

KEYSIGHT TECHNOLOGIES (AGILENT HP)

5345A

The Keysight (Agilent/HP) 5345A is a high-performance 500 MHz universal frequency counter and timer. It utilizes advanced reciprocal counting techniques to deliver a constant 9 digits of resolution per second of gate time across its entire frequency range. Offering an exceptional 2 ns single-shot time interval resolution—which scales down to 2 ps with averaging—the 5345A serves as a versatile mainframe. Its front-panel plug-in compartment supports various frequency extension converters, expanding its measurement capabilities up to 40 GHz for microwave, millimeter-wave, and pulsed RF applications.

SPECIFICATIONS

General

Interfaces	HP-IB (GPIB) via Option 011 or standard in later revisions; Rear-panel external gate input; Rear-panel gate output
Display	11-digit red LED display with sign and exponent indicators
Plug-in Compartment Compatibility	Accepts HP 5353A, HP 5354A, and HP 5355A plug-ins

Physical

Power Supply	100 / 120 / 220 / 240 VAC (+5%, -10% selectable), 48 to 66 Hz, 150 VA maximum
Operating Temperature	0 to 50 °C °C
Dimensions (W×H×D)	425.4 mm × 133.4 mm × 495.3 mm mm
Weight	15.4 kg kg

Input Channels A & B

Frequency Range (DC Coupled)	DC to 500 MHz (Channels A and B)
Frequency Range (AC Coupled)	20 Hz to 500 MHz (Channels A and B)
Input Impedance	Selectable: 50 Ω (nominal) or 1 M Ω shunted by < 30 pF
Input Coupling	AC or DC, selectable
Input Attenuation	x1 or x10, selectable
Input Sensitivity (Sine Wave)	20 mV rms (DC to 500 MHz)
Input Sensitivity (Pulse)	50 mV peak-to-peak (minimum pulse width 1 ns)
Maximum Input Damage Level (50 Ω)	5 V rms (fuse protected in connector)
Maximum Input Damage Level (1 M Ω)	250 V rms (DC to 400 Hz), decreasing to 10 V rms at 500 MHz
Trigger Level Range	-2.5 V to +2.5 V (x1 attenuation), adjustable or preset to 0 V

Measurement Capabilities & Modes

Measurement Modes	Frequency, Period, Time Interval, Time Interval Average, Ratio, Totalize
Frequency Resolution	9 digits per second of gate time
Single-Shot Resolution	2 ns
Averaged Resolution	Down to 2 ps
Period Measurement Range	2 ns to 10^4 s
Time Interval Range	10 ns to 10^4 s (single-shot)
Frequency Ratio Range	DC to 500 MHz on Channels A and B (Ratio A/B)
Totalize Range	0 to 10^{11} counts

Timebase & Reference Oscillator Options

Standard Timebase Reference Frequency	10 MHz
External Reference Input Frequency	10 MHz
External Reference Input Amplitude	> 1 V rms into 500 Ω
External Reference Output Frequency	10 MHz
External Reference Output Amplitude	> 1 V p-p into 50 Ω

Gating, Triggering & Math

Gate Time Range	100 ns to 10 s (in decade steps)
External Gating Level	TTL compatible, rear panel input

Connectivity & System Interfaces

External Arming Input	Rear-panel arming inputs for Start and Stop, TTL compatible
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Plug-In Compatibility

Frequency Extension Compatibility (5355A)	Extends frequency measurement range up to 18 GHz using HP 5355A Automatic Frequency Converter
Frequency Extension Compatibility (5356C)	Extends frequency measurement range up to 40 GHz using HP 5356C Converter Head

Power & Environmental

Storage Temperature Range	-40 °C to +75 °C
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Timebase

Standard Timebase Aging Rate	$< 3 \times 10^{-7}$ per month
Standard Timebase Temperature Stability	$< 2.5 \times 10^{-6}$ (0 °C to 50 °C)
Standard Timebase Line Voltage Stability	$< 1 \times 10^{-8}$ for 10% line voltage change
Option 001 Oven Timebase Aging Rate	$< 5 \times 10^{-10}$ per day (after 24-hour warm-up)
Option 001 Oven Timebase Temperature Stability	$< 1 \times 10^{-9}$ (0 °C to 50 °C)
Option 001 Oven Timebase Line Voltage Stability	$< 5 \times 10^{-10}$ for 10% line voltage change

Triggering

Auto Trigger Frequency Range	30 Hz to 500 MHz
Auto Trigger Duty Cycle Range	10% to 90%
Trigger Slope Selection	Positive (+) or Negative (-) independent for Channel A and Channel B

Performance

Minimum Pulse Width	1.0 ns
Channel-to-Channel Time Interval Systematic Delay	< ±1.5 ns (typical)

Inputs & Outputs

Input Capacitance (1 MΩ)	< 30 pF
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Rear Panel Inputs & Outputs

Rear Panel Gate Output Amplitude	≥ 2.4 V (high level), ≤ 0.4 V (low level) into 50 Ω
Rear Panel Gate Output Function	Provides TTL level pulse indicating main gate status (low when gate is open)
Rear Panel Trigger Level Outputs	Approximately 1 V per volt of trigger level in ×1 attenuator setting, 0.1 V per volt in ×10 setting

Options

Option 011 HP-IB Capability	Provides full remote programmability and data output capability via IEEE-488 (HP-IB)
Option 012 Digital Output Function	Provides parallel BCD data of display digits and status via rear-panel 50-pin connector

TECHNOLOGY

Reciprocal Counting & Sub-Nanosecond Time Interval Averaging

APPLICATIONS

Precision frequency, period, and time-interval measurements for radar, telecommunications, and RF/microwave engineering

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