



Hantek

HDG3000B series

Arbitrary waveform signal generator

Data Manual

2022.05

Warranties and Declarations

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Product certification

Hantek certified HDG3000B series arbitrary waveform signal generator to meet China's national industry standards and has passed the CE certification.

Contact us

If you have any questions when using the products of Qingdao Hantek Electronic Co., LTD., you can obtain service and support through the following ways:

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1 **Product features**

Product features

- Frequency range: 1μHz ~ 100MHz/80MHz/60MHz/40MHz/25MHz;
- Sampling rate up to 250MSa/s, 16 bits vertical resolution to ensure the accuracy of waveform amplitude;
- Double channels with equal performance, equivalent to two independent signal sources;
- Storage depth up to 2M to create more waveform cycles as well as the better waveform details;
- Rich modulation functions, supporting for AM, DSB - AM, FM, PM, ASK, FSK and PSK, BPSK, QPSK, 3 FSK, 4 FSK, OSK and PWM, etc.;
- There are more than 160 arbitrary signals such as exponential rise, exponential fall, ECG signal, Gaussian, half orthogonality, Lorentz, dual tone multi-frequency, DC voltage, etc.
- 4.3-inch color TFT LCD screen, clear and intuitive user interface;
- Built-in high resolution 80MHz frequency meter;
- Standard communication interface: front USB Host and rear USB Device;
- Built-in harmonic generator function with 16 harmonic frequency, output harmonic with a specified number of times, amplitude and phase, usually used in harmonic detection equipment or the testing of harmonic filtering equipment.

HDG3000B has 5 functions, that are arbitrary waveform generator, pulse generator, function generator, harmonic generator, frequency meter all in one; Using DDS (direct digital frequency synthesis) technology, which can generate stable, pure and low distortion output signal; User-friendly interface design and keyboard layout bring users extraordinary experience; Rich configuration interfaces can easily realize computer control, providing more solutions to user measurement.

2 Technical indicators

All technical specifications are applicable to HDG3000B series signal generators.
Unless otherwise stated, all technical specifications are guaranteed when the following two conditions hold.

- The signal generator is within the calibration period.
- The signal generator has been operated continuously for more than 30 minutes at the specified operating temperature (18°C to 28°C).

All specifications are guaranteed except those marked with "typical".

Overview of HDG3000B technical specifications

Model	HDG3102B	HDG3082B	HDG3062B	HDG3042B	HDG3022B	HDG3012B
Channel	Two channels					
Wavelength 2M						
Frequency range	100MHz	80MHz	60MHz	40MHz	25MHz	15MHz
Sampling rate	250MSa/s					
Voltage resolution	16Bit					

Waveform

Standard waveform output	Sine wave, square wave, triangle wave, pulse wave, noise, harmonic wave, DC
Arbitrary waveform output	160 arbitrary waveforms, including exponential rise, exponential fall, ECG signal, Gaussian, half vector, Lorentz, dual tone multiple frequency, etc

Frequency properties

Sine wave	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	100MHz	80MHz	60MHz	40MHz	25MHz	15MHz

Square wave	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	15MHz	15MHz	15MHz	15MHz	15MHz	15MHz

Pulse wave	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	15MHz	15MHz	15MHz	15MHz	15MHz	15MHz

Triangle wave	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	2MHz	2MHz	2MHz	2MHz	2MHz	2MHz

Harmonic	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	50MHz	40MHz	30MHz	20MHz	10MHz	5MHz

Noise 100MHz bandwidth

(-3dB)

Arbitrary wave	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
	20MHz	20MHz	20MHz	15MHz	15MHz	15MHz

Resolution 1μHz

Precision ±1ppm, 18~28℃

Square properties

Rise/fall time Typical (1KHz, 1Vpp) ≥9ns

Overshoot Typical (100KHz, 1Vpp) ≤5%

Duty ratio 0.001% ~ 99.999%; The range varies with frequency.

Asymmetry 1% period +4ns

Triangle wave properties

Linear $\leq 1\%$ peak output (typical, 1KHz, 1Vpp, 100% symmetry)

Symmetry 0% ~ 100%

Pulse wave properties

Cycle 67ns~1Ms 67ns~1Ms 67ns~1Ms 67ns~1Ms 67ns~1Ms 67ns~1Ms

Pulse width $\geq 16\text{ns}$ (limited by current frequency settings)

Duty ratio 0.001%-99.999%(limited by current frequency settings)

Rise/fall time $\geq 9\text{ns}$ (limited by current frequency settings and pulse width settings)

Overshoot Typical (1KHz, 1Vpp) $\leq 5\%$

Arbitrary wave properties

Wavelength 2M

Vertical resolution 16 Bits

Sampling rate 1uSa/s ~ 75MSa/s, 1uSa/s resolution

Rise/fall time $\geq 9\text{ns}$

Overshoot Typical (1Vpp) $\leq 5\%$

Harmonic properties

Harmonic frequency ≤ 16

Harmonic type Even harmonic, odd harmonic, all harmonics

Harmonic amplitude Each harmonic amplitude can be set.

Harmonic phase Each harmonic amplitude can be set.

Amplitude properties (50 Ω terminations)

Amplitude range	$\leq 10\text{MHz}$: 1mVpp ~ 10Vpp; $\leq 40\text{MHz}$: 1mVpp ~ 5.5Vpp; $\leq 60\text{MHz}$: 1mVpp ~ 4Vpp; $\leq 80\text{MHz}$: 1mVpp ~ 2Vpp; $\leq 100\text{MHz}$: 1mVpp ~ 1.5Vpp;
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Precision	Typical (1KHz sine wave, 0V offset, >10mVpp) $\pm 1\%$ set value $\pm 5\text{mVpp}$
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Amplitude flatness	$\leq 5\text{MHz}$: $\pm 0.1\text{dB}$;
(3.5Vpp, 50 Ω relative to 1kHz sine wave)	$\leq 15\text{MHz}$: $\pm 0.2\text{dB}$; $\leq 25\text{MHz}$: $\pm 0.3\text{dB}$; $\leq 40\text{MHz}$: $\pm 0.5\text{dB}$; $\leq 60\text{MHz}$: $\pm 1.0\text{dB}$;

Unit	Vpp, mVpp, Vrms, dBm(50 Ω impedance)
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Resolution	1mVpp
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Offset properties (50 Ω terminations)

Range	$\pm 5\text{Vpkac+dc}$
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Precision	$\pm(1\%$ set value + 5mV + 1% amplitude)
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Waveform output

Impedance	50 Ω
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Modulation properties

Modulation type	AM, DSB-AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK, PWM
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AM

Carrier wave	Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)
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Modulation source	Internal, external, other channels
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Modulation wave	Sine wave, square wave, triangle wave, Noise, sampled wave, EXP drop, half positive vector, Lorentz, dual audio, Gaussian, ECG
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Modulation frequency	2mHz~1MHz
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Modulation depth	0% ~ 120%
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DSB-AM

Carrier wave	Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)
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Modulation source	Internal, external, other channels
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Modulation wave	Sine wave, square wave, triangle wave, Noise, sampled wave, EXP drop, half positive vector, Lorentz, dual audio, Gaussian, ECG
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Modulation frequency	2mHz~1MHz
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Modulation depth	0% ~ 120%
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FM

Carrier	Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)
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Modulation source Internal, external, other channels

Modulation wave Sine wave, square wave, triangle wave, Noise, sampled wave, EXP drop, half positive vector, Lorentz, dual audio, Gaussian, ECG

Modulation frequency 2mHz~1MHz

PM

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source Internal, external, other channels

Modulation wave Sine wave, square wave, triangle wave, Noise, sampled wave, EXP drop, half positive vector, Lorentz, dual audio, Gaussian, ECG

Modulation frequency 2mHz~1MHz

Phase deviation $0^{\circ} \sim 360^{\circ}$

ASK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source Internal, external

Modulation wave A square wave with 50% duty cycle

Modulation frequency 2mHz~1MHz

FSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source Internal, external

Modulation wave A square wave with 50% duty cycle

Modulation frequency 2mHz~1MHz

PSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source Internal, external

Modulation wave A square wave with 50% duty cycle

Modulation frequency 2mHz~1MHz

BPSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation data source PN15 code, PN21 code, 01 code, 10 code

Modulation frequency 2mHz~1MHz

QPSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation data source PN15 code, PN21 code

Modulation frequency 2mHz~1MHz

3FSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source internal

Modulation wave A square wave with 50% duty cycle

Modulation frequency 2mHz~1MHz

4FSK

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Modulation source internal

Modulation wave A square wave with 50% duty cycle

Modulation 2mHz~1MHz

frequency

OSK

Carrier Sine wave

Modulation source Internal, external

Shock time 8 ns - 4.99975 ms

Modulation frequency 2mHz~1MHz

PWM

Carrier Square wave

Modulation source Internal, external, other channels

Modulation wave Sine wave, square wave, triangle wave, Noise, sampled wave, EXP drop, half positive vector, Lorentz, dual audio, Gaussian, ECG

Modulation frequency 2mHz~50KHz

Duty cycle deviation 0.1% ~ 49.9%

External modulation input

Input range AM, DSB-AM, FM, PM, OSK, PWM: 75mVRMS ~ ±5Vac+dc

ASK, FSK, PSK: TTL level

Input bandwidth 50KHz

Input impedance $10^{12}\Omega$

Sweep frequency properties

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Type Linear

Direction Upward

Sweep frequency time 1ms ~ 50Ks

Hold/return time 1ms ~ 50Ks

Trigger source Internal, external, manual

Tag Sync the model's falling edge

Burst properties

Carrier Sine wave, square wave, triangle wave, pulse wave, harmonic wave, arbitrary wave (except DC)

Carrier	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~	1μHz~
frequency	100MHz	80MHz	60MHz	40MHz	25MHz	15MHz

Burst 1 ~ 2000 000 000

counting

Start/stop 0 ° ~ 360 °

phase

Internal 2μs ~ 500s

cycle

Gate External trigger

control

source

Trigger Internal, external, manual

source

Counter

Measurement Frequency, period, positive/negative pulse width, duty cycle

functions

Frequency 1μHz~80MHz

Gate time 10ms~16s

Input signal range 0 ~ 3.3 V

Trigger properties

Trigger input

level TTL - compatible

Slope Rise or fall (optional)

Pulse width >100ns

Trigger output

Level TTL - compatible

Pulse width >60ns

Maximum frequency 1MHz

Reference clock

External reference input

Lock range 10MHz $\pm$ 50Hz

Level Low: 0~400mV, high: 2.5V~ 5V

Locking time <2s

Input impedance 50 Ω , DC coupling

Internal reference output

Frequency 10MHz $\pm$ 50Hz

Level 3.3 Vpp

Output impedance (typical value) 50 Ω , DC coupling

Synchronous output

Level TTL - compatible

Impedance 50 Ω , nominal value

General features

Interface USB Host, USB Device

Display 4.3-inch color TFT LCD

Voltage 100-120VACRMS($\pm$ 10%), 45Hz to 440Hz, CAT II

120-240VACRMS($\pm 10\%$), 45Hz to 66Hz, CAT II

Power <30W

Fuse T, 0.5A, 250V, 5x20mm

Environment

Temperature range When operating: 0°C ~ 45°C

When not operating: -20 °C ~ 60 °C

Humidity range $\leq +104^{\circ}\text{F}$ ($\leq +40^{\circ}\text{C}$): relative humidity $\leq 90\%$

106°F~122°F (+41°C ~50°C): relative humidity $\leq 60\%$

Altitude When operating: Below 3,000 meters

When not operating: Below 15,000 meters

Mechanical specifications

Dimensions (width x height x depth) 265 x 110 x 310mm

Weight 2.5 KG

3 Order information and warranty period

Order information

Order information	Order no.
Host machine model	
100MHz, 2-channel signal generator	HDG3102B
80MHz, 2-channel signal generator	HDG3082B
60MHz, 2-channel signal generator	HDG3062B
40MHz, 2-channel signal generator	HDG3042B
25MHz, 2-channel signal generator	HDG3022B
15MHz, 2-channel signal generator	HDG3012B
Standard accessories	
A power cord that meets the standard of the host country	--
BNC to BNC	HT322
Alligator clip wires (2)	HT324
USB cable	--

Warranty period

The host machine is guaranteed for 3 years, excluding the probe and accessories.



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