2015 Bench Products
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

6 Advanced Instruments Built In

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

*Starting price includes an oscilloscope, spectrum analyzer and digital voltmeter. Other instruments and bandwidth may be added for additional cost. © 2015 Tektronix, Inc.
New Products

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.

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.
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.

See page 31

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 63

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 19

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 27

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 63

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.

See page 45

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

<table>
<thead>
<tr>
<th>Tektronix Factory Experts</th>
<th>Tektronix Factory Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comprehensive and Thorough Treatment</th>
<th>Comprehensive and Thorough Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficiency and Convenience</th>
<th>Efficiency and Convenience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our team of professionals focus on getting your instruments back to you as soon as possible, minimizing your downtime and increasing your operating efficiency.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flexible Repair and Calibration Service</th>
<th>Flexible Repair and Calibration Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tektronix offers you the choice of a cost effective, flexible service package to meet your specific business needs.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tektronix Factory-Certified Service Plans</th>
<th>Calibration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Silver Care</strong></td>
<td><strong>Platinum Care</strong></td>
</tr>
<tr>
<td>Choose between a 3- or 5-year extended warranty plan</td>
<td>Choose from multi-year contracts and single event calibrations</td>
</tr>
<tr>
<td>No purchase orders, quotes, or approval delays – one phone call away starts the repair process</td>
<td>Accredited and traceable calibration</td>
</tr>
<tr>
<td>Covers equipment, parts, labor and transportation</td>
<td>Adjustments included to restore performance</td>
</tr>
<tr>
<td>Includes applicable software, safety and reliability updates</td>
<td>Applicable software, safety, and reliability updates</td>
</tr>
<tr>
<td>Faster repair time than without coverage (average is 5 days faster)</td>
<td>Calibration records retention</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silver Care Packages</th>
<th>Gold Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the benefits of our popular Silver Care Plan in a convenient take-home package</td>
<td>Choose between a 3- or 5-year extended warranty plan</td>
</tr>
<tr>
<td>Each package includes a unique activation code to effortlessly initiate and manage your service coverage online</td>
<td>Loaner product of equal or higher performance shipped within 24 hours</td>
</tr>
<tr>
<td>May be purchased any time during the original warranty period</td>
<td>Priority access to Global Tektronix Customer Call Center for technical support</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platinum Care</th>
<th>Calibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom-tailored plan with a typical downtime of less than 1 hour</td>
<td>Choose from multi-year contracts and single event calibrations</td>
</tr>
<tr>
<td>Identically configured spare products dedicated to your facility</td>
<td>Accredited and traceable calibration</td>
</tr>
<tr>
<td>On-site calibration event and repair coverage</td>
<td>Adjustments included to restore performance</td>
</tr>
<tr>
<td>Priority access to technical support, and flexible contract duration and payment terms</td>
<td>Applicable software, safety, and reliability updates</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silver Care</th>
<th>Silver Care Packages</th>
<th>Gold Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical downtime of 48 hours or less</td>
<td>Typical downtime of 48 hours or less</td>
<td>Typical downtime of 48 hours or less</td>
</tr>
</tbody>
</table>
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.
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

   ![Typical frequency response curve for a general purpose oscilloscope](image1)

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.
### Advanced Signal Analysis Oscilloscopes

<table>
<thead>
<tr>
<th>MSO/DPO5000B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Channels</strong></td>
</tr>
<tr>
<td>4 analog channels; 16 digital channels (MSO5000B)</td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
</tr>
<tr>
<td>350 MHz to 2 GHz</td>
</tr>
<tr>
<td><strong>Spectrum Analyzer Frequency Range</strong></td>
</tr>
<tr>
<td>--</td>
</tr>
<tr>
<td><strong>Sample Rate</strong></td>
</tr>
<tr>
<td>5 GS/s to 10 GS/s (analog); 60.6 ps (16.5 GS/s) MagniVu™ (digital)</td>
</tr>
<tr>
<td><strong>Max Record Length</strong></td>
</tr>
<tr>
<td>Up to 250 Mpoints</td>
</tr>
<tr>
<td><strong>Trigger Types</strong></td>
</tr>
<tr>
<td>Edge, Sequence, Logic, Pulse Width, Glitch, Runt, Timeout, Transition, Set-up and Hold, Rise/Fall Time, Video, PC*, SPI*, USB (Low, Full, High)<em>, RS-232/422/485/UART</em>, Parallel (MSO5000B), Visual Trigger</td>
</tr>
<tr>
<td><strong>Optional Serial Bus Decode and Analysis</strong></td>
</tr>
</tbody>
</table>
| SR-AERO: MIL-STD 1553
SR-AUTO: CAN/LIN/FlexRay
SR-COMP: RS-232/422/485/UART
SR-DPHY: MIPI D-PHY
SR-BMBD: P, SPI
SR-BNET: 10/100Base-T Ethernet
SR-USB: USB
SR-VNM: CAN, LIN |
<p>| <strong>Connectivity</strong> |
| USB Host (x6), USB Device, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), Video Out, GPIB* |
| <strong>Waveform Math and Analysis</strong> |
| <strong>Optional:</strong> |
| BroadR-Reach Compliance Test; DDR Memory Bus Analysis; DPOJET Advanced Jitter and Eye Diagram Analysis; ET3: Ethernet Compliance Test Solution; MTM: Mask Testing; Power Analysis; SignalVu Vector Signal Analysis; USB: USB Compliance Test Solution; MOST: MOST 50/150 Compliance Test Solution; HSIC: HSIC Electrical Validation; USBPWR: USB Power Adapter/ EPS Compliance Automated Test Solution |</p>
<table>
<thead>
<tr>
<th><strong>Software</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battery Operation</strong></td>
</tr>
<tr>
<td>--</td>
</tr>
<tr>
<td><strong>Upgrade</strong></td>
</tr>
</tbody>
</table>
| - Add 16 digital channels
- Add extended record length, up to 250 Mpoints
- Add serial bus compliance testing
- Add measurements and analysis (power, jitter, limit/mask)
- Add serial bus triggering and decode |
## Oscilloscopes Selection

### Mixed Signal and Mixed Domain Oscilloscopes

<table>
<thead>
<tr>
<th>Feature</th>
<th>MSO/DPO2000B</th>
<th>MDO3000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Channels</strong></td>
<td>2, 4 analog channels; 16 digital channels (MSO2000B)</td>
<td>2, 4 analog channels; 16 digital channels (with MDO3MSO option)</td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>70 MHz to 200 MHz</td>
<td>100 MHz to 1 GHz</td>
</tr>
</tbody>
</table>
| **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, PC*, SPI*, CAN*, LIN*, RS-232/422/485/UART*, Parallel (MSO2000B)  
*Optional |
| **Optional Serial Bus Decode and Analysis** | DPO2AUTO: CAN and LIN  
DPO2COMP: RS-232/422/485/UART  
DPO2EMBD: PC, SPI  
DPO2BND: Enables DPO2AUTO, DPO2COMP, DPO2EMBD | MDO3AERO: MIL-STD-1553  
MDO3AUDIO: I2S, LJ, RJ, TDM  
MDO3AUTO: CAN and LIN  
MDO3COMP: RS-232/422/485/UART  
MDO3EMBD: PC, 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 |
Optional:  
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** | -- | -- |
| **Upgrade** | • Add serial bus triggering and decode | • Increase bandwidth  
• Add Arbitrary/Function generator  
• Add 16 digital channels  
• Increase spectrum analyzer maximum frequency to 3 GHz  
• Add measurements and analysis (power, limit/mask)  
• Add serial bus triggering and decode |
## Oscilloscopes Selection

### MDO4000B

- **Channels**: 4 analog channels; 16 digital channels; 1 spectrum analyzer input
- **Bandwidth**: 100 MHz to 1 GHz (analog)
- **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)
- **Max Record Length**: Up to 20 Mpoints
- **Optional**: *With optional MDO4TRIG module, RF power level can be used as source for Pulse Width, Timeout, Runt, Logic, Sequence

### MSO/DPO4000B

- **Channels**: 2, 4 analog channels; 16 digital channels (MSO4000B)
- **Bandwidth**: 100 MHz to 1 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)
- **Max Record Length**: Up to 20 Mpoints

### Optional Serial Bus Decode and Analysis

- **DPO4AERO**: MIL-STD-1553
- **DPO4AUDIO**: I'S, LJ, RJ, TDM
- **DPO4AUTO**: CAN and LIN
- **DPO4AUTOMAX**: CAN, LIN and FlexRay
- **DPO4COMP**: RS-232/422/485/UART
- **DPO4EMBD**: PC, SPI
- **DPO4ENET**: Ethernet
- **DPO4USB**: USB
- **DPO4BIND**: Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PWR, DPO4USB, DPO4VID

### Connectivity

- **USB Host**: (x4), USB Device, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), Video Out, GPIB* [Optional]
- **USB Host**: (x4), USB Device, LAN (10/100/1000 Base-T Ethernet, LXI Class C Compliant), Video Out, GPIB* [Optional]

### Waveform Math and Analysis

- **Automated Measurements**: 45, 42
- **Optional**: DPO4LMT: Limit and Mask Testing
- **Optional**: DPO4TRIG: Adv. RF Power Level Trigger
- **Optional**: DPO4PWR: Power Analysis
- **Optional**: DPO4VID: HDTV and Custom Triggering

### Software

- **PC Communications Software**: OpenChoice® Desktop
- **Vector Signal Analysis Software**: SignalVu-PC
- **PC Communications Software**: OpenChoice® Desktop
- **Vector Signal Analysis Software**: SignalVu-PC

### Battery Operation

- --
- --

### Upgrade

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

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Learn more at [Test Equipment Depot](http://www.TestEquipmentDepot.com) - 800.517.8431 - 99 Washington Street Melrose, MA 02176 - TestEquipmentDepot.com
## Basic Oscilloscopes

<table>
<thead>
<tr>
<th></th>
<th>TBS1000</th>
<th>TBS1000B/ TBS1000B-EDU</th>
<th>THS3000</th>
<th>TPS2000B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Channels</strong></td>
<td>4</td>
<td>2</td>
<td>4 (isolated)</td>
<td>2, 4 (isolated)</td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>60 MHz to 150 MHz</td>
<td>50 MHz to 200 MHz</td>
<td>100 MHz to 200 MHz</td>
<td>100 MHz to 200 MHz</td>
</tr>
<tr>
<td><strong>Sample Rate</strong></td>
<td>1 GS/s</td>
<td>1 GS/s to 2 GS/s</td>
<td>2.5 GS/s to 5 GS/s</td>
<td>1 GS/s to 2 GS/s</td>
</tr>
<tr>
<td><strong>Max Record Length</strong></td>
<td>2.5 k points</td>
<td>2.5 k points</td>
<td>10 k points</td>
<td>2.5 k points</td>
</tr>
<tr>
<td><strong>Trigger Types</strong></td>
<td>Edge, Pulse (width), Video</td>
<td>Edge, Pulse (width), Video</td>
<td>Edge, Pulse (width), Event, Video, Non-interlaced</td>
<td>Edge, Pulse (width), Video</td>
</tr>
<tr>
<td><strong>Optional Serial Bus</strong></td>
<td><strong>Decode and Analysis</strong></td>
<td><strong>Connectivity</strong></td>
<td><strong>Waveform Math and Analysis</strong></td>
<td><strong>Software</strong></td>
</tr>
<tr>
<td><strong>Connectivity</strong></td>
<td>USB Host, USB Device, GPIB* <strong>Optional</strong></td>
<td>USB Host, USB Device, GPIB* <strong>Optional</strong></td>
<td>USB Host, USB Device</td>
<td>RS-232 (includes RS-232-to-USB Host Serial Cable), Centronics, CompactFlash</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>PC Communications Software: OpenChoice® Desktop, Educator Classroom and Lab Resource CD</td>
<td>PC Communications Software: OpenChoice® Desktop Software, PC Courseware Editor Tool, Product Documentation and Lab Resource CD</td>
<td>PC Communications Software: OpenChoice® Desktop</td>
<td>PC Communications Software: OpenChoice® Desktop</td>
</tr>
<tr>
<td><strong>Battery Operation</strong></td>
<td>--</td>
<td>--</td>
<td>One THSBAT Battery Pack Included Standard</td>
<td>One TPSBAT Battery Pack Included Standard</td>
</tr>
</tbody>
</table>

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## Battery Powered Oscilloscopes with Isolated Channels

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

<table>
<thead>
<tr>
<th></th>
<th>TDS2000C</th>
<th>TDS3000C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>2, 4</td>
<td>2, 4</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>50 MHz to 200 MHz</td>
<td>100 MHz to 500 MHz</td>
</tr>
<tr>
<td>Sample Rate</td>
<td>500 MS/s to 2 GS/s</td>
<td>1.25 GS/s to 5 GS/s</td>
</tr>
<tr>
<td>Max Record Length</td>
<td>2.5 k points</td>
<td>10 k points</td>
</tr>
<tr>
<td>Trigger Types</td>
<td>Edge, Pulse (width), Video</td>
<td>Edge, Logic (Pattern, State), Pulse (Glitch, Width, Runt, Slew Rate), Video, Extended Video*, Comm* “Optional”</td>
</tr>
<tr>
<td>Optional Serial Bus</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Decode and Analysis</td>
<td>USB Host, USB Device, GPIB* “Optional”</td>
<td>USB Host, LAN (10Base-T Ethernet) Optional: TDS3GV Module: GPIB, RS-232, and Video Out</td>
</tr>
<tr>
<td>Connectivity</td>
<td>USB Host, GPIB* “Optional”</td>
<td>LAN (10Base-T Ethernet) Optional: TDS3GV Module: GPIB, RS-232, and Video Out</td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td>PC Communications Software: OpenChoice® Desktop</td>
<td>PC Communications Software: OpenChoice® Desktop</td>
</tr>
<tr>
<td>Battery Operation</td>
<td>--</td>
<td>Requires Optional TDS3BATC Battery Pack</td>
</tr>
</tbody>
</table>

### 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.

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**
Mixed Signal and Mixed Domain Oscilloscopes

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<sup>®</sup>
- 29 automated measurements and FFT analysis
- 5-year warranty

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<sup>®</sup>. Entry level has never been so powerful.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Digital Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPO2002B</td>
<td>2</td>
<td>--</td>
<td>70 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>MSO2002B</td>
<td>2</td>
<td>16</td>
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<td>DPO2004B</td>
<td>4</td>
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<td>70 MHz</td>
<td>1 GS/s</td>
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<td>4</td>
<td>16</td>
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<td>1 GS/s</td>
</tr>
<tr>
<td>DPO2012B</td>
<td>2</td>
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<td>100 MHz</td>
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<td>DPO2014B</td>
<td>4</td>
<td>--</td>
<td>100 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>MSO2014B</td>
<td>4</td>
<td>16</td>
<td>100 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>DPO2022B</td>
<td>2</td>
<td>--</td>
<td>200 MHz</td>
<td>1 GS/s</td>
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<tr>
<td>MSO2022B</td>
<td>2</td>
<td>16</td>
<td>200 MHz</td>
<td>1 GS/s</td>
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<tr>
<td>DPO2024B</td>
<td>4</td>
<td>--</td>
<td>200 MHz</td>
<td>1 GS/s</td>
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<tr>
<td>MSO2024B</td>
<td>4</td>
<td>16</td>
<td>200 MHz</td>
<td>1 GS/s</td>
</tr>
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</table>

Application Modules

Table: Application Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPO2BND</td>
<td>Enables DPO2AUTO, DPO2COMP, DPO2EMBD</td>
</tr>
<tr>
<td>DPO2AUTO</td>
<td>Automotive (CAN, LIN)</td>
</tr>
<tr>
<td>DPO2COMP</td>
<td>Computer (RS-232)</td>
</tr>
<tr>
<td>DPO2EMBD</td>
<td>Embedded (I&lt;sup&gt;-&lt;/sup&gt;C, SPI)</td>
</tr>
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</table>

Recommended Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPO2CONN</td>
<td>Ethernet and Video Out Connectivity Module</td>
</tr>
<tr>
<td>119-7465-xx</td>
<td>TekVPI External Power Supply</td>
</tr>
<tr>
<td>ACD2000</td>
<td>Soft Carrying Case</td>
</tr>
</tbody>
</table>

Recommended Probes

Passive Voltage Probes
- TPP0200: 200 MHz, 300 V CAT II

Active Voltage Probes
- TAP1500<sup>®</sup>: 10X, 1.5 GHz, ± 8 V

Differential Voltage Probes
- TDP5000<sup>®</sup>: 500 MHz, ± 4 V/± 4.25 V

High Voltage Probes
- THDP0200<sup>®</sup>: 200 MHz, ± 1500 V/± 150 V
- TMDO2000<sup>®</sup>: 200 MHz, ± 750 V/± 75 V
- THDP1000<sup>®</sup>: 100 MHz, ± 600 V/± 600 V

Current Probes
- TCP0200: 50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
- TCP0300<sup>®</sup>: 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

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 100 MHz, 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<sup>®</sup> Desktop Software
- 5-year Warranty

1 Requires 119-7465-xx TekVPI External Power Supply
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.

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.

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

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
- Serial Bus Triggering and Protocol Analysis
  - MDO3AERO Aerospace (MIL-STD-1553)
  - MDO3AUDIO Audio (I^2S, LJ, RJ and TDM)
  - MDO3AUTO Automotive (CAN, LIN)
  - MDO3COMP Computer (RS-232)

Recommended Probes

- Current Probes
  - TOP0020 50 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min
  - TOP0030A 120 MHz, 30 A DC/30 A RMS/50 A Peak/1 mA Min
  - TOP0150 20 MHz, 150 A DC/150 A RMS/500 A Peak/5 mA Min

- Passive Voltage Probes
  - TPP0502 2X, 500 MHz, 300 V CAT II

- High Voltage Probes
  - TMOP0200 250X/25X, 200 MHz, ± 750 V / ± 75 V
  - THDP0200 100X/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.

Ships with Product

- One Low-C Passive Probe Per Channel, TPP1000 on 1 GHz Models, TPP500B on 350 and 500 MHz Models, TPP0250 on all 100 and 200 MHz Models
- One P6316 16 Channel Logic Probe (with option MDO9MSO 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
Mixed Signal and Mixed Domain Oscilloscopes

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 wfm/s max. waveform capture rate with FastAcq

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.

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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Digital Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate</th>
<th>Digital Sample Rate Main/MagnVu™</th>
<th>Spectrum Analyzer Input</th>
<th>Spectrum Analyzer Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDO4014B-3</td>
<td>4</td>
<td>16</td>
<td>100 MHz</td>
<td>2.5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 3 GHz</td>
</tr>
<tr>
<td>MDO4034B-3</td>
<td>4</td>
<td>16</td>
<td>350 MHz</td>
<td>2.5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 3 GHz</td>
</tr>
<tr>
<td>MDO4054B-3</td>
<td>4</td>
<td>16</td>
<td>500 MHz</td>
<td>2.5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 3 GHz</td>
</tr>
<tr>
<td>MDO4054B-6</td>
<td>4</td>
<td>16</td>
<td>500 MHz</td>
<td>2.5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 6 GHz</td>
</tr>
<tr>
<td>MDO4104B-3</td>
<td>4</td>
<td>16</td>
<td>1 GHz</td>
<td>5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 3 GHz</td>
</tr>
<tr>
<td>MDO4104B-6</td>
<td>4</td>
<td>16</td>
<td>1 GHz</td>
<td>5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>1</td>
<td>9 kHz – 6 GHz</td>
</tr>
</tbody>
</table>

Application Modules

DPO48ND
- Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4EMBD, DPO4ENET, DPO4LMT, DPO4PW, DPO4USB, DPO4VID

Serial Bus Triggering and Protocol Analysis

DPO4- AERO
- Aerospace (MIL-STD 1553)

DPO4- AUDIO
- Audio (FS, LJ, RJ and TDM)

DPO4- AUTO
- Automotive (CAN, LIN)

DPO4- AUTOMAX
- Automotive (CAN, LIN, FlexRay)

DPO4COMP
- Computer (RS-232)

DPO4- EMBD
- Embedded (I2C, SPI)

DPO4ENET
- Ethernet (10BASE-T, 100BASE-TX)

DPO4USB1
- 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

SignalVu-PC
- Vector Signal Analysis Software

Recommended Service

SILV900
- 5-year Extended Warranty

Recommended Probes

Passive Voltage Probes

TPP1000
- 10X, 1 GHz, 300 V CAT II

TPP500B
- 10X, 500 MHz, 300 V CAT II

TPP502
- 2X, 500 MHz, 300 V CAT II

Active Voltage Probes

TAP1500
- 10X, 1.5 GHz, ± 8 V

Differential Voltage Probes

TDP0500
- 50X/5X, 500 MHz, ± 42 V/a 4.2 V

TDP1000
- 50X/5X, 1 GHz, ± 42 V/a 4.2 V

High Voltage Probes

THDP0200
- 50X/50X, 200 MHz, ± 1500 V/5 150 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

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

1: USB 2.0 HS only available on 1 GHz analog bandwidth models.
Mixed Signal and Mixed Domain Oscilloscopes

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.

Models

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

Application Modules

- **DPO4AESO** Enables DPO4AERO, DPO4AUDIO, DPO4AUTO, DPO4COMP, DPO4MBED, DPO4ENET, DPO4MT, DPO4USB, DPO4VID
- **DPO4ATS** Audio (PS, LJ, RJ and TDM)
- **DPO4AUT** Automotive (CAN, LIN, FlexRay)
- **DPO4CMPCW** Computer (RS-232)
- **DPO4MBED** Embedded (PC, SPI)
- **DPO4ENET** Ethernet (10Base-T, 100Base-Tx)
- **DPO4USB** USB 2.0 (LS, FS, HS)

**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 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

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*See the MDO4104B-3 for an MSO + Spectrum Analyzer.
*Not available on DPO4102B, DPO4102B-L models.
*For SPI, only 2-wire support is available on DPO4102B, DPO4102B-L.
*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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Digital Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate (4 Channels/2 Channels)</th>
<th>Digital Sample Rate Main/MagniVu™</th>
<th>Pricing (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPO5034B</td>
<td>4</td>
<td>--</td>
<td>350 MHz</td>
<td>5 GS/s</td>
<td>--</td>
<td>500 MS/s /16.5 GS/s</td>
</tr>
<tr>
<td>MSO5034B</td>
<td>4</td>
<td>16</td>
<td>350 MHz</td>
<td>5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>DPO5054B</td>
<td>4</td>
<td>16</td>
<td>500 MHz</td>
<td>5 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>MSO5054B</td>
<td>4</td>
<td>16</td>
<td>1 GHz</td>
<td>5 GS/s /10 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>DPO5104B</td>
<td>4</td>
<td>16</td>
<td>1 GHz</td>
<td>5 GS/s /10 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>MSO5104B</td>
<td>4</td>
<td>16</td>
<td>2 GHz</td>
<td>5 GS/s /10 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>DPO5204B</td>
<td>4</td>
<td>--</td>
<td>2 GHz</td>
<td>5 GS/s /10 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
<tr>
<td>MSO5204B</td>
<td>4</td>
<td>16</td>
<td>2 GHz</td>
<td>5 GS/s /10 GS/s</td>
<td>500 MS/s /16.5 GS/s</td>
<td>--</td>
</tr>
</tbody>
</table>

Recommended Probes

- **Passive Voltage Probes**
  - TPP1000 10X, 1 GHz, 300 V CAT II
  - TPF0502 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, 30 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

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 MII D-PHY
  - SR-EMBD Embedded (I2C, 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 Varies
  - PWR Power Analysis
  - SVE SignAVu RF Analysis
  - USBPWR USB Power Compliance

Product Highlights

- 350 MHz, 500 MHz, 1 GHz, and 2GHz models
- >250,000 wfm/s 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

Ships with Product

- Four TPO5000B (350 MHz and 500 MHz models) or TPO1000 (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 Varies
- R5 5-year Extended Warranty Varies
Basic Oscilloscopes

**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

**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.

**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

**Recommended Probes**

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate (per channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBS1052B</td>
<td>2</td>
<td>50 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1072B</td>
<td>2</td>
<td>70 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1102B</td>
<td>2</td>
<td>100 MHz</td>
<td>2 GS/s</td>
</tr>
<tr>
<td>TBS1152B</td>
<td>2</td>
<td>150 MHz</td>
<td>2 GS/s</td>
</tr>
<tr>
<td>TBS1202B</td>
<td>2</td>
<td>200 MHz</td>
<td>2 GS/s</td>
</tr>
</tbody>
</table>

**Recommended Probes**

<table>
<thead>
<tr>
<th>Passive Voltage Probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP0201 10X, 200 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>TPP0101 10X, 100 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>TPP0051 10X, 50 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>P2220 10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Voltage Probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5200A 500X/50X, 50 MHz, ± 1300 V</td>
</tr>
<tr>
<td>P5100A 100X, 500 MHz, ± 2500 V Peak</td>
</tr>
<tr>
<td>P6021A 1000X, 75 MHz, ± 20 kV Peak</td>
</tr>
</tbody>
</table>

**Recommended Accessories**

- TEK-USB-488 GPIB-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.
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.

### Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate (per channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBS1052B-EDU</td>
<td>2</td>
<td>50 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1072B-EDU</td>
<td>2</td>
<td>70 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1102B-EDU</td>
<td>2</td>
<td>100 MHz</td>
<td>2 GS/s</td>
</tr>
<tr>
<td>TBS1152B-EDU</td>
<td>2</td>
<td>150 MHz</td>
<td>2 GS/s</td>
</tr>
<tr>
<td>TBS1202B-EDU</td>
<td>2</td>
<td>200 MHz</td>
<td>2 GS/s</td>
</tr>
</tbody>
</table>

### Recommended Probes

**Passive Voltage Probes**

<table>
<thead>
<tr>
<th>Probes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP0201</td>
<td>10X, 200 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>TPP0101</td>
<td>10X, 100 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>TPP0051</td>
<td>10X, 50 MHz, 300 V CAT II</td>
</tr>
<tr>
<td>P2220</td>
<td>10X/1X, 200 MHz/6 MHz, 300 V CAT II/150 V CAT II</td>
</tr>
</tbody>
</table>

**High Voltage Probes**

<table>
<thead>
<tr>
<th>Probes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5200A</td>
<td>500X/50X, 50 MHz, ± 1300 V/a 130 V</td>
</tr>
<tr>
<td>P5100A</td>
<td>100X, 500 MHz, 2500 V Peak</td>
</tr>
<tr>
<td>P6015A</td>
<td>1000X, 75 MHz, 20 kV Peak</td>
</tr>
</tbody>
</table>

### Recommended Probes

**Current Probes**

<table>
<thead>
<tr>
<th>Probes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P6021A</td>
<td>60 MHz, 10.6 A RMS/250 A Peak/10 mA Min</td>
</tr>
<tr>
<td>P6022</td>
<td>120 MHz, 4 A RMS/100 A Peak/1 mA Min</td>
</tr>
</tbody>
</table>

**High Voltage Probes**

<table>
<thead>
<tr>
<th>Probes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A621</td>
<td>5 Hz to 50 kHz, 1000 A RMS/2000 A Peak/10 mA Min</td>
</tr>
<tr>
<td>A622</td>
<td>100 kHz, 100 A DC/71 A RMS/100 A Peak/10 mA Min</td>
</tr>
</tbody>
</table>

### Recommended Accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEK-USB-488</td>
<td>GPIB-to-USB converter</td>
</tr>
<tr>
<td>AC2100</td>
<td>Soft Carrying Case</td>
</tr>
</tbody>
</table>

### 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

Help students master the use of an oscilloscope with the included courseware software and labs.
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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate (per channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBS1064</td>
<td>4</td>
<td>60 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1104</td>
<td>4</td>
<td>100 MHz</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>TBS1154</td>
<td>4</td>
<td>150 MHz</td>
<td>1 GS/s</td>
</tr>
</tbody>
</table>

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.

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 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

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

Recommended Accessories
- 1103 TEKPROBE Power Supply
- AC2100 Soft Carrying Case
Battery Powered and Handheld Oscilloscopes

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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>THS3014</td>
<td>4</td>
<td>100 MHz</td>
<td>2.5 GS/s</td>
</tr>
<tr>
<td>THS3014-TK</td>
<td>4</td>
<td>100 MHz</td>
<td>2.5 GS/s</td>
</tr>
<tr>
<td>THS3024</td>
<td>4</td>
<td>200 MHz</td>
<td>5 GS/s</td>
</tr>
<tr>
<td>THS3024-TK</td>
<td>4</td>
<td>200 MHz</td>
<td>5 GS/s</td>
</tr>
</tbody>
</table>

Recommended Probes

- **Passive Voltage Probes**
  - THP0301 - 300 MHz, 10X, Y/B/M/G 300 V CAT III
  - PS1501 50X, 500 MHz, 2500 V Peak, 1000 V RMS CAT II
  - PS122 100X, 200 MHz, 1000 V RMS CAT II

- **High Voltage 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

- **Current Probes**
  - THS3000 Series

Recommended Accessories

- THSBAT Additional Spare Battery
- THSCHG Battery Charger
- 119-7900-00 AC Power Adapter

\[1\] Does not include AC power adapter.

Recommended Service

- SILV400 5-year Extended Warranty

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\[2\], AC Power Adapter with Power Cord
- Hard-sided Travel Case\[3\]
- Soft-sided Probe Case, Two Probe Replacement Accessory Kits\[4\]
- 3-year Warranty

\[1\] The PS150 is compatible with THS oscilloscopes, but 50X vertical scaling is not offered.

\[2\] Non-TK models only

\[3\] TK models only

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
Battery Powered and Handheld Oscilloscopes

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 | Pricing (USD)
--- | --- | --- | --- | ---
TPS2012B | 2 | 100 MHz | 1 GS/s | 
TPS2014B | 4 | 100 MHz | 1 GS/s | 
TPS2024B | 4 | 200 MHz | 2 GS/s | 

Application Modules

- TPS2PBND2: 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

- SIL200: 5-year Extended Warranty

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**
- PS150: 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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate</th>
<th>Pricing (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS2001C</td>
<td>2</td>
<td>50 MHz</td>
<td>500 MS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2002C</td>
<td>2</td>
<td>70 MHz</td>
<td>1 GS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2004C</td>
<td>4</td>
<td>70 MHz</td>
<td>1 GS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2012C</td>
<td>2</td>
<td>100 MHz</td>
<td>2 GS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2014C</td>
<td>4</td>
<td>100 MHz</td>
<td>2 GS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2022C</td>
<td>2</td>
<td>200 MHz</td>
<td>2 GS/s</td>
<td></td>
</tr>
<tr>
<td>TDS2024C</td>
<td>4</td>
<td>200 MHz</td>
<td>2 GS/s</td>
<td></td>
</tr>
</tbody>
</table>

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**
  - PS200A 500X/50X, 50 MHz, ±1300 V/±500 V
  - PS100A 100X, 500 MHz, 2500 V Peak
  - P6015A 500X, 75 MHz, 20 kV Peak

- **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 3 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
  - TCP020 3 MHz, 20 A DC/20 A RMS/100 A Peak/10 mA Min

Recommended Accessories

- 1103 TEKPROBE Power Supply
- AC2100 Soft Carrying Case

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

**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*1
- 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.
TDS Series Oscilloscopes

Product Highlights

- 10 kpoints record length on all channels, all the time
- 3,600 wfm/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

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.

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

Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Analog Bandwidth</th>
<th>Analog Sample Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS3012C</td>
<td>2</td>
<td>100 MHz</td>
<td>1.25 GS/s</td>
</tr>
<tr>
<td>TDS3014C</td>
<td>4</td>
<td>100 MHz</td>
<td>1.25 GS/s</td>
</tr>
<tr>
<td>TDS3032C</td>
<td>2</td>
<td>300 MHz</td>
<td>2.5 GS/s</td>
</tr>
<tr>
<td>TDS3034C</td>
<td>4</td>
<td>300 MHz</td>
<td>2.5 GS/s</td>
</tr>
<tr>
<td>TDS3052C</td>
<td>2</td>
<td>500 MHz</td>
<td>5 GS/s</td>
</tr>
<tr>
<td>TDS3054C</td>
<td>4</td>
<td>500 MHz</td>
<td>5 GS/s</td>
</tr>
</tbody>
</table>

Application Modules

- TDS3LIM Limit Testing
- TDS3MT 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 Probes

- Passive Voltage Probes
  - P6139B 10X, 500 MHz, 300 V CAT II
- Active Voltage Probes
  - P6243 10X, 1 GHz, ± 8 V
- Differential Voltage Probes
  - P6246 10X/1X, 400 MHz, ± 8.5 V/± 850 mV
- High Voltage Probes
  - PS205A 500V/50X, 100 MHz, ± 1300 V/± 130 V
  - PS210A 1000V/100X, 50 MHz, ± 5600 V/± 560 V
  - PS100A 100X, 500 MHz, 2500 V Peak
- Current Voltage Probes
  - TCP202A 50 A DC/10.6 A RMS/50 A Peak/10 mA Min

- Requires 1103 TEKPROBE Power Supply

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
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

**High Voltage Differential Probes**
- Dynamic range to ± 6000 V
- Bandwidth up to 200 MHz
- Most extensive set of probe accessories

**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

**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

**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

**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

**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/√Hz

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

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.
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.

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

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; \( T = \frac{1}{F} \), 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 mVp-p to 10 Vp-p 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™

**Recommended Accessories**

<table>
<thead>
<tr>
<th>Model</th>
<th>Analog Channels</th>
<th>Output Bandwidth</th>
<th>Analog Sample Rate</th>
<th>Memory Depth</th>
<th>Amplitude (into 50 ohm)</th>
<th>Built-in Frequency Counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFG1022</td>
<td>2</td>
<td>25 MHz</td>
<td>125 MS/s</td>
<td>8 k</td>
<td>1 mVp-p to 10 Vp-p</td>
<td>200 MHz, 6 digits</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Analog Channels</th>
<th>Output Bandwidth</th>
<th>Analog Sample Rate</th>
<th>Memory Depth</th>
<th>Amplitude (into 50 Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFG2021</td>
<td>1</td>
<td>20 MHz</td>
<td>250 MS/s</td>
<td>4 x 128 k</td>
<td>10 mVp-p to 10 Vp-p</td>
</tr>
</tbody>
</table>

Recommended Accessories

<table>
<thead>
<tr>
<th>Cables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>012-0482-00</td>
<td>BNC cable shielded, 3 ft.</td>
</tr>
<tr>
<td>012-1256-00</td>
<td>BNC cable shielded, 9 ft.</td>
</tr>
<tr>
<td>012-0991-00</td>
<td>GPIB cable, double shielded</td>
</tr>
<tr>
<td>011-0049-02</td>
<td>50Ω BNC Terminator</td>
</tr>
<tr>
<td>RMU2U</td>
<td>Rackmount kit</td>
</tr>
<tr>
<td>013-0345-00</td>
<td>Fuse adapter, BNC-P to BNC-R</td>
</tr>
<tr>
<td>159-0454-00</td>
<td>Fuse set, 3pcs, 0.125 A</td>
</tr>
</tbody>
</table>

Instrument Options

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

Recommended Service

- SILV200 5-year Extended Warranty

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 µHz to 20 MHz) supports amplifier and filter testing applications.

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

Ships with Product

- User Manual
- Power Cord
- USB Cable
- BNC to BNC cable
- 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

### AFG3011C
- **Models**: AFG3011C
- **Channels**: 1
- **Output Bandwidth**: 10 MHz
- **Analog Sample Rate**: 250 MS/s
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 20 mVp-p to 20 Vp-p

### AFG3021C
- **Models**: AFG3021C
- **Channels**: 1
- **Output Bandwidth**: 25 MHz
- **Analog Sample Rate**: 250 MS/s
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 10 mVp-p to 10 Vp-p

### AFG3022C
- **Models**: AFG3022C
- **Channels**: 2
- **Output Bandwidth**: 25 MHz
- **Analog Sample Rate**: 250 MS/s
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 10 mVp-p to 10 Vp-p

### AFG3051C
- **Models**: AFG3051C
- **Channels**: 1
- **Output Bandwidth**: 50 MHz
- **Analog Sample Rate**: 1 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 10 mVp-p to 10 Vp-p

### AFG3052C
- **Models**: AFG3052C
- **Channels**: 2
- **Output Bandwidth**: 50 MHz
- **Analog Sample Rate**: 1 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 10 mVp-p to 10 Vp-p

### AFG3101C
- **Models**: AFG3101C
- **Channels**: 1
- **Output Bandwidth**: 100 MHz
- **Analog Sample Rate**: 1 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 20 mVp-p to 10 Vp-p

### AFG3102C
- **Models**: AFG3102C
- **Channels**: 2
- **Output Bandwidth**: 100 MHz
- **Analog Sample Rate**: 1 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 20 mVp-p to 10 Vp-p

### AFG3251C
- **Models**: AFG3251C
- **Channels**: 1
- **Output Bandwidth**: 240 MHz
- **Analog Sample Rate**: 2 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 50 mVp-p to 5 Vp-p

### AFG3252C
- **Models**: AFG3252C
- **Channels**: 2
- **Output Bandwidth**: 240 MHz
- **Analog Sample Rate**: 2 GS/s (≤16k), 250 MS/s (>16k)
- **Memory Depth**: 4 x 128 k
- **Amplitude (into 50 Ω)**: 50 mVp-p to 5 Vp-p

### Recommended Accessories

<table>
<thead>
<tr>
<th>Cables</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>012-0482-00</td>
<td>BNC cable shielded, 3 ft.</td>
<td></td>
</tr>
<tr>
<td>012-1256-00</td>
<td>BNC cable shielded, 9 ft.</td>
<td></td>
</tr>
<tr>
<td>012-0991-00</td>
<td>GPIB cable, double shielded</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM3100</td>
<td>Rackmount kit</td>
</tr>
<tr>
<td>013-0045-00</td>
<td>Fuse adapter, BNC-P to BNC-R</td>
</tr>
<tr>
<td>159-0454-00</td>
<td>Fuse set, 3pcs, 1.25A</td>
</tr>
</tbody>
</table>

### Recommended Service

- **SILV400**: 5-year Extended Warranty

### Ships with Product

- Quick Start User Manual
- Power Cord
- BNC to BNC cable
- 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.

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

Recommended Accessories

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS-G4100A-ATT</td>
<td>30 dB, 5 W RF attenuator up to 6 GHz</td>
</tr>
<tr>
<td>Option VM00</td>
<td>Basic vector modulation package with internal 6 MHz modulation bandwidth</td>
</tr>
<tr>
<td>Option EI0</td>
<td>External 200 MHz modulation bandwidth (requires Option VM00)</td>
</tr>
</tbody>
</table>

Product Highlights

- True DC to 2/4/6 GHz
- ≤±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)

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176 - TestEquipmentDepot.com
TekSmartLab™

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

Sample TekSmartLab Configuration

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

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

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)
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.

<table>
<thead>
<tr>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D</td>
</tr>
<tr>
<td>Interference Hunting</td>
</tr>
<tr>
<td>Field installation and maintenance</td>
</tr>
<tr>
<td>Education</td>
</tr>
</tbody>
</table>

**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

**Ships with Product**

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

<table>
<thead>
<tr>
<th>PSM3000</th>
<th>PSM4000</th>
<th>PSM5000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Power Meter</td>
<td>Power Meter</td>
</tr>
<tr>
<td></td>
<td>Average Power</td>
<td>Average / Peak / Pulse</td>
</tr>
<tr>
<td><strong>Frequency Range</strong></td>
<td>10 MHz - 8 / 18 / 26.5 GHz</td>
<td>10 MHz - 8 / 18.6 / 20 GHz</td>
</tr>
<tr>
<td><strong>Dynamic Range</strong></td>
<td>-55 to +20 dBm</td>
<td>-60 to +20 dBm</td>
</tr>
<tr>
<td><strong>Data Transfer Rate</strong></td>
<td>2000 Reads/sec</td>
<td>2000 Reads/sec</td>
</tr>
<tr>
<td><strong>Measurements</strong></td>
<td>True Average Power; Duty Cycle Corrected Pulse Power; Measurement Logging</td>
<td>Average Power (CW); Duty Cycle Corrected Pulse Power; Peak Power, Duty Cycle; Peak and Average Burst Power; Measurement Logging</td>
</tr>
</tbody>
</table>

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.
RF Power Meters

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.

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

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
- 3-year Warranty
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.

<table>
<thead>
<tr>
<th>Model 2450/2460 Touchscreen SourceMeter® Instruments</th>
<th>Series 2400 Bench SourceMeter® SMU Instruments</th>
<th>Series 2600B System SourceMeter® SMU Instruments</th>
<th>2650A High Power System SourceMeter® SMU Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>1</td>
<td>1-2 (optional expansion to 64 via TSP-Link®)</td>
<td>1 (optional expansion to 32 via TSP-Link®)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>6½-digit measurements</td>
<td>6½-digit measurements</td>
<td>6½-digit measurements</td>
</tr>
<tr>
<td>Max. Readings / Second</td>
<td>3,000</td>
<td>20,000</td>
<td>38,500</td>
</tr>
<tr>
<td>Application Features</td>
<td>Capabilities of analyzers, curve tracers, and I-V systems at a fraction of their cost; touchscreen and icon menu system; built-in graphing</td>
<td>Convenient DMM-like user interface; 2/4/6 wire resistance with force I or V source modes, V-Force from 1µV to 1.1KV, 10pA to 5A cont., 10A pulsed, 2W to 110W</td>
<td>True multi-channel parallel test via TSP-Link. Up to 0.1 fA resolution.</td>
</tr>
<tr>
<td>Test Sequencing / Scripting</td>
<td>TSP® (Test Script Processing) technology embeds complete test programs inside the instrument for unmatched system-level speed</td>
<td>Built-In ramp generator and list sweep modes, 100 point global machine state sequencer for fast test setup and execution</td>
<td>TSP® (Test Script Processing) technology embeds complete test programs inside the instrument for unmatched system-level speed</td>
</tr>
</tbody>
</table>

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.
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

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.

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.

Model 2450/2460 Advanced Touchscreen SourceMeter® SMU Instruments

Model Current Max / Min Voltage Max / Min Power

<table>
<thead>
<tr>
<th>Model</th>
<th>Current Max / Min</th>
<th>Voltage Max / Min</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>2450</td>
<td>1.000000A / 10.000000nA</td>
<td>200.0000V / 20.000000mV</td>
<td>20W</td>
</tr>
<tr>
<td>2450-NFP (with No Front Panel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2450-RACK (without Handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2450-NFP (with No Front Panel or Handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2460</td>
<td>7.0000000A / 1.0000000µA</td>
<td>100.0000V / 200.000000mV</td>
<td>100W</td>
</tr>
<tr>
<td>2460-NFP (with No Front Panel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2460-RACK (without Handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2460-NFP (with No Front Panel or Handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended Service

**2450**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2450-3Y-EW</td>
<td>1-year factory warranty extended to 3 years from date of shipment</td>
</tr>
<tr>
<td>2450-5Y-EW</td>
<td>1-year factory warranty extended to 5 years from date of shipment</td>
</tr>
<tr>
<td>C/2450-3Y-17025</td>
<td>KeithleyCare® 3-year ISO 17025 Calibration Plan</td>
</tr>
<tr>
<td>C/2450-3Y-DATA</td>
<td>KeithleyCare® 3-year Calibration w/Data Plan</td>
</tr>
<tr>
<td>C/2450-3Y-STD</td>
<td>KeithleyCare® 3-year Std. Calibration Plan</td>
</tr>
<tr>
<td>C/2450-5Y-17025</td>
<td>KeithleyCare® 5-year ISO 17025 Calibration Plan</td>
</tr>
<tr>
<td>C/2450-5Y-DATA</td>
<td>KeithleyCare® 5-year Calibration w/Data Plan</td>
</tr>
<tr>
<td>C/2450-5Y-STD</td>
<td>KeithleyCare® 5-year Std. Calibration Plan</td>
</tr>
</tbody>
</table>

**2460**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2460-3Y-EW</td>
<td>1-year factory warranty extended to 3 years from date of shipment</td>
</tr>
<tr>
<td>2460-5Y-EW</td>
<td>1-year factory warranty extended to 5 years from date of shipment</td>
</tr>
<tr>
<td>C/2460-3Y-17025</td>
<td>KeithleyCare® 3-year ISO 17025 Calibration Plan</td>
</tr>
<tr>
<td>C/2460-3Y-DATA</td>
<td>KeithleyCare® 3-year Calibration w/Data Plan</td>
</tr>
<tr>
<td>C/2460-3Y-STD</td>
<td>KeithleyCare® 3-year Std. Calibration Plan</td>
</tr>
<tr>
<td>C/2460-5Y-17025</td>
<td>KeithleyCare® 5-year ISO 17025 Calibration Plan</td>
</tr>
<tr>
<td>C/2460-5Y-DATA</td>
<td>KeithleyCare® 5-year Calibration w/Data Plan</td>
</tr>
<tr>
<td>C/2460-5Y-STD</td>
<td>KeithleyCare® 5-year Std. Calibration Plan</td>
</tr>
</tbody>
</table>

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
- KickStart Startup Software
- LabVIEW® and IVI Drivers

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

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.

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

Recommended Service
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

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

Not available in all countries.
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

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.

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

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-SY-X0XX Calibration Service 3 Years (17025 or DATA or STD)
- C/26xxB-SY-X0XX 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/2634B/2635B/2636B)
- 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)
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.

SourceMeter® SMU Instruments

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.

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

Recommended Accessories

- 2600-KIT: Low Impedance Cable Assembly, 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)
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.

### Model and Description

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Basic Accuracy (V &amp; I)</th>
<th>Voltage Input Range</th>
<th>Current Range (internal shunts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA1000</td>
<td>PA1000 Single-Phase Power Analyzer</td>
<td>0.05% (45-850 Hz)</td>
<td>10V peak to 1000V peak</td>
<td>0.0002 A to 20A RMS</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>Calibration Service</td>
</tr>
<tr>
<td>C5</td>
<td>Calibration Service</td>
</tr>
<tr>
<td>D1</td>
<td>Calibration Data Report</td>
</tr>
<tr>
<td>D3</td>
<td>Calibration Data Report</td>
</tr>
<tr>
<td>D5</td>
<td>Calibration Data Report</td>
</tr>
</tbody>
</table>

### 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
Power Analyzers

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

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>BasicAccuracy (V &amp; I)</th>
<th>Voltage Input Range</th>
<th>Current Range (internal shunts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA4000 1CH</td>
<td>PA4000 Power Analyzer with 1 input module</td>
<td>0.01% (45-850 Hz)</td>
<td>2V peak to 2000V peak</td>
<td>0.00025 A to 30 Arms</td>
</tr>
<tr>
<td>PA4000 2CH</td>
<td>PA4000 Power Analyzer with 2 input modules</td>
<td>0.01% (45-850 Hz)</td>
<td>2V peak to 2000V peak</td>
<td>0.00025 A to 30 Arms</td>
</tr>
<tr>
<td>PA4000 3CH</td>
<td>PA4000 Power Analyzer with 3 input modules</td>
<td>0.01% (45-850 Hz)</td>
<td>2V peak to 2000V peak</td>
<td>0.00025 A to 30 Arms</td>
</tr>
<tr>
<td>PA4000 4CH</td>
<td>PA4000 Power Analyzer with 4 input modules</td>
<td>0.01% (45-850 Hz)</td>
<td>2V peak to 2000V peak</td>
<td>0.00025 A to 30 Arms</td>
</tr>
</tbody>
</table>

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)

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

Recommended Service

- C3 Calibration Service 3 Years
- C5 Calibration Service 5 Years
Digital Multimeters

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.
Digital Multimeters

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)

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Basic V DC Accuracy, 1 Year (% Reading + % Range)</th>
<th>Measurements</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>6½</td>
<td>0.0030 + 0.0005</td>
<td>Vac, Vdc, ldc, lac, 2WΩ, 4WΩ, Temp, Freq, Period, dB, dBm, Cont., Diode</td>
<td>GPIB, RS-232</td>
</tr>
<tr>
<td>2100</td>
<td>6½</td>
<td>0.0038 + 0.0006</td>
<td>Vac, Vdc, ldc, lac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode</td>
<td>USB</td>
</tr>
<tr>
<td>2110</td>
<td>5½</td>
<td>0.012 + 0.002</td>
<td>Vac, Vdc, ldc, lac, 2WΩ, 4WΩ, Temp, Freq, Period, dB, dBm, Cont., Diode, Cap., Therm.</td>
<td>USB (GPIB Option)</td>
</tr>
</tbody>
</table>

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-Cl-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)
Digital Multimeters

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)


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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Basic V DC Accuracy, 1 Year (% Reading + % Range)</th>
<th>Measurements</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>7½</td>
<td>0.0024 + 0.0004</td>
<td>Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Crest, Peak</td>
<td>GPIB</td>
</tr>
<tr>
<td>2002</td>
<td>8½</td>
<td>0.0010 + 0.00015</td>
<td>Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Crest, Peak</td>
<td>GPIB</td>
</tr>
<tr>
<td>2010</td>
<td>7½</td>
<td>0.0024 + 0.0004</td>
<td>Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode, Therm., Dry Circ.Ω, Ratio</td>
<td>GPIB, RS-232</td>
</tr>
</tbody>
</table>

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 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

Ships with Product

- Model 1751 Safety Test Leads (Model 2010)
- Option Slot Cover (Models 2001, 2002)
- Calibration Data
- 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.

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Basic V DC Accuracy, 1 Year (% Reading + % Range)</th>
<th>Measurements</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMM7510</td>
<td>7 ½</td>
<td>0.0014 + 0.00012</td>
<td>Vac, Vdc, Idc, Iac, 2WΩ, 4WΩ, Temp, Freq, Period, Cont., Diode, Dry Circ., Ω, Ratio, Cap, Digitize V, Digitize I</td>
<td>GPIB, USB-TMC, LAN-LXI</td>
</tr>
</tbody>
</table>

**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-CL-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
Digital Multimeters

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

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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Display</th>
<th>Resolution (Digits)</th>
<th>Measurements</th>
<th>Basic V dc accuracy (% Reading + % Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMM4020</td>
<td>Dual; Numeric</td>
<td>5.5</td>
<td>V ac, V dc, I dc, I ac, Ω, Cont, Diode, Freq</td>
<td>0.015 + 0.004 (yr.)</td>
</tr>
</tbody>
</table>

Recommended Test Leads

<table>
<thead>
<tr>
<th>Test Leads</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>196-3520-xx</td>
<td>Premium Test Leads</td>
</tr>
<tr>
<td>TL705</td>
<td>2x4 Wire Ohm 1000V Test Lead</td>
</tr>
<tr>
<td>TL725</td>
<td>2x4 Wire Ohm SMD Test Tweezers</td>
</tr>
</tbody>
</table>

Recommended Accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACD4000</td>
<td>Soft Carrying Case</td>
</tr>
<tr>
<td>HCTEK-4321</td>
<td>Hard Carrying Case</td>
</tr>
<tr>
<td>RMU2U</td>
<td>Rackmount Kit</td>
</tr>
<tr>
<td>013-0369-xx</td>
<td>Calibration Fixture</td>
</tr>
<tr>
<td></td>
<td>4-terminal short</td>
</tr>
</tbody>
</table>

Recommended Service

| SILV100     | 5-year Extended Warranty        |

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
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

**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

**Recommended Test Leads**

**Temperature Probes**

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP750</td>
<td>100 Ohm RTD Temperature Probe</td>
<td>DMM4050 only</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Leads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>196-3520-xx</td>
<td>Premium Test Leads</td>
<td>(TL710 replacement/ spare)</td>
</tr>
<tr>
<td>TL705</td>
<td>2x4 Wire Ohm 1000V Test Lead</td>
<td></td>
</tr>
<tr>
<td>TL725</td>
<td>2x4 Wire Ohm SMD Test Tweezers</td>
<td></td>
</tr>
</tbody>
</table>

**Models**

<table>
<thead>
<tr>
<th>Models</th>
<th>Display</th>
<th>Resolution (Digits)</th>
<th>Measurements</th>
<th>Basic V dc accuracy (% Reading + % Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMM4040</td>
<td>Dual; Numeric &amp; Graphical</td>
<td>6.5</td>
<td>V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period</td>
<td>0.0035 + 0.0005</td>
</tr>
<tr>
<td>DMM4050</td>
<td>Dual; Numeric &amp; Graphical</td>
<td>6.5</td>
<td>V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period, Temp., Capacitance</td>
<td>0.0024 + 0.0005</td>
</tr>
</tbody>
</table>

**Recommended Accessories**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACD4000</td>
<td>Soft Carrying Case</td>
</tr>
<tr>
<td>HCTEK-4321</td>
<td>Hard Carrying Case</td>
</tr>
<tr>
<td>RMU2U</td>
<td>Rackmount Kit</td>
</tr>
<tr>
<td>013-0369-xx</td>
<td>Calibration Fixture 4-terminal short</td>
</tr>
</tbody>
</table>

**Recommended Service**

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILV100</td>
<td>5-year Extended Warranty</td>
</tr>
</tbody>
</table>

**Another Product for Consideration**

The PWS DC Power Supply Series is designed to stack with the DMM Series, saving you bench space.

**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**

- 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
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.

<table>
<thead>
<tr>
<th></th>
<th>Series 2700</th>
<th>Series 3700A</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMM Resolution</td>
<td>6½ Digits</td>
<td>7½ Digits</td>
</tr>
<tr>
<td>Switching Density</td>
<td>Up to 80, 2-pole channels (2700/2701)</td>
<td>Up to 576, 2-pole channels</td>
</tr>
<tr>
<td>Special Features</td>
<td>Front panel DMM jacks, Non-volatile memory buffer, Solid State temperature scanning</td>
<td>USB Flash Drive support, 1 Ohm measure range, Solid State temperature scanning</td>
</tr>
<tr>
<td>Switch Features</td>
<td>Up to 40, 2-pole Channels and 12 card options</td>
<td>Up to 96, 2-pole Channels and 10 card options</td>
</tr>
<tr>
<td>Interface</td>
<td>GPIB, RS-232 (Models 2700 and 2750), LAN, RS-232 (Model 2701)</td>
<td>GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus</td>
</tr>
<tr>
<td>Software</td>
<td>KickStart Startup Software, LabVIEW and IVI drivers.</td>
<td>Test Script Builder, LXI Discovery Browser, LabVIEW and IVI drivers.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Mainframe Size</th>
<th>Interfaces</th>
<th>Resolution (Digits), Accuracy</th>
<th>Advance Measure Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2700</td>
<td>2U, ½ Rack</td>
<td>GPIB, RS232</td>
<td>6½ Digits, 0.003%</td>
<td>Temperature, 4-Wire Resistance</td>
</tr>
<tr>
<td>2701</td>
<td>2U, ½ Rack</td>
<td>Ethernet, RS232</td>
<td>6½ Digits, 0.003%</td>
<td>Temperature, 4-Wire Resistance</td>
</tr>
<tr>
<td>2750</td>
<td>2U, Full Rack</td>
<td>GPIB, RS232</td>
<td>6½ Digits, 0.003%</td>
<td>Temperature, 4-Wire Resistance, Low Ohms</td>
</tr>
</tbody>
</table>

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-Pin25-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
- ExcelLINX Software
- Power Cord
- 1-year Warranty

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.
## 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.

### Plug-in Cards

<table>
<thead>
<tr>
<th>Model (Mainframe)</th>
<th>DMM</th>
<th>Front Panel Keypad &amp; Display</th>
<th>Resolution (Digits), Accuracy</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>3706A</td>
<td>Yes</td>
<td>Yes</td>
<td>7½ Digits, 0.0025%</td>
<td>GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus</td>
</tr>
<tr>
<td>3706A-S</td>
<td>No</td>
<td>Yes</td>
<td>NA</td>
<td>GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus</td>
</tr>
<tr>
<td>3706A-NFP</td>
<td>Yes</td>
<td>No</td>
<td>7½ Digits, 0.0025%</td>
<td>GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus</td>
</tr>
<tr>
<td>3706A-SNFP</td>
<td>No</td>
<td>No</td>
<td>NA</td>
<td>GPIB, LAN (LXI), USB-TMC, TSP-Link® Channel Expansion Bus</td>
</tr>
</tbody>
</table>

### Recommended Accessories

<table>
<thead>
<tr>
<th>Model (Mainframe)</th>
<th>DMM</th>
<th>Front Panel Keypad &amp; Display</th>
<th>Resolution (Digits), Accuracy</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>3706-BAN</td>
<td>DMM Adapter Cable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3706-TLK</td>
<td>Test Lead Kit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUSB-488B</td>
<td>IEEE-488 USB to GPIB Interface Adapter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4288-1</td>
<td>Single Fixed Rack Mount Kit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4288-10</td>
<td>Fixed Rear Rack Mount Kit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>2182A Nanovoltmeter</th>
<th>6220 / 6221 Current Sources</th>
<th>6485 / 6487 / 6482 Picoammeters / Picoammeter &amp; Voltage Source</th>
<th>6514 / 6517B / 6430 Electrometers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Min/Max</strong></td>
<td>--</td>
<td>100fA / 100mA</td>
<td>10aA / 100mA</td>
</tr>
<tr>
<td><strong>Voltage Min/Max</strong></td>
<td>1nV / 100V</td>
<td>--</td>
<td>1mV / 200V</td>
</tr>
<tr>
<td><strong>Resistance Min/Max</strong></td>
<td>10nΩ/1GΩ (with Model 6220 or 6221)</td>
<td>10Ω/1PΩ (with Model 6482A)</td>
<td>10mΩ / 10PΩ</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>7½ Digits</td>
<td>4½ Digits</td>
<td>6½ Digits (6430)</td>
</tr>
<tr>
<td><strong>Input Connection / Interface</strong></td>
<td>Low Thermal / GPIB, RS-232</td>
<td>3 Slot Triax / GPIB, RS-232 (LAN on 6221)</td>
<td>BNC (6485) / 3 Slot Triax (6482, 6487) / GPIB, RS-232</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Temperature</th>
<th>Resistance</th>
<th>Channels</th>
<th>Buffer Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2182A</td>
<td>1nV – 100V</td>
<td>-200°C to 1820°C</td>
<td>10nΩ to 200MΩ (requires 6220 or 6221)</td>
<td>2</td>
<td>1,024 rdgs</td>
</tr>
</tbody>
</table>

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.

Results from a Model 2182A and Model 6220 using the delta mode to measure a 10mΩ resistor with a 20µA test current.

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-488LP A 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Current</th>
<th>Resistance</th>
<th>Sweep Points</th>
<th>PC Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>6220</td>
<td>100fA – 100mA</td>
<td>10nΩ to 200MΩ (requires 2182A)</td>
<td>65,536 (64k)</td>
<td>GPIB, RS-232</td>
</tr>
<tr>
<td>6221</td>
<td>100fA – 100mA</td>
<td>10nΩ to 200MΩ (requires 2182A)</td>
<td>65,536 (64k)</td>
<td>GPIB, RS-232, Ethernet</td>
</tr>
</tbody>
</table>

**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)
- **4268-1** Single Fixed Rack Mounting Kit
- **4268-2** Dual Fixed Rack Mounting Kit
- **KP-CL-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**

- 10¹⁴Ω 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.
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.

### Product Highlights
- Measure currents down to 1fA
- Voltage and resistance measurement options
- Voltage burden <200µV (most models)
- 5½- to 6½-digit resolution (most models)
- Feedback ammeter design for higher accuracy

### Model Current Resistance Reading Rate Input Connections

<table>
<thead>
<tr>
<th>Model</th>
<th>Current</th>
<th>Resistance</th>
<th>Reading Rate</th>
<th>Input Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>6482</td>
<td>1fA – 20mA</td>
<td>N/A</td>
<td>900 rdgs/s</td>
<td>3-slot triax, BNC (via included adapter)</td>
</tr>
<tr>
<td>6487</td>
<td>10fA – 20mA</td>
<td>Up to 10¹¹Ω</td>
<td>1000 rdgs/s</td>
<td>3-slot triax</td>
</tr>
<tr>
<td>6485</td>
<td>10fA – 20mA</td>
<td>N/A</td>
<td>1000 rdgs/s</td>
<td>BNC</td>
</tr>
</tbody>
</table>

### Ships with Product
- 7075-TRX-BNCTriax-to-BNC Connector (2×) (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)
- 7075-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)

### Recommended Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4802-10</td>
<td>Low noise BNC Input Cable, 3m (10ft) (for 6485)</td>
</tr>
<tr>
<td>4803</td>
<td>Low Noise Cable Kit (for 6485)</td>
</tr>
<tr>
<td>6517-ILC-3</td>
<td>Interlock Cable for 8009 Resistivity Test Fixture (6487 Only)</td>
</tr>
<tr>
<td>7007-1</td>
<td>Shielded IEEE-488 Cable, 1m (3.3 ft)</td>
</tr>
<tr>
<td>7007-2</td>
<td>Shielded IEEE-488 Cable, 2m (6.6 ft)</td>
</tr>
<tr>
<td>7007-4</td>
<td>Shielded IEEE-488 Cable, 4m (13.1 ft)</td>
</tr>
<tr>
<td>7009-5</td>
<td>RS-232 Cable</td>
</tr>
<tr>
<td>7078-TRX-10</td>
<td>Low Noise Triax Cable, 3.0m (10 ft) (6487 Only)</td>
</tr>
<tr>
<td>7078-TRX-20</td>
<td>Low Noise Triax Cable, 6.0m (20 ft) (6487 Only)</td>
</tr>
<tr>
<td>7754-3</td>
<td>BNC to Alligator Cable (for 6485)</td>
</tr>
<tr>
<td>8501-1</td>
<td>Trigger Link Cable with male Micro-DIN connectors at each end, 1m (3.3 ft)</td>
</tr>
</tbody>
</table>

### Recommended Accessories

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-565</td>
<td>BNC Barrel (for 6485)</td>
</tr>
<tr>
<td>237-TRX-BAR</td>
<td>Triax Barrel (for 6487)</td>
</tr>
<tr>
<td>7078-TRX-BNC</td>
<td>Triax-to-BNC Adapter</td>
</tr>
<tr>
<td>8009</td>
<td>Resistivity Test Fixture (for 6487)</td>
</tr>
<tr>
<td>4288-1</td>
<td>Single Fixed Rack Mounting Kit</td>
</tr>
<tr>
<td>4288-2</td>
<td>Dual Fixed Rack Mounting Kit</td>
</tr>
<tr>
<td>KP-Cl-488LPA</td>
<td>IEEE-488 Interface/Controller for the PCI Bus</td>
</tr>
<tr>
<td>KUSB-488B</td>
<td>IEEE-488 USB-to-GPIB Interface Adapter</td>
</tr>
</tbody>
</table>
Ultra-Sensitive Measurement Instruments

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

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Current</th>
<th>Voltage</th>
<th>Resistance</th>
<th>Charge</th>
<th>Input Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>6517B</td>
<td>100aA – 20mA</td>
<td>10µV – 200V</td>
<td>100Ω – 10PΩ</td>
<td>10fC – 2µC</td>
<td>3-slot triax</td>
</tr>
<tr>
<td>6514</td>
<td>100aA – 20mA</td>
<td>1µV – 200V</td>
<td>10mΩ – 200GΩ</td>
<td>10fC – 20µC</td>
<td>3-slot triax</td>
</tr>
<tr>
<td>6430</td>
<td>10aA – 100mA</td>
<td>1µV – 200V</td>
<td>1µΩ – &gt;20TΩ</td>
<td>--</td>
<td>3-slot triax</td>
</tr>
</tbody>
</table>

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-Cl-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)

6517B is well suited for applications where the volume resistivity needs to be measured.
### Power Supply Selection

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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Channels</th>
<th>Max Voltage/ Max Current</th>
<th>Resolution</th>
<th>Voltage Accuracy</th>
<th>Current Accuracy</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tektronix</td>
<td>PWS2000 Series (4 models)</td>
<td>Manual</td>
<td>1</td>
<td>18V-72V/1.5A-6A</td>
<td>10mV, 10mA</td>
<td>0.03% ± 10mV</td>
<td>0.1% ± 5mA</td>
</tr>
<tr>
<td>Tektronix</td>
<td>PWS4000 Series (5 models)</td>
<td>USB Programmable Single Channel</td>
<td>1</td>
<td>20V-72V /1.2A-5A</td>
<td>1mV, 0.1mA</td>
<td>0.03% ± 3mV</td>
<td>0.05% ± 1mA</td>
</tr>
<tr>
<td>Keithley 2200 Series (5 models)</td>
<td>USB and GPIB Programmable Single Channel</td>
<td>1</td>
<td>20V-72V /1.2A-5A</td>
<td>1mV, 0.1mA</td>
<td>0.03% ± 3mV</td>
<td>0.05% ± 1mA</td>
<td>USB, GPIB</td>
</tr>
<tr>
<td>Keithley Model 2231A-30-3</td>
<td>Optional USB Multi-Channel</td>
<td>3</td>
<td>CH1/2: 30V/3A</td>
<td>10mV, 1mA</td>
<td>0.06% ± 20mA</td>
<td>0.2% ± 10 mA</td>
<td>Optional USB</td>
</tr>
<tr>
<td>Keithley 2220/2230 Series (8 models)</td>
<td>USB Multi-Channel; USB and GPIB Multi-Channel</td>
<td>2 (2220 Series)</td>
<td>CH1/2-30V / 1.5A</td>
<td>1mV, 1mA</td>
<td>0.2% ± 10 mA</td>
<td>0.1% ± 15 mA</td>
<td>USB USB &amp; GPIB (-G versions)</td>
</tr>
<tr>
<td>Keithley 2220/2230 Series (8 models)</td>
<td>3 (2230 Series)</td>
<td>CH3: 6V / 5A</td>
<td>2.4mV, 0.67mA</td>
<td>0.1% of Full Scale</td>
<td>0.2% of Full Scale</td>
<td>USB, GPIB, LAN, and optional GPIB</td>
<td></td>
</tr>
<tr>
<td>Keithley 2260B Series (4 models)</td>
<td>360W and 720W Wide output range USB, LAN, and Optional GPIB</td>
<td>1</td>
<td>30V-80V / 13.5A-72A</td>
<td>1mV, 1mA</td>
<td>0.1% ± 10mA</td>
<td>0.1% ± 10mA</td>
<td>USB, LAN, and optional GPIB</td>
</tr>
<tr>
<td>Keithley 2268 Series (6 models)</td>
<td>850W 1U high, half-rack wide, programmable, with 5V and 15V auxiliary outputs</td>
<td>1</td>
<td>20V-150V/ 5.6A-42A</td>
<td>0.1mV, 10nA</td>
<td>0.02% ± 2mV</td>
<td>0.05% ± 250µA</td>
<td>USB, GPIB, and LAN</td>
</tr>
<tr>
<td>Keithley Models 2280S-32-6 2280S-60-3</td>
<td>Precision measurement 6½-digit measurement resolution</td>
<td>1</td>
<td>32V-60V/3.2A-6A</td>
<td>0.1mV, 10nA</td>
<td>0.02% ± 2mV</td>
<td>0.05% ± 250µA</td>
<td>USB, GPIB, and LAN</td>
</tr>
<tr>
<td>Keithley Models 2290-5 2290-10</td>
<td>High Voltage</td>
<td>1</td>
<td>5kV / 5mA (2290-5)</td>
<td>1V, 1µA</td>
<td>±0.01% (2290-5), ±6V (2290-10)</td>
<td>±0.01% (2290-5), ±5µA (2290-10)</td>
<td>GPIB (2290-5), GPIB, RS-232, RS-485, and analog</td>
</tr>
<tr>
<td>Keithley Models 2302, 2302-PJ, 2306, 2306-PJ, 2306-VS, 2308</td>
<td>Battery simulator</td>
<td>1 (2302)</td>
<td>15V / 5A (2306, 2308)</td>
<td>1mV, 100nA</td>
<td>0.05% ± 3mV</td>
<td>0.2% + 1µA</td>
<td>GPIB</td>
</tr>
<tr>
<td>Keithley Models 2303, 2303-PJ, 2304A</td>
<td>Fast Transient Response</td>
<td>1</td>
<td>15V / 5A (2303) 20V / 5A (2304A)</td>
<td>1mV, 100nA</td>
<td>0.05% ± 3mV</td>
<td>0.2% + 1µA</td>
<td>GPIB</td>
</tr>
</tbody>
</table>
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 ± (% 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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Programmable</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWS2185</td>
<td>18 V</td>
<td>5 A</td>
<td>No</td>
</tr>
<tr>
<td>PWS2323</td>
<td>32 V</td>
<td>3 A</td>
<td>No</td>
</tr>
<tr>
<td>PWS2326</td>
<td>32 V</td>
<td>6 A</td>
<td>No</td>
</tr>
<tr>
<td>PWS2721</td>
<td>72 V</td>
<td>1.5 A</td>
<td>No</td>
</tr>
</tbody>
</table>

Recommended Accessories
- RML2U Rackmount Shelf Kit for 1 or 2 Units
- 386-7598-xx Rackmount Cosmetic Filler Panel

Recommended Service
- R5 5-year Extended Warranty

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

<table>
<thead>
<tr>
<th>Models</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Programmable</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWS4205</td>
<td>20 V</td>
<td>5 A</td>
<td>Yes</td>
</tr>
<tr>
<td>PWS4305</td>
<td>30 V</td>
<td>5 A</td>
<td>Yes</td>
</tr>
<tr>
<td>PWS4323</td>
<td>32 V</td>
<td>3 A</td>
<td>Yes</td>
</tr>
<tr>
<td>PWS4602</td>
<td>60 V</td>
<td>2.5 A</td>
<td>Yes</td>
</tr>
<tr>
<td>PWS4721</td>
<td>72 V</td>
<td>1.2 A</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

### 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

### Recommended Service
- **SILV100** 5-year Extended Warranty

### 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Output Voltage</th>
<th>Max Output Current</th>
<th>Power</th>
<th>Ripple and Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>2200-20-5</td>
<td>20V</td>
<td>5A</td>
<td>100W</td>
<td>&lt;1mVRMS, &lt;3mVP-P</td>
</tr>
<tr>
<td>2200-30-5</td>
<td>30V</td>
<td>5A</td>
<td>150W</td>
<td>&lt;1mVRMS, &lt;4mVP-P</td>
</tr>
<tr>
<td>2200-32-3</td>
<td>32V</td>
<td>3A</td>
<td>96W</td>
<td>&lt;1mVRMS, &lt;4mVP-P</td>
</tr>
<tr>
<td>2200-60-2</td>
<td>60V</td>
<td>2.5A</td>
<td>150W</td>
<td>&lt;1mVRMS, &lt;5mVP-P</td>
</tr>
<tr>
<td>2200-72-1</td>
<td>72V</td>
<td>1.2A</td>
<td>86W</td>
<td>&lt;1mVRMS, &lt;3mVP-P</td>
</tr>
</tbody>
</table>

Remote sensing compensates for voltage drops in the test leads by extending the power supply feedback loop to the input of the load.

Power Supplies

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

Recommended Accessories

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-1638-12</td>
<td>Rear Panel Mating Connector, Single Channel</td>
</tr>
<tr>
<td>USB-B-1</td>
<td>USB Cable</td>
</tr>
<tr>
<td>4299-7</td>
<td>Fixed Rack Mount Kit</td>
</tr>
<tr>
<td>KP-Cl-488LPA</td>
<td>IEEE-488 Interface Board for PCI Bus</td>
</tr>
<tr>
<td>7007-05</td>
<td>Double Shielded IEEE-488 Cable, 0.5m (1.6ft)</td>
</tr>
<tr>
<td>7007-1</td>
<td>Double Shielded IEEE-488 Cable, 1m (3.2 ft)</td>
</tr>
<tr>
<td>7007-2</td>
<td>Double Shielded IEEE-488 Cable, 2m (6.5 ft)</td>
</tr>
<tr>
<td>7007-3</td>
<td>Double Shielded IEEE-488 Cable, 3m (10 ft)</td>
</tr>
<tr>
<td>7007-4</td>
<td>Double Shielded IEEE-488 Cable, 4m (13 ft)</td>
</tr>
</tbody>
</table>

Recommended Service

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/Model Number*</td>
<td>1 additional year of factory warranty</td>
</tr>
<tr>
<td>EW</td>
<td>3 calibrations within 3 years of purchase</td>
</tr>
<tr>
<td>3Y-STD</td>
<td>3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase</td>
</tr>
<tr>
<td>SY-DATA</td>
<td>5 calibrations within 5 years of purchase</td>
</tr>
</tbody>
</table>

* 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Output Voltage</th>
<th>Max Output Current</th>
<th>Power</th>
<th>Ripple &amp; Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>2231A-30-3</td>
<td>CH1:30V, CH2:30V, CH3:5V</td>
<td>CH1:3A, CH2:3A, CH3:3V</td>
<td>195W</td>
<td>&lt;1mV_{RMS}, &lt;5mV_{P-P}</td>
</tr>
</tbody>
</table>

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

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.

---

**Model 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™

---

**Product Highlights**

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Output Voltage</th>
<th>Max Output Current</th>
<th>Power</th>
<th>Ripple and Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>2220-30-1</td>
<td>Ch 1: 30V, Ch 2:30V</td>
<td>Ch1: 1.5A, Ch 2: 1.5A</td>
<td>45W/channel; 90W total</td>
<td>&lt;1mVRMS, &lt;3mV P-P</td>
</tr>
<tr>
<td>2220G-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2220J-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2220GJ-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2230-30-1</td>
<td>Ch1: 30V, Ch 2: 30V, Ch 3: 6V</td>
<td>Ch1: 1.5A, Ch 2: 1.5A, Ch 3: 5A</td>
<td>Ch 1 and Ch 2: 45W each Ch 3: 30W, 120W total</td>
<td>&lt;1mVRMS, &lt;3mV P-P</td>
</tr>
<tr>
<td>2230G-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2230J-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2230GJ-30-1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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**
  - Model Number: 1 additional year of factory warranty
  - Model Number: 2 additional years of factory warranty beyond the standard 3-year warranty
  - C/Model Number: 3 calibrations within 3 years of purchase
  - C/Model Number: 3 (ANSI-Z540-1 compliant) calibrations within 3 years of purchase
  - C/Model Number: 5 calibrations within 5 years of purchase
  - C/Model Number: 5 (ANSI-Z540-1 compliant) calibrations within 5 years of purchase

**Additional Recommended Accessories for "G" Versions**

- **KP-Cl-488LPA**
  - IEEE-488 Interface Board for PCI Bus
- **7007-06**
  - 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Output Voltage</th>
<th>Max Output Current</th>
<th>Power</th>
<th>Ripple &amp; Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>2260B-30-36</td>
<td>30V</td>
<td>36A</td>
<td>360W</td>
<td>&lt;7 mV RMS, &lt;60 mV p-p</td>
</tr>
<tr>
<td>2260B-80-13</td>
<td>80V</td>
<td>13.5A</td>
<td>360W</td>
<td>&lt;7 mV RMS, &lt;60 mV p-p</td>
</tr>
<tr>
<td>2260B-30-72</td>
<td>30V</td>
<td>72A</td>
<td>720W</td>
<td>&lt;11 mV RMS, &lt;80 mV p-p</td>
</tr>
<tr>
<td>2260B-80-27</td>
<td>80V</td>
<td>27A</td>
<td>720W</td>
<td>&lt;11 mV RMS, &lt;80 mV p-p</td>
</tr>
</tbody>
</table>

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-BA 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* - 5Y-STD KeithleyCare 5-Year Standard Calibration Plan
- C/Model Number* - SY-DAT KeithleyCare 5-Year Calibration with Data Plan

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.

**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**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2280-001</td>
<td>Rear Panel Mating connector and Cover</td>
</tr>
<tr>
<td>2280-Test-Lead</td>
<td>Power Supply Test Lead Kit, 1000V, 20A Rating</td>
</tr>
<tr>
<td>CA-180-3A</td>
<td>LAN Crossover Cable</td>
</tr>
<tr>
<td>USB-B-1</td>
<td>USB Cable Type A to B, 1m (3.3 ft)</td>
</tr>
<tr>
<td>2450-TLINK</td>
<td>Trigger Link cable to connect 2280S digital I/O to Trigger Link I/O on other Keithley instruments</td>
</tr>
<tr>
<td>4299-8</td>
<td>Single Fixed Rack-Mount Kit</td>
</tr>
<tr>
<td>4299-9</td>
<td>Dual Fixed Rack-Mount Kit</td>
</tr>
<tr>
<td>4299-10</td>
<td>Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 26xx Instrument</td>
</tr>
<tr>
<td>4299-11</td>
<td>Dual Fixed Rack-Mount Kit for one 2U Graphical Display Instrument and one Series 24xx, Series 2000, or 2U Agilent Instrument</td>
</tr>
</tbody>
</table>

**Recommended Accessories**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7007-05</td>
<td>Double Shielded Premium IEEE-488 Interface Cables, 0.5m (1.6 ft)</td>
</tr>
<tr>
<td>7007-1</td>
<td>Double Shielded Premium IEEE-488 Interface Cables, 1m (3.2 ft)</td>
</tr>
<tr>
<td>7007-2</td>
<td>Double Shielded Premium IEEE-488 Interface Cables, 2m (6.5 ft)</td>
</tr>
<tr>
<td>7007-3</td>
<td>Double Shielded Premium IEEE-488 Interface Cables, 3m (10 ft)</td>
</tr>
<tr>
<td>7007-4</td>
<td>Double Shielded Premium IEEE-488 Interface Cables, 4m (13 ft)</td>
</tr>
<tr>
<td>KP-Cl-488LPA</td>
<td>IEEE-488.2 Interface Board for the PCI Bus</td>
</tr>
</tbody>
</table>

**Ships with Product**

- KickStart software
- 2280-001 output mating connector
- LAN crossover cable
- Documentation CD
- QuickStart guide
- Calibrate Certificate
- Power Cord
- 3-year Warranty

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.
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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Output Voltage</th>
<th>Max Output Current</th>
<th>Power</th>
<th>Ripple</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>2268-20-42</td>
<td>20V</td>
<td>42A</td>
<td>850W</td>
<td>50mVpp</td>
<td>8mVRMS</td>
</tr>
<tr>
<td>2268-40-21</td>
<td>40V</td>
<td>21A</td>
<td>850W</td>
<td>50mVpp</td>
<td>8mVRMS</td>
</tr>
<tr>
<td>2268-60-14</td>
<td>60V</td>
<td>14A</td>
<td>850W</td>
<td>50mVpp</td>
<td>8mVRMS</td>
</tr>
<tr>
<td>2268-80-10</td>
<td>80V</td>
<td>10A</td>
<td>850W</td>
<td>80mVpp</td>
<td>8mVRMS</td>
</tr>
<tr>
<td>2268-100-8</td>
<td>100V</td>
<td>8.5A</td>
<td>860W</td>
<td>80mVpp</td>
<td>8mVRMS</td>
</tr>
<tr>
<td>2268-150-5</td>
<td>150V</td>
<td>5.6A</td>
<td>850W</td>
<td>100mVpp</td>
<td>10mVRMS</td>
</tr>
</tbody>
</table>

**Model Number:** C/Model Number* must be used for calibrations.

**Recommended Accessories**

- **Series 2268-HDR** Hardware to Connect Test Lead Lugs to the 2268-20 or 2268-40-21
- **Series 2268-RMK-1** Rack Mount Kit for One Series 2268 DC Power Supply
- **Series 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**-SY-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. Example: 2268-40-21-SY-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 1µA resolution.

### Product Highlights

- Source voltages up to 5kV and 10kV
- 1µA current measurement resolution
- Low noise for precision sourcing and sensitive measurements; selectable filters reduce noise to less than 3mVRMS on the 5kV supply
- Safety interlock controls high voltage output
- GPIB programmable
- Protection module prevents damage to low voltage instrumentation

### Power Cord

**Model Max Output Voltage** | **Max Output Current** | **Power** | **Ripple**
--- | --- | --- | ---
2290-5 | 5kV | 5mA | 25W | 3mVRMS maximum with filter
2290-10 | 10kV | 1mA | 10W | 1V RMS

### 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 (10 ft)
- 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

**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** KeithleyCare 3-Year Standard Calibration Plan

**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-Cl-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)
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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Channels</th>
<th>Max Output Voltage / Current</th>
<th>Power</th>
<th>Transient Response to a 10X Load Current Change</th>
<th>Current Sink Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2302</td>
<td>1</td>
<td>15 V / 5 A</td>
<td>42W</td>
<td>&lt;40µs recovery time and &lt;75mV voltage drop</td>
<td>3A</td>
</tr>
<tr>
<td>2306</td>
<td>2</td>
<td>15 V / 5 A</td>
<td>45W</td>
<td>&lt;40µs recovery time and &lt;75mV voltage drop</td>
<td>3A</td>
</tr>
<tr>
<td>2308</td>
<td>2</td>
<td>15 V / 5 A</td>
<td>45W</td>
<td>&lt;35µs recovery time and &lt;90 mV voltage drop</td>
<td>3A</td>
</tr>
</tbody>
</table>

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

- 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

<table>
<thead>
<tr>
<th>Model Number*</th>
<th>1-year factory warranty extended to 3 years from date of shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2302-3Y-EW</td>
<td></td>
</tr>
<tr>
<td>2306-3Y-EW</td>
<td></td>
</tr>
<tr>
<td>2308-3Y-EW</td>
<td></td>
</tr>
</tbody>
</table>

* 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: 33µs - 833µs
- Measure sleep, standby currents, and full load currents to determine power consumption
- Sink current to simulate a discharged battery

### Model Channels Max Output Voltage / Current Power Transient Response to a 10X Load Current Change Current Sink Capacity

<table>
<thead>
<tr>
<th>Model</th>
<th>Channels</th>
<th>Max Output Voltage / Current</th>
<th>Power</th>
<th>Transient Response to a 10X Load Current Change</th>
<th>Current Sink Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2303</td>
<td>Single</td>
<td>15V/3A or 9V/5A</td>
<td>45W</td>
<td>&lt;40µs recovery time and &lt;100mV voltage drop</td>
<td>2A</td>
</tr>
<tr>
<td>2304A</td>
<td>Single</td>
<td>20V/5A</td>
<td>100W</td>
<td>&lt;40µs recovery time and &lt;100mV voltage drop</td>
<td>3A</td>
</tr>
</tbody>
</table>

### 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

### Ships with Product
- User Documentation
- Rear Panel Mating Connector
- Calibration Certificate
- Power Cord
- 1-year Warranty

### Recommended Service

<table>
<thead>
<tr>
<th>Model</th>
<th>Number*</th>
<th>1-year factory warranty extended to 3 years from date of shipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/Model</td>
<td>Number*</td>
<td>3 (ISO-17025 accredited) calibrations within 3 years of purchase for Models 2303, 2303-PJ*</td>
</tr>
</tbody>
</table>

* Insert Model Number. Examples: 2303-3Y-EW, C/2303-3Y-ISO.
Frequency Counter/Timers Selection

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.

<table>
<thead>
<tr>
<th></th>
<th>FCA3000</th>
<th>FCA3100</th>
<th>MCA3000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Range</strong></td>
<td>400 MHz, 3 GHz, 20 GHz</td>
<td>400 MHz, 3 GHz, 20 GHz</td>
<td>27 GHz, 40 GHz</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>• 100 ps (time)</td>
<td>• 50 ps (time)</td>
<td>• 100 ps (time)</td>
</tr>
<tr>
<td></td>
<td>• 12 digits/s (freq)</td>
<td>• 12 digits/s (freq)</td>
<td>• 12 digits/s (freq)</td>
</tr>
<tr>
<td><strong>Data Transfer</strong></td>
<td>• 250 k Samples/sec (internal)</td>
<td>• 250 k Samples/sec (internal)</td>
<td>• 250 k Samples/sec (internal)</td>
</tr>
<tr>
<td></td>
<td>• 5 k Samples/sec (block)</td>
<td>• 5 k Samples/sec (block)</td>
<td>• 5 k Samples/sec (block)</td>
</tr>
<tr>
<td><strong>Analysis Modes</strong></td>
<td>TrendPlot™, Measurement Statistics, Allan Deviation, Histogram</td>
<td>TrendPlot™, Measurement Statistics, Allan Deviation, Histogram</td>
<td>TrendPlot™, Measurement Statistics, Allan Deviation, Histogram</td>
</tr>
</tbody>
</table>

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.
Frequency Counter/Timers

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

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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Max. Frequency</th>
<th>Channels</th>
<th>Time Resolution</th>
<th>Frequency Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCA3000</td>
<td>400 MHz</td>
<td>2</td>
<td>100 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td>FCA3003</td>
<td>3 GHz</td>
<td>2 – 400 MHz, 1 – 3 GHz</td>
<td>100 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td>FCA3020</td>
<td>20 GHz</td>
<td>2 – 400 MHz, 1 – 20 GHz</td>
<td>100 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td>FCA3100</td>
<td>400 MHz</td>
<td>2</td>
<td>50 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td>FCA3103</td>
<td>3 GHz</td>
<td>2 – 400 MHz, 1 – 3 GHz</td>
<td>50 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td>FCA3120</td>
<td>20 GHz</td>
<td>2 – 400 MHz, 1 – 20 GHz</td>
<td>50 ps</td>
<td>12 digit/s</td>
</tr>
</tbody>
</table>

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
- HC3EK-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^-7
- HS: High Stability OCXO Timebase, 5 X 10^-8
- 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

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.
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 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.

<table>
<thead>
<tr>
<th>Models</th>
<th>Max. Frequency</th>
<th>Channels</th>
<th>Time Resolution</th>
<th>Frequency Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA3027</td>
<td>27 GHz</td>
<td>2 – 300 MHz</td>
<td>100 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – 27 GHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA3040</td>
<td>40 GHz</td>
<td>2 – 300 MHz</td>
<td>100 ps</td>
<td>12 digit/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – 40 GHz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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, $5 \times 10^{-8}$
- US: Ultra High Stability OCXO Timebase, $1.5 \times 10^{-8}$

Recommended Service

- SILV600: 5-year Extended Warranty

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

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.