Performance Characteristics

The performance characteristics describe the typical performance of the oscilloscope. You will notice that some of the characteristics are marked as tested, these are values that you can verify with the performance tests under "Verifying Oscilloscope Performance," on page 67.

Vertical System

All channels

Bandwidth[1]:
- dc to 100 MHz −3 dB (HP 54600A & HP 54601A)
- dc to 150 MHz −3 dB (channels 1 & 2, HP 54602A)
- dc to 250 MHz −3 dB (channels 3 & 4, HP 54602A)
- ac coupled, 10 Hz to 100 MHz −3 dB (HP 54600A & HP 54601A)
- ac coupled, 10 Hz to 150 MHz −3 dB (channels 1 & 2, HP 54602A)

Rise time
- 3.5 ns (calculated, HP 54600A & HP 54601A)
- <2.33 ns (calculated, channels 1 & 2, HP 54602A)
- <1.4 ns (calculated, channels 3 & 4, HP 54602A)

Dynamic range: ±32 V or ±8 divisions, whichever is less

Math functions: Channel 1 + or − channel 2

Input resistance: 1 MΩ

Input capacitance: ≈13 pf

⚠ Maximum input voltage: 400 V (dc + peak ac)

1 Tested, see "To verify bandwidth," on page 72.

Channels 1 and 2

Range 2 mV/div to 5 V/div
Accuracy[1] ±1.5%
Vernier[1]: Fully calibrated, accuracy about ±3%
Cursor accuracy[1, 2, 3]:
Single cursor accuracy: vertical accuracy ±1 2% of full scale ±0.5% of position value
Dual cursor accuracy: vertical accuracy ±0.4% of full scale
Bandwidth limit: ≈20 MHz
Coupling: Ground, ac, and dc
Inversion: Channel 1 and channel 2
CMRR (common mode rejection ratio): ≈ 20 dB at 50 MHz

Channels 3 and 4 (HP 54601A & HP 54602A only)

Range: 0.1 V/div and 0.5 V/div ranges
Accuracy[1]: ±1.5%
Coupling: Ground and dc

1 When the temperature is within ±10 °C from the calibration temperature
2 Use a full scale of 80 mV for 2 mV/div and 5 mV/div ranges
3 Tested, see "To verify voltage measurement accuracy," on page 69.

Horizontal System

Sweep speeds: 5 s/div to 2 ns/div main and delayed
Accuracy: ±0.01%
Vernier. Accuracy ±0.05%
Horizontal resolution: 100 ps
Cursor accuracy[1,2]: (Δt and 1/Δt) ±0.01% ±0.2% of full scale ±200 ps
Delay jitter: 10 ppm
Pretrigger delay (negative time): ≥10 divisions
Posttrigger delay (from trigger point to start of sweep): at least 2560 divisions or 50 ms. Not to exceed 100 s.
Delayed sweep operation

Main sweep	Delayed sweep
5 s/div to 10 ms/div	up to 200 times main sweep
5 ms/div and faster	up to 2 ns/div

1 Use full scale of 50 ns on 2 ns/div range.
2 Tested, see "To verify horizontal Δt and 1/Δt accuracy," on page 78.

Trigger System

Internal trigger

Sensitivity[1]:
- dc to 25 MHz 0.35 div or 3.5 mV (all channels on all models)
- dc to 100 MHz 1 div or 10 mV (all channels on HP 54600A & HP 54601A)
- dc to 150 MHz 1 div or 10 mV (channels 1 & 2 on HP 54602A)
- dc to 250 MHz 1 div or 10 mV (channels 3 & 4 on HP 54602A)

Sources:
- Channels 1 to 4 and line on HP 54601A & HP 54602A
- Channels 1, 2, line, and external on HP 54600A

Coupling: ac, dc, LF reject, HF reject, and noise reject
- LF reject and HF reject −3 dB at ≈50 kHz

Modes: Auto, Autolevel, Normal, Single, and TV
TV triggering: Available on channels 1 and 2 only
TV line and field: 0.5 division of composite sync for stable display
Holdoff: Adjustable from 200 ns to ≈13 s

External trigger (available on HP 54600A only)

Range: ±18 V
Sensitivity[1]:
- dc to 25 MHz 50 mV
- dc to 100 MHz 100 mV

Coupling: dc, HF reject, and noise reject
Input resistance: 1 MΩ
Input capacitance: ≈13 pf
⚠ Maximum input voltage: 400 V (dc + peak ac)

1 Tested, see "To verify trigger sensitivity," on page 81

XY Operation

Z Blanking: TTL high blanks trace
Bandwidths: X and Y same as vertical system
Phase difference: ±3 degrees at 100 kHz

Display System

Display: 7-inch raster CRT
Resolution: 255 vertical by 500 horizontal points
Controls: Front-panel intensity control
Graticule: 8 × 10 grid or frame
Autostore: Autostore saves previous sweeps in half bright display and the most recent sweep in full bright display.

Acquisition System

Maximum sample rate: 20 MSa/s
Resolution: 8 bits
Simultaneous channels: Channels 1 and 2 or channels 3 and 4
Record length: 4,000 points (2,000 single shot)
Maximum update rate: 1,000,000 points/s
Single-shot bandwidth: 2 MHz single channel, 1 MHz dual channel
Peak detect: 50 ns glitch capture (100 ns dual channel) from 5 s/div to 50 µs/div
Average: Number of averages selectable at 8, 64, and 256

Advanced Functions

Automatic measurements (measurements are continuously updated)
- Voltage: Vavg, Vrms, Vp-p, Vtop, Vbase, Vmin, Vmax
- Time: Frequency, period, + width, − width, duty cycle, rise time, and fall time

Cursors: Manually or automatically placed

Setup functions:
- Autoscale: Sets vertical and horizontal deflections and trigger level for signals with a frequency ≥50 Hz, duty cycle >1% and voltage level
  - channels 1 and 2 >20 mVp-p
  - channels 3 and 4 >100 mVp-p
  - external trigger (HP 54600A only) >100 mVp-p
- Save/Recall: 16 front-panel setups
- Trace memory: Two volatile pixel memories

Power Requirements

Line voltage range: 100 Vac to 240 Vac
Line voltage selection: Automatic
Line frequency: 45 Hz to 440 Hz
Maximum power consumption: 220 VA

General

Environmental characteristics

The instrument meets or exceeds the environmental requirements of MIL-T-28800D for Type III, Class 3, Style D equipment as described below.

Ambient temperature: (Tested to MIL-T-28800D paragraphs 4.5.5.13 option 2 and 4.5.5.14)
- Operating: −10 °C to +55 °C (+14 °F to +131 °F)
- Nonoperating: −51 °C to +71 °C (−60 °F to +160 °F)

Humidity: (tested to Hewlett-Packard environmental specification section 758 paragraphs 4.0, 4.1, and 4.2 for class B-1 products)
- Operating: 95% relative humidity at +40 °C (+104 °F) for 24 hours
- Nonoperating: 90% relative humidity at +65 °C (+149 °F) for 24 hours

Altitude: (Tested to MIL-T-28800E paragraph 4.5.5.2)
- Operating: to 4,500 m (15,000 ft)
- Nonoperating: to 15,000 m (50,000 ft)

EMI

EMI (commercial) FTZ 1046 Class B

EMI Meets the requirements in accordance with MIL-T-28800,
paragraph 3.8.3 table XII, and MIL-STD-461C
CE01 Part 2 narrow band requirements up to 15 kHz
CE03 Part 4
CE07 full limits
CS01: Part 2
CS02: Part 2
CS06: Part 5 limited to 300 V
RE01 Parts 5 and 6 measured at 12 inches, 15 dB relaxation to 20 kHz, and
exceptioned from 20 kHz to 50 kHz.
RE02 Part 2 (limited to 1 GHz) Full limits of class A1c and A1f,
with option 002 installed
without option 002 installed 10 dB relaxation, 14 kHz to 100 kHz
RS02: Part 2, Part I Exceptioned
RS02: Part 2, Part II Exceptioned
RS03: Part 2, limited to 1 V/meter from 14 kHz to 1 GHz
(with option 001 installed) Slight trace shift from 80 MHz to 200 MHz

Vibration

Operating: 15 minutes along each of the 3 major axes; 0.025 inch p-p
displacement, 10 Hz to 55 Hz in one-minute cycles. Held for 10 minutes
at 55 Hz (4 g at 55 Hz).

Shock

Operating: 30 g, 1/2 sine, 11 ms duration, 3 shocks per axis along major axis.
Total of 18 shocks.

Physical characteristics

Size (excluding handle)
Height 172 mm (6.8 in)
Width 322 mm (12.7 in)
Depth 317 mm (12.5 in)
Weight: 6 2 kg (14lbs)

Product Regulations

Safety IEC 348
UL 1244
CSA-C22 2 No 231 (Series M-89)

EMC This Product meets the requirement of the European Communities (EC) EMC Directive 89/336/EEC.

Emissions EN55011/CISPR 11 (ISM, Group 1, Class A equipment)
SABS RAA Act No. 24 (1990)

Immunity

EN50082-1	Code[1]	Notes[2]
IEC 801-2 (ESD) 8kV AD	1	
IEC 801-3 (Rad.) 3 V/m	1	
IEC 801-4 (EFT) 1kV	1	

[1] Performance Codes
1 PASS - Normal operation, no effect.
2 PASS - Temporary degradation, self recoverable.
3 PASS - Temporary degradation, operator intervention required.
4 FAIL - Not recoverable, component damage

[2] Notes:
(None)

Sound Pressure Level Less than 60 dBA