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Data Sheet

UTG1000X Series Function/Arbitrary Waveform Generator

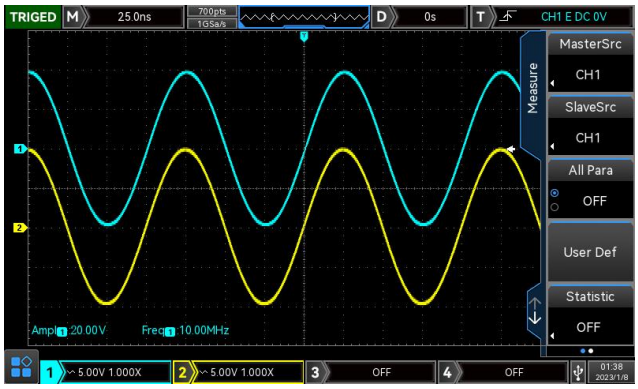
V1.1

2024.06

Product Features

- Two channels with the maximum frequency output 40 MHz, the maximum output amplitude 20 Vpp
- 200 MSa/s sampling rate and 16-bit vertical resolution
- Square wave with the maximum frequency 20 MHz, low jitter
- Multiple analog and digital modulation function: AM, FM, PM, ASK, FSK, PSK and PWM
- Supporting sweep frequency and pulse string output
- Arbitrary wave can generate by the Any waveform editor
- Built-in power pre-amplifier, the maximum power output 4 W (only for-PA model)
- 7-bit hard frequency meter
- Built-in 200 arbitrary waves
- Standard USB Host and USB Device
- 4.3-inch high resolution TFT LCD

Dual-channel Output with Same Function

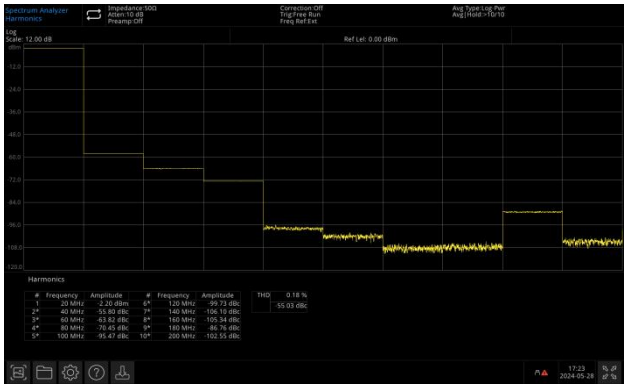


Large output capability at high frequency: 20 Vpp full amplitude output of dual-channel can still be guaranteed at 10 MHz frequency.

Power Amplifier Output

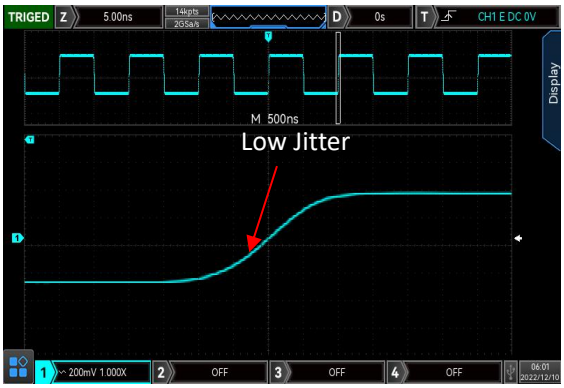
The power amplifier (on -PA model only) can boost the out to a maximum of 4 W, up to 100 kHz with a slew rate greater than 18 V/μs.

Low-distortion Output



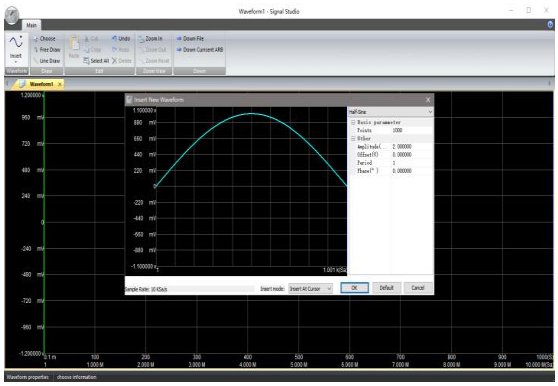
THD（total harmonic distortion）in output amplitude 0 dBm is less than 0.2%; Harmonic wave and stray in full frequency band are all less than -50 dBc.

Low Jitter



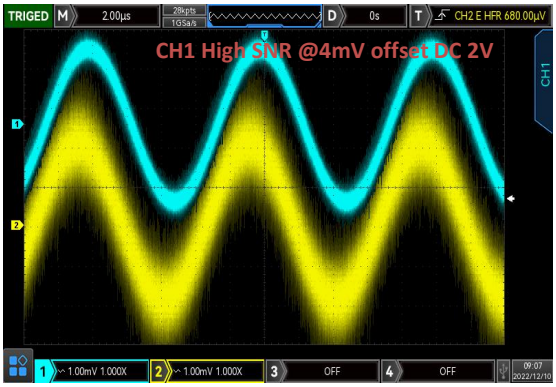
Excellent digital sampling technology to make output wave jitter more lower.

Editing Interface of Arbitrary Wave



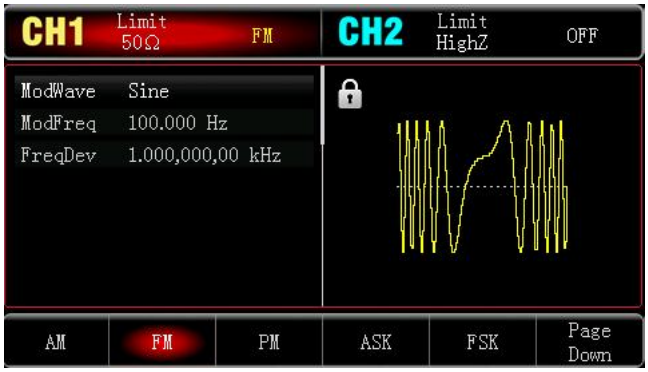
The arbitrary waveform editor has diversified generating method. The arbitrary waveform can be generated by insert the standard waveform or freely drawing

High Signal to Noise Ratio



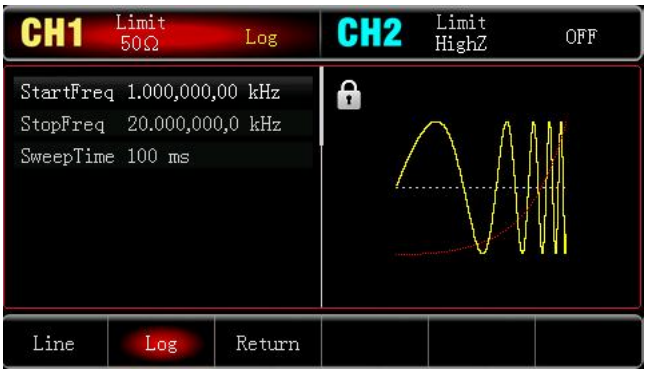
Set small signal superimposed large DC, UTG1000X output noise is lower, with higher SNR.

Multiple Modulation Function



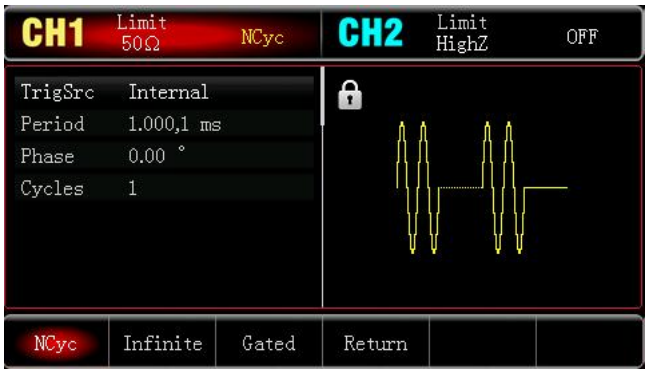
Supports multiple analog and digital modulation AM, FM, PM, FSK, ASK, PSK and PWM.

Frequency Sweep



Supports two frequency sweep modes: “Linear” and “Logarithmic”.

Pulse String Function



Supports pulse string mode: “N cycle”, “Gating”, “Infinite” Two modulation signal sources: “Internal” and “External”.

Frequency Meter

High precision frequency meter, frequency range within 100 mHz to 200 MHz can be measured.

Definition and Condition

- "Technical Index" provide a detailed description of the performance of the parameters which involved in the product warranty. Unless otherwise specified, these specifications are applicable to the temperature range from 18 °C to 28 °C.
- "Typical Value" refers to other product performance information which not covered in the product warranty. When the performance exceeds the technical index, 80% of the units can exhibit 95% confidence in the temperature range of 18 °C to 28 °C. Typical performance does not include uncertainty of measurement.
- "Nominal Value" means the expected performance or describes the performance of the product that is useful in the application of the product but is not included in the scope of the product warranty.
- Under the following conditions, it can achieve its technical indicators:
  In the calibration cycle and has been warmed up for at least 30 minutes. If the device is stored in an environment that is within the allowable storage temperature range but exceed the allowable operating temperature range, the instrument must be placed within the allowable operating temperature range for at least two hours

Product Function and Model Comparison Table

Mode	UTG1022X	UTG1022X-PA	UTG1042X
Power amplifier	×	●	×

Remarks: ● indicates standard × indicates not support

Basic Waveform Characteristics

All analog channel output related specifications is suitable for channel 1 and channel 2.

Fundamental wave characteristic		
Model	UTG1022X/-PA	UTG1042X
Channel	Dual channel	
Sampling rate	200 MSa/s	
Vertical resolution	16-bit	
Waveform characteristic	6 standard waveforms, 200 built-in arbitrary waveforms	
Waveform	Sine, Square, Ramp, Pulse, Noise, DC, Arb, AM, FM, PM, ASK, FSK, PSK, PWM, Sweep, Burst	
Working modes	Output gating, Continuous, Modulation, Frequency Sweep, Burst	
LCD	4.3" TFT LCD, WVGA (480×272)	
Frequency characteristic		
Sine wave	1 μHz to 20 MHz	1 μHz to 40 MHz

Square wave	1 μHz to 10 MHz	1 μHz to 20 MHz
Pulse wave	1 μHz to 10 MHz	1 μHz to 20 MHz
Ramp wave	1 μHz to 400 kHz	1 μHz to 1 MHz
Gauss noise	40 MHz (-3dB) (typical value)	
Resolution	1 μHz	
Reference frequency	Initial accuracy	< 30 ppm
	Temperature stability	± 2 ppm/°C, 0 °C to 40 °C
	Aging rate	±50 ppm, First year aging rate
Sine wave		
Harmonic distortion	Typical value (0 dBm)	DC to 1 MHz: -60 dBc
		1 MHz to 10 MHz: -55 dBc
		10 MHz to 40 MHz: -50 dBc
THD	< 0.2% (DC to 20 kHz, 1 Vpp)	
Spurious signals (anharmonic)	Typical value (0 dBm)	≤ 10 MHz < -70 dBc
		> 10 MHz <-70 dBc+6 dB/octave
Phase noise(typical)	1 MHz: ≤-125 dBc/Hz (typical, 0 dBm, 10 kHz deviation)	
Square wave		
Rise/fall time(1 Vpp, 50Ω)	< 16 ns	
Overshoot(100 kHz, 1Vpp, 50Ω)	< 2% (typical, 50Ω)	
Duty ratio	0.000 % to 100.00 % (limited by current frequency)	
Symmetry (duty ratio=50%)	1 % of period + 4 ns	
Shake (RMS)	Typical (1 MHz,1 Vpp, 50Ω)	≤ 5 MHz: 2 ppm + 200 ps
		> 5 MHz: 200 ps
Ramp wave		
Nonlinearity	< 1% of peak output (typical value, 1 kHz, 1 Vpp, symmetry 100%)	
Symmetry	0.0% to 100.0%	
Pulse wave		
Minimum pulse width	22 ns	
Variable edge	15 ns to 10 s	
Overshoot	< 2% (typical, 1 Vpp)	
Shake	150 ps	
Arbitrary wave		
Frequency	1 μHz to 5 MHz	1 μHz to 10 MHz
Wave length	4 kpts	
Vertical resolution	16-bit（symbol included）	

Sampling rage	200 MSa/s（DDS）
Nonvolatile storage	200 waves

Output Characteristic

Output			
Amplitude（50Ω）	≤20 MHz: 1 mVpp to 10 Vpp		
	≤40 MHz: 1 mVpp to 5 Vpp		
Amplitude（HighZ）	≤20 MHz: 2 mVpp to 20 Vpp		
	≤40 MHz: 2 mVpp to 10 Vpp		
Accuracy	Typical value(1 kHz,sine wave, 0 V, deviation, >10 mVpp)	± (1 % of set value+2 mVpp)	
Amplitude flatness	Typical value (sine wave, 0 dBm)	≤20 MHz: ±0.3 dB	
		≤40 MHz: ±0.5 dB	
Power output			
Model	UTG1022X	UTG1022X-PA	UTG1042X
Frequency	×	1 μHz to 100 kHz	×
Output power	×	4 W	×
DC offset			
Range(peak AC+DC)	±5 V (50Ω)		
	±10 V (high resistance)		
Accuracy of offset	Offset set value ±1% ± amplitude set value 2% ± 2 mV		
Waveform output			
Impedance	50Ω typical value		
Protection	Overvoltage protection, overload automatically disables waveform output		

Modulation Types

AM	
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave
Source	Internal
Modulation wave	Sine wave, square wave, ramp wave, noise, arbitrary wave
Modulation depth	0% to 120%
Modulation frequency	2 mHz to 1 MHz
FM	

Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Source	Internal	
Modulation wave	Sine wave, square wave, ramp wave, noise, arbitrary wave	
Frequency deviation	DC to 10 MHz	DC to 20 MHz
Modulation frequency	2 mHz to 1 MHz	
PM		
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Source	Internal	
Modulation wave	Sine wave, square wave, ramp wave, noise, arbitrary wave	
Phase deviation	0 to 360°	
Modulation frequency	2 mHz to 1 MHz	
ASK		
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Source	Internal/external	
Modulation wave	Square wave (Duty ratio 50%)	
Modulation frequency	2 mHz to 100 kHz	
FSK		
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Source	Internal/external	
Modulation wave	Square wave (Duty ratio 50%)	
Modulation frequency	2 mHz to 100 kHz	
PSK		
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Source	Internal/external	
Modulation wave	Square wave (Duty ratio 50%)	
Modulation frequency	2 mHz to 100 kHz	
PWM		
Carrier wave	Pulse	
Source	Internal/external	
Modulation wave	Sine wave, square wave, ramp wave, noise, arbitrary wave	
PWM range	0% to 50.00%	
Modulation frequency	2 mHz to 1 MHz	
Frequency sweep		
Carrier wave	Sine wave, square wave, ramp wave, arbitrary wave	
Type	Linear or logarithmic	
Frequency sweep time	1 ms to 500 s ± 0.1%	

Trigger source	Internal
Burst	
Mode of pulse train	N cycle, infinite, gated
Waveform	Sine wave, square wave, ramp wave, pulse, noise and arbitrary wave
Source	Internal/external
Trigger edge	Rising edge/falling edge
Internal cycle	1 μs to 500 s
Recurring number	1 to 50,000
Polarity	Positive and negative (TTL level input)
Initial and stop phase	0 to 360°
Frequency meter	
Range of input frequency	100 mHz to 200 MHz
Input level	TTL compatible
Accuracy	7-bit

Interface and Display

Interface	
Standard configuration	USB Host, USB Device, Power Output (only-PA)
Display screen	
Display Type	4.3 inches TFT LCD
Display resolution	WVGA (480×272)

General Technical Specifications

Specifications	
Supply voltage	100 to 240 VAC (Fluctuations: ±10%), 50 Hz/60Hz; 100 to 120 VAC (Fluctuations: ±10%), 400 Hz
Power consumption	< 20 W
Fuse	2 A, Class T, 250 V
Environment	
Temperature range	Operation: +10 °C to +40 °C
	Non operational: -20 °C to +60 °C
Cooling method	Natural cooling
Humidity range	+35 °C Below: ≤90% relative humidity
	+35 °C to +40 °C: ≤60% relative humidity
Altitude	Operating below 2,000 m

	Non-operating below 15,000 m	
Class of pollution	2	
Operating environment	indoor	
Mechanical specifications		
Dimensions	215mm×103mm×316mm (Width x Height x Length)	
Net weight	2.2 kg	
Calibration cycle	The recommended calibration circle is one year	
Regulatory standards		
EMC	Compliance with EMC directives(2014/30/EU), Conform to or better than IEC 61326-1:2021/EN61326-1:2021, IEC 61326-2-1:2021/EN61326-2-1:2021	
Conductive 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 (ESD)	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	0 V/m (80 MHz to 1 GHz) ; 3 V/m (1.4 GHz to 2 GHz) ; 1 V/m (2.0 GHz to 2.7GHz)
Electrical fast transient burst (EFT)	IEC 61000-4-4/EN 61000-4-4	2 kV (AC input port)
Surge	IEC 61000-4-5/EN 61000-4-5	1 kV (Live line to zero line) 2 kV (Fire/zero line to ground)
Immunity to RF continuous conduction	IEC 61000-4-6/EN 61000-4-6	3 V, 0.15-80 MHz
Voltage dips and short interruptions	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 regulations		
	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

	Description	Order No.
Models	Maximum output frequency 20 MHz	UTG1022X
	Maximum output frequency 40 MHz	UTG1042X
	Maximum output frequency 20 MHz ,4 W PA	UTG1022X-PA
Standard accessories	Power cord x 1	
	USB cable x 1	UT-D14
	BNC-BNC x 1	UT-L45
	BNC--red and black alligator clip cable x1	UT-L02A
Recommended options	10 W Power amplifier option	UT-M14

Remarks: All mainframe, accessories, optional can order from the local UNI-T distributor.

Limited Warranty and Liability

Uni-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination or improper handling. If you need warranty service within the warranty period, please contact your seller directly. Uni-T will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit instrument.uni-trend.com for full warranty information.

Learn more at: www.uni-trend.com

Register your product to confirm your ownership. You will also get product notifications, update alerts, exclusive offers and all the latest information you need to know.

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