

JHG9000T Series Function/ Arbitrary Waveform Generator

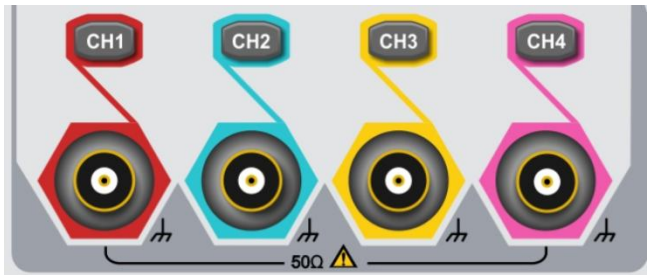


Product Features

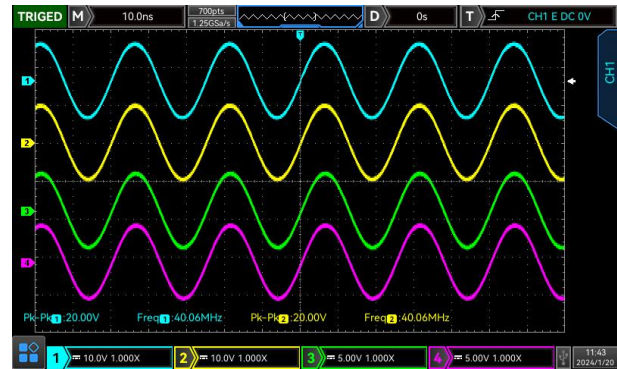
- Standard four-channel configuration with independent output mode per channel.
- Maximum output amplitude: 20Vpp
- Maximum sampling rate: 2.5 GSa/s, 16-bit/14-bit Vertical Resolution
- Nine standard waveforms: Sine, Square, Ramp, Pulse, Harmonic, Noise, Pseudo-Random Bit Sequence (PRBS), DC, and Arbitrary.
- Adjustable Noise Output
- Sine wave output up to 600MHz/500MHz/350MHz with 1 μ Hz resolution across the full frequency range.
- Supports 200MHz/160MHz/120MHz square wave outputs with Edge Times as short as 1.5ns and adjustable Duty Cycles.
- Supports 200MHz/160MHz/120MHz pulse output with wide dynamic range, high precision, and adjustable rise/fall time and Duty Cycle.
- Output of 2nd to 16th harmonics with independently adjustable phase and amplitude.
- Outputs arbitrary waveforms from 8 pts to 64 Mpts, supports point-by-point output, and stores over 200 non-volatile digital arbitrary waveforms.
- Stores up to 16 GB (optional) or 20 MB of arbitrary waveform files (.bsv or .csv) and instrument setup files.
- Reads arbitrary waveform files (.bsv or .csv) and instrument setup files from a USB drive.
- Multiple modulation types: AM, FM, PM, DSB-AM, QAM, ASK, FSK, 3FSK, 4FSK, PSK, BPSK, QPSK, OSK, PWM, SUM
- Linear, Logarithmic, List, and Step Sweeps
- Supports frequency sweep and burst output.
- Digital protocol output: SPI, I²C, UART.
- One-Click SNR Output
- Each channel can be configured independently or synchronously for: internal/external modulation and internal/external/manual trigger..
- Hardware Frequency Counter: 800 MHz, AC/DC coupled
- Powerful PC software and arbitrary waveform editor.
- 10.1-inch capacitive touchscreen, 1280 $\times$ 800 resolution
- Standard configuration interfaces: USB Host, USB Device, LAN, and dedicated 10MHz clock source input/output
- Easy-to-use multifunction knob and numeric keypad.
- Supports NeptuneLab laboratory system management software.

Design Features

Independent Four Channels

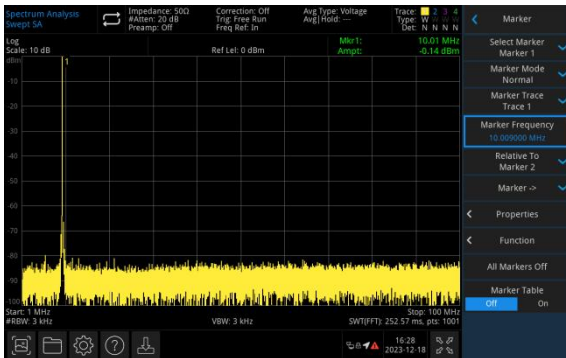


Multi-channel signal output meets various application needs by delivering clean and stable signals to multiple devices simultaneously. It supports multi-channel synchronized output with low channel-to-channel delay.

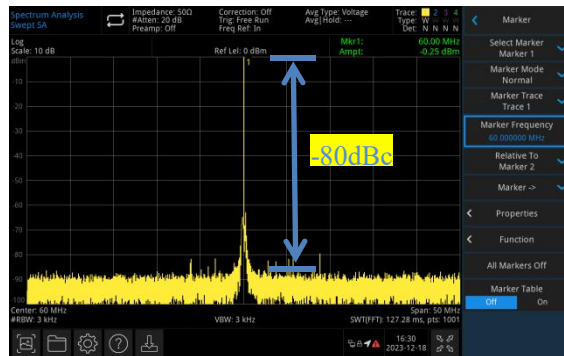


It supports multi-channel output while maintaining 20Vpp full-range output for both channel 1 and channel 2 at 40MHz frequency.

low distortion output

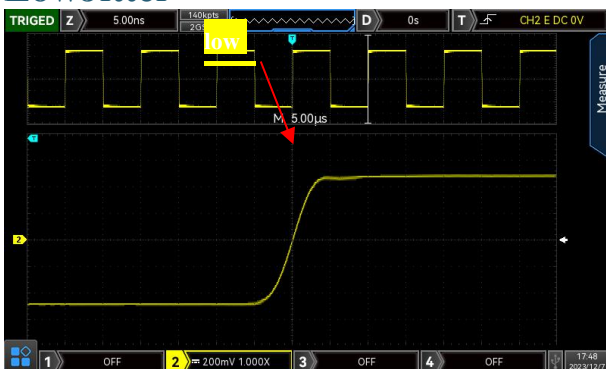


Excellent Harmonic Distortion



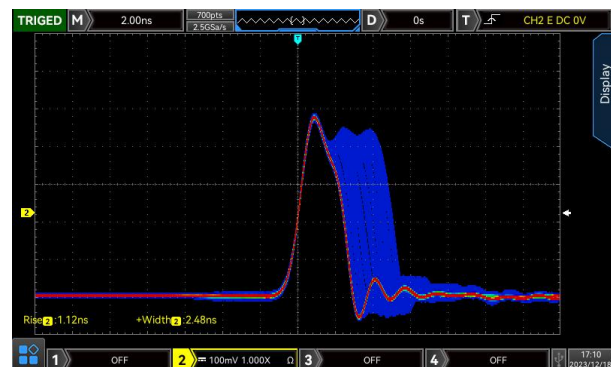
-80 dBc Spurious-Free Dynamic Range (SFDR)

Low Jitter



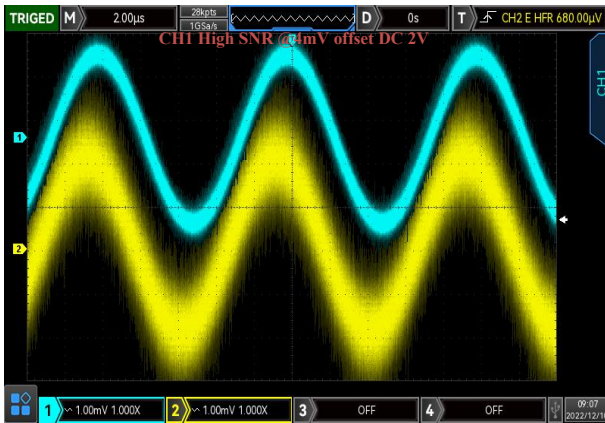
Advanced digital sampling technology ensures lower output waveform jitter.

Pulse Wave and Fast Edge Time



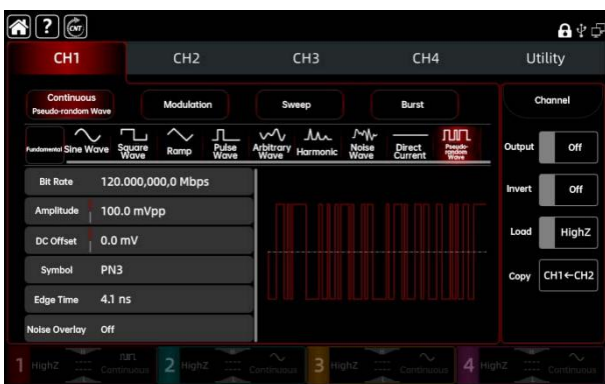
The new generation of pulse wave with wide dynamic range and high precision, and adjustable edge time, has a minimum pulse width of 2.4ns, with fine adjustable pulse width and a minimum step of 100ps. It can produce higher harmonic content and has the characteristics of a dedicated pulse generator, with an independently adjustable edge time of at least 1ns.

High signal to noise ratio



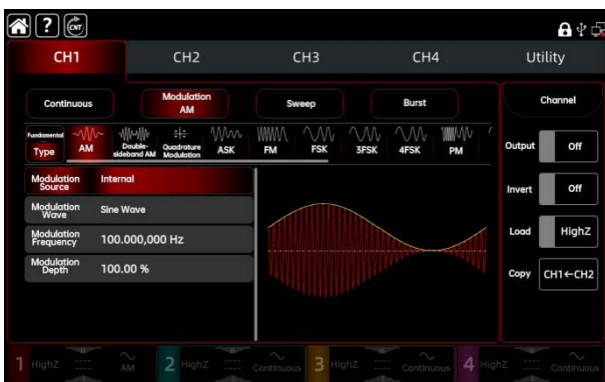
Configurable small AC signal superimposed on a large DC offset for lower output noise and higher SNR.

Pseudo random wave



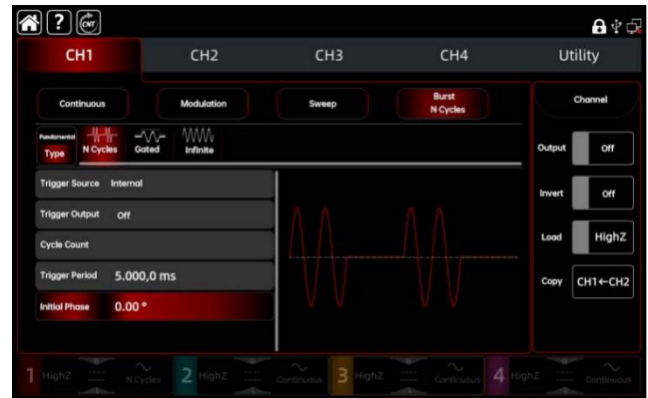
Supports multiple code formats with adjustable bit rate and Edge Time

Rich modulation features



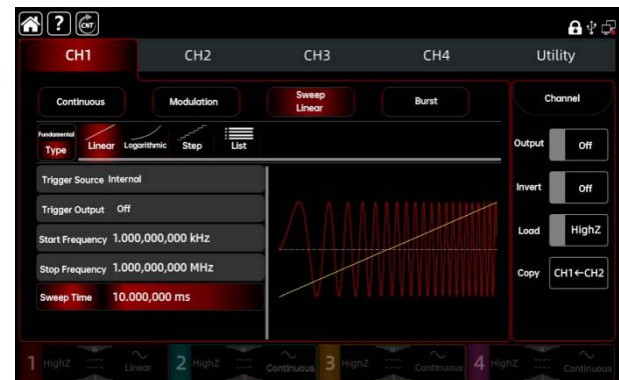
Supports 15 modulation types including AM, FM, PM, DSB-AM, ASK, FSK, PSK, 3FSK, 4FSK, BPSK, QPSK, OSK, SUM, QAM, and PWM.

Pulse string function



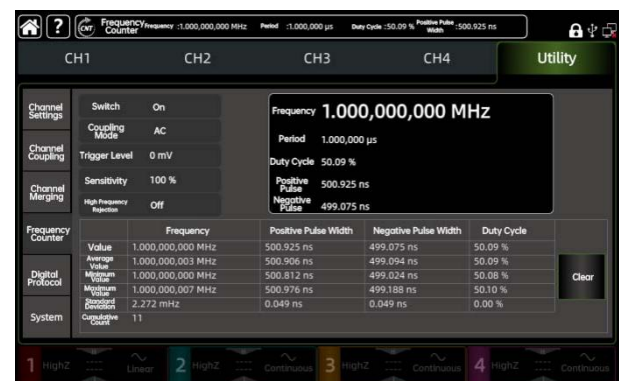
Supports three pulse train modes: "N-period", "infinite", and "gate-controlled". Three trigger sources: "internal", "external", and "manual".

Frequency sweep function



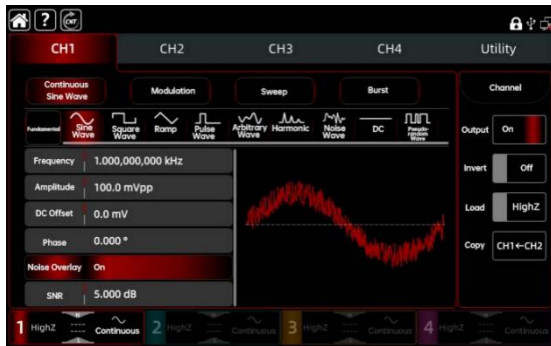
Supports four scan modes: linear, logarithmic, step, and list, with three trigger sources: internal, external, and manual.

Frequency Counter

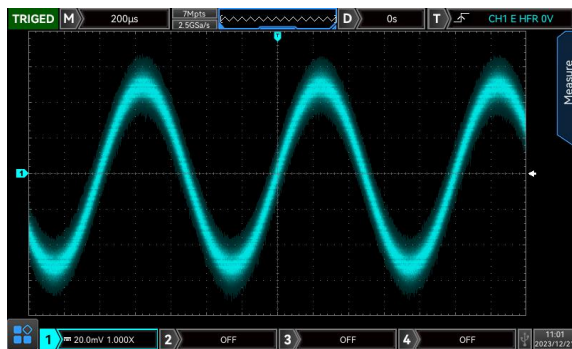


A high-precision hardware frequency counter with a measurement range of 100 mHz to 800 MHz.

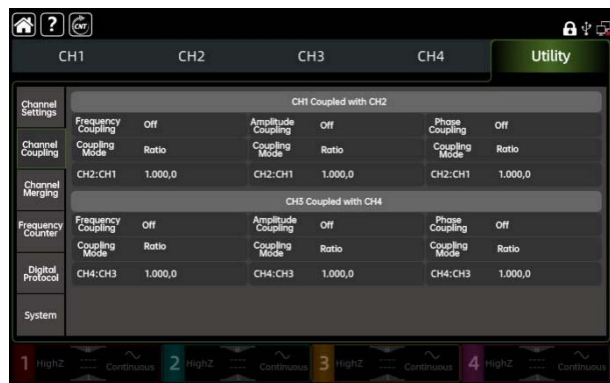
Adjustable signal to noise ratio



Enable noise superposition to adjust the signal-to-noise ratio (SNR) of the output. In communication industry R&D testing systems, it simulates performance under various SNR conditions to replicate real-world operating scenarios.

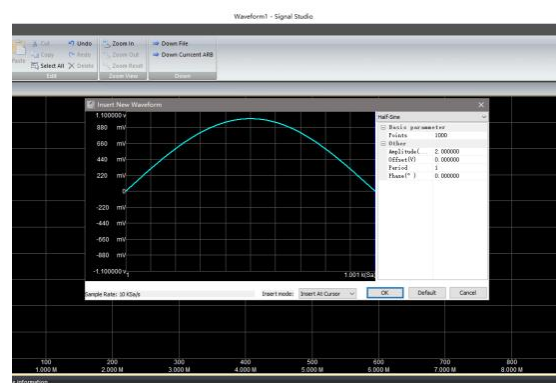


Channel Coupling



Channel coupling simplifies dual-channel operation. Both channels can be controlled with a single parameter for phase, amplitude, or frequency, making it easy to generate offset or proportional signals.

Arbitrary Waveform Editor



The arbitrary waveform editor offers multiple generation methods, including inserting standard waveforms or freely drawing to create custom waveforms.

Remote Control



It can connect to computers via standard USB and LAN interfaces, and supports Remote control. Users can perform remote operations using the corresponding control software. Control, automate testing, and monitor remotely

10.1-inch Capacitive Touch Display



10.1-inch HD touchscreen display for faster and more convenient instrument operation

Specifications

Definition and conditions:

- The “Specifications” section provides detailed descriptions of the product's warranted performance parameters. Unless otherwise specified, these specifications apply to the temperature range of 18° C to 28° C.
- "Typical values" refer to other product performance information not covered by the product warranty. When performance exceeds the technical specifications, 80% of units in The results are presented in the temperature range of 18° C to 28° C with a confidence level of 95%. Typical performance does not include measurement uncertainty.
- The term 'nominal value' refers to expected performance or product characteristics that are useful in product applications but not covered by the product warranty.
- The following conditions can meet its technical specifications:
The device is within the calibration cycle and has been preheated for at least 30 minutes. If the device is within the permitted storage temperature range but exceeds the permitted operating temperature range
If stored in a temperature range, the instrument must be placed in the permitted working temperature range for at least two hours before startup.

Basic Waveform Characteristics

Basic waveforms				
model	JHG9604T		JHG9504T	JHG9304T
channel	CH1 & CH2 (Main Channels) CH3 & CH4 (auxiliary channel)		CH1 & CH2 (Main Channels) CH3 & CH4 (auxiliary channel)	CH1 & CH2 (Main Channels) CH3 & CH4 (auxiliary channel)
maximum output frequency				
CH1 & CH2	600MHz		500MHz	350MHz
CH3 & CH4	200MHz		200MHz	160MHz
sampling rate				
CH1 & CH2	2.5GSa/s		2.5GSa/s	2.5GSa/s
CH3 & CH4	625MSa/s		625MSa/s	625MSa/s
Vertical Resolution				
CH1 & CH2	16-bit		14-bit	14-bit
CH3 & CH4	16-bit		16-bit	16-bit
Arbitrary Waveform Length				
CH1 & CH2	8pts~64Mpts		8pts~64Mpts	8pts~64Mpts
CH3 & CH4	8kpts		8kpts	8kpts
work pattern	Continuous, Modulation, Frequency Sweep, Pulse Sequence, Frequency Meter, Digital Protocol			
continuation	Sine wave, Square wave, Sine wave, Pulse wave, Harmonic, Noise, Pseudo-random sequence (PRBS), DC, Arbitrary waveform			
Modulation type	AM, FM, PM, DSB-AM, ASK, FSK, PSK, 3FSK, 4FSK, BPSK, QPSK, OSK, SUM, QAM, PWM — 15 types in total			
Sweep type	Linear, Logarithmic, List, Step			

pulse string type	N cycle, gated, infinite		
Number type	SPI、I2C、 UART		
hardware frequency meter	100mHz～800MHz		
Frequency Characteristics			
Frequency Resolution	1 μ Hz		
reference of basic frequency	Frequency: 10.0000MHz		
	Initial accuracy: ±0.5 ppm, 25° C		
	Temperature stability: ±0.5 ppm, 0° C～40° C		
	Aging rate: ±1 ppm, first year aging rate		
Sine Wave Characteristics			
model	JHG9604T	JHG9504T	JHG9304T
frequency			
CH1 & CH2	1 μ Hz～600MHz	1 μ Hz～500MHz	1 μ Hz～350MHz
CH3 & CH4	1 μ Hz～200MHz	1 μ Hz～200MHz	1 μ Hz～160MHz
frequency resolution	1 μ Hz		
Harmonic Distortion			
CH1 & CH2	≤10MHz（0dBm）， ≤-65dBc	≤10MHz（0dBm）， ≤-65dBc	≤10MHz（0dBm）， ≤-65dBc
	≤60MHz（0dBm）， ≤-60dBc	≤60MHz（0dBm）， ≤-60dBc	≤60MHz（0dBm）， ≤-60dBc
	≤150MHz（0dBm）， ≤-50dBc	≤150MHz（0dBm）， ≤-50dBc	≤150MHz（0dBm）， ≤-50dBc
	≤200MHz（0dBm）， ≤-40dBc	≤200MHz（0dBm）， ≤-40dBc	≤200MHz（0dBm）， ≤-40dBc
	≤600MHz（0dBm）， ≤-28dBc	≤500MHz（0dBm）， ≤-28dBc	≤350MHz（0dBm）， ≤-28dBc
CH3 & CH4	≤10MHz（0dBm）， ≤-65dBc	≤10MHz（0dBm）， ≤-65dBc	≤10MHz（0dBm）， ≤-65dBc
	≤60MHz（0dBm）， ≤-60dBc	≤60MHz（0dBm）， ≤-60dBc	≤60MHz（0dBm）， ≤-60dBc
	≤100MHz（0dBm）， ≤-55dBc	≤100MHz（0dBm）， ≤-55dBc	≤100MHz（0dBm）， ≤-55dBc
	≤200MHz（0dBm）， ≤-40dBc	≤200MHz（0dBm）， ≤-40dBc	≤160MHz（0dBm）， ≤-40dBc
Non-Harmonic Distortion	≤10MHz <-70dBc, typical value (0dBm)		
	>10MHz <-70dBc+6dB/ octave, typical value (0dBm)		
Total Harmonic Distortion (THD)	0.075 %（0 dBm, 10 Hz～20 kHz）		
Non-harmonic spurious			
CH1 & CH2	-60dBc（0dBm， ≤350MHz）	-60dBc（0dBm， ≤350MHz）	-60dBc（0dBm， ≤350MHz）
	-55dBc（0dBm， >350MHz）	-55dBc（0dBm， >350MHz）	-55dBc（0dBm， >350MHz）
CH3 & CH4	-60dBc（0dBm， ≤200MHz）	-60dBc（0dBm， ≤200MHz）	-60dBc（0dBm， ≤200MHz）
Flatness (Compared to a 1kHz sine wave, 1Vpp/50Ω)	≤100MHz， 0.2dB		
	≤350MHz， 0.4dB		
	≤600MHz， 0.8dB		

Noise Amplitude	Noise voltage $\leq 1V_{rms}$		
Phase	$-360.000^{\circ} \sim 360.000^{\circ}$		
phase noise	10 MHz: ≤ -125 dBc/Hz (typical value, 0 dBm, 10kHz offset)		
Square Wave Characteristics			
model	JHG9604T	JHG9504T	JHG9304T
frequency			
CH1 & CH2	1 μ Hz $\sim$ 200MHz	1 μ Hz $\sim$ 160MHz	1 μ Hz $\sim$ 120MHz
CH3 & CH4	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 50MHz
frequency resolution	1 μ Hz		
Rise/Fall Time	1 MHz, 1 Vpp, 50 Ω load		
CH1 & CH2	$<1.5ns$	$<2ns$	$<2ns$
CH3 & CH4	$<5ns$	$<5ns$	$<6ns$
Overshoot	$<2\%$ (1 MHz, 1 Vpp, 50 Ω load)		
Duty Cycle	0.000001% $\sim$ 99.999999%		
minimum pulse width			
CH1 & CH2	2.4ns (typical value)	2.4ns (typical value)	2.4ns (typical value)
CH3 & CH4	8.0ns (typical value)	8.0ns (typical value)	8.0ns (typical value)
Jitter	100 ps (1Vpp, 50 Ω load)		
Phase	$-360.000^{\circ} \sim 360.000^{\circ}$		
Noise Amplitude	Noise voltage $\leq 1V_{rms}$		
pulse wave characteristics			
model	JHG9604T	JHG9504T	JHG9304T
frequency			
CH1 & CH2	1 μ Hz $\sim$ 200MHz	1 μ Hz $\sim$ 160MHz	1 μ Hz $\sim$ 120MHz
CH3 & CH4	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 50MHz
frequency resolution	1 μ Hz		
Rise/Fall Time	1 MHz, 1 Vpp, 50 Ω load		
CH1 & CH2	1ns $\sim$ 10ks	1.5ns $\sim$ 10ks	1.5ns $\sim$ 10ks
CH3 & CH4	2ns $\sim$ 10ks	5ns $\sim$ 2ks	6ns $\sim$ 2ks
Overshoot	$<2\%$ (1 MHz, edge ≥ 2 ns, 1 Vpp, 50 Ω load)		
Duty Cycle	0.000001% $\sim$ 99.999999%		
minimum pulse width			
CH1 & CH2	2.4ns (typical value)	2.4ns (typical value)	2.4ns (typical value)
CH3 & CH4	8.0ns (typical value)	8.0ns (typical value)	8.0ns (typical value)
Jitter	100 ps (1Vpp, 50 Ω load)		
Phase	$-360.000^{\circ} \sim 360.000^{\circ}$		

Noise Amplitude	Noise voltage $\leq 1V_{rms}$
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Ramp Wave Characteristics

model	JHG9604T	JHG9504T	JHG9304T
frequency			
CH1 & CH2	1 μ Hz $\sim$ 30MHz	1 μ Hz $\sim$ 30MHz	1 μ Hz $\sim$ 20MHz
CH3 & CH4	1 μ Hz $\sim$ 10MHz	1 μ Hz $\sim$ 10MHz	1 μ Hz $\sim$ 8MHz
frequency resolution	1 μ Hz		
symmetry	0.00% $\sim$ 100.00%		
degree of linearity	<1%, (1kHz, 1Vpp, 50% symmetry)		
Phase	-360.000° $\sim$ 360.000°		
Noise Amplitude	Noise voltage $\leq 1V_{rms}$		

noise characteristic

model	JHG9604T	JHG9504T	JHG9304T
frequency			
CH1 & CH2	1mHz $\sim$ 600MHz	1mHz $\sim$ 500MHz	1mHz $\sim$ 350MHz
CH3 & CH4	1mHz $\sim$ 400MHz	1mHz $\sim$ 200MHz	1mHz $\sim$ 160MHz

arbitrary waveform characteristic

model	JHG9604T	JHG9504T	JHG9304T
sampling rate DDS			
CH1 & CH2	2.5GSa/s	2.5GSa/s	2.5GSa/s
CH3 & CH4	625MSa/s	625MSa/s	625MSa/s
Sampling rate per point			
CH1 & CH2	1 μ Sa/s $\sim$ 600MSa/s	1 μ Sa/s $\sim$ 500MSa/s	1 μ Sa/s $\sim$ 500MSa/s
CH3 & CH4	---	---	---
Frequency Range (DDS)			
CH1 & CH2	1 μ Hz $\sim$ 100MHz	1 μ Hz $\sim$ 100MHz	1 μ Hz $\sim$ 80MHz
CH3 & CH4	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 60MHz	1 μ Hz $\sim$ 50MHz
Waveform Length (pts)			
CH1 & CH2	8pts $\sim$ 64Mpts	8pts $\sim$ 64Mpts	8pts $\sim$ 64Mpts
CH3 & CH4	8 points (fixed)	8 points (fixed)	8 points (fixed)
Vertical Resolution			
CH1 & CH2	16-bit	14-bit	14-bit
CH3 & CH4	16-bit	16-bit	16-bit
Built-in Arbitrary Waveforms	More than 200		

minimum rise/fall time

	CH1 & CH2	<4ns, (50 Ω , 1Vpp)	<4ns, (50 Ω , 1Vpp)	<4ns, (50 Ω , 1Vpp)
	CH3 & CH4	<5ns, (50 Ω , 1Vpp)	<5ns, (50 Ω , 1Vpp)	<5ns, (50 Ω , 1Vpp)
Phase	-360.000° to 360.000° (DDS mode)			
Jitter	<150ps			
Noise Amplitude	Noise voltage ≤1Vrms			
PRBS characteristic				
model	JHG9604T		JHG9504T	JHG9304T
bit rate				
	CH1 & CH2	1 μ bps~120Mbps	1 μ bps~120Mbps	1 μ bps~80Mbps
	CH3 & CH4	1 μ bps~60Mbps	1 μ bps~60Mbps	1 μ bps~40Mbps
Edge Time				
	CH1 & CH2	2.6ns~1000s	2.6ns~1000s	2.6ns~1000s
	CH3 & CH4	4.2ns~1000s	4.2ns~1000s	4.2ns~1000s
code element	PN3、PN5、PN7、PN9、PN11、PN13、PN15、PN17、PN21、PN23、PN25、PN27、PN29、PN31、PN33			
Noise Amplitude	Noise voltage ≤1Vrms			
harmonic characteristics				
model	JHG9604T		JHG9504T	JHG9304T
frequency range				
	CH1 & CH2	1 μ Hz~300MHz	1 μ Hz~250MHz	1 μ Hz~175MHz
	CH3 & CH4	1 μ Hz~100MHz	1 μ Hz~100MHz	1 μ Hz~80MHz
harmonic number	1 to 16 times			
harmonic type	Odd, even, all, user-defined			
harmonic amplitude	1mV to 10Vpp (50 Ω load)			
	Set the amplitude based on the selected harmonic order			
harmonic phase	0.00° ~360.00°			
	Set the phase based on the selected harmonic order			

Output Characteristics

output characteristic			
model	JHG9604T	JHG9504T	JHG9304T
Output Impedance	50 Ω (typical value)		
Output range (high load resistance)			
CH1 & CH2			
≤40MHz	2mVpp~20Vpp	2mVpp~20Vpp	2mVpp~20Vpp

≤120MHz	2mVpp~10Vpp	2mVpp~10Vpp	2mVpp~10Vpp
≤160MHz	2mVpp~5Vpp	2mVpp~5Vpp	2mVpp~5Vpp
≤300MHz	2mVpp~4Vpp	2mVpp~4Vpp	2mVpp~4Vpp
≤400MHz	2mVpp~2.5Vpp	2mVpp~2.5Vpp	2mVpp~2.5Vpp
≤500MHz	2mVpp~1.5Vpp	2mVpp~1.5Vpp	---
≤600MHz	2mVpp~1Vpp	---	---
CH3 & CH4			
≤20MHz	2mVpp~20Vpp	2mVpp~20Vpp	2mVpp~20Vpp
≤80MHz	2mVpp~10Vpp	2mVpp~10Vpp	2mVpp~10Vpp
≤120MHz	2mVpp~5Vpp	2mVpp~5Vpp	2mVpp~5Vpp
≤200MHz	2mVpp~3Vpp	2mVpp~3Vpp	2mVpp~3Vpp
Output range (50 Ω load)			
CH1 & CH2			
≤40MHz	1mVpp~10Vpp	1mVpp~10Vpp	1mVpp~10Vpp
≤120MHz	1mVpp~5Vpp	1mVpp~5Vpp	1mVpp~5Vpp
≤160MHz	1mVpp~2.5Vpp	1mVpp~2.5Vpp	1mVpp~2.5Vpp
≤300MHz	1mVpp~2Vpp	1mVpp~2Vpp	1mVpp~2Vpp
≤400MHz	1mVpp~1.25Vpp	1mVpp~1.25Vpp	1mVpp~1.25Vpp
≤500MHz	1mVpp~0.75Vpp	1mVpp~0.75Vpp	---
≤600MHz	1mVpp~0.5Vpp	---	---
CH3 & CH4			
≤20MHz	1mVpp~10Vpp	1mVpp~10Vpp	1mVpp~10Vpp
≤80MHz	1mVpp~5Vpp	1mVpp~5Vpp	1mVpp~5Vpp
≤120MHz	1mVpp~2.5Vpp	1mVpp~2.5Vpp	1mVpp~2.5Vpp
≤200MHz	1mVpp~1.5Vpp	1mVpp~1.5Vpp	1mVpp~1.5Vpp
Amplitude	1kHz sine wave, 0V offset, >10mVpp		
Accuracy	±(1% of the amplitude setting value + 1 mVpp)		
DC offset range	50 Ω : ± (5VDC-Peak AC)		
	High resistance: ±(10VDC-Peak AC)		
DC offset accuracy	±1% of the bias setting value ± 0.5% of the amplitude setting value ± 2mV		

Modulation Characteristics

AM Modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
depth of modulation	0.00%～120.00%		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
DSB-AM Modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
depth of modulation	0.00%～100.00%		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
FM Modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
frequency deviation			
CH1 & CH2	DC～300MHz	DC～250MHz	DC～175MHz
CH3 & CH4	DC～100MHz	DC～100MHz	DC～80MHz
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
PM modulate			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, ramp wave, arbitrary wave		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
phase offset	0.00° ～360.00°		
modulating	1 μ Hz to 2MHz (internal modulation source)		

frequency			
ASK modulate			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal (50% Duty Cycle square wave) / External (TTL level)		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
FSK modulate			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal (50% Duty Cycle square wave) / External (TTL level)		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
jump frequency	Any frequency within the carrier signal range		
PSK modulate			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, ramp wave, arbitrary wave		
modulation source	Internal (50% Duty Cycle square wave) / External (TTL level)		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
phase hopping	0.00° ~360.00°		
3FSK modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal (50% Duty Cycle square wave)		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
Jump frequency 1	Any frequency within the carrier signal range		
Jump frequency 2	Any frequency within the carrier signal range		
4FSK modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave		
modulation source	Internal (50% Duty Cycle square wave)		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
Jump frequency 1	Any frequency within the carrier signal range		
Jump frequency 2	Any frequency within the carrier signal range		
Jump frequency 3	Any frequency within the carrier signal range		

BPSK modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, ramp wave, arbitrary wave		
code element	PN3、PN5、PN7、PN9、PN11、PN13、PN15、PN17、PN21、PN23、PN25、PN27、PN29、PN31、PN33		
bit rate	1 μ bps～2Mbps		
Phase 1	0.00° ～360.00°		
Phase 2	0.00° ～360.00°		
QPSK modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, ramp wave, arbitrary wave		
code element	PN3、PN5、PN7、PN9、PN11、PN13、PN15、PN17、PN21、PN23、PN25、PN27、PN29、PN31、PN33		
bit rate	1 μ bps～2Mbps		
Phase 1	0.00° ～360.00°		
Phase 2	0.00° ～360.00°		
Phase 3	0.00° ～360.00°		
Phase 4	0.00° ～360.00°		
OSK modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	sinusoidal wave		
trigger source	Internal/External		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
shock time	1ns～500ks		
SUM modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave, harmonic, noise		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
depth of modulation	0.00%～100.00%		
QAM Modulation			
model	JHG9604T	JHG9504T	JHG9304T
constellation mapping	QAM4、QAM8、QAM16、QAM32、QAM64、QAM128、QAM256		
code element	PN3、PN5、PN7、PN9、PN11、PN13、PN15、PN17、PN21、PN23、PN25、PN27、PN29、PN31、		

	PN33		
modulation rate	1 μ bps∼2Mbps		
PWM modulation			
model	JHG9604T	JHG9504T	JHG9304T
carrier type	impulse wave		
modulation source	Internal/External		
modulated wave type	Sine wave, square wave, rising ramp, falling ramp, noise, arbitrary wave		
modulating frequency	1 μ Hz to 2MHz (internal modulation source)		
pulse width deviation	0.000000%∼49.999999%		

Sweep

Linear Sweep					
model		JHG9604T		JHG9504T	JHG9304T
trigger source		Internal, external rising edge, external falling edge, manual			
Trigger output		Close, rising edge, falling edge			
initial frequency					
CH1 & CH2		1 μ Hz～600MHz		1 μ Hz～500MHz	1 μ Hz～350MHz
CH3 & CH4		1 μ Hz～200MHz		1 μ Hz～200MHz	1 μ Hz～160MHz
Stop frequency					
CH1 & CH2		1 μ Hz～600MHz		1 μ Hz～500MHz	1 μ Hz～350MHz
CH3 & CH4		1 μ Hz～200MHz		1 μ Hz～200MHz	1 μ Hz～160MHz
frequency sweep time		1ms～500s			
Logarithmic Sweep					
model		JHG9604T		JHG9504T	JHG9304T
trigger source		Internal, external rising edge, external falling edge, manual			
Trigger output		Close, rising edge, falling edge			
initial frequency					
CH1 & CH2		1 μ Hz～600MHz		1 μ Hz～500MHz	1 μ Hz～350MHz
CH3 & CH4		1 μ Hz～200MHz		1 μ Hz～200MHz	1 μ Hz～160MHz
Stop frequency					
CH1 & CH2		1 μ Hz～600MHz		1 μ Hz～500MHz	1 μ Hz～350MHz
CH3 & CH4		1 μ Hz～200MHz		1 μ Hz～200MHz	1 μ Hz～160MHz

frequency sweep time	1ms~500s		
Step Sweep			
model	JHG9604T	JHG9504T	JHG9304T
trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
initial frequency			
CH1 & CH2	1 μ Hz~600MHz	1 μ Hz~500MHz	1 μ Hz~350MHz
CH3 & CH4	1 μ Hz~200MHz	1 μ Hz~200MHz	1 μ Hz~160MHz
Stop frequency			
CH1 & CH2	1 μ Hz~600MHz	1 μ Hz~500MHz	1 μ Hz~350MHz
CH3 & CH4	1 μ Hz~200MHz	1 μ Hz~200MHz	1 μ Hz~160MHz
residence time	1ms~500s		
step number	2 to 2048 steps		
List Sweep			
model	JHG9604T	JHG9504T	JHG9304T
trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
initial frequency			
CH1 & CH2	1 μ Hz~600MHz	1 μ Hz~500MHz	1 μ Hz~350MHz
CH3 & CH4	1 μ Hz~200MHz	1 μ Hz~200MHz	1 μ Hz~160MHz
Stop frequency			
CH1 & CH2	1 μ Hz~600MHz	1 μ Hz~500MHz	1 μ Hz~350MHz
CH3 & CH4	1 μ Hz~200MHz	1 μ Hz~200MHz	1 μ Hz~160MHz
residence time	1ms~500s		
listing file	A single file can contain up to 2048 frequency points		

Burst

N-Cycle Burst	
wave form	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave
trigger source	Internal, external rising edge, external falling edge, manual
Trigger output	Close, rising edge, falling edge
trigger period	1 μ s~500s
recurring number	1 to 50,000
initial phase	0.00° ~360.00°

Gated Burst

wave form	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave, noise
polarity	Positive and negative (TTL level input)
initial phase	0.00° ~ 360.00°

Infinite Burst

wave form	Sine wave, square wave, pulse wave, ramp wave, arbitrary wave
trigger source	Internal, external rising edge, external falling edge, manual
Trigger output	Close, rising edge, falling edge
initial phase	0.00° ~ 360.00°

Auxiliary Functions

Frequency Counter			
Measure parameters	Frequency, period, Duty Cycle, positive pulse width, negative pulse width		
accuracy	± 5ppm		
frequency resolution	8-bit		
frequency range	100mHz~800MHz	100mHz~60MHz	≥ 100mVrms
		60MHz~300MHz	≥ 200mVrms
		300MHz~500MHz	≥ 500mVrms
		500MHz~800MHz	≥ 1Vrms
coupled mode	AC Coupling, DC Coupling, HF Reject		
trigger level	-2.5V~2.5V		
sensitivity	0%~100%		
digital protocol	SPI characteristic		
interface	CH2 - SCLK、CH3 - nCS、CH4 - MOSI		
range	1mV~10V		
clock frequency	1Hz~50MHz		
transmit mode	Auto, Manual		
interval	20ns to 1000s, automatic mode		
data format	Hexadecimal, character		
Buffer Depth	Maximum 2048 bytes		
digital protocol	I2C features		
interface	CH3 - SCL、CH4 - SDA		
range	1mV~10V		
clock frequency	1Hz~50MHz		
address	7-digit, 10-digit		
transmit mode	Auto, Manual		
interval	20ns to 1000s, automatic mode		
data format	Hexadecimal, character		
Buffer Depth	Maximum 2048 bytes		
digital protocol	UART characteristic		
interface	CH4 - TX		
range	1mV~10V		
Baud rate	1~1,000,000 (customized by users)		
data bit	4、5、6、7、8		
stop bit	1st and 2nd		

check bit	No parity, odd parity, even parity		
transmit mode	Auto, Manual		
interval	20ns to 1000s, automatic mode		
data format	Hexadecimal, character		
Buffer Depth	Maximum 2048 bytes		
channel	Couple & Merge		
model	JHG9604T	JHG9504T	JHG9304T
frequency coupled ratio			
All channels	0.0001~10000		
frequency coupling deviation			
CH1 & CH2	-600MHz ~ 600MHz	-500MHz ~ 500MHz	-350MHz ~ 350MHz
CH3 & CH4	-200MHz ~ 200MHz	-200MHz ~ 200MHz	-160MHz ~ 160MHz
phase coupling	scale	0.0001~10000	
	Deviat ion	-720° ~ 720°	
amplitude coupling	scale	0.0001~10000	
	Deviat ion	-9.999Vpp~9.999Vpp (50 Ω)	
channel merging	Merge CH1 with CH2, CH3 with CH4		

Interfaces and Display

Communication Interfaces

standard configuration USB Host, USB Device, LAN

synchronous signal output

level range TTL compatible

output frequency ≤60MHz, CH3 is synchronized with CH1, CH4 is synchronized with CH2, CH3 and CH4
have no synchronization function

Output Impedance 50 Ω (typical value)

external modulation input

incoming frequency <50kHz

depth of modulation ± 5Vpk = 100%

input impedance 5k Ω (typical value)

external reference input

incoming frequency 10MHz±50Hz

level range	TTL compatible
input impedance	10k Ω (typical value, DC coupled)
locking time	< 1s
internal reference output	
output frequency	10MHz
level range	TTL compatible
Output Impedance	50 Ω (typical value, DC coupled)
Trigger input	
level range	TTL compatible
gradient	Up or down
pulse length	> 100ns
input impedance	10k Ω (typical value, DC coupled)
response time	<1 μ s (typical value)
Trigger output	
maximun-frequency	1MHz
output level	TTL compatible
pulse length	>400ns (typical value)
Output Impedance	50 Ω (typical value)
show	
type	10.1-inch TFT capacitive touch
Frequency Resolution	1280*800

General Specifications

source	
supply voltage	100~240VAC (fluctuation: $\pm 10\%$), 50Hz/60Hz; 100~120VAC (fluctuation: $\pm 10\%$), 400 Hz
power consumption	Less than 100W
fuse	2.5A, T class, 250V
environment	
temperature range	Operation: +10°C ~ +40°C Non-operational: -20°C to +60°C
cooling means	forced cooling by fan
Humidity range	Below +35° C: Relative humidity $\leq 90\%$

+35℃～+40℃:≤60% relative humidity

above sea level	Operation below 2,000 meters
	Do not operate below 15,000 meters
class of pollution	2
service environment	Indoor use

Mechanical Specifications

size	370mm×115mm×185mm (width×height×depth)
weight	4.04kg
Calibration Interval	The recommended calibration interval is one year

Regulatory standards

electromagnetic compatibility	Complies with the EMC Directive (2014/30/EU) and meets or exceeds the standards of IEC 61326-1:2021/EN61326-1:2021 and IEC 61326-2-1:2021/EN61326-2-1:2021.	
conduction disturbance	CISPR 11/EN 55011	CLASS B group 1, 150kHz-30MHz
radiation disturbance	CISPR 11/EN 55011	CLASS B group 1, 30MHz-1GHz
electrostatic discharge	IEC 61000-4-2/EN 61000-4-2	4.0 kV (contact), 8.0 kV (air)
Radio frequency electromagnetic field immunity	IEC 61000-4-3/EN 61000-4-3	0V/m (80 MHz to 1 GHz) ; 3V/m (1.4 GHz to 2 GHz) ; 1V/m (2.0 GHz to 2.7GHz)
electric fast transient pulse train	IEC 61000-4-4/EN 61000-4-4	2kV (AC input port)
surge	IEC 61000-4-5/EN 61000-4-5	1kV (hot wire to neutral wire) 2kV (hot/neutral to ground)
Radio frequency continuous conduction immunity	IEC 61000-4-6/EN 61000-4-6	3V,0.15-80MHz
Voltage Sags and Short Term Outages	IEC 61000-4-11/EN 61000-4-11	voltage dip : 0% UT during 1 cycle; 40% UT during 10/12 cycles; 70% UT during 25/30 cycles Short interruption: 0% UT during 250/300 cycles

Safety Standards

EN 61010-1:2010+A1:2019
EN IEC61010-2-030:2021+A11:2021
BS EN61010-1:2010+A1:2019
BS EN IEC61010-2-030:2021+A11:2021
UL 61010-1:2012 Ed.3+ R:19 Jul2019
UL 61010-2-030:2018 Ed.2
CSA C22.2#61010-1:2012 Ed.3+U1;U2;A1
CSA C22.2#61010-2-030:2018 Ed.2

Ordering Information and Warranty

Order Information

	description	Order Code
model	Maximum output frequency: 600MHz	JHG9604T
	Maximum output frequency: 500MHz	JHG9504T
	Maximum output frequency: 350MHz	JHG9304T
Standard Accessories	Power cord compliant with local standards x1	
	USB cable x1	UT-D14
	BNC-BNC straight-through line x4	UT-L45

Note: All hosts, accessories, and optional items should be ordered from your local KTB dealer.

Warranty Period

The host comes with a 1-year warranty, excluding cables and accessories.