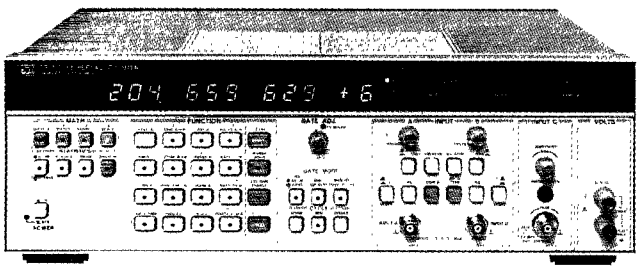
ELECTRONIC COUNTERS

Universal Systems Counter and Preamplifier

HP 5335A, 10855A

- A high-performance 200 MHz/2-ns universal counter
- Built-in automatic rise time, duty cycle, pulse width, slew rate and phase measurements
- Advanced automatic triggering capabilities
- HP-IB plus math and statistics functions standard



HP 5335A

DESIGNED FOR HP-IB SYSTEMS

HP 5335A Universal Counter

Designed for bench or systems applications, the HP 5335A has 20 measurement functions, all automatically selected by push-button or by HP-IB. These functions, plus greatly expanded arming and triggering capability, make the HP 5335A a powerful universal counter. Math and statistics features, matched Channel A and B input amplifiers, and HP-IB are all included in the standard unit.

The HP 5335A can automatically measure waveform characteristics. With a signal source, rise and fall times, output slew rate, and propagation times can be measured with one test setup. Duty cycle can be measured to see the distortion on a square wave through the amplifier due to different rising and falling slew rates. Phase measurements are push-button selectable and performed automatically.

Advanced Triggering and Full Measurement Capabilities

The HP 5335A offers several powerful features:

Manual and Automatic Triggering: In manual, the ±5 Vdc range reduces the need for input attenuators. Two auto trigger modes (front-panel or HP-IB control) select 10 to 90% rise/fall-time trigger points, 50% phase trigger points, or a preset value, then track dc offset to remain on the trigger point.

Trigger Level DVM: View both input channel trigger levels.

Frequency: Measure to 200 MHz on Channel A, 100 MHz on Channel B, and 1.3 GHz on optional Channel C. Resolution is 9 digits per second over the entire frequency range.

Time Intervals: Matched custom input amplifiers reduce trigger errors between Channels A and B. Analog interpolation converts the clock to a 1-GHz-equivalent time base, yielding single-shot time-interval measurements better than 2 ns (100 ps with averaging).

Math and Statistics: Averaging can extend resolution for all measurements except phase. Sample sizes are selectable: 100 or 1000. The HP 5335A calculates standard deviation. Built-in math functions (scale, offset, and normalize) simplify conversions for viewing flow, speed, pressure, and temperature parameters, and can be set individually for each measurement function.

HP 10855A 2-1300 MHz Preamplifier

The HP 10855A Preamplifier enhances measurements of very low-level signals. The ±1.5 dB flat response reduces distortion in non-sinusoidal waveforms. The HP 10855A operates with instruments having probe power outlets, or with the HP 1122A Probe Power Supply. The HP 5334A/5335A Option 030 and HP 5328B Option 031 counters support the HP 10855A.

HP 10855A Specifications

Frequency Range: 2 MHz to 1300 MHz
Gain (minimum): 22 dB; 24 dB typical
Gain Flatness Across Full Frequency Range: ±1.5 dB
Noise Figure: <8.5 dB typical
Output power for 1 dB gain compression 0 dBm
Harmonic Distortion: −30 dB for −15 dBm output, typical; −25 dBm for < −66 dB output, typical
VSWR: <2.9, typical
Impedance: 50 Ω nominal
Reverse Isolation: >45 dB
Maximum Input: 3.5 V rms (+24 dBm), fuse protected

HP 5335A Specifications

Input Characteristics (Channels A and B)

Range: dc-coupled, 0 to 100 MHz;
ac, 1 MΩ, 30 Hz to 100 MHz; 50 Ω, 200 kHz to 100 MHz
Note: Channel A range 200 MHz in Frequency A and Ratio modes.
Sensitivity (X1): 25 mV rms sinewave.
75 mV peak-to-peak pulse, minimum pulse width of 5 ns
Dynamic Range (X1): 75 mV to 5 V peak-to-peak, to 100 MHz;
75 mV to 2.5 V peak-to-peak, >100 MHz
Signal Operating Range (X1, dc): −5 to 5 Vdc
Trigger Level Range (X1)
Auto Trigger OFF
Preset: Set to 0 Vdc nominal; adjustable: −5 to +5 Vdc
Auto Trigger ON
Preset: Set to nominal 50% point of input signal.
Adjustable: Nominally between + and − peaks of input signal.
Auto Trigger (X1), (Requires Repetitive Signal)
Range (50% duty cycle): dc-coupled, 30 Hz to 200 MHz
ac: 1 MΩ, 30 Hz to 200 MHz; 50 Ω, 200 kHz to 200 MHz
Minimum signal: 100 mV rms
Duty cycle range: 10% to 90%
Response time: 3 s, typical
Coupling: ac or dc, switchable
Impedance: 1 MΩ, nominal, shunted by <35 pF or 50 Ω nominal, switchable. In Common A, 1 MΩ is shunted by <50 pF.
Attenuator: ×1 or ×10 nominal, switchable
Slope: Independent selection of + or − slope
Channel Input: Separate or Common A, switchable

Frequency A

Range: 0 to 200 MHz, prescaled by 2
LSD Displayed: $\frac{1\text{ ns}}{\text{gate time}} \times$ freq. (e.g. 9 digits in a second)
Resolution: $\pm (2 \times \text{LSD}) \pm 1.4 \times \frac{\text{trigger error}}{\text{gate time}} \times \text{freq}$
Accuracy: ± (resolution) ± (timebase error) × freq

Period A

Range: 10 ns to 10^7 s
LSD Displayed: $\frac{1\text{ ns}}{\text{gate time}} \times$ PER. (e.g. 9 digits in a second)
Period Average: Select MEAN function, and n = 100 or 1000

Time Interval A→B

Range: 0 ns to 10^7 s
LSD Displayed: 1 ns (100 ps using MEAN)
Resolution: ± (2 × LSD) ± (START trigger error) ± (STOP trigger error)
Accuracy: ± (resolution) ± (timebase error) × TI ± (trigger level timing error) ± (2 ns)
Gate Mode: MIN only
Time Interval Average: Select MEAN function, and n = 100 or 1000

Time Interval Delay (Holdoff)

Front panel Gate Adjust control inserts a variable delay between START and enabling of STOP. Electrical inputs during delay are ignored. Delay ranges are same as gate time ranges (100 μs to 4 s, nominal) for gate modes of Fast, Norm, and Manual.

Inverse Time Interval A→B

Range: 10^{-7} to 10^9 units/second
LSD Displayed, Resolution, and Accuracy are inverse of Time Interval A→B specifications.

Rise and Fall Time A

Range: 20 ns to 10 ms transition with 50 Hz to 25 MHz repetition rates (50% duty cycle)
Minimum Pulse Height: 500 mV peak-to-peak
Minimum Pulse Width: 20 ns
Duty Cycle Range: 20% to 80%
LSD Displayed, Resolution: See Time Interval A→B specifications.

Pulse Width A

Range: 5 ns to 10^7 s
Trigger Point Range: 40% to 60% of pulse height
LSD Displayed, Resolution: See Time Interval A→B specifications.