

# Agilent Technologies 8114A 100 V/2 A Programmable Pulse Generator

## Technical Specifications



## Faster Characterization and Test, without Compromise

### Key Features:

- 100 Vpp (2 A) into open (or from 1K $\Omega$  into 50 $\Omega$ ),
- 7ns Transitions (fixed),
- 15 MHz Repetition Rate,
- Variable Pulse-Width,
- Variable Pulse Baseline  $\pm 25$  V (optional),
- 3 Digit Resolution,
- SCPI Programming Commands,
- External Triggering and Gating,
- Counted Burst Mode,
- Graphic Display.

## Agilent Technologies 8114A 100 V/ 2 A Programmable Pulse Generator

The Agilent 8114A 100 V/ 2 A pulse generator helps you maximize test efficiency as the key to reducing time to market without compromising the quality of your product. It shortens characterization and test time by providing:

- clean, reliable and repeatable pulse waveforms,
- easy set-up and operation,
- full programmability,
- protection of the device under test.

### On the bench ...

To save time on the bench the 8114A offers you fast set-up and operation, confidence in your results and the ability to automate your tests to improve test coverage in the time available. You get:

- all pulse parameters at a glance,
- fast store and recall of hundreds of settings on memory card,
- accurate, repeatable pulses,
- SCPI programming commands.

To protect your device under test, the Agilent 8114A provides:

- adjustable level and duty cycle limits,
- clean, reliable pulses,
- inhibit input that allows DUT feedback signal to inhibit pulse output.

### In a Test System ...

To achieve high test throughput, and efficient integration of diverse test instruments and effective generation of test programs, the Agilent 8114A integrates smoothly into automated test systems by ensuring:

- reduced programming investment through SCPI programming commands,
- easy physical integration into a rack with optional rear panel connectors,
- reliable, repeatable pulses across a wide temperature range.



**Agilent Technologies**

**Clean, Reliable Pulses**

The Agilent 8114A generates clean pulses with low jitter and excellent pulse performance at all specified settings in any triggering mode and, of course, across the entire operating temperature range. Parameters and trigger modes can be changed without generating unwanted pulses, so that reliable measurements are guaranteed

**External Synchronization**

As well as generating continuous streams of pulses, the Agilent 8114A can be triggered or gated by an external signal or the MANual trigger key. Combined with the ability to generate double-pulses per period and counted bursts you can generate a variety of pulse patterns synchronized to an external signal.

**Accuracy and Repeatability**

The excellent accuracy, repeatability and resolution of the Agilent 8114A let you concentrate on your results, not the measurement. Confidence in your results is assured when you can trust your test set-up and the Agilent 8114A maintains its pulse performance at all specified pulse amplitudes.

**Voltage or Current**

With the Agilent 8114A you can set the pulse levels in terms of voltage or current, to suit the device you are testing.

**Load Compensation**

You can quickly set the pulse levels for your device, even when it's not a true 50  $\Omega$  load. Set the expected load impedance at the output and the Agilent 8114A adjusts its signal accordingly to achieve the required levels as shown on the display or programmed via GPIB.

**Device Protection**

To reduce the risk of accidental damage to the device under test the Agilent 8114A has adjustable voltage, current and duty cycle limits. As long as the limits are enabled you cannot set or program the output signal outside your chosen limits.

The Agilent 8114A inhibit input accepts a TTL feedback signal from your test system or device under test to inhibit the pulse signal under hardware control.

**Reduced Programming**

All parameters of the Agilent 8114A are programmable via GPIB. SCPI (Standard Commands for Programmable Instruments) facilitates the standardization of test programs and offers a common programming syntax with other instruments.

The local user-interface eases the transition from manual to automated test by displaying the SCPI command syntax for each parameter as part of the on-screen help information.

**Easy Rack Integration**

Optional rear panel connectors and rack mount kits make it easy to install the Agilent 8114A in a rack-based system.

Conformance to the latest European EMC standards minimizes radiated and conducted electromagnetic interference with the test system.

Reliable measurements are guaranteed over the whole temperature range that exists in a test rack.

## Specifications

Specifications describe the instrument's warranted performance. Non-warranted values are described as typical. All specifications apply after a 30-minute warm-up phase with 50  $\Omega$  source/ load resistance. All specifications are valid from 0°C to 55°C ambient temperature.

## 8114A Specifications

### Timing Characteristics

Measured at 50% amplitude at fastest transitions in continuous mode and 50  $\Omega$  source impedance.

Frequency range	1 Hz to 15.00 MHz
Timing resolution (period, width)	3 digits, 100 ps best case
RMS jitter (period, width, delay)	0.03% $\pm$ 25 ps ( $\pm$ 0.05% $\pm$ 25 ps for period < 100ns)
Period range	66.7 ns to 999 ms
Accuracy	$\pm$ 5% $\pm$ 100 ps
Width range	10.0 ns to 150 ms (max: period - 10.0 ns)
Accuracy	$\pm$ 5% $\pm$ 500 ps
Fixed delay	42ns typical <sup>[1]</sup>
Additional variable delay range	0.00 ns to 999 ms(max: period - 4 ns)
Accuracy	$\pm$ 5% $\pm$ 1 ns
Resolution	3 digits, 10 ps best case
Transition time (10/90)	50 $\Omega$ into 50 $\Omega$ : < 7 ns (amplitude > 5 V) High-Z into 50 $\Omega$ : < 12ns (amplitude > 10 V)

Note: [1] Measured between Trigger Output and Output

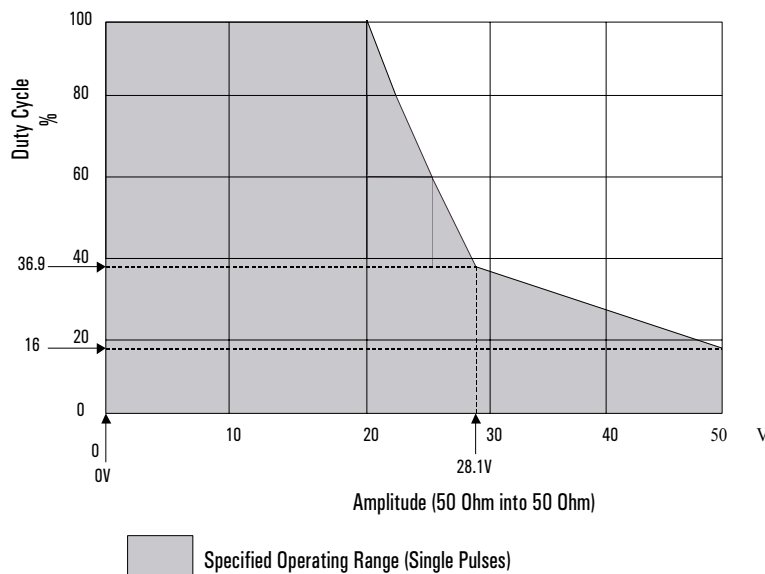


Figure 1

**Width:** Can be set as width, duty cycle, or trailing edge delay.

**Burst Count:** 2 to 65536 (single or double pulses).

**Double Pulse:** Two pulses are generated per pulse period. The first pulse starts at the start of the period, the double-delay sets the delay to the start of the second pulse. Double pulses are available in all trigger modes except External Width.

**Delay:** Delay, phase or % of period. Double pulse delay: Double pulse and delay are mutually exclusive. The delay between double pulses can be set as delay or % of period (minimum period 134 ns)

**Duty cycle:** Set between 0.1% and 100% (subject to width limits and period specifications).

Figure 1 shows the specified operating range for actual duty cycle and amplitude. Note that in double pulse mode the actual duty cycle is twice the displayed value.

**Repeatability:** Is typically four times better than accuracy.

# Level/Pulse Performance Characteristics

		Agilent 8114A
Amplitude		1.00 V to 50.0V or 20.0 mA to 1.00A (values approximately double for source or load resistance $> 1\text{ k}\Omega$ ).
Accuracy		$\pm 1\%$ of amplitude $\pm 100\text{ mV}$
Resolution		3 digits, best case 10 mV
Baseline	Standard Instrument Option 001	$< 100\text{ mV} + 0.5\%$ of amplitude. $-25.0\text{ V to }25.0\text{V}^{[1]}$
Accuracy		$\pm 1\% \pm 100\text{ mV} \pm 0.5\%$ of amplitude.
Pulse Window		$\pm 50\text{ V}$
Base line noise		10 mV RMS typ.
Output connectors		BNC
Source Impedance		Selectable $50\Omega$ or High Impedance ( $> 1\text{ k}\Omega$ )
Short circuit current		2 A
Overshoot/preshoot/ringing		$< \pm 5\%$ of amplitude $\pm 100\text{ mV}$
Settling time		$< 100\text{ ns}$ typical

Note: [1]  $50\Omega$  source must be selected for variable baseline

**Level parameters:** Can be entered as voltage or current, as high and low level, or as offset and amplitude.

**Load compensation:** The actual load value can be entered (for loads differnt to  $50\Omega$ ) to display actual output values.

**On/ off:** Relays connect/disconnect output.

**Polarity:** Positive or negative pulses selectable.

**Output Protection:** Maximum external voltage 100 Vpp from  $50\Omega$  source ( $\pm 10\text{ Vdc}$  from  $0\Omega$  source).

**Limit:** Programmable level and duty cycle limits restrict the available output ranges to protect the device-under-test.

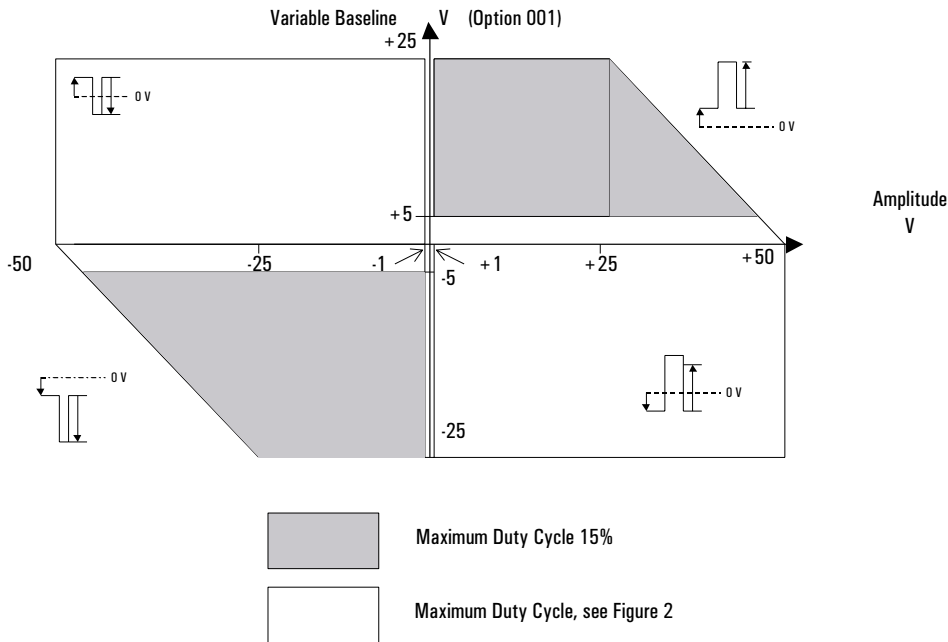


Figure 2

### Trigger Modes

**Continuous:** Continuous pulses, double pulses or bursts (single or double pulses).

**External triggered:** Each active input transition (rising, falling or both) generates a single or double pulse or burst.

**External gated:** The active input level (high or low) enables pulses, double pulses or bursts. The last single/ double pulse or burst is always completed.

**External width:** The pulse shape can be recovered, whilst period and width of an external input signal are maintained. Levels and transitions can be set.

**Manual:** Simulates an external input signal.

### External input

Used for trigger, gate or external width.

**Input impedance:** 10 k $\Omega$

**Threshold:** -10 V to +10 V with 100 mV resolution.

**Max. input voltage:**  $\pm 50$  V.

**Sensitivity:**  $\pm 300$  mVpp typical.

**Input transitions:** <100 ns.

**Frequency:** dc to 15 MHz.

**Minimum pulsewidth:** 10 ns typical.

### Trigger Output

**Level:** fixed TTL (2.5 V into 50  $\Omega$ ).

**Output impedance:** 50  $\Omega$  typical.

**Trigger format:** One pulse per period with 50% duty cycle typical.

**Max. external voltage:** -2 V/+7 V.

**Transition times:** 5 ns typical.

**Delay from external input to trigger output:** 24 ns typical.

### Inhibit Input

An external TTL signal at the inhibit input can be used to inhibit the pulse signal, holding the output signal at its baseline level.

**Inhibit on Edge:** An active edge inhibits the pulse signal until reset from the front panel or GPIB

**Inhibit on Level:** An active level inhibits the pulse signal.

**Input impedance:** 100 k $\Omega$

**Threshold:** 1.5 V (TTL) typical.

**Max. input voltage:**  $\pm 50$  V.

**Input transitions:** <100 ns.

**Frequency:** dc to 5 MHz.

**Minimum pulsewidth:** 100 ns typical

**Inhibit response time:** 200 ns typical.

### Remote Control

Operates according to IEEE standard 488.2, 1987 and SCPI 1992.0.

**Function Code:** SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0.

**Programming times:** (all checks and display off).

ASCII command	Typ. exec. time
One parameter or mode	5 ... 20 ms typ.
Recall setting	250 ms typ.

### User Interface

**Overprogramming:** all parameters can be overprogrammed (exceeding specifications) to fully exploit the hardware limits.

**Display:** All pulse parameters at a glance on one display.

**Help key:** displays a context-sensitive message.

**Non-volatile memory:** current setting is saved on power-down.

**Clear memory:** clears all stored user settings.

**Memory card:** Instrument settings (350 bytes) can be stored on MS-DOS $\hat{a}$  formatted PCMCIA card. Cards can also be used for convenient firmware upgrades.

### General

**Operating temperature:**

0 $^{\circ}$ C to +55 $^{\circ}$ C.

**Storage temperature:**

-40 $^{\circ}$ C to +70 $^{\circ}$ C.

**Humidity:** 95% r.h. up to 40 $^{\circ}$ C ambient temperature.

**EM C:** EN 55011, Group 1, Class A.

**Noise emission:** 5.5 bel typical.

**Safety:** IEC1010 safety class 1

**Battery:** Lithium CR2477-N.

**Power requirements:**

100-240 Vac,  $\pm 10\%$ , 50-60 Hz;  
100-120 Vac,  $\pm 10\%$ , 400 Hz.

**Power consumption:**

500 VA max.

**Max. dimensions (H \* W \* D):**

133 mm \* 426 mm \* 422 mm.

**Weight:** 14 kg net, 17 kg shipping.

**Recalibration period:**

one year recommended.

**Warranty:** 1 year.

## Ordering Information

**Agilent 8114A** 100 V / 2 A Programmable Pulse Generator

**Option 001:** Variable Baseline  $\pm 25$  V

**Option UFJ:** 1 MB Memory Card

**Opt UN2:** Rear Panel Connectors (instead of front panel)

**Opt 1CP:** Rack Mount and Handle Kit (5063-9219)

**Opt 1CN:** Handle Kit (5063-9226)

**Opt 1CM:** Rack Mount Kit (5063-9212)

**Opt 1CR:** Rack Slide Kit (1494-0059)

**Opt 0BW:** Service Manual (08114-91021)

**Opt 0B2:** Additional English Language User's Guide  
(08114-91012)

## Related Agilent Literature

- Agilent Family of Pulse/ Pattern Generators, brochure p/ n 5980-0489E

## Agilent Technologies' Test and Measurement Support, Services, and Assistance

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#### Japan:

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(fax) (81) 426 56 7840

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(tel) (305) 267 4245

(fax) (305) 267 4286

#### Australia:

(tel) 1 800 629 485

(fax) (61 3) 9272 0749

#### New Zealand:

(tel) 0 800 738 378

(fax) 64 4 495 8950

#### Asia Pacific:

(tel) (852) 3197 7777

(fax) (852) 2506 9284

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