

**Counter/Timer Productivity**

The new 2247A delivers the crystal controlled timing accuracy and extra measurement productivity power you need for digital systems. Frequency, period, and width are measured directly from the scope's vertical inputs. Time intervals can be measured with push-button ease. The 2247A is easily set up to perform gated time measurements; this allows the user to select specific start and stop points for the counter measurement.

Automatic measurements are key in improving measurement productivity. The 2247A can automatically measure rise and fall times (both 10-90% and 20-80%) and propagation delay times. These measurement setups can be saved in the scope's store/recall memory, either to be recalled later or used as part of a sequence. Recalled measurements are then completely automatic and require no operator intervention.

With the Totalize mode, you can record the passing of unusual events or verify a burst of events on any vertical channel. Frequency Ratio can be useful in comparing the frequencies of two input signals.

Cursors after delay are possible on the 2247A, allowing accurate measurements to be made of expanded waveforms.

Coupled with all these advanced measurement capabilities are user aids to further simplify operation, such as; user prompting and providing status and error messages to guide instrument setup.

The 2247A provides high accuracy and resolution measurements. It also provides an external time base input so you can provide your own time base standard to further increase accuracy.

**Three-Year Warranty**

The 2245A, 2246A, and 2247A are covered by the Tektronix three-year instrument warranty, making ownership more cost effective than ever.

**CHARACTERISTICS**

Characteristics are common to the 2245A, 2246A and 2247A, except where indicated.

**VERTICAL SYSTEM**

**Display Modes**—CH 1, CH 2, CH 3, CH 4, Add (CH 1+CH 2), Invert (CH 2), Alternate and Chopped display switching for all channels, and 20-MHz bandwidth limiting

**CHANNEL 1 AND CHANNEL 2**

**Frequency Response**—(-3 dB Bandwidth)—100 MHz: 0 to 35°C; 90 MHz: 35 to 50°C (100 MHz 35 to 55°C).<sup>\*1</sup>

**AC Coupled Lower -3 dB Frequency**—10 Hz or less with 1X probe, 1 Hz or less with standard accessory 10X probe.

**Rise Time**—≤3.5 ns for temperatures from 0 to +35°C. ≤3.9 ns for temperatures from +35 to +50°C (rise times calculated from:  $t_r = 0.35/BW$ ).

**Deflection Factor Range**—2 mV/div to 5 V/div in a 1-2-5 sequence of 11 steps.

**Maximum Error**—±2% 15 to 35°C (add ±1% from 0 to 15°C and from 35 to 50°C).

**Variable Range**—Continuously variable between Volts/Div step settings. Increases step setting by at least 2.5 V/div.

**Uncalibrated Indicators**—> symbol appears on-screen when deflection factor is between calibrated Volts/Div step settings.

**Channel Isolation**—50 dB or more attenuation of deselected channel at 10 MHz. 34 dB or more at 100 MHz (measured with an eight div input signal and equal Volts/Div settings on both channels from 2 mV/div to 0.5 V/div).

**CH 2 Signal Delay With Respect to CH 1**—<200 ps difference (400 ps<sup>\*1</sup>).

**Input Characteristics**—1 MΩ ±1% (2%<sup>\*1</sup>) shunted by 20 pF ±0.5 pF (±2 pF<sup>\*1</sup>). Maximum Input Voltage: 400 V (dc+peak ac); 800 V ac p-p at 10 kHz or less.

**Common-Mode Rejection Ratio (ADD Mode With CH 2 Inverted)**—At least 10:1 at 50 MHz. (for common-mode signals of eight div or less and with Var Volts/Div control adjusted for best CMRR at 50 kHz at any Volts/Div setting). (25:1 at 10 MHz; 10:1 at 100 MHz<sup>\*1</sup>).

**Trace Drift**—Between Volts/Div Step Settings: 0.2 div or less. Var Volts/Div Rotated Between Extremes: 1 div or less. Inverting CH 2: 1 div or less. Between Gnd and DC Input Coupling: <0.5 mV from 0 to +35°C; <2 mV from 35 to 50°C.

**Position Range**—At least ±11 div from graticule center (±10 div<sup>\*1</sup>).

**CHANNEL 3 AND CHANNEL 4**

**Frequency Response**—Same as CH 1 and CH 2.

**Rise Time**—Same as CH 1 and CH 2.

**Deflection Factor**—Settings: 0.1 V/div and 0.5 V/div.

**Maximum Error**—Same as CH 1 and CH 2.

**CH Isolation**—34 dB or more attenuation of deselected channel at 100 MHz (measured with an eight div input signal).

**CH 4 Signal Delay With Respect to CH 3**—<200 ps difference (<400 ps<sup>\*1</sup>).

**Input Characteristics**—1 MΩ ±1% (2%<sup>\*1</sup>) shunted by 20 pF ±0.5 pF (±2 pF<sup>\*1</sup>). Max Input Voltage: 400 V (dc+peak ac); 800 V p-p ac at 10 kHz or less.

**Trace Shift**—Between Volts/Div Settings: 1 div or less.

**Position Range**—Same as CH 1 and CH 2.

<sup>\*1</sup> 2246 Option 1Y2Y (Mod A)

**ALL CHANNELS**

**Low Frequency Linearity**—≤0.06 div compression or expansion of a 2 div, center-screen signal when positioned anywhere within the graticule area.

**Bandwidth Limit**—Reduces upper -3 dB bandpass to a limit of 17 to 23 MHz. (15 to 25 MHz<sup>\*1</sup>).

**Trace Separation Range**—±4 div.

**Chop Mode Switching Rate**—625 kHz ±10%.  
**CH 3 or CH 4 Signal Delay With Respect to Either CH 1 or CH 2**—<400 ps difference. (800 ps<sup>\*1</sup>).

**HORIZONTAL SYSTEM**

**Display Modes**—A (main sweep), A Alternate with B (delayed sweep), and B. In X-Y mode, CH 1 provides X-axis (horizontal) deflection.

**A Sweep Time Base Range**—0.5 ns/div to 20 ns/div in a 1-2-5 sequence of 24 steps. X10 magnification extends fastest sweep rate to 2 ns/div.

**B Sweep Time Base Range**—5 ns/div to 20 ns/div in a 1-2-5 sequence of 21 steps. X10 magnification extends fastest sweep rate to 2 ns/div.

**Variable Timing Range**—Continuously variable between Sec/Div calibrated step settings. Extends slowest A sweep and B sweep speeds by a factor of at least 2.5 times. Affects the A Sec/Div setting with the A display mode; affects the B Sec/Div setting with the Alt and B modes.

**A Sweep Timing Accuracy<sup>\*2</sup>**

Range	Unmagnified	Magnified
+15 to +35°C	±2%	±3%
0 to +15°C		
+35 to +50°C	±3%	±4%

**Linearity**—±5% over any two of the center eight div, on both unmagnified and magnified displays (2245A/46A/47A only).

**Delay Time**—Range: <0.1 div to >10 div of the A sweep. (Maximum value does not exceed end of the A sweep.) Jitter: 1:20,000 p-p (0.005%) (viewed over two seconds).

**ΔTime**—Range: 0 to >0.9 div to right of the delay time setting (does not exceed end of the A sweep.) Accuracy: ±0.5% of reading +1% of one A sweep div (±1% of reading + 1% of one A sweep div).<sup>\*1</sup>

**TRIGGERING**

Trigger Sensitivity from CH 1, CH 2, CH 3, CH 4 Source.

**DC Coupled**—0.35 div or greater triggers from dc to 25 MHz, increasing to 1 div at 150 MHz (100 MHz<sup>\*1</sup>).

**Noise Reject Coupled**—0.8 div or more triggers; 0.5 div or less does not trigger.

**HF Reject Coupled**—0.35 div or greater triggers from dc to 50 kHz; 0.25 div or less does not trigger above 50 kHz.

**LF Reject Coupled**—0.35 div or greater triggers from 100 kHz to 25 MHz; 0.35 div or greater does not trigger from dc to 10 kHz.

<sup>\*1</sup> Applies over the center eight div. Excludes the first 0.25 div of the magnified sweep and sweep beyond the 100th magnified div.

