current and voltage waveforms.

Model	Power Characteristics	4 Quadrant Source or Sink Capabilities	Resolution	Applications
2651A	Up to 50A (or 100A with 2 units) and up to 2000W pulse / 200W DC power	Up to ±40V and ±50A	100fA/1μV resolution	High Current, High Power Device Testing
2657A	Up to 3,000V and up to 180W of power	Up to 3000V @ 20mA or 1500V @ 120mA	1fA/100μV resolution	High Voltage, High Power, Low Current Device Testing

### Recommended Accessories

2600-KIT	Low Impedance Cable Assemble, 1m (3.3 ft)
ACS-BA-SIC	Component Characterization Software
4299-6	Rack Mount Kit
8011	Test Socket Kit
8010	High Power Device Test Fixture (Model 2657A)
8020	High Power Interface Panel
2657A-LIM-3	Low Interconnect Module (Model 2657A)
2657A-PM-200	200V Protection Module (Model 2657A)
SHV-CA-553-2	High Voltage Triax to SHV Cable (1, 2, 3m) (Model 2657A)
HV-CA-554-2	High Voltage Triax to Triax Cable (0.5, 1, 2, 3m) (Model 2657A)
HV-CA-571-3	High Voltage Triax to Unterminated Cable (Model 2657A)
HV-CS-1613	High Voltage Triax Feedthrough Connector (Model 2657A)

### Recommended Service

2651A-3Y-EW	3-Year KeithleyCare Gold Plan
2657A-3Y-EW	3-Year KeithleyCare Gold Plan
C/2651A-3Y-STD	KeithleyCare 3-Yr Std Cal Plan
C/2657A-3Y-STD	KeithleyCare 3-Yr Std Cal Plan
C/2651A-5Y-STD	KeithleyCare 5-Yr Std Cal Plan
C/2657A-5Y-STD	KeithleyCare 5-Yr Std Cal Plan

### Ships with Product

- 7709-308A Digital I/O and Interlock Connector
- CA-180-3A TSP-Link/Ethernet Cable
- Documentation CD
- Software Tools and Drivers CD
- 2651A-KIT-1A: Low Impedance Cable Assembly (1m) (Model 2651)
- CS-1592-2: High Current Phoenix Connector (male) (Model 2651)
- CS-1626-2: High Current Phoenix Connector (female) (Model 2651)
- CA-557-1: Sense Line Cable Assembly (1m) (Model 2651)



# Power Analyzers

Fully characterize your power-electronics design from input to output with Tektronix power analyzers. Designed for precision measurement of power-electronics circuits and devices, these analyzers give you what you need to measure conversion efficiency and perform compliance testing on single-phase or 3-phase devices.



	PA4000 Multi-Channel	PA1000 Single-Phase
Multi-Channel Power Analyzer	PA4000_1CH, PA4000_2CH, PA4000_3CH, PA4000_4CH	PA1000
Power Input Modules	1 – 4 (factory configured)	1
Basic Accuracy (V & I)	0.01% of reading + 0.04% of range (45-850 Hz)	0.05% of reading + 0.05% of range
Measurement Bandwidth	DC, 0.1 Hz - 1 MHz	DC, 0.1 Hz - 1 MHz
Voltage Range	2V peak to 2000V peak	10V peak to 1000V peak
Current Range (internal shunts)	0.00025 A to 30 A RMS	0.0002 A to 20A RMS

## Choosing Your Power Analyzer

Power analyzers are used for testing a wide range of power-electronics devices, from cell-phone chargers to 1000kW grid-connected inverters. To help you choose the best analyzer for your application, consider the criteria below.

### 1 Number of Inputs

Power analyzers are available in both fixed configurations (typically single-channel) and modular configurations. If your application is limited to single-phase devices, a single-channel analyzer may meet your needs. But if you need to measure conversion efficiency on these devices, a two-channel analyzer is required.

Testing of 3-phase devices of course requires a multi-phase analyzer. In many cases, two channels will be all you need for a two-wattmeter measurement on 3-wire inputs or outputs. A four-channel analyzer can measure both input and output simultaneously, to determine conversion efficiency.

### 2 Measurement Bandwidth

How much bandwidth is enough? The measurement bandwidth you need is usually determined by the switching speed of the device-under-test, or the highest-order harmonic that you are testing requires. Switching speeds of tens or hundreds of kHz are common in today's designs. But new semiconductor technologies promise to increase speeds up to 2x or more in the near future. Choose an analyzer that is capable of measuring your highest frequencies of interest, with some headroom for future-proofing.

### 3 Compliance Testing for Regulatory Standards

If your application requires you to know that your device is compliant with regulatory standards such as IEC61000 for

harmonics, or ENERGY STAR™ for energy efficiency, you need an analyzer capable of meeting the test requirements specified by the standard. Even better, look for an analyzer supported by software applications that can automate instrument setup and reporting of test results in the exact format required for your application.

### 4 Current Shunts: Internal or External?

Will you be measuring milliamperes or hundreds of amperes? Power analyzers vary in the features they offer for direct current inputs or connection to external current transducers. Ideally, the analyzer should have internal current shunts that allow you to connect your device directly, for best accuracy. If you will be testing a range of devices at different power levels, you may value both high- and low-range shunts. Finally, if your application requires external current transducers (usually required for current >30Amps), make sure there are transducers available that are well-matched to the analyzer and offer the accuracy you need.

### 5 Remote Communication

Will you have a need to control the analyzer remotely or transfer measurement data to your PC? If so, you will want to look for an instrument that features the communication ports you need. Depending on the analyzer model, some ports may be standard features or extra-cost options; be careful to choose the right instrument configuration that meets your requirements.



## PA1000 Power Analyzer

The Tektronix PA1000 is your best choice for making precision power measurements on single-phase power supplies and all types of products connected to the AC line. Whether you need to test for compliance with energy-usage regulations such as ENERGY STAR™, or simply need to characterize your product's overall power-conversion performance and efficiency, you will find the PA1000 offers the most modern and complete test solution with performance and features unmatched by other single-phase analyzers.

### Product Highlights

- 0.05% basic reading accuracy
- Dual shunts maximize accuracy for low and high current measurements
- USB, Ethernet and GPIB interfaces.
- PWRVIEW PC software for measurement and control. Includes IEC62301 Ed.2 standby power.
- Harmonics, Inrush and Energy (W-h) measurements.



Color display for 4 or 14 measurements and waveform, harmonics and energy trend graphics.



PWRVIEW PC software for measurement and control. Includes IEC62301 Ed.2 standby power measurement reporting.

Model	Description	Basic Accuracy (V & I)	Voltage Input Range	Current Range (internal shunts)
PA1000	PA1000 Single-Phase Power Analyzer	0.05% (45-850 Hz)	10V peak to 1000V peak	0.0002 A to 20A RMS

### Recommended Accessories

CL200	Current Clamp, 0.5A - 200A, for Tektronix Power Analyzers
CL1200	Current Clamp, 0.1A - 1000A, for Tektronix Power Analyzers
BAL-LAST-CT	Differential current transformer for lighting applications. 1A, 1MHz
BB1000-XX	Breakout Box simplifies connections to AC power cords. NA, EU and UK versions.
PA-LEADSET	Replacement Lead Set for Tektronix Power Analyzers (One Channel Lead Set)

### Recommended Service

C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Opt. C3)
D5	Calibration Data Report 5 Years (with Opt. C5)

### Ships with Product

- Lead Set
- User Manual
- AC Power Cord
- Certificate of Traceable Calibration
- 5-year Product Warranty

### Available for Free Download

- PWRVIEW PC Software for remote instrument setup, data transfer and offline analysis
- Application notes, whitepapers and videos at: [www.tek.com/application/power-measurement](http://www.tek.com/application/power-measurement)



BB1000-NA Breakout Box





## PA4000 Power Analyzers

Tektronix PA4000 Power Analyzers provide you with highly accurate power, energy and efficiency measurements. Precisely matched inputs and advanced signal processing deliver high measurement accuracy, even when power is distorted or noisy. The PA4000 performs all power measurements – and harmonics analysis, application-specific measurements, PC interfaces, and dual patent-pending Spiral Shunt™ current shunts per channel are all standard features. PWRVIEW for data transfer and PC analysis is available to download free from [tektronix.com](http://tektronix.com).

### Product Highlights

- 1 to 4 input modules with precision phase-matched V & I inputs, 1000 Vrms, 30 Arms direct input
- Measurement BW: DC to 1 MHz
- 0.01% basic accuracy
- Application specific test modes for Motor Drives, Ballasts, Standby Power and Energy Integration
- Harmonics measurement to 100th harmonic
- Full-color TFT display with waveform graphics, vector, bar chart, trend



Each input module features both high- and low-range current shunts.



USB, Ethernet and RS-232 ports are standard.

Model	Description	Basic Accuracy (V & I)	Voltage Input Range	Current Range (internal shunts)
PA4000 1CH	PA4000 Power Analyzer with 1 input module	0.01% (45-850 Hz)	2V peak to 2000V peak	0.00025 A to 30 Arms
PA4000 2CH	PA4000 Power Analyzer with 2 input modules	0.01% (45-850 Hz)	2V peak to 2000V peak	0.00025 A to 30 Arms
PA4000 3CH	PA4000 Power Analyzer with 3 input modules	0.01% (45-850 Hz)	2V peak to 2000V peak	0.00025 A to 30 Arms
PA4000 4CH	PA4000 Power Analyzer with 4 input modules	0.01% (45-850 Hz)	2V peak to 2000V peak	0.00025 A to 30 Arms

### Recommended Accessories

CT-60-S	Fixed-Core Current Transducer, High Accuracy, up to 60A
CT-200-S	Fixed-Core Current Transducer, High Accuracy, up to 200A
CT-400-S	Fixed-Core Current Transducer, High Accuracy, up to 400A
CT-1000-S	Fixed-Core Current Transducer, High Accuracy, up to 1000A (requires external power supply)
CT-100-M	Fixed-Core Current Transducer, Hall Effect, up to 100A
CT-200-M	Fixed-Core Current Transducer, Hall Effect, up to 200A
CT-500-M	Fixed-Core Current Transducer, Hall Effect, up to 500A
CT-1000-M	Fixed-Core Current Transducer, Hall Effect, up to 1000A

### Recommended Accessories

CL200	Current Clamp, 0.5A - 200A, for Tektronix Power Analyzers
CL1200	Current Clamp, 0.1A - 1000A, for Tektronix Power Analyzers
BAL-LAST-CT	Differential current transformer for lighting applications. 1A, 1MHz
BB1000-XX	Breakout Box simplifies connections to AC power cords. NA, EU and UK versions.
PA-LEADSET	Replacement Lead Set for Tektronix Power Analyzers (One Channel Lead Set)

### Recommended Service

C3	Calibration Service 3 Years
C5	Calibration Service 5 Years

### Ships with Product

- Lead Set (1 set per input module)
- User Manual
- AC Power Cord
- Certificate of Traceable Calibration
- 5-year Product Warranty

### Available for Free Download

- PWRVIEW PC Software for remote instrument setup, data transfer and offline analysis
- Application notes, whitepapers and videos at: [www.tek.com/application/power-measurement](http://www.tek.com/application/power-measurement)



# Switch Systems

Keithley provides a wide array of high integrity switch systems to address the need for switching DC, RF, microwave, and digital I/O signals, whether in matrix, multiplexer, or a combination of configurations. Elsewhere in this catalog, you will also find data acquisition systems and digital multimeters with switching options.



	Series 3700A*	Models 7001 / 7002	System 46 / 46T	707B / 708B
Max Channels / Crosspoints	576 / 2688	80 / 400	32	576 / 96
Card Slots	6	2 / 10	Not applicable	6 / 1
Unique optional card capabilities	High density switching, automatic CJC, long-life switching, FET switching	Hall effect, scanner cards, high/low current and voltage switching	Not applicable	7072-HV provides 1kV and low current
Interface	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus	GPIB, RS-232	GPIB	GPIB, LAN (LXI), ACS software, 4200-SCS KTEI software

\* Series 3700A Switch Systems are found elsewhere in this catalog under "Data Acquisition."

## Choosing Your Switches

To help you choose the appropriate switch mainframe for your application, the most common selection criteria are listed below.

### 1 Multiplex Switching

Multiplex switching can be used to connect one instrument to multiple devices (1:N) or multiple instruments to a single device (N:1). Multiplex switching permits multiple simultaneous connections, and sequential or non-sequential switch closures.

### 2 Matrix Switching

The matrix switch configuration is the most versatile because it can connect multiple inputs to multiple outputs. A matrix is useful when connections must be made between several signal sources and a multi-pin device, such as an integrated circuit or resistor network.

### 3 Isolated Switch Configurations

The isolated, or independent, switch configuration consists of individual relays, often with multiple poles, with no connections between relays. Isolated relays are not connected to any other circuit, so the addition of external wiring makes them suitable for building very flexible and unique combinations of input/output configurations. Isolated relays are commonly used in power and control applications to open and close different parts of a circuit that are at substantially different voltage levels.



## Models 7001 / 7002 Multi-Purpose Switch Systems

The two and ten slot, respectively, Model 7001 and Model 7002 multi-purpose switch systems for precision measurement, switching, and control support a wide range of signals, with more than 15 switch/control cards available. Also, see our Series 2700 and Model 3706A data acquisition and digital multimeter/switch systems.

### Product Highlights

- Supports more than 15 switch/control cards
- Integrates easily with DMM and SourceMeter® SMU instruments
- Full channel status display
- Supports industry's broadest range of signals



The display of the Model 7001 makes it much easier to configure a test system, make modifications, or debug an existing program.



The interactive front panel display of the Model 7002 helps shorten the time required to configure the switch system and develop test software.

Model	Max. Channels or Crosspoints per Chassis	Card Slots	Front Panel	Built-in Digital I/O
7001	Up to 80 per mainframe	2	Full status display with programming control	1 input/4 outputs
7002	Up to 400 per mainframe	10	Full status display with programming control	1 input/4 outputs

### Recommended Accessories

7011-C	Quad 1x10 Mux w/ Mass-Terminated Connector
7011-S	Quad 1x10 Mux w/ Screw Terminals
7012-C	4x10 Matrix Card w/ Mass-Terminated Connector
7012-S	4x10 Matrix Card w/ Screw Terminals
7013-C	Isolated, 20-Ch Relay Switch w/ Mass-Terminated Connector
7013-S	Isolated, 20-Ch Relay Switch w/ Screw Terminals
7015-C	Quad 1x10 Solid-State Mux Card w/ Mass-Terminated 96-Pin Connector
7015-S	Quad 1x10 Solid-State Mux Card w/ Detachable Screw Terminal Connector
7018-C	Dual 1x14 Mux Card w/ Mass-Terminated 96-Pin Connector

### Recommended Accessories

7020	Digital I/O Card w/ 40 Inputs, 40 Outputs and Mass-Terminated 96-Pin Connector
7020-D	Digital I/O Card w/ 40 Inputs, 40 Outputs and Two 50-Pin D Subconnectors
7035	9-Bank, 1x4 Mux Card
7036	Single-Pole Relay Card w/ 40 Independent Switches and a Mass-Terminated 96-Pin Connector
7037-D	Single-Pole Relay Digital I/O Card w/ 30 Independent Switches, 10 Independent Digital Inputs, 10 Independent Digital Outputs and Two 50-Pin D-Subconnectors
7053	High-Current, 10-Ch Scanner Card w/ 5A Contacts
7065	Hall Effect Card
7111-S	40-Ch Form C Switch Card

### Recommended Accessories

7152	4x5 Low-Current Matrix Card
7153	4x5 High-Voltage, Low-Current Matrix Card
7154	10-Ch, High-Voltage Scanner Card
7158	10-Ch, Low-Current Scanner Card w/ BNC Connectors
7168	Nanovolt Scanner Card

### Ships with Product

- Power Cord
- User Manual

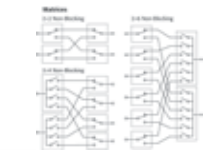


## System 46 RF Microwave Switch Systems

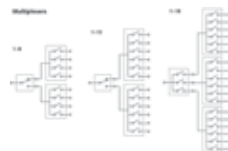
Both terminated and unterminated versions of the Model S46 Switch System are available for testing devices such as cellular and cordless phones, specialized mobile radios, base stations, and RF components, including RFICs. Series 2700 data acquisition systems also offer RF/microwave switch options.

### Product Highlights

- Compact RF/microwave switching system only 2U high
- Built-in contact closure counter to monitor switch cycles
- Standard configuration allows up to 32 channels of switching
- Simple control with built-in GPIB/IEEE-488 interface bus
- Channel characterization (S-parameter) data storage



Maximum Configuration:  
(8) – Unterminated (S46) or Terminated (S46T) SPDT relays.



Maximum Configuration:  
(4) – Unterminated (S46) or Terminated (S46T) multi-pole relays (SP4T, SP6T).

Model	Max. Channels or Crosspoints per Chassis	Frequency Ranges	Relays
S46 (unterminated)	Up to 32 RF/microwave chs	Up to 40GHz	Up to 8 unterminated SPDT coaxial microwave relays and 4 unterminated multi-pole coaxial microwave relays
S46T (terminated)	Up to 32 RF/microwave chs	Up to 40GHz	Up to 8 terminated or unterminated SPDT coaxial microwave relays and 4 terminated or unterminated multi-pole coaxial microwave relays

### Ships with Product

- Power Cord
- Instruction Manual
- Rack Mount Kit



## Semiconductor Switch Matrix Mainframes

Models 707B/708B are specifically designed for semiconductor lab and production test environments, delivering ultra low current switching performance using standard triax connectors and cables. For smaller test systems, the Model 708B supports a single 8x12 switch card. For larger systems, the Model 707B can accommodate up to six 8x12 cards.

### Product Highlights

- Remote and manual programming support
- Integrates seamlessly with the Model 4200-SCS and Series 2600B SourceMeter SMU instruments
- Stores hundreds of switching configurations and channel patterns
- LXI Class C interface supports remote programming and control
- 14 bits of digital I/O



Series 2600B SMUs have an on-board test script processor (TSP) that executes test scripts and controls the switch matrix via the TSPLink.



Models 707B and 708B support a family of matrices designed specifically for low-level semiconductor device testing.

Model	Max. Voltage/Current	Max. Offset Current	Rec. Frequency	Connection Type
7072	200V / 1A	<1pA	15 MHz	3-lug triax
7072-HV	1300V / 1A	<1pA	4 MHz	3-lug triax
7174A	200V / 2A	<100fA	30 MHz	3-lug triax
7073	200V / 1A	<200pA	30 MHz	BNC
7173-50	30V / 0.5A	<200pA	200 MHz	BNC

### Recommended Accessories

CA-126-5A	25-pin Female Digital I/O to 25-pin Male Cable, 3m (10 ft)
2600-TLINK	Digital I/O to Trigger Link Cable, 1m (3.3 ft)
4299-6	Universal Full Rack Mount Kit (for Model 708B)
7007-1	Double-shielded GPIB Cable, 1m (3.3 ft)
7007-2	Double-shielded GPIB Cable, 2m (6.6 ft)
7072	Semiconductor Matrix Card
7072-HV	High Voltage Semiconductor Matrix Card
7072-TRT	Triax Fastening Tool
7079	Slide Rack Mount Kit (for Model 707B)
7173-50	High Frequency, 2-pole, 4x12 Matrix Card
7174A	Low Current Matrix Card

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Product Information CDs (Product Information, Quick Start Guide, Switching and Control Product Information, Test Script Builder User Suite)
- CA-180-4A: CAT 5 Ethernet Crossover Cable, 1m (3.3 ft)
- CA-179-2A: CAT 5 Ethernet Cable, 3m (10 ft)
- CO-7: Line Cord
- Rear Fixed Rack Mount Hardware (707B only)





# Semiconductor Test Systems

From lab to fab, Keithley continues to bring the next generation of semiconductors to market with the industry's most cost-effective, fully automatic parametric testers; parameter analyzers that increase test throughput, reduce time to market, and test more device types; and software for semiconductor device testing and analysis.



	4200-SCS	PCT Configurations	S500 & 530 Parametric Test Systems	Automation Characterization Suite (ACS), ACS Basic, Wafer Level Reliability Option
<b>Definition</b>	Parameter Analyzer for semiconductor devices and materials	Parametric Curve Tracer configurations for power device characterization	Parametric Test Systems Used in Production and Lab Environments	Automated Semiconductor Device Characterization software
<b>Typical Devices Tested</b>	Devices and materials associated with CMOS, non-volatile memory, MEMS, III-V devices, TFTs, solar cells, nanoscale devices/structures	Semiconductor components including: IGBTs, MOSFETs, BJTs, Triacs/SCRs, diodes, and other power control devices	Wafer-level testing of semiconductor devices associated with CMOS, LDMOS, III-V, MEMS, and TFT process technologies	Semiconductor Devices individually or at wafer level associated with CMOS, non-volatile memory, MEMS, III-V devices, TFTs, and power control devices
<b>Applications</b>	Semiconductor device characterization, materials research, device reliability, and failure analysis	Semiconductor component characterization, inspection, and failure analysis	Semiconductor process control monitoring, automated characterization, wafer level reliability analysis, and die sort testing	Semiconductor device characterization, wafer level reliability analysis, parametric testing, and die sort testing
<b>Measurement Capabilities</b>	I-V, C-V, Ultra-fast I-V, pulse	Low-power I-V, high-power I-V, and C-V	I-V, C-V, frequency, and pulse	Real-time plotting and results associated with Keithley 2600Bs, 4200, S500, and S530

## Choosing Your Semiconductor Test System

The following is a brief overview of key aspects of Semiconductor Characterization Systems.

### 1 Parametric Test Systems

Semiconductor Parametric Test Systems are engineered to handle the DC and C-V measurements required in process control monitoring, process reliability monitoring, and device characterization and are used in production and lab environments that entail a broad range of devices and technologies.

### 2 Characterization Software

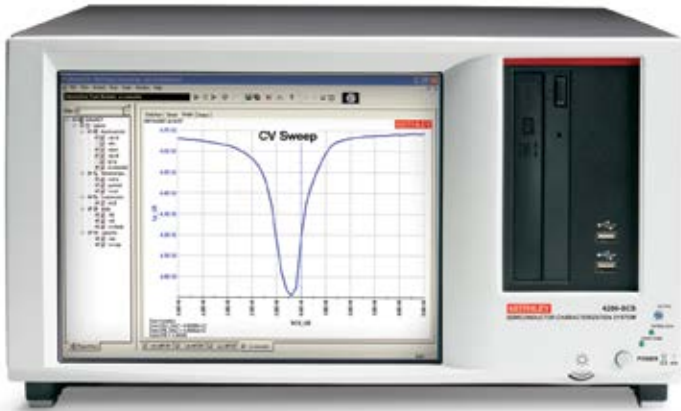
Characterization software automates semiconductor device characterization at the device, wafer, or cassette level, and when combined with source measure instrumentation or integrated test systems, can fill the gap between interactive lab-based setups and high-speed production test systems.

### 3 Parameter Analyzers

Parameter analyzers support all aspects of parametric testing, from basic DC I-V and C-V sweeps to advanced ultra-fast I-V, transient, waveform capture, and pulsed I-V measurements.

### 4 Curve Tracer Solutions

Complete solutions for power device characterization that are configured with a variety of high quality instruments, cables, test fixturing, and software.



## Model 4200-SCS Parameter Analyzer System

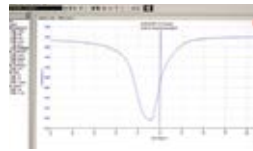
The modular, fully integrated 4200-SCS parameter analyzer performs electrical characterization of materials, semiconductor devices and processes. The software guides the user in performing complex characterization tests using I-V and C-V measurement sweeps, ultra-fast pulsed & transient I-V and arbitrary waveform to fully characterize their device under test.

### Product Highlights

- Modular architecture - configurable and scalable to test needs
- 0.1fA and 1 $\mu$ V SMU/PA measure resolution
- Multi-frequency, Quasistatic and VLF C-V measurement capabilities
- Two-channel, Ultra-Fast Pulse I-V module for transient & self-heating analysis
- Includes software drivers for leading analytical probers



The 4200-SCS software and application tests are designed to let the user understand device behavior quickly.



C-V curve from a MOSFET transistor measured with the Model 4210-CVU.

Model	Total # of SMUs	Current Range & Resolution	Voltage Range & Resolution	C-V Module	Ultra-Fast I-V
4200-SCS	Up to 9 high or medium power	1 A / 0.1 fA	$\pm 210$ V / 1 $\mu$ V	Optional	Optional
4200-SCS-PK1	2 medium power	100 mA / 0.1 fA	210 V / 1 $\mu$ V	No	No
4200-SCS-PK2	2 medium power	100 mA / 0.1 fA	210 V / 1 $\mu$ V	Yes	No
4200-SCS-PK3	2 medium power 2 high power	1 A / 0.1 fA	$\pm 210$ V / 1 $\mu$ V	Yes	No

### Instrument Modules

4210-CVU	C-V Instrument
4225-PMU	Ultra-Fast I-V Module
4225-RPM	Remote Amplifier/Switch
4220-PGU	High Voltage Pulse Generator
4200-SMU	Medium Power Source Measure Unit
4210-SMU	High Power Source Measure Unit
4200-PA	Remote PreAmp Option for 4200-SMU and 4210-SMU
4210-MMPC/X	Multi-measurement Performance Cables

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
R3DW	Repair Service Coverage 3 Years
R5DW	Repair Service Coverage 5 Years

### Ships with Product

- Reference and User Manual on CD-ROM
- 236-ILC-3 Interlock Cable
- All Cables and Adapters



## Parametric Curve Tracer (PCT) Configurations

Keithley's Parametric Curve Tracer configurations are complete solutions configured with a variety of high quality instruments, cables, test fixturing, and software for power device characterization. This building block approach offers the advantages of easy upgrading or modification to meet changing test needs.

### Product Highlights

- Economical power device characterization that is field upgradeable and reconfigurable
- Highest accuracy and resolution
- DC or fast pulse capability
- High resolution 24-bit A/D converters and high speed 18-bit digitizers
- Trace mode for real-time control and parametric mode for parameter extraction
- Interlocked test fixture with safe access ports



Test libraries supplied for most device types.



ACS Basic Edition Software quickly captures output characteristics of an IGBT device.

Model	Type	Collector/Drain Supply High Voltage Mode	Collector/Drain Supply High Current Mode	Step Generator Base/ Gate Supply
2600-PCT-1	Low Power	200 V/10 A	200 V/10 A	200 V/10 A
2600-PCT-2	High Current	200 V/10 A	40 V/50 A	200 V/10 A
2600-PCT-3	High Voltage	3 kV/120 mA	200 V/10 A	200 V/10 A
2600-PCT-4	High Current / High Voltage	3 kV/120 mA	40 V/50 A	200 V/10 A
PCT-CVU	Multi Frequency C-V Meter	Measures Capacitance vs. Voltage on 2, 3 and 4 Terminal Devices up to 3 kV		

### Recommended Accessories

2651A	High Power System SourceMeter® SMU Instrument
2657A	High Power System SourceMeter® SMU Instrument
8010-CTB	Customizable Test Board
8010-DTB	Device Test Board with TO-247 Socket
8010-DTB-CT	Curve Tracer Socket Adaptor
CVU-3K-KIT	Bias Tee Kit for Up to 3 kV
CVU-200-KIT	Bias Tee Kit for Up to 200 V
70161-MSA	Keyboard/Monitor Arm for K420 and K475 Carts
8020	High Power Interface Panel
K475	Workstation Tower Mobile Cart for All PCT Configurations
K420	Workbench Cart Mobile Cart for Smaller PCT Configurations

### Recommended Service

R3	3-year Extended Warranty
R5	5-year Extended Warranty
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years

### Ships with Product

- ACS-Basic Component Test Software
- KUSB-488B USB to GPIB Adapter (2600 configurations only)
- All Cables and Adapters
- Sample Parts

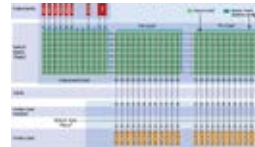


## S530 Parametric Test Systems and S500 Integrated Test Systems

Keithley's S530 Semiconductor Parametric Test Systems are engineered to handle the DC and C-V measurements required in process control monitoring, process reliability monitoring, and device characterization. These parametric test systems are used in production and lab environments that entail a broad range of devices and technologies. For specialized applications, S500 Integrated Test Systems offer semi-custom configurability.

### Product Highlights

- C-V measurements up to 1MHz
- Compatible with fully automatic probers
- 20W SMUs provide up to 1A or 200V
- 1kV SMU to any system pin (S530 High V)
- pA current measurement capability (S530 Low I)
- 24 pins full Kelvin (S530 High V), 48 pins full Kelvin (S530 Low I)



S530 systems five layers: instruments, switch pathways, cable interface, probe card adapter, and probe card.



The Model 9139A Probe Card Adapter combines low current performance and high voltage capability.

Model	Wiring & Pin Count	SMU Channels	Max Voltage	Max Current
S530 Low Current Parametric Test System	Up to 60 pins (4-wire or "Kelvin")	2 to 8	200V (2636B SMU)	1A
S530 High Voltage Parametric Test System	Up to 24 pins (4-wire or "Kelvin")	3 to 7	1100V (2410 SMU), 200V (2636B SMU)	1A
S500 Integrated Test System	Up to 60 pins with switch (2-wire), or 32pins (direct wiring from SMU)	1 to 8 with switch, or 1 to 32 without switch	1100V with 7072-HV switch, or Max voltage of SMU with no switch	1A with switch, or Max current of SMU with no switch

### S530 Recommended Accessories

Probe Card Adapter

Capacitance-Voltage (C-V) Unit

Pulse Generator Unit

7½-Digit Digital Multimeter (DMM) for use as a sensitive DC-voltmeter

Frequency Measurement Option

Switching Matrix (Standard in S530)

### Ships with Product

- System Source Measure Units (SMUs)
- Switching Matrix (optional in S500)
- System Cabinet, Controller, and Integration
- System Software
- High-voltage Safety Interlock



## Automated Characterization Suite (ACS) Software, ACS Basic, ACS Wafer Level Reliability Option

Automated Characterization Suite (ACS) software automates semiconductor device characterization at the device, wafer, or cassette level. Combined with Keithley's wide range of source-measure instrumentation or S500 Integrated Test Systems, ACS-based solutions fill the gap between interactive lab-based setups and high-speed production test systems.

### Product Highlights

- ACS is a flexible, interactive software test environment that supports many Keithley instruments and parametric test systems
- Model ACS-2600-RTM option with Series 2600B System SourceMeter® instruments provides a wafer level reliability solution.
- ACS Basic Edition is optimized for component and discrete device testing



ACS' hardware support ranges from bench-top instruments used in a QA lab to automated rack-based parametric testers.



For component and discrete device testing, ACS Basic Edition maximizes research and development productivity.

Model	Description
ACS	<ul style="list-style-type: none"> <li>▪ Intuitive GUI simplifies test plan development, test execution, and results analysis</li> <li>▪ Develop and execute tests at the device, site, wafer and cassette level</li> <li>▪ Supports a wide range of instruments and system configurations including multi-SMU parallel test systems</li> <li>▪ Full control of semi-automatic and fully automatic probers</li> <li>▪ Interactive and real-time data plotting</li> </ul>
ACS Basic Edition	<ul style="list-style-type: none"> <li>▪ Easy-to-use GUI with a wide range of device libraries for characterizing MOSFETs, BJTs, IGBTs, diodes, resistors, etc.</li> <li>▪ Supports wide range of instruments including 2600B SourceMeter® SMU Instruments and 2650A High Power SourceMeter® SMU instruments</li> <li>▪ ACS Basic is included in Keithley's Parametric Curve Tracer (PCT) configurations</li> <li>▪ Interactive and real-time data plotting</li> <li>▪ Use unlicensed copies on stand-alone PCs for test development</li> </ul>
ACS-2600-RTM	<ul style="list-style-type: none"> <li>▪ Wafer Level Reliability option for ACS</li> <li>▪ Configurable from 2 to 44 source-measure channels</li> <li>▪ Supports both sequential and parallel test</li> <li>▪ Integrated multi-site capability</li> <li>▪ Comprehensive JEDEC-compliant test suite</li> <li>▪ Real-time plotting and wafer mapping</li> </ul>

### Recommended Accessories

4200-SCS	Semiconductor Characterization System
2602B	Dual-channel System SourceMeter Instrument (3A DC, 10A Pulse)
2612B	Dual-channel System SourceMeter Instrument (200V, 10A Pulse)
2636B	Dual-channel System SourceMeter Instrument (1fA, 10A Pulse)
2657A	Model 2657A High Power System SourceMeter Instrument (High Voltage)
2651A	Model 2651A High Power System SourceMeter Instrument (High Current)
707B	Six-slot Switch Mainframe
7174A	Low-current switch matrix for 707B

### Ships with Product

- Software CD
- License Key





# Digital Multimeters

Designed to save time and reduce headaches, Tektronix and Keithley Digital Multimeters are built to do more so you don't have to. Each one is loaded with time-saving features like automated measurements, built-in analysis modes and front-panel shortcut buttons. Keithley's highly regarded high performance digital multimeters (DMMs) include 7½ or 8½-digit solutions as well as flexible broad-purpose DMMs.



	Keithley Model 2110	Tektronix Model DMM4020	Keithley Models 2000, 2100	Keithley Model DMM7510	Tektronix Models DMM4040/4050	Keithley Models 2001, 2010	Keithley Model 2002
Resolution	5½ digit	5½ digit	6½ digit	7 ½ digit	6½ digit	7½ digit	8½ digit
Basic Accuracy	0.012%	0.015%	0.0038% (Model 2100) 0.0030% (Model 2000)	0.0014%	0.0035% (DMM4040) 0.0024% (DMM4050)	0.0024%	0.0010%
Optional Switch Functions	Not Applicable	Not Applicable	10 Channel (Model 2000)	Future	Not Applicable	10 Channel	10 Channel
Interface	USB-TMC GPIB Option	RS-232, RS-232 to USB Device Adapter Included	GPIB, RS-232 (Model 2000) USB-TMC (Model 2100)	GPIB, USB Device-TMC, Ethernet-LXI, USB- Host	USB host, RS-232, GPIB, Ethernet, RS-232 to USB Device Adapter Included	GPIB, RS-232 (Model 2010) GPIB (Model 2001)	GPIB
Software	KI-Tool and KI-Link Startup Software, LabVIEW and IVI drivers. Available at <a href="http://www.keithley.com">www.keithley.com</a>	--	KI-Tool and KI-Link Startup Software (Model 2100 only), LabVIEW and IVI drivers. Available at <a href="http://www.keithley.com">www.keithley.com</a>	KickStart Startup Software, LabVIEW, IVI-COM/IVI-C, drivers, Keithley LXI Discovery Browser, Test Script Builder	--	LabVIEW Driver	LabVIEW Driver

## Choosing Your Digital Multimeter

To help you choose the right digital multimeter for your needs, the most common selection criteria are listed below, along with helpful tips for determining your requirements.

### 1 Resolution

Resolution refers to how fine a measurement a meter can make. By knowing the resolution of a meter, you can determine if it is possible to see a small change in your signal. The terms digits and counts are used to describe a meter's resolution. A 6.5-digit multimeter can display 6 full digits ranging from 0 to 9, and one "half" digit, which displays only a 1 or is left blank. A 6.5-digit meter will display up to 1,999,999 counts of resolution.

### 2 Accuracy

Accuracy is the largest allowable error that will occur under specific operating conditions. In other words, it is an indication of how close the DMM's displayed measurement is to the actual value of the signal being measured. Accuracy is usually expressed as a percent of reading. An accuracy of one percent of reading means that for a displayed reading of 100 volts, the actual value of the voltage could be anywhere between 99 volts and 101 volts.

### 3 Measurements

Digital multimeters are capable of making a variety of different measurements. A basic DMM typically can measure voltage, current and resistance. Other measurements commonly supported are continuity and diode measurements. Continuity is a quick go/no-go resistance test that distinguishes between an open and a closed circuit. A diode test mode measures the actual voltage drop across a junction. Other possible measurement modes are frequency, period, temperature and capacitance.

### 4 Extra Channel Capacity

Many of Keithley's DMMs include the capability to add a scanner accessory, enabling measurements on multiple test points or devices.

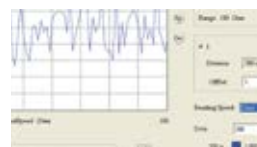


## Models 2000, 2100, 2110

These cost effective, high precision instruments offer 5.5- and 6.5-digit accuracy and are ideal for a wide range of manual, semi-automatic, and production test applications. They can be used as stand-alone benchtop instruments and as components in test systems.

### Product Highlights

- Exceptional 6½-digit measurement integrity with high speed throughput (Model 2000)
- Built-in slot for scanner card (Model 2000)
- 15 built-in measurement functions including thermocouples (Model 2110)
- Full featured DMMs at a value price
- USB Test and Measurement Class (USBTMC) interface (Models 2110 and 2100)



The KI-Tool application for the Model 2100 provides charting and graphing capabilities without programming.



For multipoint measurement, plug a scanner card into the Model 2000.

Model	Resolution	Basic V DC Accuracy, 1 Year (% Reading + % Range)	Measurements	Interface
2000	6½	0.0030 + 0.0005	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, dB, dBm, Cont., Diode	GPIB, RS-232
2100	6½	0.0038 + 0.0006	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode	USB
2110	5½	0.012 + 0.002	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, dB, dBm, Cont., Diode, Cap., Therm.	USB (GPIB Option)

### Recommended Accessories

2000-SCAN	10-channel Scanner Card (Model 2000)
2001-SCAN	10-channel Scanner Card with Two High-speed channels (Model 2000)
2001-TSCAN	9-channel Thermocouple Scanner Card (Model 2000)
5808	Low cost, Single Pin, Kelvin Probes
5805	Kelvin Probes, 0.9m (3ft)
5805-12	Kelvin Probes, 3.6m (12ft)
5809	Low Cost, Kelvin Clip Lead Set

### Recommended Accessories

7007-1	Shielded GPIB Cable, 1m (3.3ft)
7007-2	Shielded GPIB Cable, 2m (6.6ft)
KP-CI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB to GPIB Interface Adapter
4288-1	Single Fixed Rack Mount Kit (Model 2000, 2100)
4299-3	Single Rack Mount Kit (Model 2100 and 2110)
4299-4	Dual Rack Mount Kit (Model 2100 and 2110)

### Ships with Product

- Safety Test Leads
- Product CD (Includes Users Manual, Drivers, Etc.)
- USB Cable (Models 2100/2110)
- KI Tool and KI Link Software (Models 2100/2110)
- Calibration Certificate
- Power Cord
- 1-year Warranty
- 3-year Warranty (Model 2110)

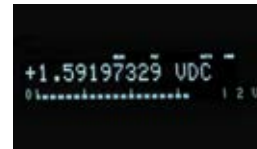


## Product Highlights

- Measurement functions include temperature, 4-wire resistance, peak detection, low ohms, and Agilent 3458A emulation (Model 2002)
- Built-in slot for scanner card
- Multiple measurement display (Models 2001 and 2002)
- Dry circuit measure function limits test voltage when testing contact or connector resistances (Model 2010)



Add a plug-in scanner card to turn any of these DMMs into a complete scan and measure system.



Use the multiple display capability (Model 2001/2002) to simultaneously display different aspects of one signal.

## Models 2001, 2002, 2010

Each Model 2001, 2002, and 2010 digital multimeter (DMM) offers superior measurement precision, sensitivity, and traceability. They also support plug-in scanner cards that allow you to quickly and economically create multi-channel measurement systems.

Model	Resolution	Basic V DC Accuracy, 1 Year (% Reading + % Range)	Measurements	Interface
2001	7½	0.0024 + 0.0004	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Crest, Peak	GPIOB
2002	8½	0.0010 + 0.00015	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Crest, Peak	GPIOB
2010	7½	0.0024 + 0.0004	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode, Therm., Dry Circ.Ω, Ratio	GPIOB, RS-232

## Recommended Accessories

2000-SCAN	10-channel Scanner Card
2001-SCAN	10-channel Scanner Card with Two Highspeed Channels
2001-TSCAN	9-channel Thermocouple Scanner Card
5805	Kelvin Probes, 0.9m (3ft)
5805-12	Kelvin Probes, 3.6m (12ft)
5808	Low Cost, Single Pin, Kelvin Probes
5809	Low Cost, Kelvin Clip Lead Set
7007-1	Shielded GPIOB Cable, 1m (3.3ft)
7007-2	Shielded GPIOB Cable, 2m (6.6ft)
KP-CI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB to GPIOB Interface Adapter
4288-1	Single Fixed Rack Mount Kit

## Ships with Product

- Model 8605 High Performance Modular Test Leads (Models 2001, 2002)
- Model 1751 Safety Test Leads (Model 2010)
- Option Slot Cover (Models 2001, 2002)
- Calibration Data
- User Manual, Service Manual
- Power Cord
- 1-year Warranty



## DMM7510 7½-Digit Graphical Sampling Multimeter

The DMM7510 combines all the advantages of a precision digital multimeter, a graphical touchscreen display, and a high speed, high resolution digitizer to create an industry first: a graphical sampling multimeter. The digitizer gives the Model DMM7510 unprecedented signal analysis flexibility; the five-inch capacitive touchscreen display makes it easy to observe, interact with, and explore measurements with “pinch and zoom” simplicity. This combination of high performance and high ease of use offers unparalleled insight into your test results.

### Product Highlights

- Precision multimeter with 3½- to 7½-digit resolution
- 100mV, 1Ω, and 10μA ranges offer the sensitivity needed for measuring low level signals
- Capture and display waveforms or transients with 1MS/sec digitizer
- Large internal memory buffer; store over 11 million readings in standard mode or 27.5 million in compact mode
- Display more with five-inch, high resolution touchscreen interface
- Extensive software available including: Test Script Builder, KickStart Startup Software, and LabVIEW and IVI Drivers (available at [www.keithley.com](http://www.keithley.com))



The high speed digitizing function allows capturing and displaying voltage and current waveforms.



Advanced triggering options make it possible to capture a signal at precisely the right point.

Model	Resolution	Basic V DC Accuracy, 1 Year (% Reading + % Range)	Measurements	Interface
DMM7510	7 ½	0.0014 + 0.00012	Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode, Dry Circ., Ω, Ratio, Cap, Digitize V, Digitize I	GPIO, USB-TMC, LAN-LXI

### Recommended Accessories

5804	Kelvin (4-Wire) Universal 10-Piece Test Lead Kit
5805	Kelvin (4-Wire) Spring-Loaded Probes
5806	Kelvin Clip Lead Set
5808	Low Cost Single-pin Kelvin Probe Set
5809	Low Cost Kelvin Clip Lead Set
KP-CI-488LPA	IEEE-488 Interface for PCI Bus

### Recommended Accessories

KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter
7007-1	Shielded GPIB Cable, 1m (3.2ft)
7007-2	Shielded GPIB Cable, 2m (6.5ft)
2450-TLINK	DB-9 to Trigger Link Connector Adapter
8503	DIN-to-BNC Trigger Cable
4299-8	Single Fixed Rack Mount Kit

### Ships with Product

- 1756 Test Leads
- USB-B-1 USB Cable, Type A to Type B, 1m (3.3 ft)
- CA-180-3A TSP-Link/Ethernet Cable
- Documentation CD
- DMM7510 QuickStart Guide
- KickStart Software Quick Start Guide
- Calibration Certificate
- Power Cord
- 1-Year Warranty
- Test Script Builder Software (available at [www.keithley.com](http://www.keithley.com))
- KickStart Startup Software (available at [www.keithley.com](http://www.keithley.com))
- LabVIEW® and IVI Drivers (available at [www.keithley.com](http://www.keithley.com))



## DMM4020

Make measurements, not compromises. Measure a variety of parameters—from volts, ohms and amps to frequency—with one instrument. Save time with front-panel shortcut keys and built-in limit testing. Performance. Reliability. Legendary ease of use. One instrument. Looks like you can have it all.

### Product Highlights

- 5.5 digit resolution
- Basic V dc accuracy of up to 0.015%
- Volts, ohms, amps and frequency measurements
- Dedicated dc leakage current measurement
- CAT I 1000 V, CAT II 600 V



Make accurate 4-wire resistance measurements with only two test leads!



With the unique dual display, you can measure two different parameters of the same signal from one test connection.

Models	Display	Resolution (Digits)	Measurements	Basic V dc accuracy (% Reading + % Range)
DMM4020	Dual; Numeric	5.5	V ac, V dc, I dc, I ac, $\Omega$ , Cont, Diode, Freq	0.015 + 0.004 (yr.)

### Recommended Test Leads

Test Leads	
196-3520-xx	Premium Test Leads (TL710 replacement/spare)
TL705	2x4 Wire Ohm 1000V Test Lead
TL725	2x4 Wire Ohm SMD Test Tweezers

### Recommended Accessories

Accessories	
ACD4000	Soft Carrying Case
HCTEK-4321	Hard Carrying Case
RMU2U	Rackmount Kit
013-0369-xx	Calibration Fixture 4-terminal short

### Recommended Service

SILV100	5-year Extended Warranty
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### Another Product for Consideration

If you need greater accuracy, the DMM4050 provides 6.5 digits of resolution and up to 0.0024% basic V dc accuracy.

### Ships with Product

- One Set TL710 Test Leads
- RS-232 to USB Adapter Cable
- NI LabVIEW SignalExpress™ TE (LE version) Software
- Statement of Calibration Practices
- User Manual & Documentation on CD
- Power Cord
- 3-year Warranty





DMM4040/4050

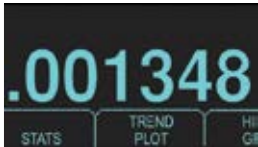
Meet the multimeter to rule them all. Make a wide range of measurements—from volts, ohms and amps to frequency, temperature and capacitance—with one instrument. Monitor and record measurements over time, or environmental changes with built-in histogram, TrendPlot™ testing and statistics analysis modes. Get unparalleled ease of use with a dual display and USB connectivity. Hello, efficiency. Goodbye, complexity.

Product Highlights

- 6.5 digit resolution
- Basic V dc accuracy of up to 0.0024%
- Volts, ohms, amps, frequency and period measurements
- Capacitance and temperature measurements (DMM4050)
- CAT I 1000 V, CAT II 600 V



Make accurate 4-wire resistance measurements with only two test leads!



See how your device is changing over time with built-in analysis modes – TrendPlot™, histograms and statistics.

Models	Display	Resolution (Digits)	Measurements	Basic V dc accuracy (% Reading + % Range)
DMM4040	Dual; Numeric & Graphical	6.5	V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period	0.0035 + 0.0005
DMM4050	Dual; Numeric & Graphical	6.5	V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period, Temp., Capacitance	0.0024 + 0.0005

Recommended Test Leads

Temperature Probes	
TP750	100 Ohm RTD Temperature Probe (DMM4050 only)
Test Leads	
196-3520-xx	Premium Test Leads (TL710 replacement/spare)
TL705	2x4 Wire Ohm 1000V Test Lead
TL725	2x4 Wire Ohm SMD Test Tweezers

Recommended Accessories

Accessories	
ACD4000	Soft Carrying Case
HCTEK-4321	Hard Carrying Case
RMU2U	Rackmount Kit
013-0369-xx	Calibration Fixture 4-terminal short

Recommended Service

SILV100	5-year Extended Warranty
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Another Product for Consideration

The PWS DC Power Supply Series is designed to stack with the DMM Series, saving you bench space.

Ships with Product

- One Set TL710 Test Leads
- RS-232 to USB Adapter Cable
- NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate
- User Manual & Documentation on CD
- Power Cord
- 3-year Warranty



# Data Acquisition Systems

Keithley data acquisition systems combine precision measurement, switching, and control into a single, tightly integrated enclosure. They offer affordable alternatives to separate DMMs and switch systems, dataloggers/recorders, plug-in card data acquisition equipment, and VXI/PXI systems.



	Series 2700	Series 3700A
DMM Resolution	6½ Digits	7½ Digits
Switching Density	Up to 80, 2-pole channels (2700/2701) Up to 200, 2-pole channels (2750)	Up to 576, 2-pole channels
Special Features	Front panel DMM jacks, Non-volatile memory buffer, Solid State temperature scanning	USB Flash Drive support, 1 Ohm measure range, Solid State temperature scanning
Switch Features	Up to 40, 2-pole Channels and 12 card options	Up to 96, 2-pole Channels and 10 card options
Interface	GPIB, RS-232 (Models 2700 and 2750) LAN, RS-232 (Model 2701)	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus
Software	KickStart Startup Software, LabVIEW and IVI drivers. Available at <a href="http://www.keithley.com">www.keithley.com</a>	Test Script Builder, LXI Discovery Browser, LabVIEW and IVI drivers. Available at <a href="http://www.keithley.com">www.keithley.com</a>

## Choosing Your Data Acquisition System

Designing the switching for an automated test system demands an understanding of the signals to be switched and the tests to be performed. The following is a cursory look at key decision points in the design of a switching system.

### 1 Switch Configuration

Multiplex switching can be used to connect one instrument to multiple devices or multiple instruments to a single device. Multiplex switching permits multiple simultaneous connections and sequential or non-sequential switch closures. A matrix switch configuration is the most versatile because it can connect multiple inputs to multiple outputs. The isolated, or independent, switch configuration consists of individual relays, often with multiple poles, with no connections between relays. For scanner (or multiplex) cards, the channel is used as a switched input in measuring circuits or as a switched output in sourcing circuits. For switch cards, each channel's signal paths are independent of other channels.

### 2 Relay Types

Three key relay types are used. Electromechanical relays offer the widest power range and a good life and speed at a relatively low cost. Reed relays cost more but offer less contact wear and bounce for a better life and speed than electromechanical. Solid-state relays cost still more, but offer the best life and speed with no contact wear or bounce.

### 3 Systemization

Connection types found on switch cards include both screw terminals and mass-terminated connectors. At the instrument level, TSP-Link master/slave connection offers easy system expansion between Series 3700A mainframes and to connect to Series 2600B SourceMeter instruments.



## Series 2700

The Series 2700 System Switch/Multimeter combines precision measurement, switching, and control in a single, tightly integrated enclosure for either rack-mount or bench-top applications used by data loggers. The 2700 Series offers two- and five-slot models, as well as an Ethernet-based model for high speed and long distance communication.

### Product Highlights

- 6½-digit measurement engine
- Front panel DMM jacks
- 300 volt isolation between channels and from any channel to ground to maintain signal integrity
- Mass terminated or screw terminal connector options
- Full per-channel card configurability
- Non-volatile memory buffer
- Choice of 12 switch/control plug-in modules



Install up to five switch/control modules in the 2750 mainframe or up to two in the 2700 and 2701 mainframes.



Screw terminals use oversize connectors for easier, mistake-free wiring. Removable terminals available for some models.

Model	Mainframe Size	Interfaces	Resolution (Digits), Accuracy	Advance Measure Functions
2700	2U, ½ Rack	GPIB, RS232	6½ Digits, 0.003%	Temperature, 4-Wire Resistance
2701	2U, ½ Rack	Ethernet, RS232	6½ Digits, 0.003%	Temperature, 4-Wire Resistance
2750	2U, Full Rack	GPIB, RS232	6½ Digits, 0.003%	Temperature, 4-Wire Resistance, Low Ohms

### Plug-in Cards

7700	Dual 1x10 / Electromechanical Relay
7701	Dual 1x16 / Electromechanical Relay
7702	Dual 1x20 / Electromechanical Relay
7703	Dual 1x16 / Reed Relay
7705	40 Independent Relay / Electromechanical Relay

### Recommended Accessories

7007-1	Shielded IEEE-488 Cable, 1m (2700, 2750)
7007-2	Shielded IEEE-488 Cable, 2m (2700, 2750)
7788	50-Pin D-Shell Connector Kit (for 7703 & 7705 Mods.)
7789	50-Pin/25-Pin D-Shell Kit
7790	50-Pin Male/Female, 25-Pin Male IDC D-Shell Con. Kit

### Plug-in Cards

7706	16 Digital I/O, 2 Analog Outputs, 1x20 Multiplexer
7707	32 Digital I/O, 1x10 Multiplexer
7708	Dual 1x20 / Electromechanical Relay
7709	6x8 / Electromechanical Relay
7710	Dual 1x10 / Solid State Relay
7711	Dual 1x4, 2GHz / RF Relay
7712	Dual 1x4, 3.5GHz / RF Relay

### Ships with Product

- Product CD (Includes Users Manual, Drivers, Etc.)
- Ethernet Crossover Cable (Model 2701 Only)
- Calibration Certificate
- Quick Reference Manual
- ExceLINX Software
- Power Cord
- 1-year Warranty



## Series 3700A

The Series 3700A DMM/switch system offers a scalable, instrument grade switching and multi-channel measurement solution for automated testing of electronic devices. The system includes a high performance DMM with up to six switch/control cards and can support up to 576 two-wire multiplexer channels for unrivaled density and low per channel cost.

### Product Highlights

- Mainframe variations (DMM and keypad/display optional)
- High performance (1 Ohm resistance, 10µA DCI range) 7.5 Digit multimeter
- High density switching (Up to 720 one-wire multiplexer channels, 2,688 one-wire matrix crosspoints)
- TSP control and TSP-Link for Intelligent distributed control
- Embedded startup/control software



Use the built-in web server interface to configure the system, build and run an automated scan list, and analyze data.



Model 3706A-NFP eliminates keypad and display for automated test rack applications.

Model (Mainframe)	DMM	Front Panel Keypad & Display	Resolution (Digits), Accuracy	Interface
3706A	Yes	Yes	7½ Digits, 0.0025%	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus
3706A-S	No	Yes	NA	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus
3706A-NFP	Yes	No	7½ Digits, 0.0025%	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus
3706A-SNFP	No	No	NA	GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus

### Plug-in Cards

3720	Dual 1x30 Multiplexer: 300V, 2A, Auto-CJC with 3720-ST accessory
3721	Dual 1x20 Multiplexer: 300V, 3A, Auto-CJC with 3721-ST accessory
3722	Dual 1x48 Multiplexer: 300V, 2A
3723	Dual 1x30 Multiplexer: 200V, 1.25A, Reed Relay
3724	Dual 1x30 Multiplexer: 200V, 0.12A, Solid State Relay, Auto-CJC with 3724-ST accessory

### Plug-in Cards

3730	6x16 Matrix: 300V, 2A
3731	6x16 Matrix: 200V, 2A, Reed Relay
3732	Quad 4x28 Matrix: 200V, 1.2A, Reed Relay
3740	Independent Relay: 28 Form C: 300V, 3A; 4 Form A: 250VAC, 7A
3750	Control: 40 Digital I/O 2 Analog Outputs, 4 Counter

### Recommended Accessories

3706-BAN	DMM Adapter Cable
3706-TLK	Test Lead Kit
KUSB-488B	IEEE-488 USB to GPIB Interface Adapter
4288-1	Single Fixed Rack Mount Kit
4288-10	Fixed Rear Rack Mount Kit

### Ships with Product

- Test Script Builder Software Suite CD
- Series 3700A Product CD (Includes LabVIEW, IVI C, and IVI.COM Drivers)
- Ethernet Crossover Cable
- Calibration Certificate
- Quick Reference Manual
- Power Cord
- 1-year Warranty



# Ultra-Sensitive Measurement Instruments

Scientists and researchers worldwide rely on Keithley Electrometers, Picoammeters, and Nanovoltmeters for making low-level measurements beyond the capabilities of a typical digital multimeter. Keithley Electrometers and Picoammeters provide low current and high resistance measurements and Keithley Nanovoltmeters measure low voltages.



	2182A Nanovoltmeter	6220 / 6221 Current Sources	6485 / 6487 / 6482 Picoammeters / Picoammeter & Voltage Source	6514 / 6517B / 6430 Electrometers
Current Min/Max	--	100fA / 100mA	1fA / 20mA	10aA / 100mA
Voltage Min/Max	1nV / 100V	--	--	1mV / 200V
Resistance Min/Max	10nΩ / 1GΩ (with Model 6220 or 6221)	10nΩ / 1GΩ (with Model 2182A)	10Ω / 1PΩ (with Model 6487)	10mΩ / 10PΩ
Resolution	7½ Digits	4½ Digits	5½ Digits (6485, 6487) 6½ Digits (6482)	5½ Digits (6514, 6517B) 6½ Digits (6430)
Input Connection / Interface	Low Thermal / GPIB, RS-232	3 Slot Triax / GPIB, RS-232 (LAN on 6221)	BNC (6485) 3 Slot Triax (6482, 6487) / GPIB, RS-232	3 Slot Triax / GPIB, RS-232

## Choosing Your Specialized Low Level Instrument

To help you choose the appropriate specialized low level instrument for your application, the most common selection criteria are listed below, including helpful tips for determining the correct specialized low level instrument for your requirements.

### 1 Resolution

Resolution means how fine a meter's measurement is and lets you determine if it's possible to see a small change in the signal. Resolution is described by digits and counts. A 6.5-digit instrument can display six full digits ranging from 0 to 9, and one "half" digit that displays either a 1 or is left blank. A 6.5-digit instrument can display up to 1,999,999 counts of resolution.

### 2 Accuracy

Accuracy is the largest allowable error that will occur under specific operating conditions and is an indication of how close the instrument's displayed measurement is to the actual value of the signal measured. Accuracy is typically expressed as a percent of reading. For example, an accuracy of 1% of reading means that, for a displayed reading of 100 volts, the actual value of the voltage is between 99 volts and 101 volts.

### 3 Low Current/High Resistance Measurements

Low current/high resistance measurements evaluate the insulation qualities of materials or components. Typically, a voltage up to 500 or 1000 volts is applied and the resulting current is measured, which can be in the range of picoamperes (10E-12A) or lower. A digital multimeter may seem like the right instrument for these measurements. But if the current is below 1μA or the resistance is above 10MΩ, the correct solution is an Electrometer or Picoammeter.

### 4 Low Voltage/Low Resistance Measurements

Low resistance/low voltage measurements evaluate the conduction or contact qualities of materials or components. Typically, a current under 100mA but as low as 1μA is applied and the resulting voltage is measured, which can be in the range of microvolts and even nanovolts. For low voltage, choose a Nanovoltmeter or low noise multimeter. For low resistance, a Nanovoltmeter/current source combination or switch/multimeter is the correct solution.



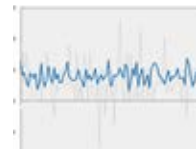


## 2182A Nanovoltmeter

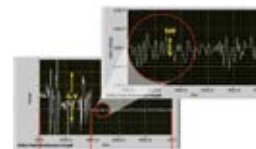
The two-channel Model 2182A Nanovoltmeter is optimized for making stable, low noise voltage measurements and for characterizing low resistance materials and devices reliably and repeatably. It provides higher measurement speed and significantly better noise performance for voltage meters than alternative low voltage measurement solutions.

### Product Highlights

- Low noise voltage measurements at high speeds
- Delta mode coordinates measurements with a reversing current source at up to 24Hz with 30nV p-p noise (typical) for one reading. Averages multiple readings for greater noise reduction
- Built-in thermocouple linearization and cold junction compensation
- Dual channels



Comparison of the Model 2182A's DC noise performance with a nanovolt/micro-ohmmeter's.



Results from a Model 2182A and Model 6220 using the delta mode to measure a 10mΩ resistor with a 20μA test current.

Model	Voltage	Temperature	Resistance	Channels	Buffer Size
2182A	1nV – 100V	-200°C to 1820°C	10nΩ to 200MΩ (requires 6220 or 6221)	2	1,024 rdgs

### Recommended Accessories

6220	DC Precision Current Source (used with 2182A for low current/voltage measurement)
6221	AC and DC Current Source (used with 2182A for low current/voltage measurement)
4288-1	Single Fixed Rack Mounting Kit
4288-2	Dual Fixed Rack Mounting Kit
KPCI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter
2107-30	Low Thermal Input Cable with spade lugs, 9.1m (30 ft)
2182-KIT	Low Thermal Connector with strain relief
2187-4	Input Cable with safety banana plugs

### Recommended Accessories

2188	Low Thermal Calibration Shorting Plug
7007-1	Shielded GPIB Cable, 1m (3.2 ft)
7007-2	Shielded GPIB Cable, 2m (6.5 ft)
7009-5	Shielded RS-232 Cable, 1.5m (5 ft)
8501-1	Trigger Link Cable, 1m (3.2 ft)
8501-2	Trigger Link Cable, 2m (6.5 ft)
8503	Trigger Link Cable to 2 male BNC connectors

### Ships with Product

- 2107-4 Low Thermal Input Cable with Spade Lugs, 1.2m (4 ft)
- User Manual
- Service Manual
- Contact Cleaner
- Power Cord
- Alligator Clips



## 6220 / 6221 Current Sources

Keithley precision current sources include both broad-purpose Model 6220 and high-performance Model 6221. Their high sourcing accuracy and built-in control functions make them ideal for Hall Effect, resistance (using delta mode), pulsed, and differential conductance measurements. Programmable pulse widths limit power dissipation.

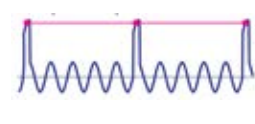
Model	Current	Resistance	Sweep Points	PC Interface
6220	100fA – 100mA	10nΩ to 200MΩ (requires 2182A)	65,536 (64k)	GPIB, RS-232
6221	100fA – 100mA	10nΩ to 200MΩ (requires 2182A)	65,536 (64k)	GPIB, RS-232, Ethernet

## Product Highlights

- $10^{14}\Omega$  output impedance ensures stable current sourcing into variable loads
- 64k-point source memory for comprehensive test current sweeps
- (Model 6221) Source AC currents from 4pA to 210mA peak to peak for AC characterization of components and materials. The 10MHz output update rate generates smooth sine waves up to 100kHz



Perform, analyze, and display differential conductance measurements.



Measurements are line synchronized to minimize 50/60Hz interference.

## Recommended Accessories

2182A	Nanovoltmeter (used with 6220/6221 for low current/voltage measurement)
237-ALG-2	Low Noise Triax Cable, 3-slot triax to alligator clips
7007-1	Shielded GPIB Cable, 1m (3.2 ft)
7007-2	Shielded GPIB Cable, 2m (6.5 ft)
7007-4	Shielded IEEE-488 Cable, 4m (13.1 ft)
7009-5	Shielded RS-232 Cable, 1.5m (5 ft)
7078-TRX-3	Low Noise Triax Cable, 3-Slot Triax Connectors, 0.9m (3 ft)
7078-TRX-5	Low Noise Triax Cable, 3-Slot Triax Connectors, 1.5m (5 ft)
7078-TRX-10	Low Noise Triax Cable, 3-Slot Triax Connectors, 3m (10 ft)
7078-TRX-20	Low Noise Triax Cable, 3-Slot Triax Connectors, 6m (20 ft)

## Recommended Accessories

8501-1	Trigger Link Cable with male Micro-DIN connectors at each end, 1m (3.3 ft)
4288-1	Single Fixed Rack Mounting Kit
4288-2	Dual Fixed Rack Mounting Kit
KP-CI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

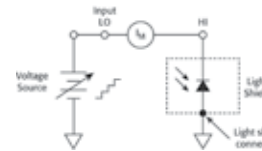
## Ships with Product

- 6.6 ft (2m), Low Noise, Input Cable with Triax-to-Alligator Clips
- 6.6 ft (2m) Trigger Link Cable to connect 622x to 2182A
- Ethernet Crossover Cable (6221 only)
- Communication Cable between 2182A and 622x
- Safety Interlock Connector
- Instruction manual on CD
- Getting Started manual (hardcopy)
- Software (downloadable)

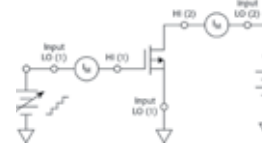


## Product Highlights

- Measure currents down to 1fA
- Voltage and resistance measurement options
- Voltage burden <200 $\mu$ V (most models)
- 5½- to 6½-digit resolution (most models)
- Feedback ammeter design for higher accuracy



Dark current characterization of a photodiode using Picoammeter and voltage source (such as the Model 6482).



MOSFET sub-threshold voltage test using Picoammeters and voltage sources (such as the Model 6482).



## 6485, 6487 Picoammeters, 6482 Picoammeter & Voltage Source

Keithley Picoammeters combine sensitive current measurement with high speed. The Model 6485 Picoammeter offers fast, sensitive current measurement. The Model 6487 offers improved measurement capability, and adds a high resolution 500V source. The Model 6482 offers two independent Picoammeter/voltage source channels.

Model	Current	Resistance	Reading Rate	Input Connections
6482	1fA – 20mA	N/A	900 rdgs/s	3-slot triax, BNC (via included adapter)
6487	10fA – 20mA	Up to 10 <sup>+16</sup> $\Omega$	1000 rdgs/s	3-slot triax
6485	10fA – 20mA	N/A	1000 rdgs/s	BNC

### Recommended Accessories

4802-10 Low noise BNC Input Cable, 3m (10ft) (for 6485)

4803 Low Noise Cable Kit (for 6485)

6517-ILC-3 Interlock Cable for 8009 Resistivity Test Fixture (6487 Only)

7007-1 Shielded IEEE-488 Cable, 1m (3.3 ft)

7007-2 Shielded IEEE-488 Cable, 2m (6.6 ft)

7007-4 Shielded IEEE-488 Cable, 4m (13.1 ft)

7009-5 RS-232 Cable

7078-TRX-10 Low Noise Triax Cable, 3.0m (10 ft) (6487 Only)

7078-TRX-20 Low Noise Triax Cable, 6.0m (20 ft) (6487 Only)

7754-3 BNC to Alligator Cable (for 6485)

8501-1 Trigger Link Cable with male Micro-DIN connectors at each end, 1m (3.3 ft)

### Recommended Accessories

CS-565 BNC Barrel (for 6485)

237-TRX-BAR Triax Barrel (for 6487)

7078-TRX-BNC Triax-to-BNC Adapter

8009 Resistivity Test Fixture (for 6487)

4288-1 Single Fixed Rack Mounting Kit

4288-2 Dual Fixed Rack Mounting Kit

KP-CI-488LPA IEEE-488 Interface/Controller for the PCI Bus

KUSB-488B IEEE-488 USB-to-GPIB Interface Adapter

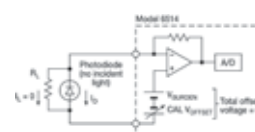
### Ships with Product

- 7078-TRX-BNCTriax-to-BNC Connector (2 $\times$ ) (Model 6482)
- CA-186-1B Ground Connection Cable, Banana to Screw-Lug (Model 6487)
- CAP-31 Protective Shield/Cap (3-lug) (Model 6487)
- CS-459 Safety Interlock Plug (Model 6487)
- 7078-TRX-3 Low Noise Triax Input Cable, 1m (3 ft) (Model 6487)
- 8607 High Voltage Banana Cable Set for Voltage Source Output (Model 6487)
- CAP-18 Protective Shield/Cap (2-lug) (Model 6485)
- 4801 Low Noise BNC Input (Model 6485)



## Product Highlights

- Measure low current & high voltage, resistance, and charge
- Resistance measurements to 10PΩ
- Current sensitivity as low as 10aA (6430)
- Voltage burden as low as 200μV
- Superior accuracy and sensitivity



This illustrates how the Model 6514's measurement can be adjusted to reflect the true dark current of the photodiode.



A Model 6517B is well suited for application where the volume resistivity needs to be measured.

## 6514 / 6517B / 6430 Electrometers

Our high resistance Electrometers provide voltage source and high resistivity measurements for sensitive measurement. They combine flexible interfacing capabilities with current sensitivity, charge measurement capabilities, resolution, and speed. The Model 6430 offers unmatched low current sensitivity.

Model	Current	Voltage	Resistance	Charge	Input Connections
6517B	100aA – 20mA	10μV – 200V	100Ω – 10PΩ	10fC – 2μC	3-slot triax
6514	100aA – 20mA	10μV – 200V	10mΩ – 200GΩ	10fC – 20μC	3-slot triax
6430	10aA – 100mA	1μV – 200V	1μΩ – >20TΩ	--	3-slot triax

### Recommended Accessories

237-ALG-2	Low Noise Triax Cable, 3-slot triax to alligator clips
6517B-ILC-3	Interlock Cable (For 6517B only)
7078-TRX-3	Low Noise Triax Cable, 3-Slot Triax Connectors, 0.9m (3 ft)
7007-1	Shielded IEEE-488 Cable, 1m (3.2 ft)
8501-1	Trigger Link Cable, 1m (3.3 ft)
8503	Trigger Link Cable to 2 male BNCs, 1m (3.3 ft)
8607	1kV Source Banana Cables (for 6517B only)
6517-RH	Humidity Probe with Extension Cable (6517B only)
6517-TP	Temperature Bead Probe (included with 6517B) (6517B only)
8009	Resistivity Test Fixture (for 6517B)

### Recommended Accessories

237-BNC-TRX	Male BNC to 3-Lug Female Triax Adapter (for 6517B)
237-TRX-NG	Triax Male-Female Adapter with Guard Disconnected
7078-TRX-BNC	3-Slot Male Triax to BNC Adapter
7078-TRX-GND	3-Slot Male Triax to BNC Adapter with guard removed (for 6517B)
4288-1	Single Fixed Rack Mounting Kit
4288-2	Dual Fixed Rack Mounting Kit
6521	Low Current Scanner Card (for 6517B)
6522	Voltage/Low Current Scanner Card (for 6517B)
KP-CI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

### Ships with Product

- Low Noise Triax Cable, 3-slot triax to alligator clips (6514, 6517B)
- 6430-322-1B Low noise Triax Cable, 3-slot triax to alligator clips (20cm)
- Dual Test Leads (6430)
- 6517-TP Thermocouple Bead Probe (6517B)
- CS-1305 Interlock Connector (6517B)
- PreAmp Cable 2m (6.6ft)



# Power Supplies

Tektronix and Keithley power supplies offer a wide range of performance. Get single channel models with superior accuracy and 10nA current measurement resolution. New high voltage power supplies combine high voltage with sensitive, low current measurement for high voltage device testing and characterization and high voltage research. For multiple source needs, select a dual channel or triple channel supply. All channels are isolated and fully programmable. For testing battery-operated devices, consider a battery simulator.



Category	Description	Channels	Max Voltage/ Max Current	Resolution	Voltage Accuracy	Current Accuracy	Interface
Tektronix PWS2000 Series (4 models)	Manual	1	18V-72V/1.5A-6A	10mV, 10mA	0.03% ± 10mV	0.1% ± 5mA	Not applicable
Tektronix PWS4000 Series (5 models)	USB Programmable Single Channel	1	20V-72V / 1.2A-5A	1mV, 0.1mA	0.03% ± 3mV	0.05% ± 1mA	USB
Keithley 2200 Series (5 models)	USB and GPIB Programmable Single Channel	1	20V-72V / 1.2A-5A	1mV, 0.1mA	0.03% ± 3mV	0.05% ± 1mA	USB, GPIB
Keithley Model 2231A-30-3	Optional USB Triple-channel	3	CH1/2: 30V/3A CH3: 5V/3A	10mV, 1mA	0.06% ± 20mV	0.2% ± 10 mA	Optional USB
Keithley 2220/2230 Series (8 models)	USB Multi-Channel; USB and GPIB Multi-Channel	2 (2220 Series) 3 (2230 Series)	CH1/2-30V / 1.5A (2220 Series) CH1/2-30V / 1.5A, CH3-6V / 5A (2230 Series)	1mV, 1mA	0.2% ± 10 mA	0.1% ± 15 mA	USB USB & GPIB (-G versions)
Keithley Models 2280S-32-6 2280S-60-3	Precision measurement 6½-digit measurement resolution	1	32V-60V/3.2A-6A	0.1mV, 10nA	0.02% ± 2mV	0.05% ± 250uA	USB, GPIB, and LAN
Keithley 2260B Series (4 models)	360W and 720W Wide output range USB, LAN, and Optional GPIB	1	30V-80V / 13.5A-72A	1mV, 1mA	0.1% ± 10mV	0.1% ± 10mA	USB, LAN, analog, and optional GPIB
Keithley 2268 Series (6 models)	850W 1U high, half-rack wide, programmable, with 5V and 15V auxiliary outputs	1	20V-150V/ 5.6A-42A	2.4mV, 0.67mA	0.1% of Full Scale	0.2% of Full Scale	USB, GPIB, LAN, RS-232, RS-485, and analog
Keithley Models 2302, 2302-PJ, 2306, 2306-PJ, 2306-VS, 2308	Battery simulator	1 (2302) 2 (2306, 2308)	15V / 5A	1mV, 100nA	0.05% + 3mV	0.2% + 1µA	GPIB
Keithley Models 2303, 2303-PJ, 2304A	Fast Transient Response	1	15V / 5A (2303) 20V / 5A (2304A)	1mV, 100nA	0.05% + 3mV	0.2% + 1µA	GPIB
Keithley Models 2290-5 2290-10	High Voltage	1	5kV / 5mA (2290-5) 10kV / 1mA (2290-10)	1V, 1µA	±0.01% (2290-5), ±6V (2290-10)	±0.01% (2290-5), ±5µA (2290-10)	GPIB (2290-5), GPIB, RS-232 (2290-10)





## Choosing Your Programmable Power Supply

To help you choose the appropriate power supply for your application, the most common selection criteria are listed below.

### 1 Output Voltage, Current, and Power

Ensure that the power supply has sufficient voltage output and current output to meet your needs. Also ensure that the supply can deliver the required power. Some power supply V-I output characteristics offer a trade-off between maximum voltage and maximum current (hyperbolic V-I output).

### 2 Setting Resolution and Accuracy

Voltage and current settings (sometimes called limits or programmed values) each have resolution and accuracy specifications associated with them. The resolution of these settings determines the minimum increment in which the output may be adjusted. The accuracy describes the extent to which the value of the output matches international standards and is typically expressed as  $\pm$  (% of reading + offset).

### 3 Ripple and Noise

Spurious AC components on the output of a DC supply are called ripple and noise. The term “ripple” refers to periodic AC on the output. When viewed in the frequency domain, ripple shows up as spurious responses. Unlike ripple, which is periodic, noise is random. A power supply’s ripple and noise is specified within a bandwidth, and should be specified for both current and voltage.

### 4 Features and Programmability

When selecting your power supply, select the supply that has the functionality you need. Consider a multiple-channel supply as a cost-effective solution for applications requiring multiple power sources. For maximum accuracy, consider supplies that have remote sensing. When developing and testing battery-operated devices, consider a special purpose battery-simulating supply.



## PWS2000 Series Single Channel Power Supplies

More power. More features. More value. Support many different applications with wide output voltage and current ranges, and down to 10 mV/10 mA resolution. Save time with a numeric keypad for fast and accurate voltage/current selection. Strain less with a bright, large readout digital display. All backed by Tektronix reliability.

### Product Highlights

- Linear regulation
- 0.05% basic DC voltage accuracy
- 0.2% basic DC current accuracy
- Less than 3 mVp-p ripple and noise
- 20 user-defined setup memories



The numeric keypad makes it easy to specify a precise current limit before you start your test.



PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.

Models	Output Voltage	Output Current	Programmable
PWS2185	18 V	5 A	No
PWS2323	32 V	3 A	No
PWS2326	32 V	6 A	No
PWS2721	72 V	1.5 A	No

### Recommended Accessories

RMU2U	Rackmount Shelf Kit for 1 or 2 Units
386-7598-xx	Rackmount Cosmetic Filler Panel

### Recommended Service

R5	5-year Extended Warranty
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### Another Product for Consideration

The PWS4000 Series offers greater accuracy, additional features and programmability.

### Ships with Product

- Calibration Certificate
- Technical Reference Manual & Documentation on CD
- Power Cord
- 3-year Warranty



## PWS4000 Series USB Programmable, Single Channel Power Supplies

Precision. Now available at the touch of a button. Generate the power you need with down to 1 mV/0.1 mA resolution and a basic voltage accuracy of 0.03%. Accelerate complex tests with list mode and a USB port for remote programming. Save time with a numeric keypad for fast and accurate voltage/current selection. Performance. Accuracy. Affordability. Meet your new power supply.

### Product Highlights

- Linear regulation
- 0.03% basic DC voltage accuracy; 0.05% basic DC current accuracy
- USB interface for remote programming
- Less than 5 mVp-p ripple and noise
- Remote sense, list mode and 40 user-defined setup memories



The numeric keypad makes it easy to specify a precise current limit before you start your test.



PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.

Models	Output Voltage	Output Current	Programmable
PWS4205	20 V	5 A	Yes
PWS4305	30 V	5 A	Yes
PWS4323	32 V	3 A	Yes
PWS4602	60 V	2.5 A	Yes
PWS4721	72 V	1.2 A	Yes

### Recommended Accessories

RMU2U	Rackmount Shelf Kit for 1 or 2 Units
386-7598-xx	Rackmount Cosmetic Filler Panel

### Recommended Service

SILV100	5-year Extended Warranty
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### Another Product for Consideration

The DMM Series offers accurate voltage, current and resistance measurements for AC and DC signals.

### Ships with Product

- NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate
- Technical Reference Manual & Documentation on CD
- Power Cord
- 3-year Warranty



## 2200 Programmable Single-Channel DC Power Supplies with Remote Sensing

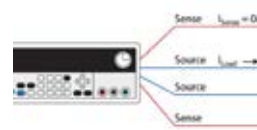
Keithley programmable single-channel DC power supplies offer an excellent combination of performance, versatility, and ease of use, including 0.03% basic accuracy, 0.1mA measurement resolution, and keypad data entry. Select from a variety of DC power supplies with voltages from 20V to 72V.

### Product Highlights

- Low noise, linear regulation
- 0.03% basic voltage output
- 0.05% basic current accuracy
- 1mV and 0.1mA output and measurement resolution
- Seven programmable output lists with up to 80 steps/list
- GPIB and USB interfaces



Series 2200 rear panel.



Remote sensing compensates for voltage drops in the test leads by extending the power supply feedback loop to the input of the load.

Model	Max Output Voltage	Max Output Current	Power	Ripple and Noise
2200-20-5	20V	5A	100W	<1mV <sub>RMS</sub> , <3mVP-P
2200-30-5	30V	5A	150W	<1mV <sub>RMS</sub> , <4mVP-P
2200-32-3	32V	3A	96W	<1mV <sub>RMS</sub> , <4mVP-P
2200-60-2	60V	2.5A	150W	<1mV <sub>RMS</sub> , <5mVP-P
2200-72-1	72V	1.2A	86W	<1mV <sub>RMS</sub> , <3mVP-P

### Recommended Accessories

CS-1638-12	Rear Panel Mating Connector, Single Channel
USB-B-1	USB Cable
4299-7	Fixed Rack Mount Kit
KP-CI-488LPA	IEEE-488 Interface Board for PCI Bus
7007-05	Double Shielded IEEE-488 Cable, 0.5m (1.6ft)
7007-1	Double Shielded IEEE-488 Cable, 1m (3.2 ft)
7007-2	Double Shielded IEEE-488 Cable, 2m (6.5 ft)
7007-3	Double Shielded IEEE-488 Cable, 3m (10 ft)
7007-4	Double Shielded IEEE-488 Cable, 4m (13 ft)

### Recommended Service

Model Number*-EW	1 additional year of factory warranty
C/Model Number*-3Y-STD	3 calibrations within 3 years of purchase
C/Model Number*-3Y-DATA	3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase
C/Model Number*-5Y-STD	5 calibrations within 5 years of purchase
C/Model Number*-5Y-DATA	5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

\* Insert Model Number. Example: C/2200-20-5-3Y-DATA.

### Ships with Product

- User Documentation and Driver CD
- Rear Panel Mating Connector
- Calibration Certificate
- Power Cord
- 3-year Warranty



## Model 2231A-30-3 Triple-Channel DC Power Supply

The Model 2231A-30-3 Triple Channel DC Power Supply can output a total of 195W of power, providing the power levels needed to energize a wide range of circuits and devices for benchtop work. Two channels can supply up to 30V at 3A each; the third channel can provide up to 5V at 3A. The Model 2231A-30-1 does not compromise on performance or convenience features, offering the versatility and ease of use you need, so it can be the only DC power supply on your bench.

### Product Highlights

- 195W with two 30V@3A outputs and one 5V@3A output
- All channels are isolated and programmable
- 0.06% basic voltage accuracy and 0.2% basic current accuracy
- Double output levels by connecting two channels in series or parallel
- Optional USB interface
- Fully supported by TekSmartLab™



Connect the two 30V channels in series or parallel to double the output voltage to 60V or the supplied current to 6A.



2231A-30-3 fully supported by TekSmartLab™.

Model	Max Output Voltage	Max Output Current	Power	Ripple & Noise
2231A-30-3	CH1:30V, CH2:30V, CH3:5V	CH1:3A, CH2:3A, CH3:3V	195W	<1mV <sub>RMS</sub> , <5mV <sub>p-p</sub>

### Recommended Accessories

RMU2U	Rack Mount Kit
386-7598-XX	RMU2U Rack Mount Cosmetic Filler Panel
2231A-001	USB Adaptor with USB Cable

### Recommended Service

Model Number*-EW	1-Year KeithleyCare® Gold Plan
Model Number*-5Y-EW	5-Year KeithleyCare Gold Plan
C/Model Number*-3Y-STD	KeithleyCare 3-Yr Std Calibration Plan
C/Model Number*-5Y-STD	KeithleyCare 5-Yr Std Calibration Plan

\* Insert Model Number. Examples: 2231A-5Y-EW, C/2200-20-5-3Y-DATA

### Ships with Product

- Documentation CD
- Calibration Certificate
- Power Cord
- 3-year Warranty





## 2220/2230 Programmable Multiple Channel DC Power Supplies with Remote Sensing

Keithley programmable multi-channel DC power supplies offer an excellent combination of performance, versatility, and ease of use including fully isolated channels, fully programmable channels, and all channel measurements displayed simultaneously. Choose either the dual channel DC power supply or the triple channel DC power supply.

### Product Highlights

- Dual and triple channel models
- Two 30V/1.5A channels
- One 6V/5A channel (on triple channel model)
- All channels are isolated and programmable
- USB interface, USB and GPIB on G versions
- Fully supported by TekSmartLab™



Model 2230G-30-1 rear panel.



Power two isolated circuits with isolated output channels.

Model	Max Output Voltage	Max Output Current	Power	Ripple and Noise
2220-30-1 2220G-30-1* 2220J-30-1 * 2220GJ-30-1 *	Ch 1: 30V, Ch 2:30V	Ch1: 1.5A, Ch 2: 1.5A	45W/channel; 90W total	<1mVRMS, <3mV P-P
2230-30-1 2230G-30-1* 2230J-30-1* 2230GJ-30-1*	Ch1: 30V, Ch 2: 30V, Ch 3: 6V	Ch1: 1.5A, Ch 2: 1.5A, Ch 3: 5A	Ch 1 and Ch 2: 45W each Ch 3: 30W, 120W total	<1mVRMS, <3mV P-P

\*G versions include a GPIB interface; J versions for Japan.

### Recommended Accessories

CS-1655-15	Rear Panel Mating Connector, Multi-Channel
USB-B-1	USB Cable
4299-7	Fixed Rack Mount Kit

### Recommended Service

Model Number*-EW	1 additional year of factory warranty
Model Number*-5Y-EW	2 additional years of factory warranty beyond the standard 3-year warranty
C/Model Number*-3Y-STD	3 calibrations within 3 years of purchase
C/Model Number*-3Y-DATA	3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase
C/Model Number*-5Y-STD	5 calibrations within 5 years of purchase
C/Model Number*-5Y-DATA	5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

\* Insert Model Number. Examples: 2220-30-1-5Y-EW, C/2220-30-1-3Y-DATA

### Recommended Accessories

#### Additional Recommended Accessories for "G" Versions

KP-CI-488LPA	IEEE-488 Interface Board for PCI Bus
7007-05	Double Shielded IEEE-488 Cable, 0.5m (1.6ft)
7007-1	Double Shielded IEEE-488 Cable, 1m (3.2 ft)
7007-2	Double Shielded IEEE-488 Cable, 2m (6.5 ft)
7007-3	Double Shielded IEEE-488 Cable, 3m (10 ft)
7007-4	Double Shielded IEEE-488 Cable, 4m (13 ft)

### Ships with Product

- User Documentation and Driver CD
- Rear Panel Mating Connector
- Calibration Certificate
- Power Cord
- 3-year Warranty



## Series 2260B Programmable DC Power Supplies

Source a wide range of voltages and currents with Series 2260B Programmable DC Power Supplies. All four supplies have constant power outputs to provide a flexible range of voltage and current output combinations. The 360W supplies can output as much as 30V or 80V or as much as 13.5A or 36A, while the 720W supplies can output twice as much current, 72A and 27A, with the same maximum voltage outputs. Series 2260B power supplies offer multiple interfaces that make them well-suited for numerous applications, including research and design, quality control, and production test.

### Product Highlights

- Wide output range with constant power
- Programmable voltage/current rise and fall times
- Constant current priority setting
- Programmable output resistance
- USB, LAN, Analog Control, optional GPIB



Precisely control voltage rise time with the variable slew rate control.



Rear panel of Model 2260B-30-36 or 2260B-80-13

Model	Max Output Voltage	Max Output Current	Power	Ripple and Noise
2260B-30-36	30V	36A	360W	<7 mV <sub>RMS</sub> , <60 mV <sub>p-p</sub>
2260B-80-13	80V	13.5A	360W	<7 mV <sub>RMS</sub> , <60 mV <sub>p-p</sub>
2260B-30-72	30V	72A	720W	<11 mV <sub>RMS</sub> , <80 mV <sub>p-p</sub>
2260B-80-27	80V	27A	720W	<11 mV <sub>RMS</sub> , <80 mV <sub>p-p</sub>

### Recommended Accessories

2260-001	Accessory Kit
2260-002	Simple IDC Tool
2260-003	Contact Removal Tool
2260-004	Basic Accessories kit
2260-005	Cable for 2 units in Series connection
2260-006	Cable for 2 units in Parallel connection
2260-007	Cable for 3 units in Parallel connection
2260B-GPIB-USB	GPIB To USB Adapter
2260B-EXTERM	Extended Terminal
2260B-RMK-JIS	Rack Mount Kit (JIS)
2260B-RMK-EIA	Rack Mount Kit (EIA)

### Recommended Service

Model Number*-EW	3-year factory warranty extended to 1 additional year from date of shipment
Model Number*-5Y-EW	3-year factory warranty extended to 5 years from date of shipment
C/Model Number*-3Y-STD	KeithleyCare 3-Year Standard Calibration Plan
C/Model Number*-3Y-DAT	KeithleyCare 3-Year Calibration with Data Plan
C/Model Number*-5Y-STD	KeithleyCare 5-Year Standard Calibration Plan
C/Model Number*-5Y-DAT	KeithleyCare 5-Year Calibration with Data Plan

\* Insert Model Number. Examples: 2260B-30-36-5Y-EW, C/2260B-30-36-3Y-DAT.

### Ships with Product

- 2260B Basic Accessories Kit
- Test Leads
- USB Cable
- Quick Start Guide
- CD with Manuals and Software Drivers
- Power Cord
- 3-year Warranty

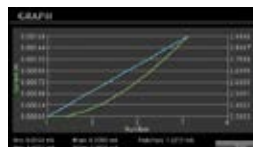


## Series 2280S Precision Measurement DC Power Supplies

Series 2280S Precision Measurement, Low Noise, Programmable DC Power Supplies are much more than just sources of clean power; they are also precision measurement instruments. They can source stable, low noise voltages as well as monitor load currents over a wide dynamic range from amps to nanoamps. The Model 2280S-32-6 can output up to 32V at up to 6A; the Model 2280S-60-3 can output up to 60V at up to 3.2A.

### Product Highlights

- 10nA resolution to 6A with high accuracy, measure voltage and current with 6½-digit resolution
- Capture dynamic load currents as short as 140µs
- Output up to 192W of low noise, linear regulated power
- Programmable rise and fall times eliminate voltage overshoot and undershoot transients
- Built-in graphing simplifies analyzing trends or displaying voltage or current waveforms
- GPIB, USB, and LAN interfaces, built-in LXI web interface simplifies automated control/monitoring/data logging



Built-in graphing simplifies analyzing trends or displaying voltage or current waveforms.



Remote control or monitor the supply using its web browser over the LAN LXI interface.



KickStart software DC power supply main screen.

Model	Max Output Voltage/Current	Output Power	Max Current Measurement Accuracy	Transient Response Time
2280S-32-6	32V/6A	192W	±(0.05% + 10 µA)	<50µs
2280S-60-3	60V/3.2A	192W	±(0.05% + 10 µA)	<50µs

### Recommended Accessories

2280-001	Rear Panel Mating connector and Cover
2280-Test-Lead	Power Supply Test Lead Kit, 1000V, 20A Rating
CA-180-3A	LAN Crossover Cable
USB-B-1	USB Cable Type A to B, 1m (3.3 ft)
2450-TLINK	Trigger Link cable to connect 2280S digital I/O to Trigger Link I/O on other Keithley instruments
4299-8	Single Fixed Rack-Mount Kit
4299-9	Dual Fixed Rack-Mount Kit
4299-10	Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 26xx Instrument
4299-11	Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 24xx, Series 2000, or 2U Agilent Instrument

### Recommended Accessories

7007-05	Double Shielded Premium IEEE-488 Interface Cables, 0.5m (1.6 ft)
7007-1	Double Shielded Premium IEEE-488 Interface Cables, 1m (3.2 ft)
7007-2	Double Shielded Premium IEEE-488 Interface Cables, 2m (6.5 ft)
7007-3	Double Shielded Premium IEEE-488 Interface Cables, 3m (10 ft)
7007-4	Double Shielded Premium IEEE-488 Interface Cables, 4m (13 ft)
KP-CI-488LPA	IEEE-488.2 Interface Board for the PCI Bus

### Ships with Product

- KickStart software
- 2280-001 output mating connector
- LAN crossover cable
- Documentation CD
- QuickStart guide
- Calibrate Certificate
- Power Cord
- 3-year Warranty



## Series 2268 850W DC Power Supplies

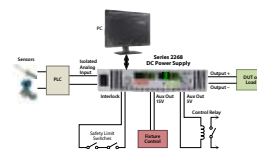
Series 2268 power supplies provide both analog and digital control options and a number of digital interface options and can operate in constant voltage (CV), constant current (CC), or constant power modes to address a broad array of applications. These high-efficiency, soft-starting power supplies provide reliable performance and long life. Packaged in low profile 1U high, half-rack width enclosures, they offer the highest power density in the smallest package.

### Product Highlights

- Compact 1U high, half-rack wide
- 5V and 15V auxiliary outputs
- Isolated and non-isolated analog inputs and outputs
- Foldback mode with programmable delay
- Control up to 30 supplies through one interface
- LAN, USB, GPIB, RS-232, RS-485, and analog I/O are all standard



Series 2268 rear panel showing all the interfaces.



Control a 2268 supply with analog inputs and control external devices with the auxiliary outputs.

Model	Max Output Voltage	Max Output Current	Power	Ripple	Noise
2268-20-42	20V	42A	850W	50mV <sub>p-p</sub>	8mV <sub>RMS</sub>
2268-40-21	40V	21A	850W	50mV <sub>p-p</sub>	8mV <sub>RMS</sub>
2268-60-14	60V	14A	850W	50mV <sub>p-p</sub>	8mV <sub>RMS</sub>
2268-80-10	80V	10.5	850W	80mV <sub>p-p</sub>	8mV <sub>RMS</sub>
2268-100-8	100V	8.5A	860W	80mV <sub>p-p</sub>	8mV <sub>RMS</sub>
2268-150-5	150V	5.6A	850W	100mV <sub>p-p</sub>	10mV <sub>RMS</sub>

### Recommended Accessories

2268-HDR	Hardware to Connect Test Lead Lugs to the 2268-20-42 or 2268-40-21
2268-RMK-1	Rack Mount Kit for One Series 2268 DC Power Supply
2268-RMK-2	Rack Mount Kit for Two Series 2268 DC Power Supplies
CA-180-3A	LAN Crossover Cable
USB-B-1	USB Cable Type A to B, 1m (3.3 ft)
KP-CI-488LPA	IEEE-488.2 Interface Board for the PCI Bus
KUSB-488B	IEEE-488.2 USB-GPIB Interface Adapter for USB Port

### Recommended Accessories

7007-05	Double Shielded Premium IEEE-488 Interface Cables, 0.5m (1.6 ft)
7007-1	Double Shielded Premium IEEE-488 Interface Cables, 1m (3.2 ft)
7007-2	Double Shielded Premium IEEE-488 Interface Cables, 2m (6.5 ft)
7007-3	Double Shielded Premium IEEE-488 Interface Cables, 3m (10 ft)
7007-4	Double Shielded Premium IEEE-488 Interface Cables, 4m (13 ft)

### Ships with Product

- CD with user manual
- Test lead connection hardware (for 2268-20-42 and 2268-40-21 only)
- Power cord

### Recommended Service

Model Number*-EW	1 additional year of factory warranty
Model Number*-5Y-EW	2 additional years of factory warranty beyond the standard 3-year warranty
C/Model Number*-3Y-STD	3 calibrations within 3 years of purchase
3Y-DATA	3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase
C/Model Number*-5Y-STD	5 calibrations within 5 years of purchase
C/Model Number*-5Y-DATA	5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

\* Insert Model Number. Examples: 2268-40-21-5Y-EW, C/2268-40-21-3Y-DATA.



## 2290 High Voltage Power Supplies

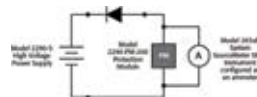
Series 2290 High Voltage Power Supplies facilitate high voltage device and material testing, as well as high energy physics experimentation. The Model 2290-5 5kV Power Supply provides voltage outputs up to 5000V, and the Model 2290-10 10kV Power Supply offers up to 10,000V. These supplies measure both output voltage with 1V resolution and output current with 1 $\mu$ A resolution.

## Product Highlights

- Source voltages up to 5kV and 10kV
- 1 $\mu$ A current measurement resolution
- Low noise for precision sourcing and sensitive measurements; selectable filters reduce noise to less than 3mV<sub>RMS</sub> on the 5kV supply
- Safety interlock controls high voltage output
- GPIB programmable
- Protection module prevents damage to low voltage instrumentation



The Model 2290-PM-200 Protection Module protects low voltage measurement equipment from voltages greater than 200V.



Reverse breakdown testing of a high voltage diode using a Keithley SourceMeter® SMU instrument to measure leakage currents down to pA levels. The Model 2290-PM-200 SMU Protection Module protects the SourceMeter SMU instrument from high voltage when the diode breaks down.

Model	Max Output Voltage	Max Output Current	Power	Ripple
2290-5	5kV	5mA	25W	3mV <sub>RMS</sub> maximum with filter
2290-10	10kV	1mA	10W	1V <sub>RMS</sub>

## Recommended Accessories

## For 2290-5

2290-5-SHV	5kV SHV Female—SHV Female Cable, 3m (10 ft)
2290-5-MHV	5kV SHV Female—MHV Male Cable, 3m (10 ft)
2290-5-SHVBH	5kV SHV Male Bulkhead Connector
2290-5-RMK-1	Single Fixed Rack Mount Kit for 5kV Power Supply
2290-5-RMK-2	Dual Fixed Rack Mount Kit for 5kV Power Supply

For 2290-10:

2290-10-SHVUC	10kV SHV Male to Unterminated Cable, 3m (10ft)
2290-10-SHV	10kV SHV Male-SHV Male Cable, 3m (10 ft)
2290-10-SHVBH	10kV SHV Female Bulkhead Connector
2290-10-RMK-1	Single Fixed Rack Mount Kit for 10kV Power Supply
2290-10-RMK-2	Dual Fixed Rack Mount Kit for 10kV Power Supply

## Recommended Accessories

For both:

2290-PM-200	10kV Protection Module
2290-INT-CABLE	3-Pin Connector to Unterminated Interlock Cable
4299-7	Fixed Shelf Rack Mount Kit
KP-CI-488LPA	IEEE-488.2 Interface Board for the PCI Bus
KUSB-488B	IEEE-488.2 USB-GPIB Interface Adapter for USB port with built-in 2m (6.6 ft) cable
7007-05	Double Shielded Premium IEEE-488 Interface Cable, 0.5m (1.6 ft)
7007-1	Double Shielded Premium IEEE-488 Interface Cable, 1m (3.2 ft)
7007-2	Double Shielded Premium IEEE-488 Interface Cable, 2m (6.5 ft)
7007-3	Double Shielded Premium IEEE-488 Interface Cable, 3m (10 ft)
7007-4	Double Shielded Premium IEEE-488 Interface Cable, 4m (13 ft)

## Ships with Product

- CD with User Manual, Software Drivers, and Accessory Information
- Power Cord

### Recommended Service

Model Number*-3Y-EW	1-Year Factory Warranty extended to 3 years from date of shipment
Model Number*-5Y-EW	1-Year Factory Warranty extended to 5 years from date of shipment
C/Model Number*-3Y-STD	KeithleyCare 3-Year Standard Calibration Plan

\* Insert Model Number. Examples: 2290-5-3Y-EW, C/2290E-10-3Y-STD





## Series 2300 Portable Device Battery/Charger Simulators

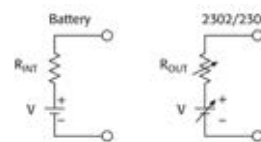
Keithley's battery simulating power supplies can simulate a battery's output characteristics and its discharged state. These supplies can measure low, sleep mode load current and pulsed output load current. Dual channel models facilitate testing portable device, charge control circuitry with a battery channel and a charger simulator channel.

### Product Highlights

- Optimized for battery-powered device testing
- 100nA current measurement sensitivity
- Load pulse current measurement: 33 $\mu$ s - 833 $\mu$ s
- Variable output resistance: 0 - 1 $\Omega$  with 10m $\Omega$  resolution
- Measure sleep, currents, standby currents, and full load currents to determine power consumption
- Sink current to simulate a discharged battery



Model 2306 Rear Panel.



Simplified schematic of a battery and the 2302/2306.

Model	Channels	Max Output Voltage / Current	Power	Transient Response to a 10X Load Current Change	Current Sink Capacity
2302, 2302-PJ	1	15 V / 5 A	42W	<40 $\mu$ s recovery time and <75mV voltage drop	3A
2306, 2306-PJ	2	15 V / 5 A	45W	<40 $\mu$ s recovery time and <75 mV voltage drop	3A
2306-VS	2	15 V / 5 A	45W	<40 $\mu$ s recovery time and <75 mV voltage drop	3A
2308	2	15 V / 5 A	45W	<35 $\mu$ s recovery time and <90 mV voltage drop	3A

### Recommended Accessories

2306-DISP	Remote Display (2302, 2306, 2308)
CS-846	Mating Output Connector
SC-182	Low Inductance Coaxial Cable
4288-1	Single Fixed Rack Mount Kit
4288-2	Dual Fixed Rack Mount Kit
KPCI-488LPA	IEEE-488 Interface Board for PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

### Recommended Accessories

7007-05	Double Shielded IEEE-488 Cable, 0.5m (1.6ft)
7007-1	Double Shielded IEEE-488 Cable, 1m (3.2 ft)
7007-2	Double Shielded IEEE-488 Cable, 2m (6.5 ft)
7007-3	Double Shielded IEEE-488 Cable, 3m (10 ft)
7007-4	Double Shielded IEEE-488 Cable, 4m (13 ft)

### Ships with Product

- User Documentation
- Rear Panel Mating Connector
- Calibration Certificate
- Power Cord
- 1-year Warranty

### Recommended Service

Model Number*-3Y-EW	1-year factory warranty extended to 3 years from date of shipment
Model Number*-PJ-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

\* Insert Model Number. Example: 2302-3Y-EW.



## 2303/2304A High Speed Power Supplies

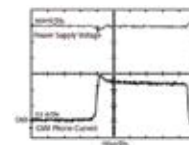
The Model 2303/2304A Power Supplies provide both voltage control and power consumption monitoring for automated testing of portable, battery-operated devices. They are optimized for testing battery-operated, wireless communication devices such as cellular phones that undergo substantial load changes for very short time intervals.

### Product Highlights

- Ultra-fast response times to load changes
- Optimized for battery-powered device testing
- 100nA current measurement sensitivity
- Load pulse current measurement: 33 $\mu$ s - 833 $\mu$ s
- Measure sleep, standby currents, and full load currents to determine power consumption
- Sink current to simulate a discharged battery



Model 2303 or 2304A rear panel.



Keithley's high speed power supplies maintain a stable voltage during large load changes.

Model	Channels	Max Output Voltage / Current	Power	Transient Response to a 10X Load Current Change	Current Sink Capacity
2303	Single Output	15V/3A or 9V/5A	45W	<40 $\mu$ s recovery time and <100mV voltage drop	2A
2304A	Single Output	20V/5A	100W	<40 $\mu$ s recovery time and <100mV voltage drop	3A

### Recommended Accessories

2304-DISP	Remote Display (2303, 2304A)
CS-846	Mating Output Connector
SC-182	Low Inductance Coaxial Cable
4288-1	Single Fixed Rack Mount Kit
4288-2	Dual Fixed Rack Mount Kit
KPCI-488LPA	IEEE-488 Interface Board for PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

### Recommended Accessories

7007-05	Double Shielded IEEE-488 Cable, 0.5m (1.6ft)
7007-1	Double Shielded IEEE-488 Cable, 1m (3.2 ft)
7007-2	Double Shielded IEEE-488 Cable, 2m (6.5 ft)
7007-3	Double Shielded IEEE-488 Cable, 3m (10 ft)
7007-4	Double Shielded IEEE-488 Cable, 4m (13 ft)

### Ships with Product

- User Documentation
- Rear Panel Mating Connector
- Calibration Certificate
- Power Cord
- 1-year Warranty

### Recommended Service

Model Number*-3Y-EW	1-year factory warranty extended to 3 years from date of shipment
C/Model Number*-3Y-ISO	3 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2303, 2303-PJ*

\* Insert Model Number. Examples: 2303-3Y-EW, C/2303-3Y-ISO.



## Frequency Counter/Timers

Featuring the precision and intuitive operation you’ve come to expect from our oscilloscopes, Tektronix counter/timers are built with performance and convenience in mind. Featuring industry-leading resolution, built-in measurement and analysis modes.



	FCA3000	FCA3100	MCA3000
Frequency Range	400 MHz, 3 GHz, 20 GHz	400 MHz, 3 GHz, 20 GHz	27 GHz, 40 GHz
Resolution	<ul style="list-style-type: none"><li>100 ps (time)</li><li>12 digits/s (freq)</li></ul>	<ul style="list-style-type: none"><li>50 ps (time)</li><li>12 digits/s (freq)</li></ul>	<ul style="list-style-type: none"><li>100 ps (time)</li><li>12 digits/s (freq)</li></ul>
Data Transfer	<ul style="list-style-type: none"><li>250 k Samples/sec (internal)</li><li>5 k Samples/sec (block)</li></ul>	<ul style="list-style-type: none"><li>250 k Samples/sec (internal)</li><li>15 k Samples/sec (block)</li></ul>	<ul style="list-style-type: none"><li>250 k Samples/sec (internal)</li><li>5 k Samples/sec (block)</li></ul>
Measurements	13 Automated Measurements Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p	14 Automated Measurements Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p, Totalize	13 Automated Measurements Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p + An Integrated Power Meter
Analysis Modes	TrendPlot™, Measurement Statistics, Allan Deviation, Histogram	TrendPlot™, Measurement Statistics, Allan Deviation, Histogram	TrendPlot™, Measurement Statistics, Allan Deviation, Histogram
Connectivity	Rear panel: USB device port, GPIB PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version)	Rear panel: USB device port, GPIB PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version)	Rear panel: USB device port, GPIB PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version)

## Choosing Your Counter/Timer

To help you choose the right counter/timer for your needs, the most common selection criteria are listed below, along with helpful tips for determining your requirements.

### 1 Frequency Resolution

The frequency resolution is the smallest change the counter/timer can detect in closely spaced frequencies. The resolution is influenced by the time setting on the instrument, i.e., longer time settings (averaged) will display more digits. In general this feature is expressed as the number of digits per second shown on the instrument’s display (e.g., 12 digits/s). More digits indicate a higher frequency resolution.

### 2 Time Resolution

For timing measurements this feature represents the smallest “time” change that the instrument can detect. Time resolution is sometimes described as “single shot” resolution and is generally measured in picoseconds, e.g., 50 ps. The lower the number, the better the time resolution feature.

### 3 Time Base Stability

The internal time base establishes the reference against which input signals are measured. The better the time base, the more accurate your measurements can be. Most counters employ a quartz crystal as the internal time base element which comes in 3 basic types; Room Temperature (RTXO), Temperature Compensated (TCXO) and Oven Control (OCXO). TCXO and OCXO devices are more stable and when used as the internal time base, the instrument will consistently yield accurate and reliable results.

### 4 Analysis Capability

When choosing your counter/timer, you should review available analysis modes, such as trend plotting, measurement statistics, histograms and modulation domain analysis to ensure your needs are met.

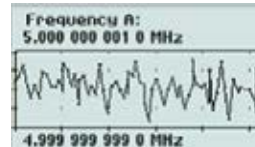


## FCA3100/3000 Series

Looking to capture small frequency and time changes? Look no further than this Timer/Counter/Analyzer. Capture small changes in your signal with industry-leading frequency and time resolution. Quickly and accurately analyze signals with 13 automated measurements and comprehensive built-in analysis modes, including measurement statistics, histograms and trending. Get unparalleled ease of use with intuitive operation and USB connectivity. It's everything you need in a Timer/Counter/Analyzer. And more.

### Product Highlights

- 12 digit/sec frequency resolution
- 50 ps (FCA3100) or 100 ps (FCA3000) single-shot time resolution
- 0.001° phase resolution
- 250 k readings/sec data transfer rate to internal memory
- 13 automated frequency, time, phase and voltage measurements



See how your device is changing over time with built-in analysis modes – TrendPlot™, histograms and statistics.



Easily connect to a PC with the USB and GPIB ports.

Models	Max. Frequency	Channels	Time Resolution	Frequency Resolution
FCA3000	400 MHz	2	100 ps	12 digit/s
FCA3003	3 GHz	2 – 400 MHz 1 – 3 GHz	100 ps	12 digit/s
FCA3020	20 GHz	2 – 400 MHz 1 – 20 GHz	100 ps	12 digit/s
FCA3100	400 MHz	2	50 ps	12 digit/s
FCA3103	3 GHz	2 – 400 MHz 1 – 3 GHz	50 ps	12 digit/s
FCA3120	20 GHz	2 – 400 MHz 1 – 20 GHz	50 ps	12 digit/s

### Recommended Accessories

174-4401-xx	USB Host to Device Cable, 3 Feet
012-0991-xx	GPIB Cable, Double Shielded
012-1256-xx	BNC Male to BNC Male, 9 Feet
ACD4000	Soft Carrying Case
HCTEK-4321	Hard Carrying Case
RMU2U	Rackmount Shelf Kit for 2 Units
TVA3000	TimeView™ Modulation Domain Analysis Software

### Instrument Options

MS	Medium Stability OCXO Timebase, 2 X 10 <sup>-7</sup>
HS	High Stability OCXO Timebase, 5 X 10 <sup>-8</sup>
RP	Rear-panel Connectors

### Recommended Service

SILV200	5-year Extended Warranty (FCA3000, FCA3003, FCA3100, FCA3103)
SILV400	5-year Extended Warranty (FCA3020, FCA3120)

### Ships with Product

- Trial Version of TimeView™ Software and NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate
- User Manual on CD
- Programmers Guide & Technical Specifications
- Power Cord
- 3-year Warranty



### MCA3000 Series

Feature-rich. Fully loaded. No matter how you say it, this microwave timer/counter is packed with functionality. Measure up to 40 GHz signals. And, get two extra 300 MHz timer/counter ports for added versatility. Quickly and accurately analyze signals with 13 automated measurements and comprehensive analysis modes, including statistics, histograms and trending. Get unparalleled ease of use with intuitive operation and USB connectivity. Finally, fully-loaded comes standard.

### Product Highlights

- 12 digit/sec frequency resolution
- 100 ps single-shot time resolution
- 250 k readings/sec data transfer rate to internal memory
- 13 automated frequency, time, phase and voltage measurements
- Integrated power meter



See how your device is changing over time with built-in analysis modes – TrendPlot™, histograms and statistics.



Easily connect to a PC with the USB and GPIB ports.

Models	Max. Frequency	Channels	Time Resolution	Frequency Resolution
MCA3027	27 GHz	2 – 300 MHz 1 – 27 GHz	100 ps	12 digit/s
MCA3040	40 GHz	2 – 300 MHz 1 – 40 GHz	100 ps	12 digit/s

### Recommended Accessories

174-4401-xx	USB Host to Device Cable, 3 Feet
012-0991-xx	GPIB Cable, Double Shielded
012-1256-xx	BNC Male to BNC Male, 9 Feet
AC4000	Soft Carrying Case
HCTEK-4321	Hard Carrying Case
RMU2U	Rackmount Shelf Kit for 2 Units
TVA3000	TimeView™ Modulation Domain Analysis Software

### Instrument Options

HS	High Stability OCXO Timebase, 5 X 10 <sup>-8</sup>
US	Ultra High Stability OCXO Timebase, 1.5 X 10 <sup>-8</sup>

### Recommended Service

SILV600	5-year Extended Warranty
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### Ships with Product

- Trial Version of TimeView™ Software and NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate
- User Manual on CD
- Programmers Guide & Technical Specifications
- Power Cord
- 3-year Warranty







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Contact List Updated June 2013

### For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com)



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