

HP 53310A Modulation Domain Analyzer

With the HP 53310A, HP advances modulation domain technology in two directions: affordability and ease of use. Key features of this newest frequency and time-interval analysis product include:

- **Automated setup:** A single button can set up the HP 53310A for measurement. Settings are selected by automatic signal evaluation.
- **Single-touch measurements:** Peak-to-peak deviation, carrier frequency, and modulation rate are easily and quickly measured for quantifying jitter and modulation. The Save/Recall function stores up to 10 measurement steps for fast repeat operations.
- **One-button statistics:** Mean, standard deviation, and probability functions are simplified for easy jitter analysis.
- **Softkey-driven menus:** Measurement parameters and analysis functions are easily selected while measurement data is displayed.
- **Large display:** The expanded screen displays measurement results clearly and aids analysis.
- **Low cost:** The HP 53310A is priced to fit budget-constrained projects and departments.

Product Description

The HP 53310A offers powerful analyzer features:

- **Dual timebases:** A main timebase and a window timebase allow data capture while viewing measurement details in the window.
- **Auto or triggered operation:** Select auto, edge-triggering (rising or falling), or a new, unique feature: measurement value triggering (frequency or time-interval). Value triggering can eliminate the need for and expense of external sync signal generation. This can shorten project time and lower costs.
- **Display vs. time or histogram:** Select the appropriate view.
- **Fast histograms:** Up to 16 million measurements/acquisition.
- **Automated measurements:** Autoscale selects appropriate setup parameters; built-in analysis functions eliminate calculations.

Specifications*

Frequency Measurements

Range: 10 Hz to 200 MHz (Channel A)
10 Hz to 100 MHz (Channel B)
50 MHz to 2.5 GHz (Channel C)

Maximum Measurement Rate:

1 MHz (1.5 MHz for fast histograms)
8 MHz (repetitive)

Time Interval Measurements

+ **Time interval:** Range: +20 ns to +1 s
Maximum measurement rate: 1.25 MHz (2.5 MHz for fast histograms)

± **Time interval:** Range: -0.5 s to +0.5 s
Maximum measurement rate: 1.25 MHz (2.0 MHz for fast histograms)

Time Axis in Versus Time

Resolution:

Main timebase setting/45 (with panorama off)
Window timebase setting/45 (with panorama on)

Inputs

Channels A and B

Sensitivity (minimum hysteresis): 20 mV rms sinewave to 100 MHz (25 mV rms sinewave for Freq A from 100 to 200 MHz)

Minimum pulse width: 5 ns at 60 mV peak-to-peak (2.5 ns at 75 mV peak-to-peak for Freq A \geq 50 MHz)

Input amplifier noise: 600 μ V rms

Threshold drift: \pm 3 mV after warmup at 25° C

Voltage threshold accuracy: \pm (25 mV + 1% of threshold value)

Maximum hysteresis: Increases the minimum input signal amplitude required by factor of 3 (increased noise immunity)

Impedance: 50 Ω or 1 M Ω (500 k Ω in common)

ac coupling: 100 Hz cutoff frequency

Capacitance (1 M Ω): < 20 pF (< 30 pF in common)

Dynamic range (ac): 60 mV peak-to-peak to 5 V peak-to-peak

Signal operating range (dc): \pm 10 V (1 M Ω), \pm 5 V (50 Ω)

Damage level: 5 V rms (50 Ω); 40 V rms for < 5 kHz, 5 V rms for > 5 kHz (1 M Ω)

Channel C (Opt 030)

Sensitivity: -25 dBm to 1.5 GHz, -20 dBm from > 1.5 to 2.0 GHz, -15 dBm from > 2.0 to 2.5 GHz

Maximum input level: +7 dBm

Damage level: +15 dBm

External Arm

Impedance: 1 M Ω

Delay: < 10 ns

Note: Sensitivity, minimum pulse width, signal operating range and damage level of external input are the same as for Channel B.

Frequency Reference

Standard Crystal (see page 198)

Temperature stability: $< 8 \times 10^{-9}$, referenced to 25° C

Short-term stability: $< 4 \times 10^{-9}$ for 1 second average

Aging rate: $< 3 \times 10^{-7}$ per month

Opt 010: High-stability oven reference (see page 198)

Temperature stability: $< 7 \times 10^{-9}$ referenced to 25° C

Short-term stability: $< 4 \times 10^{-9}$ for 1 second average

Aging rate: $< 5 \times 10^{-10}$ per day, $< 1 \times 10^{-7}$ per year

Warm-up: Within 5×10^{-9} of final value (frequency 24 hours after turn-on) 10 minutes after turn-on.

Rear-Panel Connectors

HP-1B

Full programmability: All instrument settings and operating modes except specific self-test routines

Data acquisition and transfer rate: For 450-point data record, approximately 17 times/sec with an HP 9000 Series 300 (when measuring, for example, a 1-MHz carrier with a timebase setting of 40 μ s/division)

Data transfer rate: Approximately 175 kB/s

Interface capabilities: SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0, E2

Test Limit Output

Operation: Goes high when measurements fall outside the display range of the fast histogram

Operating range: Low < 0.6 V and high > 1.5 V into 50 Ω

Frequency Standard Input

Frequency: 5 MHz or 10 MHz

Operating range: 1 V peak-to-peak to 5 V peak-to-peak into 1 k Ω

Damage level: 10 V rms

Frequency Standard Output

Frequency: 10 MHz, or External Reference if frequency standard input selected

Operating range (ac-coupled): > 1 V peak-to-peak square wave (50 Ω), > 2 V peak-to-peak square wave (1 M Ω)

Power Requirements

Voltage: 115/230 V ac (-25% to +15%)

Frequency: 48 to 66 Hz

Maximum power: 300 VA

General

Operating Temperature: 0° to 55° C

Size: 194 mm W \times 425 mm H \times 363 mm D (440 mm D, handle extended)

Weight: Net, 10 kg; shipping, 18 kg

Ordering Information

| | Price |
|--|----------|
| HP 53310A Modulation Domain Analyzer | \$9,950 |
| Opt 001 Extended Measurement Memory (4 X) | \$500 |
| Opt 010 High-Stability Oven Timebase | \$1,750 |
| Opt 030 2.5 GHz Channel C | \$1,600 |
| Opt 031 Digital RF Communications | \$5,000 |
| Opt W30 Extended Repair Service (see page 624) | \$235 |
| Opt W32 Calibration Service (see page 624) | \$380 |
| HP 5364A 2 to 18 GHz Mixer/Detector | \$14,000 |
| HP J06-59992A Time Interval Calibrator | \$3,000 |

*For complete specifications on the HP 53310A see data sheet #5091-2596. For specifications on Option 031 see data sheet #5091-2597.