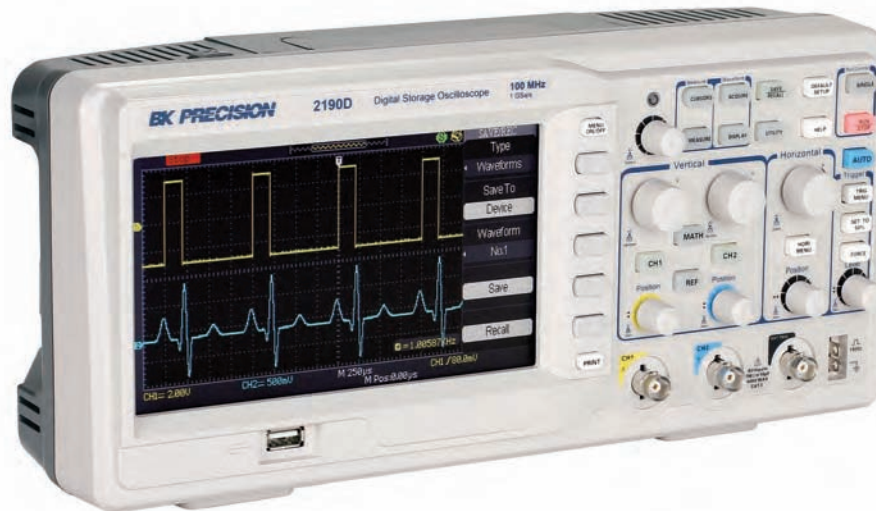# Data Sheet

# 100 MHz Digital Storage Oscilloscope
## Model 2190D



The 2190D combines performance and value all in one portable solution. With 100 MHz bandwidth and 1 GSa/s sample rate, these oscilloscopes offer advanced triggering capabilities, long waveform memory up to 40,000 points, and extensive features such as pass/fail limit testing, digital filtering, waveform recorder, and 32 automatic measurements.

Engineered to allow you to see more of your signal under test, the 2190D widescreen 7" TFT display offers a significantly larger viewing area than typical economy oscilloscopes (5.7").

Maximize productivity with PC connectivity via RS232 and USB. The downloadable PC software lets you easily capture, save, and analyze measurement results. All oscilloscope parameters can be controlled via a PC without the need for programming.

The 2190D oscilloscope is ideal for applications in education, design and debug, service and repair.
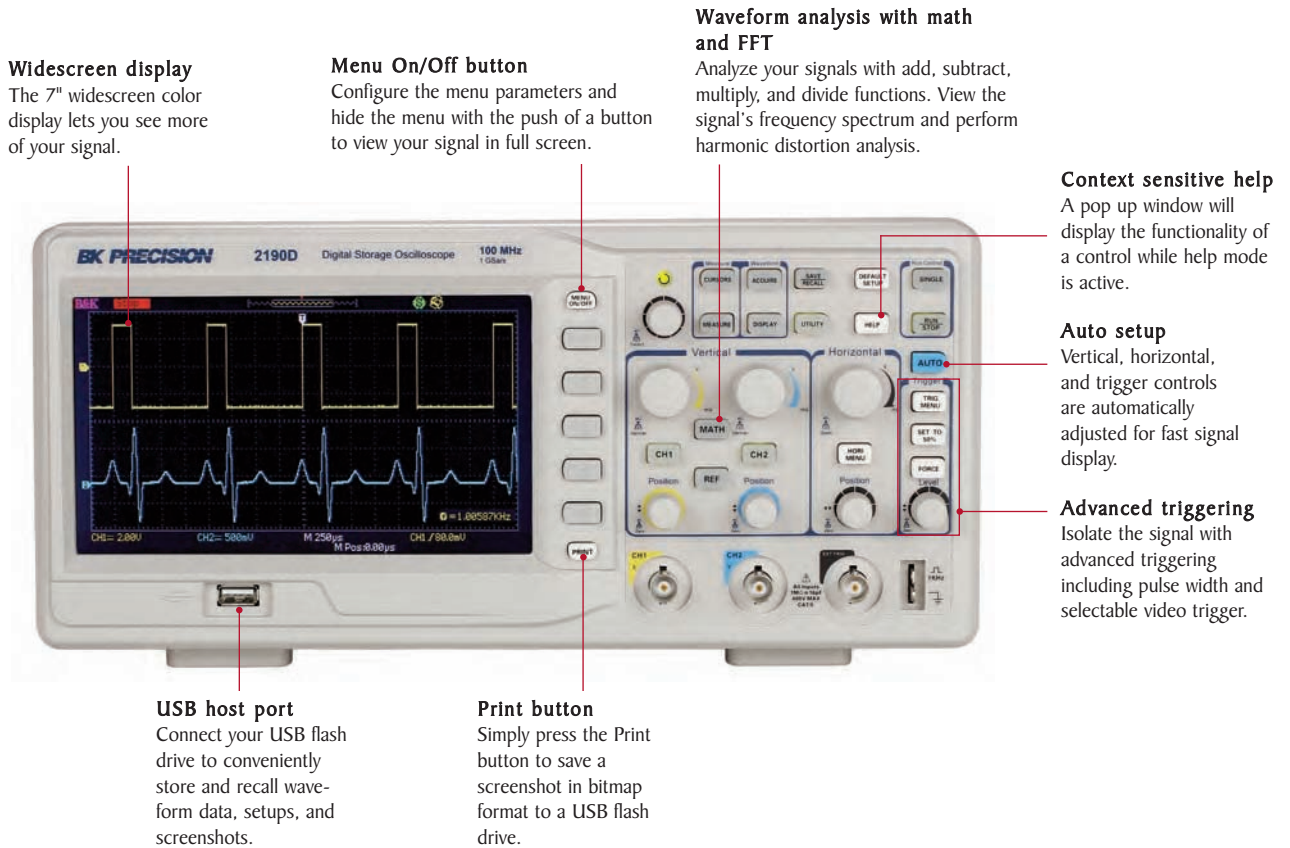
## PC connectivity
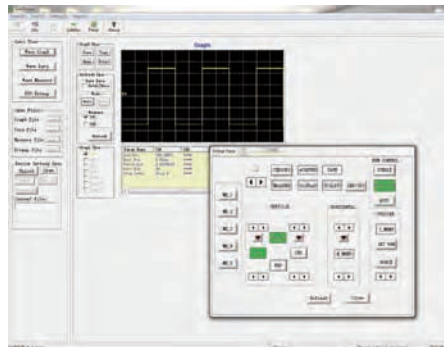


PC software is provided (free download at B&K Precision's website at www.bkprecision.com) for seamless integration between the oscilloscope and PC. Capture and transfer waveforms, screen images, setups and measurement results to a Windows PC via the USB device port on the back of the instrument. A USB host port on the front and rear allows for quick and easy screen saving.

## Features & Benefits

- 100 MHz, 1 GSa/s sample rate
- Large 7" widescreen color display
- Long waveform memory up to 40,000 points
- Five different math functions – Add, Subtract, Multiply, Divide, and FFT
- Versatile triggering capabilities including pulse width, line-selectable video, slope, and alternating trigger
- 32 automatic measurements
- Advanced tools include digital filter with adjustable limits, pass/fail testing, and waveform recorder mode
- 12 different language user interfaces and context sensitive help
- Special EDU mode allows educators to disable Auto set button, Measure menu, and Cursors menu
- Front panel USB host port for saving and recalling waveform setups, data, and screen shots on a USB flash drive
- USBTMC-compliant USB device port for remote PC control
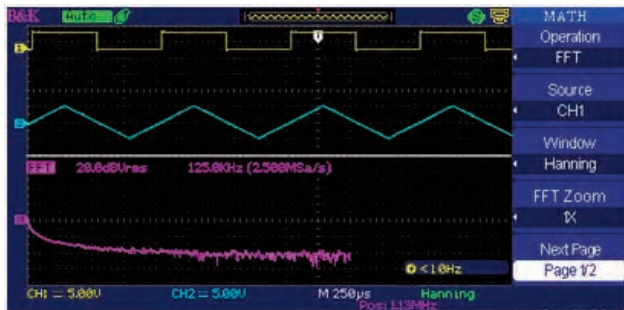- GPIB connectivity with optional USB-to-GPIB adapter

# Front panel

**Widescreen display**
The 7" widescreen color display lets you see more of your signal.

**Menu On/Off button**
Configure the menu parameters and hide the menu with the push of a button to view your signal in full screen.

**Waveform analysis with math and FFT**
Analyze your signals with add, subtract, multiply, and divide functions. View the signal's frequency spectrum and perform harmonic distortion analysis.

**Context sensitive help**
A pop up window will display the functionality of a control while help mode is active.

**Auto setup**
Vertical, horizontal, and trigger controls are automatically adjusted for fast signal display.

**Advanced triggering**
Isolate the signal with advanced triggering including pulse width and selectable video trigger.

**USB host port**
Connect your USB flash drive to conveniently store and recall waveform data, setups, and screenshots.

**Print button**
Simply press the Print button to save a screenshot in bitmap format to a USB flash drive.

# Rear panel

**Security loop**
Use the built-in security loop to secure your instrument to your location.

**Kensington security slot**
Helps to secure your oscilloscope and prevent theft.

**Communication**
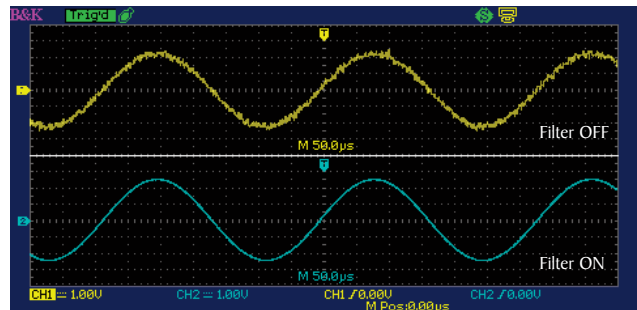RS232 and USB ports enable remote control from a PC

# The tools you need

## Powerful measurement functions



Display and measure the input signal's frequency spectrum. Select one of the 4 FFT windows: Rectangular, Hanning, Hamming, and Blackman. Use cursors to measure the spectral component's magnitude and frequency.

## Digital filtering



Filter out unwanted signal components such as various types of noise with built-in digital filters. Choose from Low-Pass, High-Pass, Band-Pass, and Band-Stop filters.

## Waveform recorder
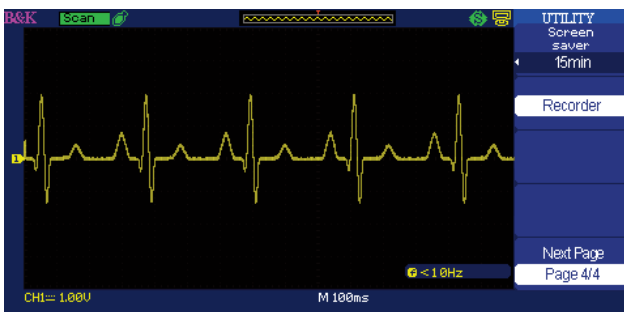


Monitor and analyze long-term signal behavior by recording data continuously over an extensive period of time and playing it back for post acquisition analysis. Data is recorded in a sequence of up to 2500 frames.

## Delayed sweep/zoom
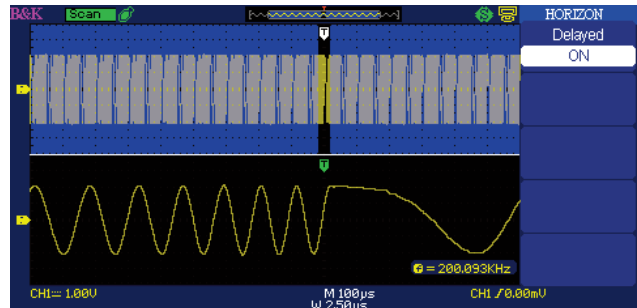


Use the oscilloscope's delayed sweep feature to zoom in a particular area of a signal in real time while viewing the entire captured waveform simultaneously.

## Large internal storage
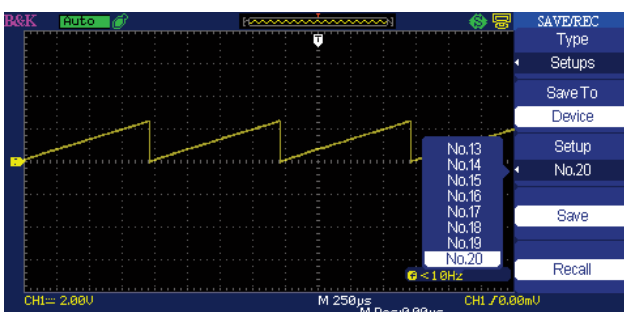


Minimize debug time by saving and recalling setups and waveforms from internal memory. Save and recall up to 20 different oscilloscope setups and 10 different waveforms.

## Pass/Fail testing
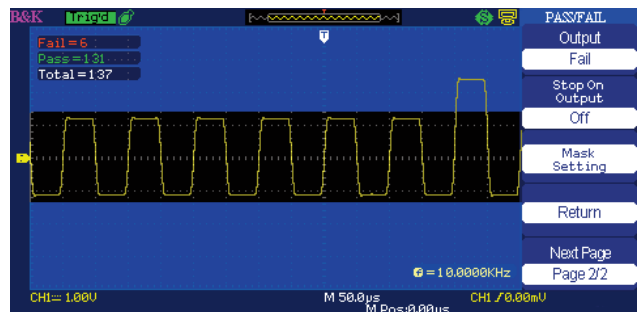


Generate user-defined pass/fail limits to quickly identify go/no go test results.

# Digital Storage Oscilloscope
## Model 2190D

| Model | 2190D |
|---|---|
| **Performance Characteristics** | |
| Bandwidth | 100 MHz |
| Real Time Sampling Rate | Single Channel: 1 GSa/s<br>Dual Channel: 500 MSa/s (for timebase faster than 250 ns/div) |
| Channels | 2 |
| Rise time | < 3.5 ns |
| Record Length | 40,000 points when timebase is 2.5 ns to 50 ns (20,000 points for 100 ns to 50 ms timebase), 20,000 points for dual channel operation |
| Vertical Resolution | 8 bit |
| Vertical Sensitivity | 2 mV/div -10 V/div (1-2-5 order) |
| DC Gain Accuracy | <±3.0%: 5 mV/div to 10 V/div in fixed gain ranges<br><±4.0%: 2 mV/div in variable gain ranges |
| Maximum input voltage | 400 V (DC+AC pk-pk, 1 MΩ input impedance, X10), CAT I |
| Position Range | 2 mV - 200 mV: ±1.6 V<br>206 mV - 10 V: ±40 V |
| Horizontal Scan Range | 2.5 ns/div - 50 s/div<br>Scan mode: 100 ms/div - 50 s/div (1 - 2.5 - 5 sequence) |
| Timebase Accuracy | ±50 ppm measured over 1 ms interval |
| Input Coupling | AC, DC, GND |
| Input Impedance | 1 MΩ±2% || 16 pF±3 pF |
| Vertical and Horizontal Zoom | Vertically or horizontally expand or compress a live or stopped waveform |
| I/O interface | USB host port on front panel supports USB flash drives, RS-232 and USB (USBTMC-compliant) device port for connection to PC, Pass/Fail output |
| **Acquisition Modes** | |
| Sample | Display sample data only |
| Peak Detect | Capture the maximum and minimum values of a signal |
| Average | Waveform averaged, selectable from 4, 16, 32, 64, 128, 256 |
| Scan Mode | For time base settings 0.1 s/div - 50 s/div |
| **Trigger System** | |
| Trigger Types | Edge, Pulse Width, Video*, Slope, Alternating<br><br>*Support signal Formats: PAL/SECAM, NTSC<br>Trigger condition : odd field, even field, all lines, or line number |
| Trigger Modes | Auto, Normal, Single |
| Trigger Coupling | AC, DC, LF reject, HF reject |
| Trigger Source | CH1, CH2, EXT, EXT/5, AC Line |
| Pulse Width Trigger | Trigger Modes: (>,<,=) Positive Pulse Width, (>,<,=) Negative Pulse Width |
| Slope Trigger | (>,<,=) Positive slope, (>,<,=) Negative slope<br>Time: 20 ns -10 s |

| Hardware Frequency Counter | |
|---|---|
| Reading Resolution | 1 Hz |
| Accuracy | ±0.01% |
| Range | DC Couple, 10 Hz to 100 MHz |
| Signal Types | All trigger signals (except pulse width trigger and video trigger) |
| **Waveform Math and Measure** | |
| Math operation | Add, Subtract, Multiply, Divide, FFT |
| FFT | Window mode: Hanning, Hamming, Blackman, Rectangular<br>Sampling points: 1024 |
| Measure | Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vavg, Mean, Crms, Vrms, ROV, FOV, RPRE, FPRE,<br>FREQ, Period, Rise Time, Fall Time, BWid, + Wid, - Wid, + Duty, - Duty, Phase, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF |
| **Display System** | |
| Display | 7 in. Color TFT, 480 x 234 resolution, 64K color |
| Display Contrast (Typical state) | 150:1 |
| Backlight Intensity (Typical state) | 300 nit |
| Display Area | 8 x 18 div |
| Display Mode | Dots, Vector |
| Persistence | Off, 1 sec, 2 sec, 5 sec, Infinite |
| Menu Display Timer | 2 sec, 5 sec, 10 sec, 20 sec, Infinite |
| Screen-Saver | Off, 1 min, 2 min, 5 min, 10 min, 15 min, 30 min, 1 hour, 2 hour, 5 hour |
| Waveform Interpolation | Sin(x)/x, Linear |
| Display Color Mode | Normal, Invert |
| **Environment** | |
| Temperature | Operating: 50° F to 104 °F (10 °C to 40 °C)<br>Not operating: -4 °F to 140 °F (-20 °C to 60 °C) |
| Humidity | Operating: 85% RH, 104 °F (40 °C)<br>Not operating: 85% RH, 149 °F (65 °C) |
| Altitude | Operating: 9,842 ft (3,000 m)<br>Not operating: 50,085 ft (15,266 m) |
| Electromagnetic Compatibility | EMC Directive 2004/108/EC, EN61326:2006 |
| Safety | Low voltage directive 2006/95/EC, EN61010-1:2001 |
| **General** | |
| AC Input | 100-240 VAC, CAT II, 50 VA max, 45 Hz to 440 Hz |
| Dimension (WxHxD) | 12.7 x 5.35 x 5.24 inches (323 x 136 x 157 mm) |
| Weight | 5.5 lbs. (2.5 kg) |
| ***One-Year Warranty*** | |
| Standard Accessories | User Manual, 10:1 Probe Set (2 pieces), Power Cord, USB Interface Cable |
| Optional Accessories | USB-to-GPIB adapter (model AK40G) |