

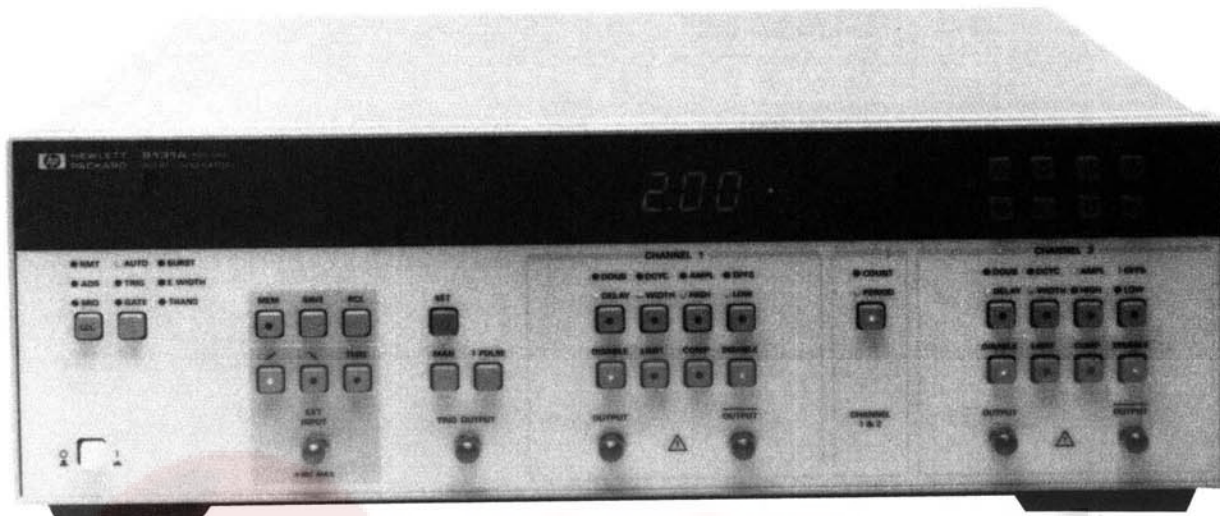
PULSE GENERATORS & DATA GENERATORS

500 MHz High-Speed Pulse Generator

HP 8131A

501

- < 200 ps fixed transitions
- Suitable for BICMOS, ECL, and GaAs technologies
- 10 ps 10 mV best case resolution
- Optional second channel
- Simulates data/clock signals
- 1 GHz Transducer Mode



HP 8131A with Option 020, second channel



200 ps Transition Times

The HP 8131A delivers excellent performance to help you solve high-speed measurement problems. Transition times of less than 200 ps from the 10% to 90% amplitude (20% to 80% of amplitude; typical 150 ps) enable repeatable and reliable timing measurements on high-speed digital circuits. Since compromises in edge speed directly affect your measurement accuracy, the clean and sharp edges offered by the HP 8131A minimize errors due to threshold uncertainties. Matching the requirements of the most advanced ECL and GaAs devices, you now can characterize components and circuits with repetition rates up to 500 MHz (in Transducer Mode up to 1 GHz). The HP 8131A is the first product that offers 200 ps edge speed in a fully programmable product, which makes it extremely useful not only in research and development environments but also in high-speed production test applications.

10 ps Timing Resolution

The high timing resolution allows precise measurement of timing parameters, such as setup and hold times. Especially in the two-channel version, the ability to exactly position sharp pulses through independent delay and width makes the HP 8131A a very useful tool in evaluating fast digital circuits. With a timing resolution that is about one order of magnitude higher than the typical gate delay of ECL devices, it is easy to detect trends when varying a critical pulse parameter without losing a required timing relation. Spikes can be simulated with 500 ps small pulses, and, in combination with the 10 ps width resolution, timing and energy-related failures can be examined.

5 V Amplitude and 10 mV Resolution

The 5 V amplitude makes it possible to stimulate high-speed circuits such as ECL, GaAs, or BICMOS devices. In addition, you can now test the excess-voltage immunity of your high-speed components and evaluate crosstalk caused by 5 V, 200 ps transitions. The 10 mV resolution helps to slowly approach the threshold levels of digital circuits. The minimum amplitude of 100 mV is enough to check for minimum signal swing up to a 500 MHz (1 GHz in Transducer Mode) repetition rate. In combination with the full programmability, you can now do detailed analysis of critical level conditions in an automated test routine.

500 MHz Repetition Rate

The 500 MHz repetition rate of the HP 8131A establishes a new class of high-speed programmable pulse generator, which allows testing at the maximum toggle rate of your ECL, CMOS, and complex GaAs devices. Now it is possible to perform functional and parametric tests of fast digital circuits under program control. In research and development, this means more reliable tests under repeatable conditions and easy documentation of test results. In production, the programmability opens new possibilities to functionally test high-speed digital components with significantly higher throughput under well-defined conditions.

1 GHz Transducer Mode

If you need to functionally test your component at frequencies beyond 500 MHz, the 1 GHz transducer mode allows for shaping an externally provided sinewave into a squarewave with transition times of 200 ps. Especially if you need a very fast, programmable clock source, the combination of the HP 8131A and a microwave signal generator is ideal. This way, you can test maximum toggle frequency with a true digital 1 GHz signal.



PULSE GENERATORS & WAVEFORM GENERATORS

500 MHz High-Speed Pulse Generator (cont'd) HP 8131A

Transition Time Converters (HP 15432/3/4A)

HP 8131A's fast edges are ideal for testing some of today's fastest digital ICs. But what happens when a practical circuit — through unavoidably long ground connections, for example — is reactive?

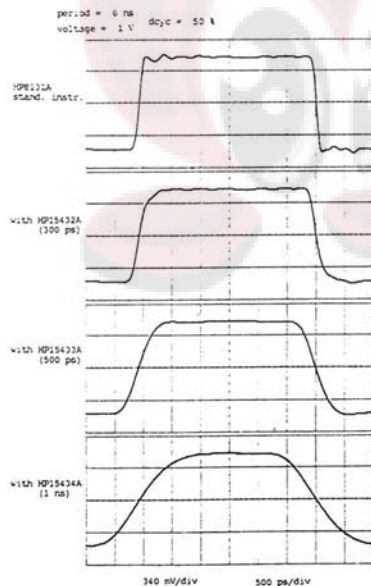
It doesn't take much inductance to cause violent ringing when shot at with edges faster than 200 ps. It's unlikely that a reduction in repetition rate will improve circuit performance, unless accompanied by an increase in switching time. The transition time converters allow the edges to be slowed to nominal values of 300, 500 and 1000 ps.

Flexibility

You can thus test not only fast digital ICs, but also test heads and mainframes where, at high frequencies, the quality of cables, connectors, and terminations can influence the transition times significantly. Always think of the route from the HP 8131A to the device as a transmission line, and the transition time converter as simply a filter that removes some of the highest frequencies, slowing the edges, damping reflections, and reducing overshoot and ringing.

Typical Performance Characteristics:

	15432A	15433A	15434A
Output Transition Times	300 ps	500 ps	1000 ps
Intrinsic Transition Times	260 ps	480 ps	990 ps
3 dB Corner Frequency	1120 MHz	660 MHz	330 MHz
Input Voltage	< 10.0 V peak-to-peak		
Insertion Loss	< 0.2 dB		
Overshoot and Ringing	< 5%		
VSWR	< 2.0		



Waveforms are plotted from the HP 54121T Digitizing Oscilloscope

Specifications

Specifications describe the instrument's warranted performance (30 minutes warm-up, 50 Ω load) at 0° C to 55° C ambient temperature.

Timing Parameters (Measured at 50% of amplitude)

Common Specification

Resolution: 3 digits (best case: 10 ps)

Period: 2 ns to 99.9 ms

Delay

Fixed: 20 ns

Variable range: from 0 ns to 99.9 ms (max < Period) measured between trigger out and main out.

Double pulse: 2 ns to 99.9 ms (period ≥ 5.00 ns)

Double Pulse and Delay are mutually exclusive.

Width: 500 ps to 99.9 ms (max < Period)

Transition times: (for leading and trailing edges)

10%-90% of amplitude: < 200 ps, 300mV to 3V range, period ≤ 1 us.

20%-80% of amplitude: < 200 ps, 100mV to 5V range

Differential Outputs

Output Levels: (Into 50 Ω, output levels double when driving into open circuits, instrument disables outputs if levels exceed ±6.5V, or ampl. exceeds 6.5V)

High level: -4.90V to +5.00V **Low level:** -5.00V to +4.90V
Resolution: 3 digits (best case: 10 mV)

Settling Time: 10 ns

Operating Characteristics

(Values describe typical, non-warranted performance)

Inputs and Outputs

External input: (Trigger, Gate, Burst, Ext. Width)

Trigger slopes can be selected pos/neg.

Input impedance: 50 Ω ± 2.5 Ω

Threshold: -5 V to +5 V

Input frequency: dc to 500 MHz

Min. pulse width: 1 ns

Input sensitivity: ≥ 300 mV (peak-to-peak)

Transducer input:

Impedance: 50 Ω ± 2.5 Ω

Transition: < 50 ns

Frequency: 10 MHz to 1 GHz

Sensitivity: ≥ 600 mV (peak-to-peak)

Trigger output:

Levels: high 0V, Low -0.6 V

Delay from external input to trigger output: 16 ns

Source impedance: 50 Ω ± 5 Ω

HP-IB Capabilities

All modes and parameters are fully HP-IB programmable

Operating Modes

Manual: Simulates an external input signal

1 Pulse: in Trigger, Gate, and Burst mode, one pulse or double pulse is generated.

Auto: Continuous pulse stream

Trigger: Each active input transition generates a single output pulse or double pulse

Gate: External signal enables period generation. First output pulse is synchronous with active edge. Last pulse is always completed. Width and period of first pulse may deviate from subsequent pulses.

E. Width: Restoration of external signal with selectable output levels
E. Burst: Each active input transition generates a preprogrammed number of pulses (1 to 9999); min burst period is 5 ns. Width and period of first pulse may deviate from subsequent pulses.

Transducer: External sinewave (up to 1 GHz) toggles output. Output levels are selectable

Limit: Max. high and low levels into 50 Ohm can be limited to protect the device under test. Pushing the limit key declares present levels as limits, which then can not be exceeded as long as the mode is active.

Complement: Normal/complement selectable

Disable: Relays connect/disconnect outputs

Set: Sets parameters to fixed ratio relative to period

Store: Stores complete setting in displayed location

Recall: Recalls complete setting from displayed location

General

Storage temperature: -40° C to +65° C

Operating temperature: 0° C to 55° C

Power: 100/120/220/240 Vrms, ±10%, 400 VA max., 48 to 66 Hz

Weight: 20 kg (44.4 lb)

Sizes: 145 mm H × 426 mm W × 525 mm D (5.7 in × 16.75 in × 20.65 in)

Recalibration period: 1 year recommended

Ordering Information

HP 8131A 500 MHz Pulse Generator

Price

\$16,000

Options

Opt 001 Rear-Panel Connectors

\$0

Opt 020 Second channel (not retrofittable)

\$8,250

Opt 908 Rack Mount Flange Kit (P/N 5062-3977)

\$36

Opt 910 Additional Manual Set

\$230

Opt 915 Additional Service Manual

\$200

Opt 916 Additional Operating and Programming Manual (P/N 08131-90011)

\$32

Opt H01 Preparation for rack slides (requires rack slide kit)

\$0

Opt W30 Extended repair service. See page 671

\$360

Accessories

HP 15432A 300 ps Transition Time Converter

\$240

HP 15433A 500 ps Transition Time Converter

\$240

HP 15434A 1 ns Transition Time Converter

\$240

HP 8493A Option 010; 10 dB Attenuator

\$145

HP 8493A Option 020; 20dB Attenuator

\$145

P/N 8120-4948 Cable, Coax (SMA)

\$210

☎ For off-the-shelf shipment, call 800-452-4844.