300

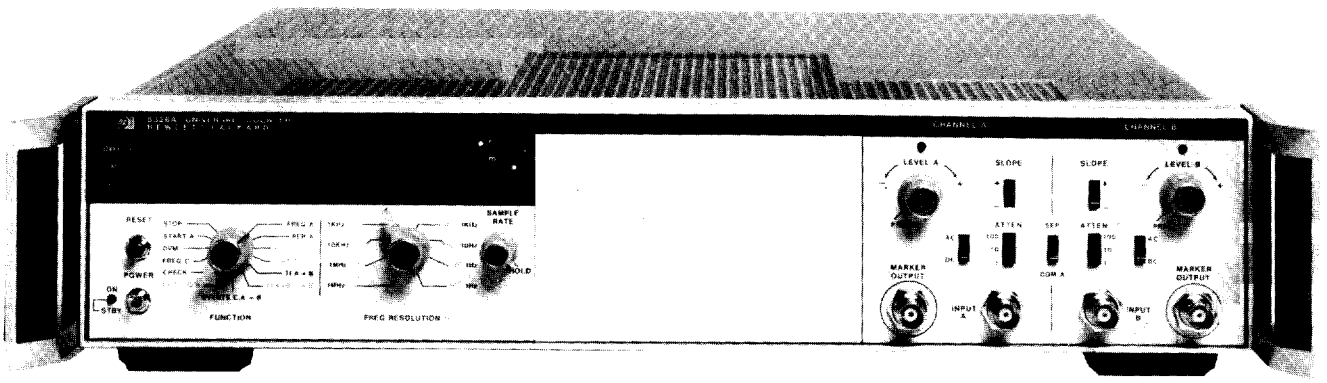
ELECTRONIC COUNTERS

100 MHz Universal Counters

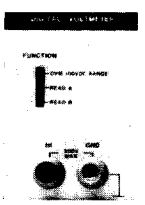
Model 5328A

- 100 MHz, 512 MHz and 1300 MHz
- 100 ns or 10 ns time interval
- T.I. averaging to 10 ps resolution
- "Armed" measurements
- DVM options
- HP-IB interface option

DESIGNED FOR HP-IB SYSTEMS

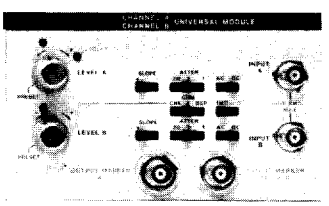


5328A



Opt 020

Opt 030



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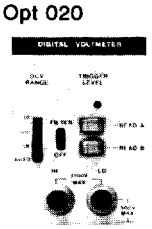

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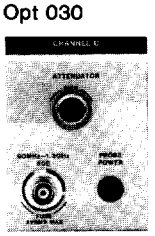
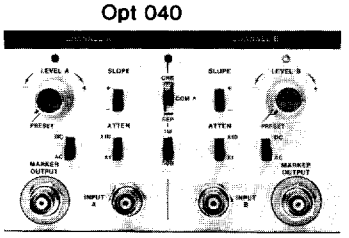


Opt 031



Opt 041

Description

The 5328A, thru the use of technology such as a ROM controlled measurement cycle and a modular design, provides you with excellent universal counter price/performance. Optional modules allow you to tailor the performance of the 5328A to meet your particular measurement needs. In many instances, however, the standard 5328A offers all the capability you're likely to need.

Burst and CW measurements to 100 MHz: special gating circuits start a measurement only when the input signal is present, allowing burst frequencies to be measured as easily as CW signals. The option 030 C Channel extends this capability to 512 MHz; option 031, to 1300 MHz.

Single shot time interval measurements: the standard universal module's 100 ns single shot resolution meets or exceeds the requirements for a wide range of applications such as mechanical and electromechanical device timing (relays), time of flight measurements (ballistics), sonar ranging, radio ranging and navigation.

Time interval averaging: resolution better than 10 ps (10^{-11} seconds) for repetitive time intervals as short as 100 ps.

General

Display: 9 digit LED display, ninth digit used only with channel C functions (FREQ. C, Ratio C/A, Events C, A→B).

Blanking: suppresses display of unwanted zeros to left of most significant digit.

Storage: holds reading between samples; can be overridden by rear panel switch.

Sample rate: variable from less than 2 ms between measurements to HOLD which holds display indefinitely.

Gate output: rear panel output, TTL levels; high if gate is open.

Period, period average, ratio, totalize, scale: extra problem solving power for your special requirements.

Armed measurements: versatile arming modes (controlled by a rear panel switch) allow real time control over when a measurement begins. Useful for measurements such as frequency burst profile and frequency sweep linearity.

Trigger lights: trigger light blinks when channel is triggering; light is ON when input is above trigger level; OFF when input is below trigger level. Simplifies trigger level adjustments.

High performance marker outputs: marker outputs (operational to 100 MHz) indicate where channel is triggering in real time for oscilloscope monitoring applications. Provides measurement feedback to the operator for greatly simplified measurement set-ups.

These features and capabilities make the 5328A an excellent choice for general purpose lab use, electronic service, and production test. For more demanding applications, a variety of options offer extended performance at a modest increase in price.

Time base output: rear panel output: TTL levels.

Check signal: with function switch in CHECK, counter should display 10 MHz ±1 count. With options 040 and 041, place function switch in FREQ A and universal module in CHECK (CHK). Counter should display 100 MHz ±1 count.

Operating temperature: 0° to 50° C.

Power requirements: 100/120/220/240 V rms, +5%, −10% (switch selectable), 48-66 Hz; 150 VA max.

Standard Universal Module

Input characteristics
Sensitivity: 25 mV rms, to 40 MHz
50 mV rms, 40 MHz −100 MHz
Impedance (Nominal): Separate: 1MΩ//<40 pF; Common: 1MΩ//<65 pF
Attenuators (Nominal): X1, X10, X100 switch selectable
Frequency A
Range: 0 to 100 MHz with resolution to 0.1 Hz
Period A
Range: 100 ms to 10^8 with resolution to 100 ns
Period Average A
Range: 100 ns to 10^8 s with resolution to 100 ps
Time Interval A→B
Range: 100 ns to 10^8 s with resolution to 100 μs
Time Interval Average A→B
Range: 0.1 ns to 10 s with resolution to 100 ps
Minimum Dead Time: 150 ns
Ratio B/A
Range: channel A, 0 to 10 MHz; channel B, 0 to 100 MHz

Time Base Oscillators

Standard Crystal Oscillator
Frequency: 10 MHz
Aging rate: $<3 \times 10^{-7}$/month
Temperature: $\pm 2.5 \times 10^{-6}$, 0° to 50°C
Line voltage: $<1 \times 10^{-7}$ for 10% change
Opt 010 Oven Oscillator
Frequency: 10 MHz
Aging rate: $<5 \times 10^{-10}$/day after 24-hour warm-up
Short term: $<1 \times 10^{-10}$ rms/s
Temperature: $<7 \times 10^{-9}$, 0° to 50°C
Line voltage: $\pm 5 \times 10^{-9}$ for 10% variation
Warm-up: within 5×10^{-9} of final value in 20 minutes
Ext. freq. std. input: 30 kHz to 10 MHz signal of amplitude >1.0 V rms into 1 kΩ. Maximum input: 5 V p-p. With options 040 and 041 the external frequency standard must be 10 MHz for Period Avg., T.I. Avg., Period (N = 1), and T.I. (N = 1).

Option 011: HP-IB Interface

Option 011 provides digital output of measurement data ("talker") as well as input for remote program control ("listener"). HP-IB cable not supplied.
Programmable features: function, resolution, sample rate (max or manual control), arming, display modes, measurement cycle modes, output modes, and reset commands. Option 041 adds control of channel A and B trigger level, slope, attenuator, coupling, input impedance, and SEP-COM-CHECK selection.
HP-IB commands: responds to the following bus commands (see HP-IB Users Guides for definitions)—Unlisten, Untalk, Local Lockout, Device Clear, Serial Poll Enable, Serial Poll Disable, Go to Local, Selected Device Clear, and Group Execute Trigger
Service request (SRQ): if enabled, indicates end of measurement
Maximum data output rate: 500 readings/s

Option 020: Digital Voltmeter

Range: ±125 Vdc
Sensitivity: 1 mV, 1 mV, 2 mV, 20 mV, 200 mV for measurement times of 10 s, 1 s, 0.1 s, 10 ms, 1 ms respectively
Input type: single ended
Impedance: 10 MΩ Nominal
Maximum input: ±500 V
Trigger level measurements: 2 mV display resolution

Option 021: High Performance Digital Voltmeter

Range: ±10, ±100, ±1000 V dc and Autorange
Sensitivity: 10 μV, 100 μV, 1 mV, 10 mV, 100 mV for measurement times of 10 s, 1 s, 0.1 s, 10 ms, 1 ms respectively
Input type: floating pair
Impedance: 10 MΩ Nominal
Maximum input: Hi to Lo: ±1100 V all ranges
Lo to Chasis ground: ±500 V
Trigger level measurements: 1 mV display resolution
Note: Trigger level readings are multiplied automatically by attenuator setting of using options 040 or 041.

Option 030: 512 MHz C Channel

Input characteristics
Sensitivity: 15 mV rms sine wave (−23.5 dBm)
Input protection: fused input
Maximum input: 5 V rms
Frequency C
Range: 5 MHz to 512 MHz, direct count with resolution to 0.1 Hz
Ratio C/A
Range: channel A, 0 to 10 MHz; channel C, 5 to 512 MHz
Events C, A→B: totalizes the number of events at C input during the synchronized time interval as defined by inputs to A and B

Option 031: 1300 MHz C Channel

Input characteristics
Sensitivity: 20 mV rms sine wave (−21 dBm)
Input protection: fused input
Maximum input: 5 V rms, ±5 V dc
Frequency C
Range: 90 MHz to 1300 MHz, prescaled by 4 with resolution to 0.1 Hz
Ratio C/A
Range: channel A, 0 to 10 MHz; channel C, 90 to 1300 MHz
Attenuation: continuously variable for optimum noise suppression

Extended Capability Universal Modules (Option 040 and 041)

Input characteristics
Sensitivity: same as standard unit
Impedance (Nominal): 10 MΩ or 50 Ω, switch selectable
Attenuators (Nominal):
Option 040—X1, X2, X20 switch selectable
Option 041—X1, X10 switch selectable
Frequency A: same as standard unit
Period A
Range: 100 ns to 10^8 s with resolution to 10 μs
Period Average A
Range: 100 μs to 10^8 s with resolution to 0.01 ps
Time Interval A→B
Range: 10 ns to 10^7 s with resolution to 10 s
Time Interval Average A→B
Range: 0.1 ns to 1 s with resolution to 10 ps
Mimimum dead time: 40 ns
Ratio A/B: same as standard unit
Delay (Option 040 only): 20 μs to 20 ns
Programmable control (Option 041 only): Level, Coupling, Attenuation, Impedance, SEP—COM—CHK

Options and Accessories	Price
010: High Stability Time Base	$800
011: HP-IB Interface	$450
020: DVM	$400
021: High Performance DVM	$800
030: 512 MHz Channel C	$700
031: 1300 MHz Channel C	$900
040: High Performance Universal Module	$550
041: Programmable Input Controls Module (Requires Option 011 for HPIB use)	$1050
908: Rack Flange Kit for use w/o front handles	$25
913: Rack Flange Kit for use with supplied front handles	$25
10855A Preamp	$475
10856A Filter Kit	$175
5363B Time Interval Probes	$3675

5328A Universal Counter **$2100**
Front Handles: supplied with instrument