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## Digital Sampling Oscilloscope

### 11801B

This product is no longer carried in our catalog.



#### Features

- DC to 50 GHz Bandwidth
- 7 ps Rise Time
- 8 Channels, Expandable to 136 (with SM-11)
- 10 fs Sampling Interval (0.01 ps)
- Modular Architecture
- 200 kS/s Sample Rate
- Dual Time Base
- Non-volatile Waveform and Setting Storage
- FFT
- Predefined Telecom Masks (Opt. 1T)
- TDR
- Automatic Measurements:
  - Jitter/Noise, Statistical
  - Histograms, Mask Testing
  - Pulse with Statistics
- Programmable for ATE Applications
- Color Display

#### Benefits

- Comprehensive Waveform Processing

#### Applications

- Semiconductor Testing
- TDR Characterization of Circuit Boards, IC Packages and Cables



Tektronix Measurement products are manufactured in ISO registered facilities.



The 11801B Series complies with IEEE Standard 488.1-1987, and with Tektronix Standard Codes and Formats.

For additional information or to order, contact your local Tektronix representative.

## Sampling Heads

**SD-14:** 2.5 GHz high impedance (100 kilohm/0.475 pF) dual-channel probe sampler

**SD-20:** 20 GHz single-channel loop-through head

**SD-22:** 12.5 GHz dual-channel low noise head

**SD-24:** 20 GHz dual-channel TDR/sampling head

**SD-26:** 20 GHz dual-channel sampling head

**SD-30:** 40 GHz single-channel sampling head

**SD-32:** 50 GHz single-channel sampling head

**SD-42:** 6.4 GHz O/E converter (55 ps optical pulse response FWHM)

**SD-46:** 20 GHz O/E converter (22 ps optical pulse response FWHM)

**SD-51:** 20 GHz trigger head

## Characteristics

### Vertical System\*

*\* Vertical system specifications of 11801B with SD-14 non-applicable. See 11800 Series Sampling Head specifications.*

**Rise Time/Bandwidth:** Determined by the sampling head used.

**Vertical Resolution:** 8-Bits full screen (78  $\mu$ V/LSB at 2 mV/div deflection factor).

**Amplifier Gain Accuracy:**  $\pm 1\%$  of all settings.

**Deflection Factors:** 2 to 255 mV/div in 1 mV/div increments.

**Offset Range:**  $\pm 2$  V.

### Horizontal System

**Main and Window Time Base:** 1 ps/div to 5 ms/div, settable to 1-2-5 sequence or in 1 ps increments.

**Record Length:** 512, 1024, 2048, 4096, and 5120 samples.

**Windows:** Any number of window records may be placed on any number of main records, up to a maximum of eight displayed traces. All window records have the same duration, but may be independently positioned on any main record. Windows may be set to automatically track a moving edge on the main record.

**Maximum Sample Rate:** 200 kS/s.

### Trigger System\*

*\* 11801B external trigger requires 23 ns pre-trigger or DL 11 Delay Lines to view trigger point (45.5 ns with Option 1M).*

**Trigger Bandwidth:** 3 GHz.

#### Trigger Sensitivity:

DC, 1X  $\leq$  3 GHz: 100 mV;

AC, 1X 300 kHz to 3 GHz: 100 mV;

DC, 10X  $\leq$  3 GHz: 1 V;

AC, 10X 300 kHz to 3 GHz: 1 V.

**Delay Jitter:** 1.3 ps +4 ppm of a position typical. 2.0 ps +5 ppm of position maximum (RMS).

**Internal Clock:** 100 kHz (drives TDR, Internal Clock Output, and Calibrator).

**Trigger Level Range:**  $\pm$ 1.0 V ( $\pm$ 10 V with 10X trigger attenuator activated).

**Trigger Input Range:**  $\pm$ 1.5 V (+15 V, 5 V<sub>RMS</sub> maximum with 10X).

**Trigger Holdoff:** 5  $\mu$ s to 2.5 second.

### Measurement System

**Waveform Processing Functions:** Add, subtract, multiply, divide, absolute, average, differentiate, envelope, exponent, integrate, natural log, log, signum, square root, smoothing, and filter.

**Measurement Set:** Max, Min, Mid, P-P, Mean, RMS, Amplitude, Extinction Ratio, Overshoot, Undershoot, Noise\*, Rise, Fall, Spectral Magnitude, Spectral Frequency, THD, SNR, Frequency, Period, Prop Delay, Cross, Width, Phase, Duty Cycle, Jitter\*, Area +, Area -, and Energy. Measurements are constantly updated; mean and standard deviation available on all measurements.

*\* Available only in statistical measurement mode.*

**Measurement Parameters:** (Proximal, mesial, distal, and start/stop levels): May be set to absolute levels.

**Cursors:** Paired or split dots, vertical bars, and horizontal bars.

### TDR System (SD-24 only)

**Combined TDR/Acquisition Reflected Rise Time:** 35 ps or less.

**TDR Step Amplitude:** Adjustable to  $\pm$ 250 mV (polarity of either step may be inverted).

**Time Coincidence Between TDR Steps:** Adjustable to less than 1 ps.

**Source Resistance:** 50  $\pm$ 0.5 ohm.

**Typical Aberrations:** (at  $\pm$ 250 mV Amplitude) 10 ns to 20 ps before step:  $\pm$ 3% or less; Less than 300 ps after step: +10%, -5% or less; 300 ps to 5 ns after step:  $\pm$ 3% or less; Elsewhere:  $\pm$ 1% or less.

## CRT And Display Features

**CRT:** 9 inch diagonal, magnetic deflection, vertical raster scan orientation. Color.

**Colors:** Eight-color default color set included; or colors are user-selectable from palette of 262,144 colors.

**Video Resolution:** 552 horizontal by 704 vertical displayed pixels.

## Power Requirements

**Line-voltage Ranges:** 90 to 132 V<sub>RMS</sub>, 180 to 250 V<sub>RMS</sub>.

**Line Frequency:** 48 to 440 Hz.

**Maximum Power Consumption:** 214 W.

## Environmental And Safety

### Temperature:

Operating: 0 to +50 degree C

Nonoperating: -40 to +75 degree C.

### Humidity:

Operating and Nonoperating: up to 95% relative humidity, up to 50 degree C. Per MIL-T-28800E, Type III, Class 5.

**Altitude, Vibration, Shock Nonoperating, Bench Handling:** Meets MIL-T-28800E, Type III, Class 5.

**Electromagnetic Compatibility:** (with sampling heads or optional blank panels installed in all sampling head compartments) Meets the Requirements of: MIL-STD-461B; FCC Part 15, subpart J, Class A; VDE 0871/6.78 Class B.

**Safety:** Listed UL 1244, CSA Bulletin 556B September 1973.

## Time Base Accuracy - Typical Specifications

**Range\*, \*\* = Interval  $\geq$  1 ns:** Base: 4 ps + Interval Specification: 0.004%\* Interval + Position Specification 0.0004%\* Position

**Range\*, \*\* = Interval = 100 ps:** Base: 2.5 ps + Position Specification: 0.0004%\* Position

**Range\*, \*\* = Interval  $\leq$  10 ps:** Base: 1 ps + Position Specification: 0.0004%\* Position

\* For intervals < 100 ps, the above holds for time/div  $\leq$  20 ps/div.

\*\* For other intervals not listed above, linearly interpolate the cardinal points.

## Physical Characteristics

**11801B Cabinet:**

Width: 448 mm (17.6 in.)  
Height: 238 mm (9.4 in.)  
Depth: 599 mm (23.6 in.)  
Net Weight: 22.3 kg (49 lb.)  
Shipping Weight: 25.9 kg (57 lb.)

**SM-11 Cabinet:**

Width: 448 mm (17.6 in.)  
Height: 238 mm (9.4 in.)  
Depth: 558 mm (22.0 in.)  
Net Weight: 20.0 kg (44 lb.)  
Shipping Weight: 23.6 kg (52 lb.)

**11801B Rackmount:**

Width: 483 mm (19.0 in.)  
Height: 222 mm (8.8 in.)  
Depth: 550 mm (21.6 in.)  
Net Weight: 23.2 kg (51 lb.)  
Shipping Weight: 26.8 kg (59 lb.)

**SM-11 Rackmount:**

Width: 483 mm (19.0 in.)  
Height: 222 mm (8.8 in.)  
Depth: 550 mm (21.6 in.)  
Net Weight: 20.9 kg (46 lb.)  
Shipping Weight: 24.5 kg (54 lb.)

## Ordering Information

**11801B Digital Sampling Oscilloscope**

**Includes:** User Manual (070-8783-00), Programmer Manual (070-8784-00), Service Manual (070-8781-00), 12 inch SMA-SMA Cable, 2 ea. 8 1/2 inch SMA-SMA Cable, 1 Wrist Strap.

**Opt. 1R:** Rackmount

**Includes:** Hardware, tooling, and instructions for converting Bench Model to Rackmount Configuration. Available with 11801B and SM-11.

**Opt. 1M:** Multi-channel Conversion.

Modifies 11801B to permit operation with up to four SM-11 Multi-channel Units

**Opt. 1T:** Predefined Telecom Masks.

AutoMask offers 38 standards-defined masks in memory for instant recall.

## International Power Plug Options

**Opt. A1:** Universal Euro 220 V, 50 Hz

**Opt. A2:** United Kingdom 240 V, 50 Hz

**Opt. A3:** Australian 240 V, 50 Hz

**Opt. A4:** North American 240 V, 60 Hz

**Opt. A5:** Switzerland 220 V, 50 Hz

## Service Assurance Options

**Opt. R2:** Adds two years of post-warranty Repair Protection

**Opt. C5:** Adds five years of Calibration Services

## Probes

**50 ohm Divider (Z0) Probe:** 9 GHz. Order P6150

**Active Probes:** (requires 1103 power supply)

10X, DC - 1 GHz,  $\geq 10$  Megohm Input Impedance, 1.9 pF. Order P6204

10X, DC - 4 GHz,  $\geq 100$  kilohm Input Impedance, 0.4 pF. Order P6217

1103 Power Supply

**Current Probe:** (requires BNC to SMA Adapter)

DC - 50 MHz, 0-20 A (DC + peak AC). Order AM 503S

DC - 15 MHz, 0-100 A (DC + peak AC). Order AM 503S Opt. 03.

25 kHz-1 GHz, Max Current of 0.5. A<sub>RMS</sub>. Order CT-1

## Optical-to-Electrical Converters:

DC - 6.4 GHz, 1000-1700 nm. Order SD42

DC - 20 GHz, 1200-1650 nm. Order SD46

DC - 1 GHz, 1100-1700 nm. Order P6703A

DC - 700 MHz, 450-1050 nm. Order P6701A

DC - 300 MHz, 1000-1700 nm, High Gain. Order P6713

DC - 250 MHz, 450-1050 nm, High Gain. Order P6711

## Cart

Order K465

## Cables And Extenders

### Sampling Head Extender Cable:

1 m. Order 012-1220-00

2 m. Order 012-1221-00

## Additional Accessories

**Power Strip:** Four Outlet, 6 ft., Noise/Surge Suppression. Order 131-5342-01

### SMA Accessory Kit:

2 ea. 2X and 5X Attenuators;

2 ea. SMA Terminations, Male Short Circuit, Female Short Circuit, Male 50 ohm, Female 50 ohm,

2 ea. 50 ohm Signal Cables (2 ns),

2 ea. 500 ps Semi-rigid Cable,

2 ea. Male-to-Male adapters,

2 ea. SMA Male-to-BNC Female,

2 ea. Female-to-Female, 1 ea. 50 ohm Power Divider,

1 ea. Combination Wrench (.312, 6 point). Order 020-1693-00

### 3.5 mm Accessory Kit:

1 ea. 50 ohm Reference Air Line,

1 ea. Male-to-Male Adapter,

1 ea. Female-to-Female Adapter,

1 ea. 26.5 GHz 50 ohm Terminator (Male),

1 ea. 26.5 GHz 50 ohm Terminator (Female),

1 ea. 26.5 GHz Short Circuit (Male),

1 ea. 26.5 GHz Short Circuit (Female),

2 ea. 50 ohm Attenuators (6 dB 26.5 GHz, 2.9 mm),

2 ea. 50 ohm Attenuators (20 dB 26.5 GHz, 2.9 mm),

1 ea. Power Divider (26.5 GHz, 2.9 mm),

2 ea. Flexible Signal Cables (2 ns, Male-to-Male),

2 ea. Signal Cables (500 ps, Male-to-Male, 2.9 mm Semi-rigid),

1 ea. Torque Wrench,  
1 ea. Combination Wrench (0.312, 6 point),  
1 ea. Combination Wrench (0.281, 6 point). Order 020-1692-00

**2X Attenuator:** SMA Male-to-Female. Order 015-1001-00

**5X Attenuator:** SMA Male-to-Female. Order 015-1002-00

**Power Divider:** Order 015-1014-00

**Blank Sampling Head:** Order 200-3395-00

**ECL Terminator:** Provides the bias and termination for ECL device outputs. At 10 GHz bandwidth and 1% precision attenuation, accurate AC and DC measurements are ensured. Attenuation: 10X  $\pm$ 1.0% @ DC, 20 dB  $\pm$ 3 dB, DC to 10 GHz Aberrations:  $\pm$ 3% max with 100 ps rise time. Order 015-0558-00

**DC Block (Coupling Capacitor):** Order 015-1013-00

**Slip-on Connector:** Order 015-0553-00

**Connector Savers:**  
(SMA) Order 015-0549-00  
(APC) Order 015-0552-00

**DL-11 Service Manual:** Order 070-7050-01

SM-11 Service Manual: Order 070-7049-01



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