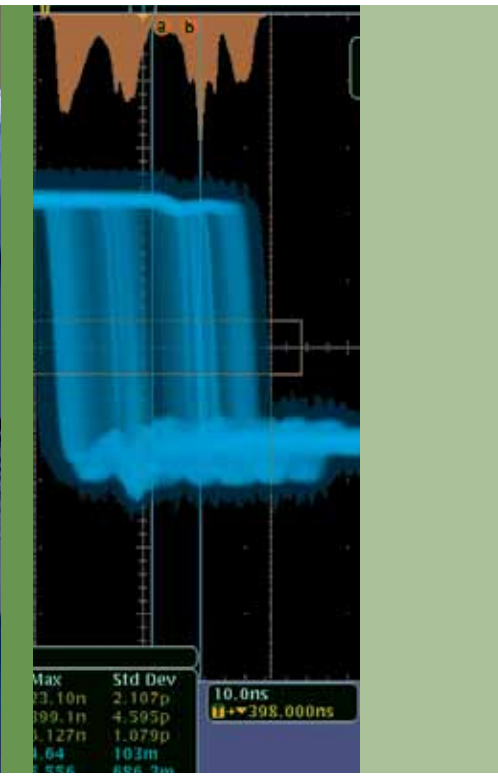
# 2012 Bench Products

## Test & Measurement Solutions


Tektronix®

# Overachiever.

## The most powerful scope you can buy for $1,290.

MSO/DPO2000B Mixed Signal Oscilloscope Series*

**Introducing the MSO/DPO2000B Mixed Signal Oscilloscope Series.** Like all of our MSO/DPO oscilloscopes, these powerful performers have the accuracy and craftsmanship you expect from Tektronix. Only the low price is surprising. Designed with you in mind, they are packed with innovative features to help speed every stage of debug. These scopes boast 16 digital channels, automated search, Wave Inspector® for navigating long records and even automated serial decode. All at a starting price that makes perfect sense, and backed by a 5-year warranty.

MSO/DPO2000B Series

| | |
|---|---|
| Bandwidth | 200 MHz, 100 MHz, 70 MHz |
| Channels | 2 or 4 analog<br>16 digital (MSO Series) |
| Record Length | 1 Mpoints |
| Display | 7.0" |
| Serial Bus Options | I²C, SPI, RS-232/422/485/UART, CAN, LIN |
| Optional Analysis | -- |
| Starting Price | $1,290 |

MSO/DPO3000 Series

| | |
|---|---|
| Bandwidth | 500 MHz, 300 MHz, 100 MHz |
| Channels | 2 or 4 analog<br>16 digital (MSO Series) |
| Record Length | 5 Mpoints |
| Display | 9.0" |
| Serial Bus Options | I²C, SPI, RS-232/422/485/UART, CAN, LIN, FlexRay, I²S/LJ/RJ/TDM, MIL-STD 1553 |
| Optional Analysis | Power Analysis, HDTV & Custom Video Triggering |
| Starting Price | $3,380 |

MSO/DPO4000B and MDO4000 Series

| | |
|---|---|
| Bandwidth | 1 GHz, 500 MHz, 350 MHz, 100 MHz |
| Channels | 2 or 4 analog<br>16 digital (MSO & MDO Series)<br>1 RF (MDO Series) |
| Record Length | Up to 20 Mpoints |
| Display | 10.4" |
| Serial Bus Options | I²C, SPI, RS-232/422/485/UART, CAN, LIN, FlexRay, I²S/LJ/RJ/TDM, MIL-STD 1553, USB, Ethernet |
| Optional Analysis | Power Analysis, Limit & Mask Testing, HDTV & Custom Video Triggering |
| Starting Price | $7,150 |

**See the scope in action, analyze the specs and learn more at**
**www.tektronix.com/mso2000**

*MSO2024B shown in picture and priced at $3,570.



Tektronix®

Table of Contents



# Tektronix: The World's Standard in Oscilloscopes

8 out of 10 engineers around the world trust Tektronix to help them speed debug and test of tomorrow's designs. To complement our oscilloscopes, we offer a portfolio of bench instruments designed with the same ease-of-use you've come to expect from us over the last 65 years. From dedicated buttons for common functions to USB ports for saving data. Our instruments are designed to be quick to learn and simple to operate.

## About Tektronix:

For 65 years, engineers have turned to Tektronix for test, measurement and monitoring instrumentation to solve design challenges, improve productivity and dramatically reduce time to market. You can always count on us to give you the domain expertise, innovation, performance, practical advice and quality you need.

Tektronix offers a wide range of test and measurement solutions, from oscilloscopes and probes to signal generators and spectrum analyzers, with much more in between including our comprehensive line of bench instruments.

For an in-depth look at all of our products, including demos and 360-degree product explorers, please visit www.tektronix.com.

# Basic Oscilloscopes

To accurately visualize the intricate details of fast changing signals, you need an oscilloscope with uncompromised performance. Tektronix basic oscilloscopes feature Digital Real-Time Sampling with at least x5 over sampling on all channels, all the time, to precisely capture today's complex signals.

| | TDS1000C-EDU | TDS2000C | TPS2000B | THS3000 | TDS3000C |
|---|---|---|---|---|---|
| Channels | 2 | 2, 4 | 2, 4 (isolated) | 4 (isolated) | 2, 4 |
| Bandwidth | 40 MHz to 100 MHz | 50 MHz to 200 MHz | 100 MHz to 200 MHz | 100 MHz to 200 MHz | 100 MHz to 500 MHz |
| Sample Rate | 500 MS/s to 1 GS/s | 500 MS/s to 2 GS/s | 1 GS/s to 2 GS/s | 2.5 GS/s to 5 GS/s | 1.25 GS/s to 5 GS/s |
| Max Record Length | 2.5 k points | 2.5 k points | 2.5 k points | 10 k points | 10 k points |
| Trigger Types | Edge, Pulse (width), Video | Edge, Pulse (width), Video | Edge, Pulse (width), Video | Edge, Pulse (width), Event, Video, Non-interlaced | Edge, Logic (Pattern, State), Pulse (Glitch, Width, Runt, Slew Rate), Video, Extended Video*, Comm*<br>*Optional |
| Optional Serial Bus Decode and Analysis | -- | -- | TPS2PWR1: Power Measurement and Analysis | -- | TDS3AAM: Advanced Analysis<br>TDS3LIM: Limit Testing<br>TDS3SDI: 601 Serial Digital Video Analysis<br>TDS3TMT: Telecom Mask Testing<br>TDS3VID: HDTV and Custom Video Triggering |
| Connectivity | USB Host, USB Device, GPIB*<br>*Optional | USB Host, USB Device, GPIB*<br>*Optional | RS-232 (includes RS-232-to-USB Host Serial Cable), Centronics, CompactFlash | USB Host, USB Device | USB Host, LAN (10Base-T Ethernet)<br>Optional TDS3GV Module: GPIB, RS-232, and Video Out |
| Waveform Math and Analysis | 16 Automated Measurements, Arithmetic Waveform Math, FFT | 16 Automated Measurements, Arithmetic Waveform Math, FFT, Waveform Limit Testing, Automated Datalogging | 11 Automated Measurements, Arithmetic Waveform Math, FFT | 21 Automated Measurements, Arithmetic Waveform Math, FFT | 25 Automated Measurements, Arithmetic Waveform Math, FFT, Advanced Math*<br>*Optional |
| Software | Educator Classroom and Lab Resource CD Included Standard.<br>PC Communications Software: OpenChoice® Desktop | PC Communications Software: OpenChoice® Desktop, NI LabVIEW SignalExpress™ Tektronix Edition LE | PC Communications Software: OpenChoice® Desktop, NI LabVIEW SignalExpress™ Tektronix Edition LE | PC Communications Software: OpenChoice® Desktop | PC Communications Software: OpenChoice® Desktop, NI LabVIEW SignalExpress™ Tektronix Edition LE |
| Battery Operation | -- | -- | One TPSBAT Battery Pack Included Standard | One THSBAT Battery Pack Included Standard | Requires Optional TDS3BATC Battery Pack |
| Starting Price | $790 | $890 | $2,990 | $3,950 | $4,980 |
| Additional Resources | | | | | |

# Bench Oscilloscopes

With the MSO/DPO Series of bench oscilloscopes, you can analyze analog and digital signals with a single instrument. And now, you can analyze your RF signals too with the MDO Series - the World's first and only mixed domain oscilloscope. Combine that with automated serial and parallel bus analysis, innovative Wave Inspector® controls for rapid waveform navigation, and automated power measurements, and the Tektronix bench oscilloscopes provide the feature-rich tools you need to simplify and speed debug of your complex design.

| | MSO/DPO2000B | MSO/DPO3000 |
|---|---|---|
| Channels | 2, 4 analog channels;<br>16 digital channels (MSO2000B) | 2, 4 analog channels;<br>16 digital channels (MSO3000) |
| Bandwidth | 70 MHz, 100 MHz and 200 MHz | 100 MHz to 500 MHz |
| Sample Rate | 1 GS/s (analog);<br>1 GS/s (digital, only 1 pod);<br>500 MS/s (digital, both pods) | 2.5 GS/s (analog);<br>121.2 ps (8.25 GS/s) MagniVu™ (digital) |
| Max Record Length | 1 Mpoints | 5 Mpoints |
| Trigger Types | Edge, Logic, Pulse Width, Runt, Set-up and Hold, Rise/Fall Time, Video, I²C*, SPI*, CAN*, LIN*, RS-232/422/485/UART*, Parallel (MSO2000B)<br>*Optional | Edge, Sequence, Logic, Pulse Width, Runt, Set-up and Hold, Rise/Fall Time, Video, Extended Video*, I²C*, SPI*, CAN*, LIN*, FlexRay*, RS-232/422/485/UART*, I²S/LJ/RJ/TDM*, MIL-STD-1553*, Parallel (MSO3000)<br>*Optional |
| Optional Serial Bus Decode and Analysis | DPO2AUTO: CAN and LIN<br>DPO2COMP: RS-232/422/485/UART<br>DPO2EMBD: I²C, SPI | DPO3AERO: MIL-STD-1553<br>DPO3AUDIO: I²S, LJ, RJ, TDM<br>DPO3AUTO: CAN and LIN<br>DPO3COMP: RS-232/422/485/UART<br>DPO3EMBD: I²C, SPI<br>DPO3FLEX: FlexRay |
| Connectivity | USB Host, USB Device, GPIB*<br>Optional DPO2CONN Module: LAN (10/100 Base-T Ethernet) and Video Out<br>*Optional | USB Host (x2), USB Device, LAN (10/100 Base-T Ethernet), Video Out, GPIB*<br>*Optional |
| Waveform Math and Analysis | 29 Automated Measurements, Waveform and Screen Cursors, Arithmetic Waveform Math, FFT | 29 Automated Measurements, Waveform and Screen Cursors, Arithmetic and Advanced Waveform Math, FFT, Measurement Statistics<br>**Optional:**<br>DPO3PWR: Power Analysis<br>DPO3VID: HDTV and Custom Triggering |
| Software | PC communications software: OpenChoice® Desktop | PC Communications Software: OpenChoice® Desktop, NI LabVIEW Signal Express™ Tektronix Edition LE |
| Battery Operation | -- | -- |
| Starting Price | $1,290 | $3,380 |
| Additional Resources | | |

## Tektronix Reference Library

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

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

| Additional Resources Key | |
|---|---|
| Product Demo | |
| Product Explorer | |
| Data Sheet | |
| Technical Content | |

# Choosing Your Oscilloscope

With over 50 models to choose from, 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 the higher frequency components of your signal, and therefore show signal transitions accurately. Since the edge speed (rise time) of a digital signal can carry much higher frequency components than its repetition rate might imply, choose an oscilloscope with a bandwidth greater than the 5th harmonic of your signal to ensure a measurement error of less than +/- 2%.

**Rule: Bandwidth > 5th Harmonic of Signal**

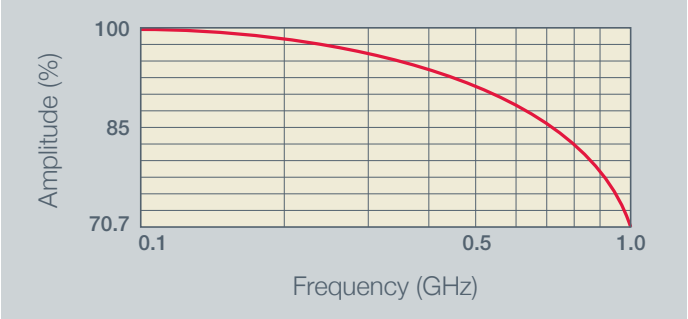



**Figure 1:** Typical frequency response curve for a general purpose oscilloscope

## 2 Sample Rate

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

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

## 3 Record Length

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

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

## 4 Digital and RF Channels

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 offers 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

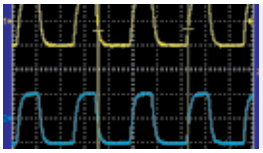
Tektronix oscilloscopes offer a range of features and analysis capabilities. When choosing your scope, you should review available triggers, waveform search tools, automated measurements, and analysis packages such as serial bus analysis, jitter and power analysis to ensure they meet your needs.

## TDS1000C-EDU Series

The best teach with the best. Easy to use and operate, this oscilloscope prepares students for real-world engineering challenges with the same interface found on over 500,000 Tektronix oscilloscopes worldwide. Add in a low price point and tools that make it easy to implement into your existing curriculum and you have an oscilloscope that your students—and your department—can't live without.

### Product Highlights

- 2.5 kpoints record length on all channels, all the time
- 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
- Qualifies for Education Discount



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

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

| Models | Analog Channels | Analog Bandwidth | Display | Analog Sample Rate | Pricing (USD) |
|---|---|---|---|---|---|
| TDS1001C-EDU | 2 | 40 MHz | Color | 500 MS/s | $790 |
| TDS1002C-EDU | 2 | 60 MHz | Color | 1.0 GS/s | $990 |
| TDS1012C-EDU | 2 | 100 MHz | Color | 1.0 GS/s | $1,190 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| TPP0101 | 100 MHz, 10X, 300V | $66 |
| TPP0201 | 200 MHz, 10X, 300V | $81 |
| P2220 | 200 MHz, 1X/10X, 150V/300V | $127 |
| **High Voltage Probes** | | |
| P5200A | 50 MHz, 50X/500X, 1.3 kV Differential | $926 |
| P5205A[*1] | 100 MHz, 50X/500X, 1.3 kV Differential | $1,360 |
| **Current Probes** | | |
| P6021 | 60 MHz, 15 A AC | $1,550 |
| P6022 | 120 MHz, 6 A AC | $1,660 |
| A621 | 5 to 50 kHz, 2000 A AC | $628 |
| A622 | 100 kHz, 100 A AC/DC | $633 |

[*1] Requires 1103 TEKPROBE Power Supply.

### Recommended Accessories

| | | |
|---|---|---|
| 1103 | TEKPROBE Power Supply | $2,260 |
| AC2100 | Soft Carrying Case | $129 |

### Recommended Service

| | | |
|---|---|---|
| SILV100 | 5-year Extended Warranty | $156 |

### Another Product for Consideration

Need 4 channels? The TDS2000C Series offers the same great performance as the TDS1000C-EDU on both 2- and 4-channel models, and includes a Lifetime Warranty.

### Ships with Product

- Two TPP0101 100 MHz, 10X Passive Probes
- Educator Classroom and Lab Resource CD
- OpenChoice® Desktop Software
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Power Cord
- 3-year Warranty

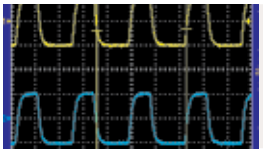
Help your students master the use of an oscilloscope with the included classroom labs and resources.

## TDS2000C Series

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

### Product Highlights

- 2.5 kpoints record length on all channels, all the time
- 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*2



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

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

| Models | Analog Channels | Analog Bandwidth | Analog Sample Rate | Pricing (USD) |
|---|---|---|---|---|
| TDS2001C | 2 | 50 MHz | 500 MS/s | $890 |
| TDS2002C | 2 | 70 MHz | 1.0 GS/s | $1,080 |
| TDS2004C | 4 | 70 MHz | 1.0 GS/s | $1,640 |
| TDS2012C | 2 | 100 MHz | 2.0 GS/s | $1,300 |
| TDS2014C | 4 | 100 MHz | 2.0 GS/s | $1,950 |
| TDS2022C | 2 | 200 MHz | 2.0 GS/s | $1,850 |
| TDS2024C | 4 | 200 MHz | 2.0 GS/s | $2,280 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| TPP0101 | 100 MHz, 10X, 300V | $66 |
| TPP0201 | 200 MHz, 10X, 300V | $81 |
| P2220 | 200 MHz, 1X/10X, 150V/300V | $127 |
| **High Voltage Probes** | | |
| P5200A | 50 MHz, 50X/500X, 1.3 kV Differential | $926 |
| P5205A*1 | 100 MHz, 50X/500X, 1.3 kV Differential | $1,360 |
| **Current Probes** | | |
| P6021 | 60 MHz, 15 A AC | $1,550 |
| P6022 | 120 MHz, 6 A AC | $1,660 |
| A621 | 5 to 50 kHz, 2000 A AC | $628 |
| A622 | 100 kHz, 100 A AC/DC | $633 |

*1 Requires 1103 TEKPROBE Power Supply

*2 For complete details visit www.tektronix.com/lifetimewarranty

### Recommended Accessories

| | | |
|---|---|---|
| 1103 | TEKPROBE Power Supply | $2,260 |
| AC2100 | Soft Carrying Case | $129 |

### Another Product for Consideration

If you work with serial or parallel buses, the MSO/DPO2000B Series offers trigger, decode and search options for common protocols.

### Ships with Product

- One TPP0x01 100 MHz or 200 MHz, 10X Passive Probe Per Analog Channel
- OpenChoice® Desktop and NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Power Cord
- Lifetime Warranty*2

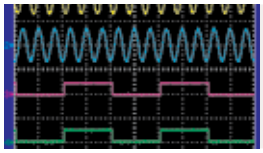
2011 Winner of the EETimes Annual Creativity in Electronics (ACE) Award

## TPS2000B Series

Great performance goes beyond the lab. This compact, battery-powered oscilloscope packs big-time performance and versatility. Make floating or differential measurements with up to four isolated channels. Tackle tough electronics and power systems in challenging environments with backlit buttons and optional power analysis software. Accurately capture your signals with Digital Real-Time Sampling. Huge performance. Small footprint.

### Product Highlights

- 2.5 kpoints record length on all channels, all the time
- 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 | 1.0 GS/s | $2,990 |
| TPS2014B | 4 | 100 MHz | 1.0 GS/s | $3,900 |
| TPS2024B | 4 | 200 MHz | 2.0 GS/s | $4,400 |

### Application Modules

| | | |
|---|---|---|
| TPS2PBND2 | TPS2PWR1 Module and Four P5122 Probes | $1,550 |
| TPS2PWR1 | Power Measurement and Analysis Module | $650 |

### Recommended Accessories

| | | |
|---|---|---|
| 1103 | TEKPROBE Power Supply | $2,260 |
| AC2100 | Soft Carrying Case | $129 |
| TPSBAT | Additional Lithium-Ion Battery Pack (one included standard with instrument) | $289 |
| TPSCHG | External Battery Charger | $502 |

### Recommended Service

| | | |
|---|---|---|
| SILV200 | 5-year Extended Warranty | $260 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| TPP0101 | 100 MHz, 10X, 300V | $66 |
| TPP0201 | 200 MHz, 10X, 300V | $81 |
| P2220 | 200 MHz, 1X/10X, 150V/300V | $127 |
| **High Voltage Probes** | | |
| P5205A[*1] | 100 MHz, 50X/500X, 1.3 kV Differential | $1,360 |
| P5210A[*1] | 50 MHz, 50X/500X, 5.6 kV Differential | $2,730 |
| P5122 | 200 MHz, 100X, 1 kV RMS CAT II, Single-ended | $273 |
| **Current Probes** | | |
| P6021 | 60 MHz, 15 A AC | $1,550 |
| P6022 | 120 MHz, 6 A AC | $1,660 |
| A621 | 5 to 50 kHz, 2000 A AC | $628 |
| A622 | 100 kHz, 100 A AC/DC | $633 |

[*1] Requires 1103 TEKPROBE Power Supply

### Another Product for Consideration

For very accurate voltage and current measurements, the DMM Series offers up to 0.0024% basic DC voltage 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 and NI LabVIEW SignalExpress™ TE (LE version) Software
- RS-232 to USB Adapter Cable
- One Lithium-Ion Battery
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Front Panel Cover, AC Adapter with Power Cord
- 3-year Warranty

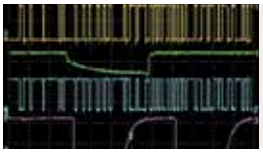
**Learn more** with the "Fundamentals of Floating Measurements and Isolated Input Oscilloscopes" application note.

## THS3000 Series

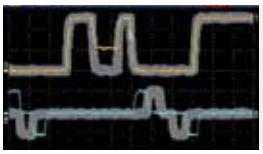
Affordable performance in a rugged, portable design. This handheld, battery-powered oscilloscope is packed with features and analysis tools. With up to 5 GS/s sampling rate and four isolated channels that can measure up to 1000 Volts you can quickly, reliably and accurately evaluate your signal characteristics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

### Product Highlights

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



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



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

| Models | Analog Channels | Analog Bandwidth | Analog Sample Rate | Pricing (USD) |
|---|---|---|---|---|
| THS3014 | 4 | 100 MHz | 2.5 GS/s | $3,950 |
| THS3014-TK | 4 | 100 MHz | 2.5 GS/s | $4,380 |
| THS3024 | 4 | 200 MHz | 5.0 GS/s | $4,480 |
| THS3024-TK | 4 | 200 MHz | 5.0 GS/s | $4,900 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| THP0301 - Y/B/M/G | 300 MHz, 10X, 300 V CAT III | $181 |
| **High Voltage Probes** | | |
| P5122 | 200 MHz, 100X, 1kV Single-ended | $273 |
| P5150[*1] | 500 MHz, 50X | $490 |
| **Current Probes** | | |
| A621 | 2000 A, 5 kHz to 50 kHz AC | $628 |
| A622 | 100 A, 100 kHz AC/DC | $633 |
| CT2 | 2.5 A, 200 MHz AC | $685 |

[*1] The P5150 is compatible with THS oscilloscopes, but 50X vertical scaling is not offered.

### Recommended Accessories

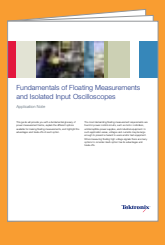
| | | |
|---|---|---|
| THSBAT | Additional Spare Battery | $309 |
| THSCHG[*2] | Battery Charger | $103 |

[*2] Does not include AC power adapter.

### Recommended Service

| | | |
|---|---|---|
| SILV400 | 5-year Extended Warranty | $415 |

**Learn more** with the "Fundamentals of Floating Measurements and Isolated Input Oscilloscopes" application note.




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

[*3] Non-TK models only

[*4] TK models only

## TDS3000C Series

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

### Product Highlights

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

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

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

| Models | Analog Channels | Analog Bandwidth | Analog Sample Rate | Pricing (USD) |
|---|---|---|---|---|
| TDS3012C | 2 | 100 MHz | 1.25 GS/s | $4,980 |
| TDS3014C | 4 | 100 MHz | 1.25 GS/s | $6,100 |
| TDS3032C | 2 | 300 MHz | 2.5 GS/s | $7,350 |
| TDS3034C | 4 | 300 MHz | 2.5 GS/s | $8,750 |
| TDS3052C | 2 | 500 MHz | 5 GS/s | $10,600 |
| TDS3054C | 4 | 500 MHz | 5 GS/s | $12,500 |

### Application Modules

| | | |
|---|---|---|
| TDS3LIM | Limit Testing | $750 |
| TDS3TMT | Telecom Mask Test Triggering | $1,400 |
| TDS3VID | HDTV and Custom Video Triggering | $750 |

### Recommended Accessories

| | | |
|---|---|---|
| 1103 | TEKPROBE Power Supply | $2,260 |
| TDS3GV | GPIB, RS-232, and VGA Communications Module | $750 |
| TDS3BATC | Lithium-ion Battery | $631 |
| TDS3ION | Battery Charger | $125 |
| AC3000 | Soft Carrying Case | $247 |
| HCTEK4321 | Hard Carrying Case (requires AC3000) | $788 |

### Recommended Service

| | | |
|---|---|---|
| SILV400 | 5-year Extended Warranty | $415 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| P6139B | 500 MHz, 10X, 300V | $435 |
| **Active Voltage Probes** | | |
| P6243 | 1 GHz, 10X, ±15V Single-ended | $1,070 |
| **Differential Voltage Probes** | | |
| P6246[*1] | 400 MHz, 1X/10X, 8.5 V Differential | $3,440 |
| **High Voltage Probes** | | |
| P5205A | 100 MHz, 50X/500X, 1.3 kV Differential | $1,360 |
| P5210A | 50 MHz, 100X/1000X, 5.6 kV Differential | $2,730 |
| **Current Voltage Probes** | | |
| TCP202 | 50 MHz, 15 A AC/DC | $2,290 |

[*1] Requires 1103 TEKPROBE Power Supply

### Another Product for Consideration

If you work with serial or parallel buses, the MSO/DPO3000 Series offers trigger, decode and search options for common protocols.

### Ships with Product

- One P6139B 500 MHz, 10X Passive Probe Per Analog Channel
- OpenChoice® Desktop and NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate, Quick Reference Manual, & Documentation on CD
- Front Panel Cover, Power Cord
- 3-year Warranty

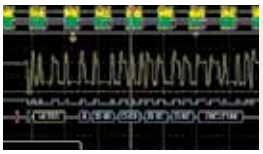
**Learn more** about Digital Real-Time Sampling with the "Be Sure to Capture the Complete Picture" application note.

# MSO/DPO2000B Series

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

## Product Highlights

- 1 Mpoint record length on all channels
- 5,000 wfm/s max. waveform capture rate with DPO technology
- Over 125 available trigger combinations, including setup/hold, serial packet and parallel data
- Automated search and easy waveform navigation with Wave Inspector®
- 29 automated measurements and FFT analysis
- 5-year warranty



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

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

| Models | Analog Channels | Digital Channels | Analog Bandwidth | Analog Sample Rate | Pricing (USD) |
|---|---|---|---|---|---|
| DPO2002B | 2 | -- | 70 MHz | 1 GS/s | $1,290 |
| MSO2002B | 2 | 16 | 70 MHz | 1 GS/s | $2,120 |
| DPO2004B | 4 | -- | 70 MHz | 1 GS/s | $1,970 |
| MSO2004B | 4 | 16 | 70 MHz | 1 GS/s | $2,790 |
| DPO2012B | 2 | -- | 100 MHz | 1 GS/s | $1,570 |
| MSO2012B | 2 | 16 | 100 MHz | 1 GS/s | $2,390 |
| DPO2014B | 4 | -- | 100 MHz | 1 GS/s | $2,330 |
| MSO2014B | 4 | 16 | 100 MHz | 1 GS/s | $3,150 |
| DPO2022B | 2 | -- | 200 MHz | 1 GS/s | $2,230 |
| MSO2022B | 2 | 16 | 200 MHz | 1 GS/s | $3,060 |
| DPO2024B | 4 | -- | 200 MHz | 1 GS/s | $2,750 |
| MSO2024B | 4 | 16 | 200 MHz | 1 GS/s | $3,570 |

## Application Modules

| | | |
|---|---|---|
| **Serial Bus Triggering and Protocol Analysis** | | |
| DPO2AUTO | Automotive (CAN, LIN) | $350 |
| DPO2COMP | Computer (RS-232) | $350 |
| DPO2EMBD | Embedded (I²C, SPI) | $350 |

## Recommended Accessories

| | | |
|---|---|---|
| DPO2CONN | Ethernet and Video Out Connectivity Module | $425 |
| 119-7465-xx | TekVPI External Power Supply | $79 |
| ACD2000 | Soft Carrying Case | $247 |

## Recommended Probes

| | | |
|---|---|---|
| **Differential Voltage Probes** | | |
| TDP0500[*1] | 500 MHz, 50X/500X, ±42V, TekVPI™ | $3,400 |
| **High Voltage Probes** | | |
| THDP0200[*1] | 200 MHz, 50X/500X, 1.5 kV Differential, TekVPI | $1,710 |
| TMDP0200[*1] | 200 MHz, 25X/250X, 750 V Differential, TekVPI | $1,710 |
| THDP0100[*1] | 100 MHz, 100X/1000X, 6.0 kV Differential, TekVPI | $2,930 |
| **Current Probes** | | |
| TCP0030[*1] | 120 MHz, 30A AC/DC, TekVPI | $3,430 |
| TCP0150[*1] | 20 MHz, 150A AC/DC, TekVPI | $4,050 |

[*1] Requires 119-7465-xx TekVPI External Power Supply

## Another Product for Consideration

Need more bandwidth? The MSO/DPO3000 Series offers up to 500 MHz analog bandwidth and additional performance.

## Ships with Product

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

"It combines scope, logic analyzer, and protocol analyzer features into an easy-to-use, portable package. The mixed signal functionality, serial decode, small-footprint, and affordable price provide compelling value."

Alfred Mora
Electrical Engineer, Datalogic Scanning, Inc.

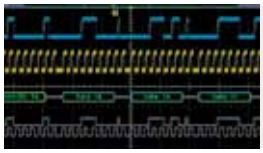
## MSO/DPO3000 Series

Looking for an all-purpose oscilloscope? Look no further. Measure up to 20 channels of analog and digital signals with one instrument. Save time with automated measurements, and built-in serial and parallel bus analysis. Instantly search your entire record with Wave Inspector®. Efficiency. Versatility. Performance. One oscilloscope.

### Product Highlights

- 5 Mpoint record length on all channels
- >50,000 wfm/s max. waveform capture rate with DPO technology
- Over 125 available trigger combinations, including setup/hold, serial packet and parallel data
- Automated search and easy waveform navigation with Wave Inspector®
- 29 automated measurements and FFT analysis

Analyze your digital signals with up to 121.2 ps timing resolution with MagniVu™ (MSO Series).



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

| Models | Analog Channels | Digital Channels | Analog Bandwidth | Analog Sample Rate | Digital Sample Rate Main/MagniVu™ | Pricing (USD) |
|---|---|---|---|---|---|---|
| DPO3012 | 2 | -- | 100 MHz | 2.5 GS/s | -- | $3,380 |
| MSO3012 | 2 | 16 | 100 MHz | 2.5 GS/s | 500 MS/s / 8.25 GS/s | $4,800 |
| DPO3014 | 4 | -- | 100 MHz | 2.5 GS/s | -- | $4,050 |
| MSO3014 | 4 | 16 | 100 MHz | 2.5 GS/s | 500 MS/s / 8.25 GS/s | $5,500 |
| DPO3032 | 2 | -- | 300 MHz | 2.5 GS/s | -- | $6,380 |
| MSO3032 | 2 | 16 | 300 MHz | 2.5 GS/s | 500 MS/s / 8.25 GS/s | $8,520 |
| DPO3034 | 4 | -- | 300 MHz | 2.5 GS/s | -- | $7,680 |
| MSO3034 | 4 | 16 | 300 MHz | 2.5 GS/s | 500 MS/s / 8.25 GS/s | $10,300 |
| DPO3052 | 2 | -- | 500 MHz | 2.5 GS/s | -- | $8,600 |
| DPO3054 | 4 | -- | 500 MHz | 2.5 GS/s | -- | $10,500 |
| MSO3054 | 4 | 16 | 500 MHz | 2.5 GS/s | 500 MS/s / 8.25 GS/s | $13,700 |

### Application Modules

| | | |
|---|---|---|
| **Serial Bus Triggering and Protocol Analysis** | | |
| DPO3AERO | Aerospace (MIL-STD-1553) | $1,100 |
| DPO3AUDIO | Audio ($I^2S$, LJ, RJ and TDM) | $1,100 |
| DPO3AUTO | Automotive (CAN, LIN) | $1,100 |
| DPO3COMP | Computer (RS-232) | $1,100 |
| DPO3EMBD | Embedded ($I^2C$, SPI) | $1,100 |
| DPO3FLEX | Automotive (FlexRay) | $1,100 |
| **Additional Analysis** | | |
| DPO3PWR | Power Analysis | $1,370 |
| DPO3VID | HDTV and Custom Video Triggering | $695 |

### Recommended Accessories

| | | |
|---|---|---|
| ACD4000 | Soft Carrying Case | $247 |

### Recommended Service

| | | |
|---|---|---|
| SILV400 | 5-year Extended Warranty | $415 |

### Recommended Probes

| | | |
|---|---|---|
| **Passive Voltage Probes** | | |
| P6139B | 500 MHz, 10X, TekVPI | $435 |
| **Active Voltage Probes** | | |
| TAP1500 | 1.5 GHz, 10X, ±8V, TekVPI | $2,380 |
| **Differential Voltage Probes** | | |
| TDP0500 | 500 MHz, 50X/500X, ±42V, TekVPI | $3,400 |
| TDP1000 | 1 GHz, 50X/500X, ±42V, TekVPI | $4,790 |
| **High Voltage Probes** | | |
| THDP0200 | 200 MHz, 50X/500X, 1.3 kV Differential, TekVPI | $1,710 |
| TMDP0200 | 200 MHz, 25X/250X, 750 V Differential, TekVPI | $1,710 |
| **Current Probes** | | |
| TCP0030 | 120 MHz, 30A AC/DC, TekVPI | $3,430 |
| TCP0150 | 20 MHz, 150A AC/DC, TekVPI | $4,050 |

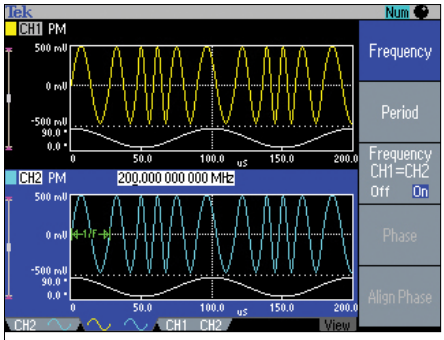
### Ships with Product

- One P6139B 500 MHz, 10X TekVPI Passive Probe Per Analog Channel
- One P6316 16 Channel Logic Probe (MSO only)
- OpenChoice® Desktop and NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Front Panel Cover, Power Cord
- 3-year Warranty

Upgrade the bandwidth of your MSO/DPO3000 Series any time after your purchase up to 500 MHz, ensuring your scope can grow with your needs.

# Fast, accurate and efficient. Just like the engineers who use them.

**Debug today's complex designs faster than ever with the feature-packed Tektronix AFG3000 and AFG2000 Arbitrary/Function Generator Series.** Best-in-class performance, up to 12 standard waveforms, arbitrary waveform capability and signal impairment options offer the flexibility to test a variety of applications with one instrument. Plus, all Tektronix Arbitrary/Function Generators are controllable from your PC, so you can analyze data across your Tektronix bench instruments. Put simply, we designed both the AFG3000 and AFG2000 Series to do more, so you don't have to.




- Dual-channel—Save cost and bench space by replacing two signal generators with one AFG3000 2 channel instrument

- 12 standard waveforms
- AM, FM, PM, FSK, PWM
- Arbitrary waveform capabilities and signal impairment options
- Up to 2 GS/s sample rate
- Shortcut keys for fast input
- USB, LAN, GPIB connectivity
- Connect and control from your PC with included National Instruments LabVIEW SignalExpress™ software
- Industry-leading, 3-year warranty

Tektronix® Arbitrary/Function Generators

Detailed specs, virtual demos and more at
**www.tektronix.com/afg**

## 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.

| | AFG2000 | AFG3000 Series |
|---|---|---|
| Bandwidth | 20 MHz | 240 MHz, 100 MHz, 25 MHz, 10 MHz |
| Channels | 1 | 1 or 2 (independent or synchronized) |
| Memory Depth | 4 x 128 k points | 128 k points |
| Standard Waveforms | Sine, Sine(x)/x, Square, DC, Ramp, Gaussian, Exponential Decay, Pulse, Lorentz, Noise, Arbitrary, Haversine, Exponential Rise | Sine, Sine(x)/x, Square, DC, Ramp, Gaussian, Exponential Decay, Pulse, Lorentz, Noise, Arbitrary, Haversine, Exponential Rise |
| Modulation | AM, FM, PM, FSK, PWM, External | AM, FM, PM, FSK, PWM, External |
| Additional Modes | Sweep, Burst, Add Noise Impairment | Sweep, Burst, Add Noise Impairment |
| Connectivity | Front panel: USB host<br>Rear panel: USB device, (LAN & GPIB optional)<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE version) & ArbExpress™ Waveform Tool | Front panel: USB host<br>Rear panel: USB device, LAN, GPIB<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE version) & ArbExpress™ Waveform Tool |
| Starting Price | $1,590 | $1,950 |

# Choosing Your Signal Generator

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

### 1 Sample (Clock) Rate

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

### 2 Memory Depth (Record Length)

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

### 3 Vertical (Amplitude) Resolution

Vertical resolution pertains to the binary word size, in bits, of the instrument's DAC, with more bits equating to higher resolution. The vertical resolution of the DAC defines the amplitude accuracy and distortion of the re-produced waveform. While 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

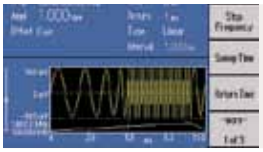
Tektronix signal generators offer a range of features and output capabilities. When choosing your signal generator, you should also evaluate standard waveforms, modulation capabilities, output amplitude and waveform editing software to ensure that the instrument meets your needs.

## AFG2000

Usually, generating a range of signals requires investment in a high-end signal generator. Introducing the Tektronix AFG2000. With 20 MHz bandwidth, 14-bit resolution, and 250 MS/s sample rate, the AFG2021 Arbitrary Function Generator can create simple and complex signals. But perhaps its most impressive feature is its entry-level price.

### Product Highlights

- 12 standard waveforms – Sine, Square, Pulse, Ramp, Noise, DC, Sine(x)/x, Gaussian, Lorentz, Exponential Rise, Exponential Decay and Haversine
- Arbitrary waveform capability
- AM, FM, PM, FSK, PWM, sweep and burst modes
- Front-panel USB host port and rear-panel USB device port, optional Ethernet and GPIB ports (Opt. GL)



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.

| Models | Analog Channels | Output Bandwidth | Analog Sample Rate | Memory Depth | Amplitude (into 50 Ω) | Pricing (USD) |
|---|---|---|---|---|---|---|
| AFG2021 | 1 | 20 MHz | 250 MS/s | 128 k | 10 $mV_{p-p}$ to 10 $V_{p-p}$ | $1,590 |

### Recommended Accessories

| | | |
|---|---|---|
| **Cables** | | |
| 012-0482-00 | BNC cable shielded, 3 ft. | $206 |
| 012-1256-00 | BNC cable shielded, 9 ft. | $84 |
| 012-0991-00 | GPIB cable, double shielded | $488 |
| 011-0049-02 | 50Ω BNC Terminator | $135 |
| **Accessories** | | |
| RMU2U | Rackmount kit | $152 |
| 013-0345-00 | Fuse adapter, BNC-P to BNC-R | $312 |
| 159-0454-00 | Fuse set, 3pcs, 0.125 A | $21 |

### Instrument Options

| | | |
|---|---|---|
| Opt. GL | GPIB/LAN Interface (configured at time of purchase) | $100 |

### Recommended Service

| | | |
|---|---|---|
| SILV200 | 5-year Extended Warranty | $260 |

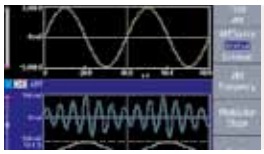
### Ships with Product

- ArbExpress™ Software and NI LabVIEW SignalExpress™ TE (LE version) Software
- LabView & IVI drivers
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- USB Cable
- Power Cord
- 3-year Warranty

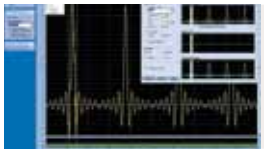
**Learn more** about the time-saving features of ArbExpress with the "Replicating Real World Signals with an Arbitrary/ Function Generator" application note.

## Product Highlights

- 12 standard waveforms - Sine, DC, Pulse, Exponential Decay, Sine(x)/x, Ramp, Lorentz, Haversine, Exponential Rise, Square, Gaussian, Noise
- Arbitrary waveform capability
- AM, FM, PM, FSK, PWM modulation
- Front-panel USB host port and rear-panel Ethernet and GPIB ports



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



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

# AFG3000 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.

| Models | Analog Channels | Output Bandwidth | Analog Sample Rate | Memory Depth | Amplitude (into 50 W) | Pricing (USD) |
|---|---|---|---|---|---|---|
| AFG3011 | 1 | 10 MHz | 250 MS/s | 128 k | 20 $mV_{p-p}$ to 20 $V_{p-p}$ | $4,220 |
| AFG3021B | 1 | 25 MHz | 250 MS/s | 128 k | 10 $mV_{p-p}$ to 10 $V_{p-p}$ | $1,950 |
| AFG3022B | 2 | 25 MHz | 250 MS/s | 128 k | 10 $mV_{p-p}$ to 10 $V_{p-p}$ | $2,990 |
| AFG3101 | 1 | 100 MHz | 1 GS/s (≤16k)<br>250 MS/s (>16k) | 128 k | 20 $mV_{p-p}$ to 10 $V_{p-p}$ | $4,290 |
| AFG3102 | 2 | 100 MHz | 1 GS/s (≤16k)<br>250 MS/s (>16k) | 128 k | 20 $mV_{p-p}$ to 10 $V_{p-p}$ | $6,090 |
| AFG3251 | 1 | 240 MHz | 2 GS/s (≤16k)<br>250 MS/s (>16k) | 128 k | 50 $mV_{p-p}$ to 5 $V_{p-p}$ | $8,660 |
| AFG3252 | 2 | 240 MHz | 2 GS/s (≤16k)<br>250 MS/s (>16k) | 128 k | 50 $mV_{p-p}$ to 5 $V_{p-p}$ | $11,900 |

## Recommended Accessories

| | | |
|---|---|---|
| **Cables** | | |
| 012-0482-xx | BNC cable shielded, 3 ft. | $210 |
| 012-1256-xx | BNC cable shielded, 9 ft. | $86 |
| 012-0991-xx | GPIB cable, double shielded | $498 |
| **Accessories** | | |
| RM3100 | Rackmount kit | $450 |
| 013-0345-xx | Fuse adapter, BNC-P to BNC-R | $318 |
| 159-0454-xx | Fuse set, 3pcs, 0.125A | $21 |

## Recommended Service

| | | |
|---|---|---|
| SILV400 | 5-year Extended Warranty | $415 |

## Ships with Product

- ArbExpress™ Software and NI LabVIEW SignalExpress™ TE (LE version) Software
- LabView & IVI drivers
- Calibration Certificate, Quick Reference Manual & Documentation on CD
- Power Cord
- 3-year Warranty

**Learn more** about the time-saving features of ArbExpress with the "Replicating Real World Signals with an Arbitrary/ Function Generator" application note.

## Digital Multimeters

Designed to save time and reduce headaches, Tektronix Digital Multimeters are built to do more so you don't have to. Loaded with time-saving features like automated measurements, built-in analysis modes and front-panel shortcut buttons.


| | DMM4020 | DMM4040 | DMM4050 |
|---|---|---|---|
| Resolution | 5.5 digit | 6.5 digit | 6.5 digit |
| Basic Vdc Accuracy | Up to 0.015% | Up to 0.0035% | Up to 0.0024% |
| Measurements | V ac, V dc, I ac, I dc, Resistance, Continuity, Diode, Frequency | V ac, V dc, I ac, I dc, Resistance, Continuity, Diode, Frequency, Period | V ac, V dc, I ac, I dc, Resistance, Continuity, Diode, Frequency, Period, Temperature, Capacitance |
| Analysis Modes | Limit Compare | TrendPlot™, Statistics, Histogram | TrendPlot™, Statistics, Histogram |
| Connectivity | Rear panel: RS-232, RS-232 to USB adapter included<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) | Front panel: USB host<br>Rear panel: RS-232, RS-232 to USB adapter included, GPIB and Ethernet<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) | Front panel: USB host<br>Rear panel: RS-232, RS-232 to USB adapter included, GPIB and Ethernet<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) |
| Starting Price | $780 | $1,130 | $1,400 |

# 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 Analysis Capability

When choosing your digital multimeter, you should review available analysis modes, such as trend plotting, measurement statistics and histograms, to ensure your needs are met.

# DMM4020

Make measurements, not compromises. Measure a variety of parameters— from volts, ohms and amps to frequency—with one instrument. Save time with front-panel shortcut keys and built-in limit testing. Performance. Reliability. Legendary ease-of-use. One instrument. Looks like you can have it all.

## Product Highlights

- 5.5 digit resolution
- Basic V dc accuracy of up to 0.015%
- Volts, ohms, amps and frequency measurements
- Dedicated dc leakage current measurement
- CAT I 1000 V, CAT II 600 V


Make accurate 4-wire resistance measurements with only two test leads!


With the unique dual display, you can measure two different parameters of the same signal from one test connection.

| Models | Display | Resolution (Digits) | Measurements | Basic V dc accuracy (% Reading + % Range) | Pricing (USD) |
|---|---|---|---|---|---|
| DMM4020 | Dual; Numeric | 5.5 | V ac, V dc, I dc, I ac, Ω, Cont, Diode, Freq | 0.015 + 0.004 (yr.) | $780 |

## Recommended Test Leads

| Test Leads | | |
|---|---|---|
| 196-3520-xx | Premium Test Leads (TL710 replacement/ spare) | $33 |
| TL705 | 2x4 Wire Ohm 1000V Test Lead | $77 |
| TL725 | 2x4 Wire Ohm SMD Test Tweezers | $102 |

## Recommended Accessories

| Accessories | | |
|---|---|---|
| ACD4000 | Soft Carrying Case | $247 |
| HCTEK-4321 | Hard Carrying Case | $788 |
| RMU2U | Rackmount Kit | $152 |
| 013-0369-xx | Calibration Fixture 4-terminal short | $43 |

## Recommended Service

| | | |
|---|---|---|
| SILV100 | 5-year Extended Warranty | $156 |

## 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

**Learn more** with the "Using the DMM Series to Make Simple and Accurate Resistance Measurements" application note.


# DMM4040/4050

Meet the multimeter to rule them all. Make a wide range of measurements—from volts, ohms and amps to frequency, temperature and capacitance—with one instrument. Monitor and record measurements over time, or environmental changes with built-in histogram, TrendPlot™ and statistics analysis modes. Get unparalleled ease-of-use with a dual display and USB connectivity. Hello, efficiency. Goodbye, complexity.

## Product Highlights

- 6.5 digit resolution
- Basic V dc accuracy of up to 0.0024%
- Volts, ohms, amps, frequency and period measurements
- Capacitance and temperature measurements (DMM4050)
- CAT I 1000 V, CAT II 600 V


Make accurate 4-wire resistance measurements with only two test leads!


See how your device is changing over time with built-in analysis modes – TrendPlot™, histograms and statistics.

| Models | Display | Resolution (Digits) | Measurements | Basic V dc accuracy (% Reading + % Range) | Pricing (USD) |
|---|---|---|---|---|---|
| DMM4040 | Dual; Numeric & Graphical | 6.5 | V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period | 0.0035 + 0.0005 | $1,130 |
| DMM4050 | Dual; Numeric & Graphical | 6.5 | V ac, V dc, I dc, I ac, Ω, Continuity, Diode, Freq, Period, Temp., Capacitance | 0.0024 + 0.0005 | $1,400 |

## Recommended Test Leads

| | | |
|---|---|---|
| **Temperature Probes** | | |
| TP750 | 100 Ohm RTD Temperature Probe (DMM4050 only) | $520 |
| **Test Leads** | | |
| 196-3520-xx | Premium Test Leads (TL710 replacement/ spare) | $33 |
| TL705 | 2x4 Wire Ohm 1000V Test Lead | $77 |
| TL725 | 2x4 Wire Ohm SMD Test Tweezers | $102 |

## Recommended Accessories

| | | |
|---|---|---|
| **Accessories** | | |
| ACD4000 | Soft Carrying Case | $247 |
| HCTEK-4321 | Hard Carrying Case | $788 |
| RMU2U | Rackmount Kit | $152 |
| 013-0369-xx | Calibration Fixture 4-terminal short | $43 |

## Recommended Service

| | | |
|---|---|---|
| SILV100 | 5-year Extended Warranty | $156 |

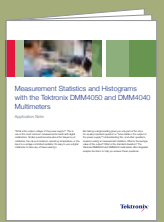
## Another Product for Consideration

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

## Ships with Product

- One Set TL710 Test Leads
- RS-232 to USB Adapter Cable
- NI LabVIEW SignalExpress™ TE (LE version) Software
- Calibration Certificate
- User Manual & Documentation on CD
- Power Cord
- 3-year Warranty

**Learn more** with the "Measurement Statistics and Histograms with the Tektronix DMM4050 and DMM4040 Multimeters" application note.



## Power Supplies

Tektronix Power Supplies deliver a wide range of voltage and current, along with precision, accuracy and a long list of convenient features. Which means faster debug of complex designs.

| | PWS2000 | PWS4000 |
|---|---|---|
| Output Voltage/ Current | ▪ 18V/5A ▪ 32V/6A<br>▪ 32V/3A ▪ 72V/1.5A | ▪ 20V/5A ▪ 60V/2.5A<br>▪ 30V/5A ▪ 72V/1.2A<br>▪ 32V/3A |
| Basic Accuracy | ▪ 0.05% Voltage ▪ 0.2% Current | ▪ 0.03% Voltage ▪ 0.05% Current |
| Ripple and Noise | Less than 3 mVpp | Less than 5 mVpp |
| Features | ▪ 20 Setup Memories<br>▪ User-defined Password Lock Out | ▪ 40 Setup Memories ▪ Adjustable Overvoltage Protection<br>▪ User-defined Password Lock Out ▪ Remote Sense<br>▪ List Mode |
| Connectivity | -- | Rear panel: USB device port<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) |
| Starting Price | $401 | $891 |

# Choosing Your DC Power Supply

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

### 1 Output Voltage and Current

At any given time, either voltage or current is being regulated by the power supply.

- In constant voltage (CV) mode, the output voltage will match the voltage setting within the accuracy specifications of the instrument. The current will be determined by the impedance of the load.
- In constant current (CC) mode, the output current will match the current setting within the accuracy specifications. The voltage will be determined by the impedance of the load.

When choosing a power supply, the most important selection criteria is the output voltage and current range of the supply. You will want to select a power supply that meets your different application needs.

### 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 choosing your power supply, you should review available features, such as remote sense, list mode and set up memories, to ensure your needs are met. Some power supplies are also programmable, allowing you to remotely control your supply from your PC.

## PWS2000 Series

More power. More features. More value. Support many different applications with wide output voltage and current ranges, and down to 10 mV/10 mA resolution. Save time with a numeric keypad for fast and accurate voltage/current selection. Strain less with a bright, large readout digital display. All backed by Tektronix reliability.

### Product Highlights

- Linear regulation
- 0.05% basic DC voltage accuracy
- 0.2% basic DC current accuracy
- Less than 3 mVp-p ripple and noise
- 20 user-defined setup memories

The numeric keypad makes it easy to specify a precise current limit before you start your test.

PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.

| Models | Output Voltage | Output Current | Programmable | Pricing (USD) |
|---|---|---|---|---|
| PWS2185 | 18 V | 5 A | No | $401 |
| PWS2323 | 32 V | 3 A | No | $401 |
| PWS2326 | 32 V | 6 A | No | $463 |
| PWS2721 | 72 V | 1.5 A | No | $401 |

### Recommended Accessories

| | | |
|---|---|---|
| RMU2U | Rackmount Shelf Kit for 1 or 2 Units | $152 |
| 386-7598-xx | Rackmount Cosmetic Filler Panel | $33 |

### Recommended Service

| | | |
|---|---|---|
| SILV100 | 5-year Extended Warranty | $156 |

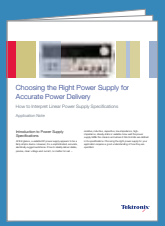
### Another Product for Consideration

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

**Learn more** with the "Choosing the Right Power Supply for Accurate Power Delivery" application note.



## PWS4000 Series

Precision. Now available at the touch of a button. Generate the power you need with down to 1 mV/0.1 mA resolution and a basic voltage accuracy of 0.03%. Accelerate complex tests with list mode and a USB port for remote programming. Save time with a numeric keypad for fast and accurate voltage/current selection. Performance. Accuracy. Affordability. Meet your new power supply.

### Product Highlights

- Linear regulation
- 0.03% basic DC voltage accuracy; 0.05% basic DC current accuracy
- USB interface for remote programming
- Less than 5 mVp-p ripple and noise
- Remote sense, list mode and 40 user-defined setup memories

The numeric keypad makes it easy to specify a precise current limit before you start your test.

PWS Series power supplies are designed to be stacked with other Tektronix bench instruments to save you valuable bench space.

| Models | Output Voltage | Output Current | Programmable | Pricing (USD) |
|---|---|---|---|---|
| PWS4205 | 20 V | 5 A | Yes | $891 |
| PWS4305 | 30 V | 5 A | Yes | $1,050 |
| PWS4323 | 32 V | 3 A | Yes | $891 |
| PWS4602 | 60 V | 2.5 A | Yes | $1,050 |
| PWS4721 | 72 V | 1.2 A | Yes | $891 |

### Recommended Accessories

| | | |
|---|---|---|
| RMU2U | Rackmount Shelf Kit for 1 or 2 Units | $152 |
| 386-7598-xx | Rackmount Cosmetic Filler Panel | $33 |

### Recommended Service

| | | |
|---|---|---|
| SILV100 | 5-year Extended Warranty | $156 |

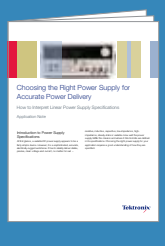
### Another Product for Consideration

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

**Learn more** with the "Choosing the Right Power Supply for Accurate Power Delivery" application note.



## Frequency Counter/Timers

Featuring the precision and intuitive operation you've come to expect from our oscilloscopes, Tektronix Timer/Counters are built with performance and convenience in mind. Featuring industry-leading resolution, built-in measurement and analysis modes.


| | FCA3000 | FCA3100 | MCA3000 |
|---|---|---|---|
| Frequency Range | 400 MHz, 3 GHz, 20 GHz | 400 MHz, 3 GHz, 20 GHz | 27 GHz, 40 GHz |
| Resolution | ▪ 100 ps (time)<br>▪ 12 digits/s (freq) | ▪ 50 ps (time)<br>▪ 12 digits/s (freq) | ▪ 100 ps (time)<br>▪ 12 digits/s (freq) |
| Data Transfer | ▪ 250 k Samples/sec (internal)<br>▪ 5 k Samples/sec (block) | ▪ 250 k Samples/sec (internal)<br>▪ 15 k Samples/sec (block) | ▪ 250 k Samples/sec (internal)<br>▪ 5 k Samples/sec (block) |
| Measurements | 13 Automated Measurements<br>Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p | 14 Automated Measurements<br>Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p, Totalize | 13 Automated Measurements<br>Frequency, Period, Ratio, Time Interval, Time Interval Error, Pulse Width, Rise/Fall Time, Phase Angle, Duty Cycle, Vmax, Vmin, Vp-p<br>+ An Integrated Power Meter |
| Analysis Modes | TrendPlot™, Measurement Statistics, Allan Deviation, Histogram | TrendPlot™, Measurement Statistics, Allan Deviation, Histogram | TrendPlot™, Measurement Statistics, Allan Deviation, Histogram |
| Connectivity | Rear panel: USB device port, GPIB<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) | Rear panel: USB device port, GPIB<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) | Rear panel: USB device port, GPIB<br>PC communications software: NI LabVIEW SignalExpress™ Tektronix Edition (LE Version) |
| Starting Price | $2,270 | $3,550 | $8,860 |

# Choosing Your Timer/Counter

To help you choose the right timer/counter 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 timer/counter 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 pico seconds, 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

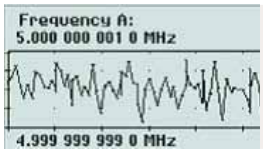
When choosing your timer/counter, you should review available analysis modes, such as trend plotting, measurement statistics, histograms and modulation domain analysis to ensure your needs are met.

# FCA3100/3000

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 TrendPlots. Get unparalleled ease-of-use with intuitive operation and USB connectivity. It's everything you need in a Timer/Counter/Analyzer. And more.

## Product Highlights

- 12 digit/sec frequency resolution
- 50 ps (FCA3100) or 100 ps (FCA3000) single-shot time resolution
- 0.001° phase resolution
- 250 k readings/sec data transfer rate to internal memory
- 13 automated frequency, time, phase and voltage measurements




See how your device is changing over time with built-in analysis modes – TrendPlot™, histograms and statistics.

Easily connect to a PC with the USB and GPIB ports.

| Models | Max. Frequency | Channels | Time Resolution | Frequency Resolution | Pricing (USD) |
|---|---|---|---|---|---|
| FCA3000 | 400 MHz | 2 | 100 ps | 12 digit/s | $2,270 |
| FCA3003 | 3 GHz | 2 – 400 MHz<br>1 – 3 GHz | 100 ps | 12 digit/s | $3,320 |
| FCA3020 | 20 GHz | 2 – 400 MHz<br>1 – 20 GHz | 100 ps | 12 digit/s | $6,580 |
| FCA3100 | 400 MHz | 2 | 50 ps | 12 digit/s | $3,550 |
| FCA3103 | 3 GHz | 2 – 400 MHz<br>1 – 3 GHz | 50 ps | 12 digit/s | $4,610 |
| FCA3120 | 20 GHz | 2 – 400 MHz<br>1 – 20 GHz | 50 ps | 12 digit/s | $7,840 |

## Recommended Accessories

| | | |
|---|---|---|
| 174-4401-xx | USB Host to Device Cable, 3 Feet | $10 |
| 012-0991-xx | GPIB Cable, Double Shielded | $498 |
| 012-1256-xx | BNC Male to BNC Male, 9 Feet | $86 |
| ACD4000 | Soft Carrying Case | $247 |
| HCTEK-4321 | Hard Carrying Case | $788 |
| RMU2U | Rackmount Shelf Kit for 2 Units | $152 |
| TVA3000 | TimeView™ Modulation Domain Analysis Software | $811 |
| SIGEXPTE | NI LabVIEW SignalExpress™ Tektronix Edition Software – Full Version | $779 |

## Instrument Options

| | | |
|---|---|---|
| MS | Medium Stability OCXO Timebase, 2 X $10^{-7}$ | $704 |
| HS | High Stability OCXO Timebase, 5 X $10^{-8}$ | $1,110 |
| RP | Rear-panel Connectors | $163 |

## Recommended Service

| | | |
|---|---|---|
| SILV200 | 5-year Extended Warranty (FCA3000, FCA3003, FCA3100, FCA3103) | $260 |
| SILV400 | 5-year Extended Warranty (FCA3020, FCA3120) | $415 |

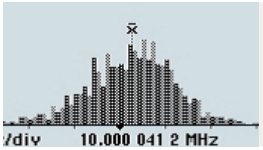
## Ships with Product

- 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

**Learn more** with the "Time and Frequency Measurements for Oscillator Manufacturers" application note.


## 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.

# MCA3000 Series

Feature-rich. Fully loaded. No matter how you say it, this microwave timer/counter is packed with functionality. Measure up to 40 GHz signals. And, get two extra 300 MHz timer/counter ports for added versatility. Quickly and accurately analyze signals with 13 automated measurements and comprehensive analysis modes, including statistics, histograms and TrendPlots. Get unparalleled ease-of-use with intuitive operation and USB connectivity. Finally, fully-loaded comes standard.

| Models | Max. Frequency | Channels | Time Resolution | Frequency Resolution | Pricing (USD) |
|---|---|---|---|---|---|
| MCA3027 | 27 GHz | 2 – 300 MHz<br>1 – 27 GHz | 100 ps | 12 digit/s | $8,860 |
| MCA3040 | 40 GHz | 2 – 300 MHz<br>1 – 40 GHz | 100 ps | 12 digit/s | $13,000 |

## Recommended Accessories

| | | |
|---|---|---|
| 174-4401-xx | USB Host to Device Cable, 3 Feet | $10 |
| 012-0991-xx | GPIB Cable, Double Shielded | $498 |
| 012-1256-xx | BNC Male to BNC Male, 9 Feet | $86 |
| AC4000 | Soft Carrying Case | $245 |
| HCTEK-4321 | Hard Carrying Case | $788 |
| RMU2U | Rackmount Shelf Kit for 2 Units | $152 |
| TVA3000 | TimeView™ Modulation Domain Analysis Software | $811 |
| SIGEXPTE | NI LabVIEW SignalExpress™ Tektronix Edition Software – Full Version | $779 |

## Instrument Options

| | | |
|---|---|---|
| HS | High Stability OCXO Timebase, 5 X $10^{-8}$ | $1,110 |
| US | Ultra High Stability OCXO Timebase, 1.5 X $10^{-8}$ | $2,230 |

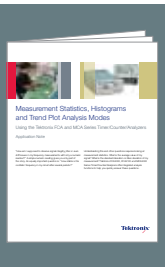
## Recommended Service

| | | |
|---|---|---|
| SILV600 | 5-year Extended Warranty | $620 |

## 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

**Learn more** with the "Measurement Statistics, Histograms and TrendPlot™ Analysis Modes" application note.



## RF Power Meters

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


| | PSM3000 | PSM4000 | PSM5000 |
|---|---|---|---|
| Description | Power Meter<br>Average Power | Power Meter<br>Average / Peak / Pulse | Power Meter<br>Average / Peak / Pulse + Profiling |
| Frequency Range | 10 MHz - 8 / 18 / 26.5 GHz | 10 MHz - 8 / 18.6 / 20 GHz | 50 MHz - 8 / 18.6 / 20 GHz |
| Dynamic Range | -55 to +20 dBm | -60 to +20 dBm | -60 to +20 dBm |
| Data Transfer Rate | 2000 Reads/sec | 2000 Reads/sec | 2000 Reads/sec |
| Measurements | True Average Power; Duty Cycle Corrected Pulse Power; Measurement Logging | Average Power (CW); Duty Cycle Corrected Pulse Power; Peak Power, Duty Cycle; Peak and Average Burst Power; Measurement Logging | Average Power (CW); Duty Cycle Corrected Pulse Power; Peak Power, Pulse Power, Duty Cycle; Peak and Average Burst Power; Measurement Logging; Pulse Width, Rise/Fall, Overshoot, Droop, Time Gated Measurements, Pulse Waveform Display with Markers |
| Starting Price | $2,590 | $2,790 | $3,690 |

# 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 triggering inputs and outputs increase 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.


## PSM3000 Series

The PSM3000 Series Power Sensor/Meters provide true average power measurements, giving accurate power measurements independent of signal modulation and bandwidth. In fact, the only thing entry-level about these meters is their price.

### Product Highlights

- True average power, duty cycle corrected pulse power, and data logging
- 10 MHz to 26.5 GHz
- High dynamic range (-55 dBm to +20 dBm)
- 2000 readings per second; an industry benchmark
- USB interface provides connectivity and power


Control the power meter and perform measurements using intuitive Windows® based software.

In addition to the USB power & Connectivity port the meters include TTL trigger inputs and outputs for synchronization.

| Models | Description | Frequency Range | Dynamic Range | Connector Style | Pricing (USD) |
|---|---|---|---|---|---|
| PSM3110 | True RMS Average | 10 MHz - 8 GHz | -55 to +20 dBm | 3.5mm male | $2,590 |
| PSM3120 | True RMS Average | 10 MHz - 8 GHz | -55 to +20 dBm | N-Male | $2,590 |
| PSM3310 | True RMS Average | 10 MHz - 18 GHz | -55 to +20 dBm | 3.5mm male | $3,450 |
| PSM3320 | True RMS Average | 10 MHz - 18 GHz | -55 to +20 dBm | N-Male | $3,450 |
| PMS3510 | True RMS Average | 10 MHz - 26.5 GHz | -55 to +20 dBm | 3.5mm male | $4,390 |

### Recommended Accessories

| | | |
|---|---|---|
| 174-6150-xx | USB Cable, 2 m, 20 AWG | $43 |
| 174-6164-xx | SMB Female to BNC Male, 1 m Trigger Cable | $67 |
| 348-2013-xx | Replacement Rubber Boot | $21 |

### Recommended Service

| | | |
|---|---|---|
| SILV200 | 5-year Extended Warranty (PSM3110, PSM3120) | $260 |
| SILV400 | 5-year Extended Warranty (PSM3310, PSM3320) | $415 |
| SILV600 | 5-year Extended Warranty (PSM3510) | $620 |

### Ships with Product

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

**Learn more** with the "Selecting an RF or Microwave Power Sensor/Meter" application note.

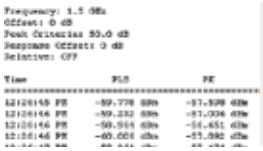

## PSM4000 Series

The ultimate mix of performance and price, the PSM4000 Series Power Sensor/Meters deliver average power (CW) measurements, and add pulse and peak power measurements for gathering basic data on pulsed RF and microwave signals. More features and options. For not much more price.

### Product Highlights

- Average power, duty cycle, pulse power, peak/average power, and data logging functionality
- 10 MHz to 20 GHz
- High dynamic range (-60 dBm to +20 dBm)
- 2000 readings per second; an industry benchmark
- USB interface provides connectivity and power


Peak power, average power, duty cycle and crest factor values are all reported on a simple Windows® user interface.



High speed logging software utilizes the USB interface and performs over 2000 readings per second.

| Models | Description | Frequency Range | Dynamic Range | Connector Style | Pricing (USD) |
|---|---|---|---|---|---|
| PSM4110 | Power Meter (Avg / Peak / Pulse) | 10 MHz - 8 GHz | -60 to +20 dBm | 3.5mm male | $2,790 |
| PSM4120 | Power Meter (Avg / Peak / Pulse) | 10 MHz - 8 GHz | -60 to +20 dBm | N-Male | $2,790 |
| PSM4320 | Power Meter (Avg / Peak / Pulse) | 50 MHz - 18.6 GHz | -40 to +20 dBm | N-Male | $5,290 |
| PSM4410 | Power Meter (Avg / Peak / Pulse) | 50 MHz - 20 GHz | -40 to +20 dBm | 3.5mm male | $5,290 |

### Recommended Accessories

| | | |
|---|---|---|
| 174-6150-xx | USB Cable, 2 m, 20 AWG | $43 |
| 174-6164-xx | SMB Female to BNC Male, 1 m Trigger Cable | $67 |
| 348-2013-xx | Replacement Rubber Boot | $21 |

### Recommended Service

| | | |
|---|---|---|
| SILV200 | 5-year Extended Warranty (PSM4110, PSM4120) | $260 |
| SILV600 | 5-year Extended Warranty (PSM4320, PSM4410) | $620 |

### Ships with Product

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

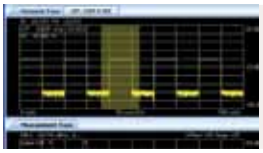
**Learn more** with the "Selecting an RF or Microwave Power Sensor/Meter" application note.


## PSM5000 Series

The PSM5000 Series Power Sensor/Meters provide the same measurements as the PSM4000, and add pulse profiling functionality for signal viewing and characterization in pulsed RF and microwave systems. When compromise is not an option, these meters are your only option.

### Product Highlights

- Average power, duty cycle, pulse power, peak/average power, pulse measurements (pulsewidth, rise/fall, PDF, CCDF, overshoot, droop), time gated measurements, pulse waveform display, and data logging functionality
- 50 MHz to 20 GHz
- High dynamic range (-60 dBm to +20 dBm)
- 2000 readings per second; an industry benchmark
- USB interface provides connectivity and power



Pulse profiling software enable a thorough analysis of pulse characteristics.

Power meter application burst measurement window enables time gated measurements.

| Models | Description | Frequency Range | Dynamic Range | Connector Style | Pricing (USD) |
|---|---|---|---|---|---|
| PSM5110 | Power Meter (Avg / Peak / Pulse + Profiling) | 100 MHz - 8 GHz | -60 to +20 dBm | 3.5mm male | $3,690 |
| PSM5120 | Power Meter (Avg / Peak / Pulse + Profiling) | 100 MHz - 8 GHz | -60 to +20 dBm | N-Male | $3,690 |
| PSM5320 | Power Meter (Avg / Peak / Pulse + Profiling) | 50 MHz - 18.6 GHz | -40 to +20 dBm | N-Male | $6,290 |
| PSM5410 | Power Meter (Avg / Peak / Pulse + Profiling) | 50 MHz - 20 GHz | -40 to +20 dBm | 3.5mm male | $6,290 |

### Recommended Accessories

| | | |
|---|---|---|
| 174-6150-xx | USB Cable, 2 m, 20 AWG | $43 |
| 174-6164-xx | SMB Female to BNC Male, 1 m Trigger Cable | $67 |
| 348-2013-xx | Replacement Rubber Boot | $21 |

### Recommended Service

| | | |
|---|---|---|
| SILV400 | 5-year Extended Warranty (PSM5110, PSM5120) | $415 |
| SILV600 | 5-year Extended Warranty (PSM5320, PSM5410) | $620 |

### Ships with Product

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

**Learn more** with the "Selecting an RF or Microwave Power Sensor/Meter" application note.

# 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.

## Active Probes

- Bandwidth up to 4 GHz
- True signal reproduction and fidelity
- Low input capacitance: down to < 0.5 pF
- Small compact probe heads for probing small geometry circuit elements

## Current Probes

- Easy to use and accurate AC/DC current measurements
- DC up to 2 GHz
- Amplitude measurements from 1 mA to 20,000 A
- Split core and solid core construction

## Differential Probes

- Bandwidth up to 20 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

## Passive Probes

- DC to 1 GHz
- Wide range of performance to meet the demands of many applications
- Lightweight, ergonomic designs to fit your needs
- Wide range of probe tips for easier circuit access

## High Voltage Probes

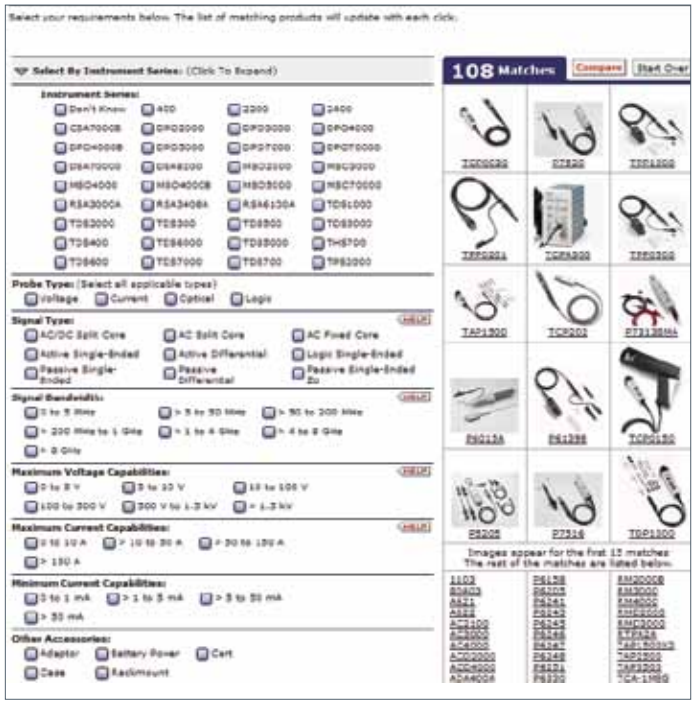
- Wide range of voltage measurements - Up to 40 kV peak (100 ms pulse)
- Single-ended or differential

## 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. Visit us anytime, anywhere at: **www.tektronix.com/probes**




# The Tektronix Service Advantage

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

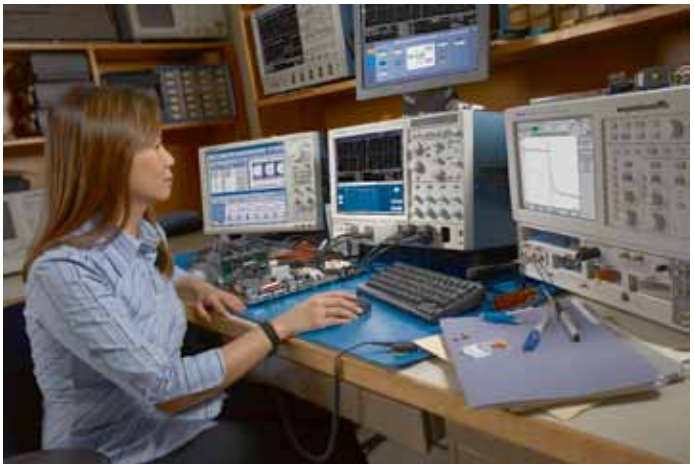
### Tektronix Service Highlights

- **Tektronix Factory Experts**
  Access to the engineering expertise that designed and built your products to ensure they are in peak performance. Our support engineers hold an average of 20 years of training and experience.
- **Comprehensive and Thorough Treatment**
  Software updates, safety and reliability modifications, and cosmetic enhancements are included if applicable. Products are returned to you in "like-new" condition. The Tektronix network of service centers offers worldwide support.
- **Efficiency and Convenience**
  Our team of professionals focus on getting your instruments back to you as soon as possible, minimizing your downtime and increasing your operating efficiency.
- **Flexible Repair and Calibration Service**
  Tektronix offers you the choice of a cost effective, flexible service package to meet your specific business needs.

## Tektronix Factory-Certified Service Plans

| Silver Care | Gold Care | Calibration |
|---|---|---|
| ▪ Extend your warranty up to 5 years<br>▪ Priority repair service<br>▪ Covers equipment, parts, labor and transportation<br>▪ Applicable software, safety and reliability updates<br>▪ Typical downtime of about 10 days | ▪ Extend your warranty up to 5 years and upgrade to premier service<br>▪ Loaner product of equal or higher performance shipped within 24 hours if your product fails<br>▪ Priority access to Tektronix Customer Care Center for fast technical support<br>▪ Coverage of customer-caused damage including EOS and ESD<br>▪ Typical downtime of 3 days or less | ▪ Multi-year contracts and single event calibrations available<br>▪ Accredited and traceable calibration<br>▪ Adjustments included where necessary to restore performance<br>▪ Applicable software, safety, and reliability updates<br>▪ Calibration records retention |

| Platinum Care |
|---|
| When high uptime is a must, Tektronix Platinum Care is the solution. With identically configured spare products dedicated to your facility, you will have the ability to quickly react and restore operations, keeping your operation at maximum capacity. If your requirements include calibration and repair, we will also put together an on-site calibration event and repair coverage plan to further reduce your out-of-service time. With priority access to technical support, and flexible contract duration and payment terms, Tektronix Platinum Care can provide a custom-tailored plan for your needs, and ensure a typical downtime of less than 1 hour. |



# Multi-Vendor Service Plans

## 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; manage 100% of repairs and calibration
- 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 and repairs, irrespective of product brand or origin. Our multi-vendor service tools simplify your calibration management program, minimizing downtime and improving operational efficiency.

### 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.

### 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.

### 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.

### Global Reach with Local Presence

Tektronix has the most extensive global network of resources. With more than 100 points of service and 1,000 highly trained experts, our unmatched suite of capabilities and services are available locally to most of the world's research and manufacturing centers.

For more information on Tektronix multi-vendor service, visit
**service-solutions.tektronix.com**
Or call us at 1-800-438-8165

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Contact List Updated 10 February 2011


**For Further Information**
Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**




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