

Arbitrary/Function Waveform Generator

2 Channels, 15/25/40/60/80/100MHz Max. Sine Output Frequency

HDG3000B Series



Accessories



Features

- 4.3-inch TFT color LCD.
- 15/25/40/60/80/100 MHz sine wave frequency.
- Frequency sweep and burst capability.
- Two channels with the same performance.
- Built in 7 digit/second high resolution 80MHz frequency counter.
- Built-in high-order harmonic generator (at most 16-order harmonics).
- Arbitrary waveform generator with 16 bits resolution, 2M waveform length.
- Built-in more than 160 arbitrary waveforms, including exponential rise, exponential fall, ECG, gauss, haversine, Lorentz, dual-tone, DC etc.
- Support AM, DSB-AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK and PWM modulations.

Specification

Model	HDG3102B	HDG3082B	HDG3062B	HDG3042B	HDG3022B	HDG3012B
Channel	2					
Max. Frequency	100MHz					
Frequency Resolution	1 μ Hz					
Internal Frequency Reference Accuracy	\pm 1ppm, 18 to 28 $^{\circ}$ C Add 1ppm/ $^{\circ}$ C average for operation outside the range of 18 $^{\circ}$ to 28 $^{\circ}$ C					

Waveforms

Standard	Sine, Square, Triangle, Pulse, Noise, Harmonic
Built-in Arbitrary	160 types of arbitrary waveforms, including Exponential rise, Exponential fall, ECG, Gauss, Haversine, Lorentz, Dual-tone, DC, etc.

Operating Mode

Operating Mode	Continuous, Modulate, Sweep, Burst
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Amplitude Characteristics

Amplitude Range in 50 Ω	1mVpp to 10Vpp (\leq 10MHz) 1mVpp to 5.5Vpp (\leq 55MHz) 1mVpp to 3.5Vpp (\leq 80MHz) 1mVpp to 2Vpp (\leq 100MHz)
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Amplitude Accuracy (at 1kHz Sine, 0V offset, >10mVpp)	±1% of setting ±5mVpp
Amplitude Units	Vpp, mVpp, Vrms, dBm in 50Ω
Amplitude Resolution	1mVpp

DC Offset Characteristics

DC Offset Range (Peak AC + DC)	±5V in 50Ω
DC Offset Accuracy	±(1% of offset setting + 5mV + 1% of amplitude setting)

Main Output

Impedance	50Ω typical
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Waveform Characteristics

Sine

Frequency	1 μHz to 100 MHz	1 μHz to 80 MHz	1 μHz to 60 MHz	1 μHz to 40 MHz	1 μHz to 25MHz	1 μHz to 15 MHz
Amplitude Flatness (Relative to 1kHz, 1Vpp, 50Ω)	±0.1dB (≤5MHz) ±0.2dB (5MHz to 25MHz)					

Square

Frequency	1 μHz to 15 MHz
Rise/Fall Time (1kHz, 1Vpp typical)	≤9ns
Overshoot (100kHz, 1Vpp typical)	≤5%
Variable Duty Cycle	0.001% to 99.999%
Asymmetry	1% of period + 4ns

Triangle

Frequency	1μHz to 2MHz
Linearity	<0.1% of peak output (1kHz, 1Vpp, 100% symmetry typical)
Symmetry	0% to 100%

Pulse

Frequency	1μHz to 15MHz
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Period	67ns to 1Ms
Pulse Width	≥16ns
Rise/Fall Time	≥9ns (Subject to current frequency and pulse width limits)
Overshoot (1Vpp typical)	≤5%

Noise

Noise Bandwidth (-3dB)	100MHz
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Harmonic

Frequency	1μHz to 50MHz	1μHz to 40MHz	1μHz to 30MHz	1μHz to 20MHz	1μHz to 10MHz	1μHz to 5MHz
Harmonic Order	≤16					
Harmonic Type	Even Harmonic, Odd Harmonic, Order Harmonic					
Harmonic Amplitude	The amplitude of each order of the harmonic can be set					
Harmonic Phase	The phase of each order of harmonic can be set					

Arbitrary

Frequency	1μHz to 20MHz	1μHz to 20MHz	1μHz to 20MHz	1μHz to 15MHz	1μHz to 15MHz	1μHz to 15MHz
Waveform Length	2M					
Voltage Resolution	16 bits					
Sample Rate	1μSa/s~62.5MSa/s, 1μSa/s resolution					
Rise/Fall Time	≥9ns					
Overshoot (1Vpp typical)	≤5%					

Modulation Characteristics

Modulation Type	AM, DSB-AM, FM, PM, ASK, FSK, PSK, BPSK, QPSK, 3FSK, 4FSK, OSK, PWM
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AM (Amplitude Modulation)

Carrier	All except noise and DC
Source	Internal,external,or other channel
Internal Modulation	Sine, Square, Triangle, Noise, Sinc, Exponential Fall, Haversine, Lorentz, Gauss, Dual-tone, ECG
Frequency	2mHz to 1MHz
Depth	0% to 120%

DSB-AM (Double Sideband and Amplitude Modulation)

Carrier	All except noise and DC
Source	Internal,external,or other channel
Internal Modulation	Sine, Square, Triangle, Noise, Sinc, Exponential Fall, Haversine, Lorentz, Gauss, Dual-tone, ECG
Frequency	2mHz to 1MHz
Depth	0% to 120%

FM (Frequency Modulation)

Carrier	All except noise and DC
Source	Internal,external,or other channel
Internal Modulation	Sine, Square, Triangle, Noise, Sinc, Exponential Fall, Haversine, Lorentz, Gauss, Dual-tone, ECG
Frequency	2mHz to 1MHz

PM (Phase Modulation)

Carrier	All except noise and DC
Source	Internal,external,or other channel
Internal Modulation	Sine, Square, Triangle, Noise, Sinc, Exponential fall, Haversine, Lorentz, Gauss, Dual-tone, ECG
Frequency	2mHz to 1MHz
Deviation	0° to 360°

ASK (Amplitude Shift Key)

Carrier	All except noise and DC
Source	Internal/External
Internal Modulation	Square with 50% duty cycle
Rate	2mHz to 1MHz

FSK (Frequency Shift Key)

Carrier	All except noise and DC
Source	Internal/External
Internal Modulation	Square with 50% duty cycle
Rate	2mHz to 1MHz
Hop Frequency	Any frequency within the carrier signal's range

PSK (Phase Shift Key)

Carrier	All except noise and DC
Source	Internal/External

Internal Modulation	Square with 50% duty cycle
Rate	2mHz to 1MHz
Phase	0° to 360°

BPSK (Binary Phase Shift Key)

Carrier	All except noise and DC
Modulation Source	Internal
Data Source	PN15, PN21, 01, 10
Rate	2mHz to 1MHz
Phase	0° to 360°

QPSK (Quadrature Phase Shift Key)

Carrier	All except noise and DC
Modulation Source	Internal
Data Source	PN15, PN21
Rate	2mHz to 1MHz
Phase	0° to 360°

3FSK/4FSK

Carrier	All except noise and DC
Source	Internal
Internal Modulation	Square with 50% duty cycle
Rate	2mHz to 1MHz

OSK (Oscillation Key)

Carrier	Sine
Source	Internal/External
Oscillation Time	8ns to 4.99975ms
Rate	2mHz to 1MHz

PWM (Pulse Width Modulation)

Carrier	Square
Source	Internal,external,or other channel
Internal Modulation	Sine, Square, Triangle, Noise, Sinc, Exponential Fall, Haversine, Lorentz, Gauss, Dual-tone, ECG
Frequency	2mHz to 50KHz
Deviation	0% to 50%

External Modulation Input

Input Range	AM, DSB-AM, FM, PM, OSK, PWM: 75 mVRMS to ± 5 (Vac+dc) ASK, PSK, FSK: standard 5 V TTL
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Input Bandwidth	50KHz
Input Resistance	10K Ω

Sweep

Carrier Waveforms	All except noise and DC
Type	Linear
Direction	Up
Sweep Time	1ms to 50Ks
Hold/Return Time	0ms to 50Ks
Trigger	Internal, External, or Manual
Marker	Falling edge of sync signal

Burst

Carrier Waveforms	All except noise and DC
Carrier Frequency	1 μ Hz to 15MHz
Burst Count	1 to 2000 000 000
Start/Stop Phase	0° to 360°
Internal Period	2 μ s to 500s
Gated Source	External trigger
Trigger Source	Internal, External, or Manual

Frequency Counter

Measurement Function	Frequency, Period, Positive/Negative Pulse Width, Duty Cycle
Frequency Range	1 μ Hz to 80MHz
Gate Time	10ms to 16s
Input Signal Range	0 to 3.3V

Trigger Input

Level	TTL compatible
Slope	Rising or falling (selectable)
Pulse Width	>100ns

Trigger Output

Level	TTL compatible
Pulse Width	>60ns
Max. Rate	1MHz

Reference Clock

External Reference Input

Lock Range	10MHz \pm 50Hz
Voltage	Low Level: 0 to 400mV High Level: 2.5V to 5 V
Lock Time	<2s
Input Impedance(Typical)	50 Ω , DC coupling

Internal Reference Output

Frequency	10MHz \pm 50Hz
Level	3.3Vpp
Output Impedance(Typical)	50 Ω , DC coupling

Synchronous Output

Level	TTL-compatible
Impedance	50 Ω , nominal value

General Characteristics

Interface	USB Host, USB Device
Display	4.3 inch color TFT
Power Voltage	CAT II 100-120VAC _{RMS} (\pm 10%), 45Hz to 440Hz CAT II 120-240VAC _{RMS} (\pm 10%), 45Hz to 66Hz
Power Consumption	<30W
Fuse	T, 0.5A (slow blow), 250V, 5x20mm

Environmental

Operating temperature	10 °C to 40 °C
Storage temperature	-20 °C to 60°C
Operating humidity	\leq +140°F (+40°C): \leq 90%RH 106 °F to 122 °F (+41°C to 50°C): \leq 60%RH
Altitude	Operating: below 3,000 meters Non-operating: below 15,000 meters

Mechanical

Dimension	260 mm W x 110 mm H x 310 mm D
Weight	3.09 kg