

KEYSIGHT TECHNOLOGIES (AGILENT HP)

8116A

The Keysight (Agilent/HP) 8116A is a versatile, fully programmable 50 MHz Pulse/Function Generator. Combining function generator capabilities (sine, triangle, square, haversine, and DC) with pulse generator features (variable pulse width and fast 6 ns transition times), the 8116A provides comprehensive waveform generation and modulation capabilities in a compact half-rack instrument.

SPECIFICATIONS

General

Interfaces	HP-IB (IEEE-488)
Display	3-digit LED display with integrated parameter and status indicators

Physical

Power Supply	100 / 120 / 220 / 240 V AC (+5%, -10%), 48 to 440 Hz, 120 VA max
Operating Temperature	0 to 55 °C °C
Dimensions (W×H×D)	212 mm × 89 mm × 362 mm mm
Weight	5.9 kg kg
Shipping Weight	8.0 kg (17.6 lbs)

Waveform Specifications

Waveform Types	Sine, Triangle, Square, Pulse, Haver-sine, Haver-triangle, DC
Frequency Range (Sine)	1 mHz to 50 MHz
Frequency Range (Triangle)	1 mHz to 50 MHz
Frequency Range (Square)	1 mHz to 50 MHz
Frequency Range (Pulse)	1 mHz to 50 MHz
Frequency Resolution	3 digits
Frequency Accuracy (1.00 mHz to 9.99 MHz)	±3% of setting ±1 digit
Frequency Accuracy (10.0 MHz to 50.0 MHz)	±5% of setting ±1 digit
Sine Wave Distortion (THD)	< 1% (-40 dB) from 10 Hz to 50 kHz
Sine Wave Flatness (up to 1 MHz)	±3% (relative to 1 kHz) up to 9.99 MHz
Sine Wave Flatness (1 MHz to 50 MHz)	±10% (relative to 1 kHz) from 10.0 MHz to 50.0 MHz
Triangle Linearity	< 1% deviation from 10 Hz to 100 kHz
Square Wave Rise/Fall Time	< 6 ns
Square Wave Aberrations	< 5% of peak-to-peak amplitude

Output Characteristics

Output Impedance	50 Ω $\pm$ 10%
Amplitude Range (into 50 Ω)	10.0 mVpp to 16.0 Vpp
Amplitude Range (Open Circuit)	20.0 mVpp to 32.0 Vpp
Amplitude Resolution	3 digits
Amplitude Accuracy	$\pm$ 5% of setting $\pm$ 1 digit
DC Offset Range (into 50 Ω)	$\pm$ 7.95 V (amplitude dependent)
DC Offset Range (Open Circuit)	$\pm$ 15.9 V (amplitude dependent)
DC Offset Accuracy	$\pm$ 2% of setting $\pm$ 50 mV
Maximum Total Window (into 50 Ω)	$ Amplitude / 2 + Offset \leq 8.0$ V
Output Protection	Short-circuit protected; protected against external voltages up to $\pm$ 14 V
Maximum External Voltage Protection	$\pm$ 14 V

Pulse & Timing Specifications

Pulse Width Range	10.0 ns to 999 ms
Pulse Width Accuracy	$\pm$ 5% of setting $\pm$ 2 ns
Pulse Width Resolution	3 digits
Double Pulse Mode Interval	20.0 ns to 999 ms
Duty Cycle Range	10% to 90% (limited by 10 ns minimum pulse width)
Transition Time (Rise/Fall)	< 6 ns (fixed)

Modulation & Operating Modes

Operating Modes	Normal, Trigger, Gate, Burst
Modulation Modes	Amplitude Modulation (AM), Frequency Modulation (FM), Pulse Width Modulation (PWM), Voltage Controlled Oscillator (VCO)
Internal Modulation Source	Requires external modulation signal
External Modulation Inputs	Control Input (for AM, FM, VCO, PWM), Trigger Input
Amplitude Modulation Depth	0 to 100% (requires $\pm$ 2.5 V control signal)
VCO / FM Frequency Control Range	Up to 1000:1 (3 decades)
VCO / FM Input Voltage Range	0 to -7.99 V
PWM Control Range	Width can be modulated up to 100:1
Auto-vernier Mode	Increments any desired parameter continuously until stopped

Trigger & Sweep Specifications

Trigger Source	Internal, External, Manual
External Trigger Input Level	TTL compatible (threshold approx +1 V)
External Trigger Input Impedance	10 k Ω
External Trigger Slope	Positive-going or negative-going edge selectable
External Trigger Minimum Pulse Width	10 ns
Sweep Modes	Linear or Logarithmic
Sweep Time Range	10 ms to 500 s (in 3 ranges)
Sweep Start/Stop Limits	Any frequency within the 1 mHz to 50 MHz range
Burst Count Range	1 to 1999 cycles

Auxiliary Inputs & Outputs

Main Output Connector	BNC (front panel)
Trigger Output Level	TTL level (≥ 2.4 V into 50 Ω)
Trigger Output Impedance	50 Ω nominal
Control Input Connector	BNC (front panel, for VCO/AM/FM/PWM)
Trigger Input Connector	BNC (front panel)
Phase Lock Option (Option 001)	Provides Reference Input / Output for phase locking

System Interfaces & Programming

Programming Capability	All parameters programmable except for the line power switch
Memory Registers	9 user-programmable storage registers (1 to 9) plus register 0 for power-off state
Self-Test and Diagnosis	Automatic self-test with error recognition and display codes

General, Physical & Environmental

Storage Temperature Range	-40 °C to +75 °C
Operating Humidity Range	Up to 95% RH at 40 °C
Warm-up Time	30 minutes to meet all specifications

Power Requirements

Power Consumption	90 VA max.
Line Voltage	100 / 120 / 220 / 240 V (+5%, -10%)
Line Frequency	48 to 66 Hz

Modulation

External AM Bandwidth	DC to > 1 MHz
External FM Bandwidth	DC to 20 kHz
External PWM Bandwidth	DC to > 20 kHz
Control Input Impedance	10 k Ω (VCO/AM/PWM)

Phase Lock (Option 001)

Option 001 Phase Lock Range	10 Hz to 50 MHz
Option 001 Reference Input Level	100 mVrms to 10 Vrms
Option 001 Phase Control Range	-180° to +180°
Option 001 Phase Resolution	1°

Connectivity

GPIO Interface subset codes	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
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Pulse Mode

Maximum Pulse Duty Cycle	80% (pulse width is limited to 80% of the period)
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Outputs

Output Complement Mode	Selectable normal or complement waveform via COMPL key or GPIO
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Environmental

Operating Altitude	Up to 4,600 m (15,000 ft)
Non-operating Altitude	Up to 15,000 m (50,000 ft)

Interfaces

GPIO Address Selection	0 to 30, set via rear-panel switches
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Compliance

Safety Standards	Designed to meet IEC 348 Class I
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Options

Available Accessories	Option 908 (Rack flange kit), Option 910 (Extra operating manual), Option 915 (Service manual), Option 916 (Extra operating and service manual)
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APPLICATIONS

Electronic test and measurement, circuit troubleshooting, and educational lab testing

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