



**Hantek**



**HDG3000C** series

Arbitrary waveform signal generator

Data Manual

2022.05

## **Warranties and Declarations**

### **Copyright**

The copyright of this document belongs to Qingdao Hantek Electronic Co., LTD.

### **Statement**

Qingdao Hantek Electronic Co., Ltd. reserves the right to amend this document without prior notice. Qingdao Hantek Electronic Co., Ltd. promises that the information provided is correct and reliable but does not guarantee that this document is free from errors. Before using this product, please make sure that the specifications of relevant technical documents are the latest effective version. If you use documents or products of Qingdao Hantek Electronic Co., LTD and need products, patents or works of third parties to cooperate with them, you shall be responsible for obtaining the consent and authorization of the third parties. The above consent and authorization shall not be the liability of Hantek.

### **Product certification**

Hantek certified HDG3000C 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:

Email: [service@hantek.com](mailto:service@hantek.com), [support@hantek.com](mailto:support@hantek.com)

Website: <http://www.hantek.com>

# 1 Product features

## Product features

- Frequency range(CH1/CH2):  
1 $\mu$ Hz ~ 100MHz/80MHz/60MHz/40MHz/25MHz; CH3: 1 $\mu$ Hz ~ 20MHz;
- 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; CH3 fixed output;
- 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.

---

HDG3000C 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 HDG3000C 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 HDG3000C technical specifications

Model	HDG3103C	HDG3083C	HDG3063C	HDG3043C	HDG3023C
Channel	Three channels				
Wavelength	2M				
Frequency range	100M	80M	60M	40M	25M
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~100MHz	1μHz~80MHz	1μHz~60MHz	1μHz~40MHz	1μHz~25MHz
-----------	-------------	------------	------------	------------	------------

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

wave

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

wave

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

wave

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

Noise 100 MHz bandwidth

(-3 dB)

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

wave

Resolution 1μHz

Precision ±1ppm, 18~28°C

**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 ≤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

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

Duty ratio 0.001% to 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 16 Bits

resolution

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

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

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

**Harmonic properties**

Harmonic  $\leq 16$

frequency

Harmonic Even harmonic, odd harmonic, all harmonics

type

Harmonic Each harmonic amplitude can be set.

amplitude

Harmonic Each harmonic amplitude can be set.

phase

**Amplitude properties (50Ω 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;
-----------------	---

Precision	Typical (1KHz sine wave, 0V offset, >10mVpp) $\pm 1\%$ set value $\pm 5\text{mVpp}$
-----------	--

Amplitude flatness	$\leq 5\text{MHz}$ : $\pm 0.1\text{dB}$ ;
(3.5Vpp, 50 $\Omega$ 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 $\Omega$ impedance)
------	---

Resolution	1mVpp
------------	-------

#### Offset properties (50 $\Omega$ terminations)

Range	$\pm 5\text{Vpkac+dc}$
-------	------------------------

Precision	$\pm(1\%$ set value + 5mV + 1% amplitude)
-----------	---

#### Waveform output

Impedance	50 $\Omega$
-----------	-------------

#### Modulation properties

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

**AM**

Carrier wave 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

Modulation depth 0% ~ 120%

**DSB-AM**

Carrier wave 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



Modulation 0% ~ 120%

depth

## FM

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

Modulation Internal, external, other channels

source

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

Modulation 2mHz~1MHz

frequency

## PM

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

Modulation Internal, external, other channels

source

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

Modulation 2mHz~1MHz

frequency

Phase deviation 0 ° ~ 360 °

**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 Internal, external

source

Modulation A square wave with 50% duty cycle

wave

Modulation 2mHz~1MHz

frequency

### BPSK

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

Modulation PN15 code, PN21 code, 01 code, 10 code

data source

Modulation 2mHz~1MHz

frequency

### QPSK

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

Modulation PN15 code, PN21 code

data source

Modulation 2mHz~1MHz

frequency

**3FSK**

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

Modulation internal

source

Modulation A square wave with 50% duty cycle

wave

Modulation 2mHz~1MHz

frequency

**4FSK**

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

Modulation internal

source

Modulation A square wave with 50% duty cycle

wave

Modulation 2mHz~1MHz

frequency

**OSK**

Carrier Sine wave

Modulation Internal, external

source

Shock time 8 ns - 4.99975 ms

Modulation 2mHz~1MHz

frequency

## PWM

Carrier Square wave

Modulation Internal, external, other channels

source

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

Modulation 2mHz~50KHz

frequency

Duty cycle 0.1% ~ 49.9%

deviation

## External modulation input

Input range AM, DSB-AM, FM, PM, OSK, PWM: 75mVRMS ~ ±5Vac+dc  
ASK, FSK, PSK: TTL level

Input 50KHz

bandwidth

Input  $10^{12}\Omega$

impedance

Sweep frequency properties

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

Type Linear

Direction Upward

Sweep frequency 1ms ~ 50Ks

time

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 1 $\mu$ Hz~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 1MHz

frequency

### Reference clock

External reference input

Lock range 10MHz ± 50Hz

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

Locking time <2s

Input impedance 50 Ω, DC coupling

Internal reference output

Frequency 10MHz ± 50Hz

Level 3.3 Vpp

Output impedance 50 Ω, DC coupling

(typical value)

Synchronous output

Level TTL - compatible

Impedance 50 Ω, nominal value

CH3 output

Standard Sine wave, square wave, triangle wave, noise, harmonic wave, DC waveform output

Arbitrary 160 kinds of arbitrary waveforms, including exponential rise, waveform output exponential fall, ECG signal, Gaussian, half normal vector, Lorentz, double tone multiple frequency, etc.

Frequency Sine wave: 1μHz~20MHz  
 Square wave: 1μHz~5MHz  
 Triangle wave: 1μHz~1MHz



	Harmonic wave: 1μHz~5MHz
	Arbitrary wave: 1μHz~15MHz
Frequency accuracy	±1ppm, 18~28°C
Sampling rate	125MSa/s
Data length	8K
Vertical resolution	12bit
Amplitude	2mVpp~7Vpp (high resistance)
Output impedance	50Ω

#### General features

Interface	USB Host, USB Device
Display	4.3-inch color TFT LCD
Voltage	100-120VACRMS(±10%), 45Hz to 440Hz, CAT II 120-240VACRMS(±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	≤+104°F(≤+40°C): relative humidity≤90% 106°F~122°F (+41°C ~50°C): relative humidity≤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.
<b>Host machine model</b>	
100MHz, 3-channel signal generator	HDG3103C
80MHz, 3-channel signal generator	HDG3083C
60MHz, 3-channel signal generator	HDG3063C
40MHz, 3-channel signal generator	HDG3043C
25MHz, 3-channel signal generator	HDG3023C
<b>Standard accessories</b>	
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.



---

Addr: #35 Building, No. 780 Baoyuan Road, High-tech Zone, Qingdao, Shandong, China 266114

Switchboard: 400-036-7077

Email: [service@hantek.com](mailto:service@hantek.com)

Tel: (0086)532-55678770 & 55678772 & 55678773

Zip code: 266114

Website: [www.hantek.com](http://www.hantek.com)

Qingdao Hantek Electronic Co., LTD