UNI-T

Data Sheet

UTG9000T Series Function/Arbitrary Waveform Generator

REV 0

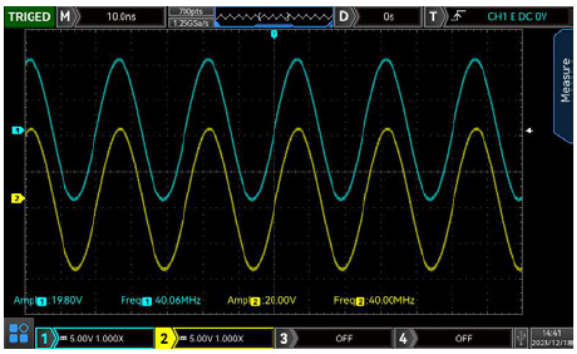
2023.12

Product Features

- Standard four channel with separate output channel mode
- Nine carrier waves: sine wave, square wave, ramp wave, pulse wave, harmonic wave, noise, PRBS (pseudo random binary sequence), DC, arbitrary wave
- The maximum sampling rate 2.5 GSa/s, the vertical resolution 16 bits and 14 bits
- Adjustable noise bandwidth
- Sine wave output: 600 MHz/500 MHz/350 MHz, full-band 1 μHz resolution
- Square wave output: 200 MHz/160 MHz/120 MHz, the minimum edge time: within 1.5 ns, adjustable duty ratio
- Pulse wave output: 200 MHz/160 MHz/120 MHz, wide dynamic range high precise adjustable rising/falling edge time, adjustable duty ratio
- It can output phase and amplitude, independent and adjustable 2~16 harmonic wave
- The maximum output swing: 20 Vpp
- It can output arbitrary wave 8pts~64Mpts, offer point-by-point, over 200 sets non - volatile digital arbitrary wave storage
- It can store 16GB (optional) or 20MB arbitrary file (.bsv and .csv), the instrument status file
- It can read arbitrary wave file (.bsv and .csv) and the instrument file storage in USB
- Abundant modulation types: AM, FM, PM, DSB-AM, QAM, ASK, FSK, 3FSK, 4FSK, PSK, B PSK, Q PSK, OSK, PWM, SUM
- Linear sweep, logarithmic sweep, list frequency sweep, stepping frequency sweep
- Offer frequency sweep and burst (pulse string) output
- Digital protocol output: SPI, I2C, UART
- SNR(signal to noise ratio) one-click output
- Double channel can be internal/external modulating, internal/external/trigger respectively or at the same time
- Hardware frequency counter: 800 MHz, AC/DC current coupling
- Powerful upper-computer software and arbitrary editor
- 10.1 capacitive touch screen, 1280*800 resolution
- Standard configuration interface: USB Host, USB Device, LAN, independent input and output 10 MHz clock source
- Easy-to-use multi-purpose knob and numeric keyboard

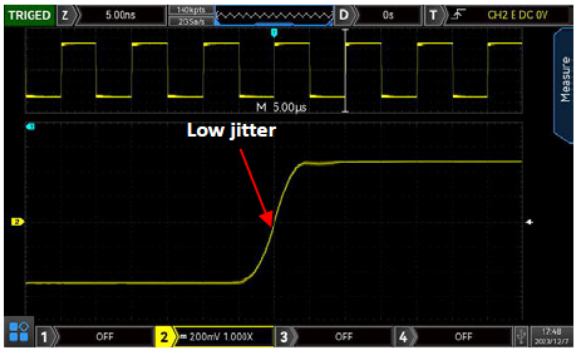
Design Features

Equal performance of double channel output



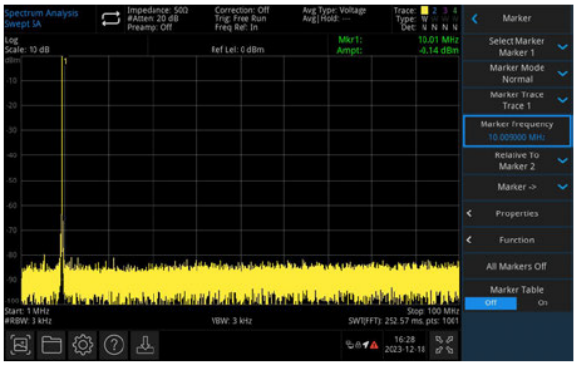
Large output under the high frequency: double channel with full amplitude output of 20 Vpp can be output under the frequency of 40 MHz.

Low Jitter

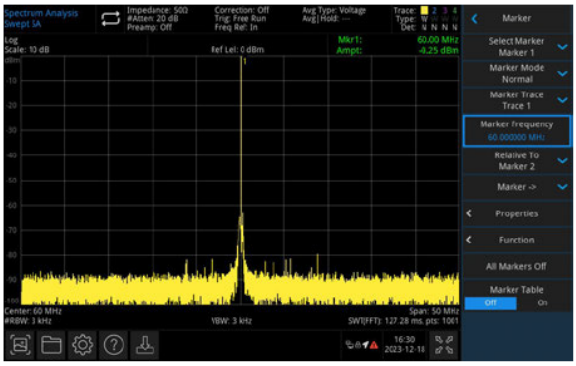


The excellent digital sampling technology makes the output waveform jitter much lower.

Low Distortion Output



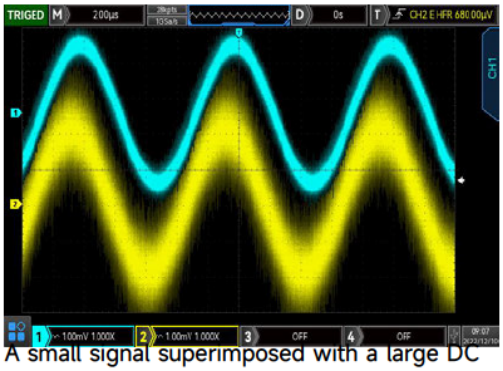
Outstanding harmonic distortion



-80dBc spurious free dynamic range

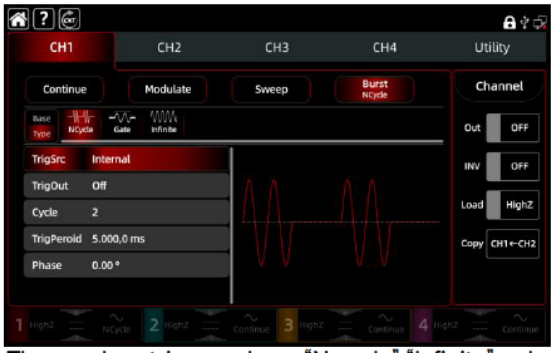
High SNR (Signal to Noise Ratio)

CH1 High SNR @4mV offset DC 2V



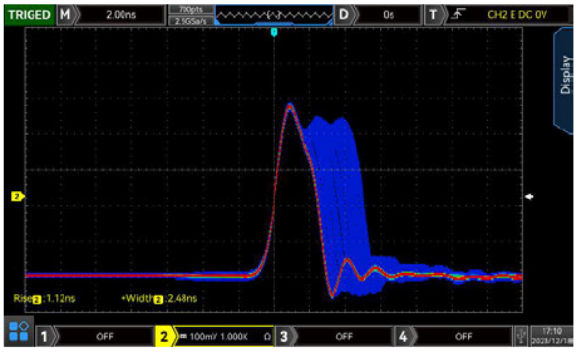
A small signal superimposed with a large DC results in a lower output noise and a higher SNR.

Pulse String



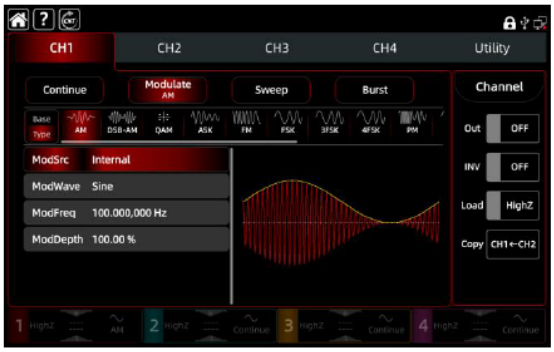
Three pulse string modes: "N cycle","Infinite"and "Gate". Three trigger sources: "Internal", "External" and "Manual".

Pulse Wave and Quick Edge Time



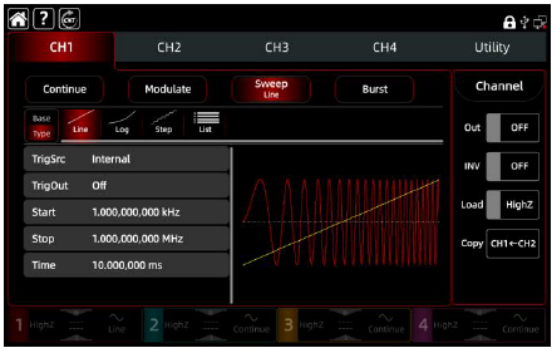
The new generation of wide dynamic high precision edge time adjustable pulse wave has a minimum pulse width of 2.4 ns. The pulse width can be fine adjusted and the minimum step is 100 ps. In addition, it can produce higher harmonic component, which has the feature of a dedicated pulse generator. The edge time can be set to a minimum of 1 ns independently.

Multiple Modulating Function



Modulating output (15 types): AM, FM, PM, DSB-AM, ASK, FSK, PSK, 3FSK, 4FSK, B PSK, Q PSK, OSK, SUM, QAM and PWM.

Sweep Frequency



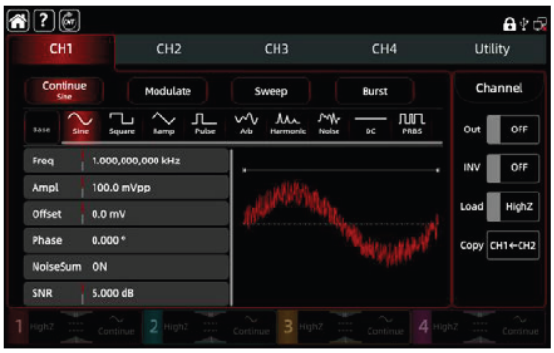
Four sweep frequency modes: "Linear", "Logarithm", "Step" and "List".

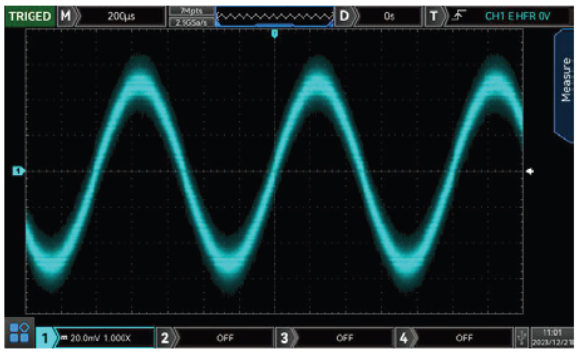
Three trigger sources: "Internal", "External" and "Manual".

Frequency Meter

The high precision hardware frequency meter can measure the frequency range of 100 MHz~800 MHz.

Adjusting SNR

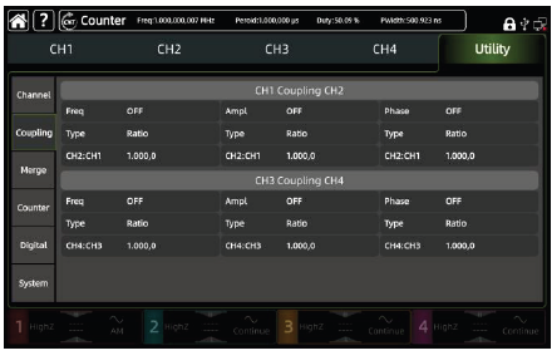




Open the noise superimposition to adjust SNR of signal output.

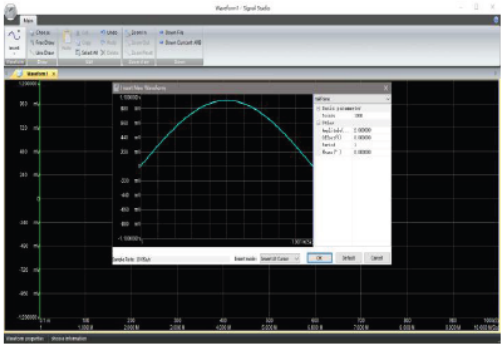
In the R&D test system of the telecommunication industry, it can simulate the working performance under different signal-to-noise ratios, so as to simulate the real working condition.

Channel Coupling



The channel coupling simplifies the operation of double channels. The two channels can use one parameter to control the phase, amplitude or frequency, making it simple to create deviated or proportional signals.

Arbitrary Waveform Editor



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

Remote Control

The instrument can connect to the computer via USB and LAN port and it supports remote control.

The user can use the control software for remote operation and control, and realize automatic testing and remote monitoring.

10.1 inch Capacitive Touch Screen

10.1 inch capacitive touch screen is easy to operate.

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

Basic Waveform Characteristics

Fundamental wave characteristic			
Model	UTG9604T	UTG9504T	UTG9354T
Channel	CH1 & CH2 (Main channel) CH3 & CH4 (AUX channel)	CH1 & CH2 (Main channel) CH3 & CH4 (AUX channel)	CH1 & CH2 (Main channel) CH3 & CH4 (AUX channel)
Maximum 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 wave length			
CH1 & CH2	8pts ~ 64Mpts	8pts ~ 64Mpts	8pts ~ 64Mpts
CH3 & CH4	8kpts	8kpts	8kpts

Mode	Continue, Modulate, Sweep, Burst, Frequency counter, Protocol		
Waveform	Sine, Square, Ramp, Pulse, Harmonic, Noise, PRBS, DC, Arbitrary wave		
Modulation type	AM, FM, PM, DSB-AM, QAM, ASK, FSK, 3FSK, 4FSK, PSK, BPSK, QPSK, OSK, PWM, SUM		
Frequency sweep type	Linear, logarithm, stepping, list sweep		
Burst type	N cycle, infinite, gated		
Digital protocol	SPI, I2C, UART		
Frequency counter	100 mHz ~ 800 MHz		
Frequency Characteristics			
Resolution	1 μHz		
Reference frequency	frequency	10.0000 MHz	
	Initial accuracy	± 0.5 ppm, 25 °C	
	Temperature stability	± 0.5 ppm, 0 °C~+40 °C	
	Aging rate	± 1 ppm within one year	
Sine Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Resolution	1 μHz		
Harmonic distortion (Typical value)			
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
Spurious signal (non-harmonics, typical value)	≤ 10 MHz < -70 dBc, Typical value (0 dBm)		
	> 10 MHz < -70 dBc+6 dB/ octave , Typical value (0 dBm)		
Total harmonic distortion (Typical value)	0.075 % (0 dBm, 10 Hz ~ 20 kHz)		
Non-harmonics 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)
Amplitude flatness (versus to 1 kHz sine wave, 1 Vpp/50 Ω)	≤ 100 MHz, 0.2 dB		
	≤ 350 MHz, 0.4 dB		
	≤ 600 MHz, 0.8 dB		
Overlay amplitude of noise	noise voltage ≤ 1 Vrms		
Phase characteristics	-360.000°~ 360.000°		
Phase noise(typical value)	10 MHz: ≤ -125 dBc/Hz (typical value, 0 dBm, 10 kHz deviation)		
Square Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency			
CH1 & CH2	1μHz ~ 200MHz	1μHz ~ 160MHz	1μHz ~ 120MHz
CH3 & CH4	1μHz ~ 60MHz	1μHz ~ 60MHz	1μHz ~ 50MHz
Resolution	1 μHz		
Rising/falling 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) (typical value)		
Duty ratio	0.000001 %~99.999999 %		
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)
Shake	100 ps (1 Vpp, 50 Ω load) (typical value)		
Phase characteristics	-360.000 °~ 360.000 °		
Overlay amplitude of noise	noise voltage ≤ 1 Vrms		
Pulse Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency			
CH1 & CH2	1μHz ~ 200MHz	1μHz ~ 160MHz	1μHz ~ 120MHz

CH3 & CH4	1μHz ~ 60MHz	1μHz ~ 60MHz	1μHz ~ 50MHz
Resolution	1μHz		
Rising/falling time	(1 MHz, 1 Vpp, 50 Ω load)		
CH1 & CH2	1ns ~ 10ks	1.5ns ~ 10ks	1.5ns ~ 10ks
CH3 & CH4	2ns ~ 10ks	5ns ~ 2ks	6ns ~ 2ks
Overshoot	< 2% , (1 MHz, edge ⩾ 2 ns , 1 Vpp, 50 Ω load)		
Duty ratio	0.000001% ~ 99.999999%		
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)
Shake (typical value)	100 ps (1 Vpp, 50 Ω load)		
Phase characteristics	-360.000 °~ 360.000 °		
Overlay amplitude of noise	noise voltage ⩽ 1 Vrms		
Ramp Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency			
CH1 & CH2	1μHz ~ 30MHz	1μHz ~ 30MHz	1μHz ~ 20MHz
CH3 & CH4	1μHz ~ 10MHz	1μHz ~ 10MHz	1μHz ~ 8MHz
Resolution	1 μHz		
Symmetry	0.00 %~100.00 %		
Linearity	< 1%, (1 kHz, 1 Vpp, 50% Symmetry)		
Phase characteristics	-360.000 °~ 360.000 °		
Overlay amplitude of noise	noise voltage⩽ 1 Vrms		
Gussian Noise Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency			
CH1 & CH2	1mHz ~ 600MHz	1mHz ~ 500MHz	1mHz ~ 350MHz
CH3 & CH4	1mHz ~ 400MHz	1mHz ~ 200MHz	1mHz ~ 160MHz
Arbitrary Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Sampling rate DDS			

CH1 & CH2	2.5GSa/s	2.5GSa/s	2.5GSa/s
CH3 & CH4	625MSa/s	625MSa/s	625MSa/s
Sampling rate Point by point			
CH1 & CH2	1μSa/s ~ 600MSa/s	1μSa/s ~ 500MSa/s	1μSa/s ~ 500MSa/s
CH3 & CH4	---	---	---
Frequency range (DDS)			
CH1 & CH2	1μHz ~ 100MHz	1μHz ~ 100MHz	1μHz ~ 80MHz
CH3 & CH4	1μHz ~ 60MHz	1μHz ~ 60MHz	1μHz ~ 50MHz
Length			
CH1 & CH2	8pts ~ 64Mpts	8pts ~ 64Mpts	8pts ~ 64Mpts
CH3 & CH4	8kpts (fixed)	8kpts (fixed)	8kpts (fixed)
Vertical resolution			
CH1 & CH2	16-bit	14-bit	14-bit
CH3 & CH4	16-bit	16-bit	16-bit
Nonvolatile storage	more than 200 waveform		
Minimum rising/falling time			
CH1 & CH2	＜4ns，（50Ω，1Vpp）	＜4ns，（50Ω，1Vpp）	＜4ns，（50Ω，1Vpp）
CH3 & CH4	＜5ns，（50Ω，1Vpp）	＜5ns，（50Ω，1Vpp）	＜5ns，（50Ω，1Vpp）
Phase characteristics (DDS)	-360.000 °~ 360.000 ° (DDS model)		
Shake	＜150 ps		
Overlay amplitude of noise	noise voltage≤ 1 Vrms		
PRBS Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Bitrate			
CH1 & CH2	1μbps ~ 120Mbps	1μbps ~ 120Mbps	1μbps ~ 80Mbps
CH3 & CH4	1μbps ~ 60Mbps	1μbps ~ 60Mbps	1μbps ~ 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
PN code	PN3, PN5, PN7, PN9, PN11, PN13, PN15, PN17, PN21, PN23, PN25, PN27, PN29, PN31, PN33		
Overlay amplitude of noise	noise voltage ≤ 1 Vrms		

Harmonic Wave Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Frequency range			
CH1 & CH2	1μHz ~ 300MHz	1μHz ~ 250MHz	1μHz ~ 175MHz
CH3 & CH4	1μHz ~ 100MHz	1μHz ~ 100MHz	1μHz ~ 80MHz
Harmonic time	1~16		
Harmonic type	even harmonic, odd harmonic, all harmonics, customize		
Harmonic amplitude	1 mV~10 Vpp (50 Ω load)		
	set the amplitude according to the selected harmonic serial number		
Harmonic phase	0.00 °~360.00 °		
	set the phase according to the selected harmonic serial number		

Output characteristics

Output Characteristics			
Model	UTG9604T	UTG9504T	UTG9354T
Output impedance	50Ω (Typical value)		
Amplitude range (Load: HighZ)			
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
Amplitude range (Load: 50 Ω)			
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
Accuracy	1 kHz sine wave, 0 V deviation, > 10 mVpp		
	± (amplitude value 1 %+1 mVpp)		
DC offset range	50 Ω: ± (5 VDC - Peak AC)		
	HighZ: ± (10 VDC - peak AC)		
Accuracy of deviation	± 1 % of deviation value ± 0.5 %± 2 mV of amplitude value		

Modulation characteristics

AM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal/external		
Modulation wave	Sine, square, rising ramp, falling ramp, noise, arbitrary wave		
Modulation depth	0.00 %~120.00 %		
Modulation frequency	1 μHz~2 MHz (Internal)		
DSB-AM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal/external		
Modulation wave	Sine, square, rising ramp, falling ramp, noise, arbitrary wave		
Modulation depth	0.00 %~100.00 %		
Modulation frequency	1 μHz~2 MHz (Internal)		
FM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T

Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal/external		
Modulation wave	Sine, square, 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
Modulation frequency	1 μHz~2 MHz (Internal)		
PM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal/external		
Modulation wave	Sine, square, rising ramp, falling ramp, noise, arbitrary wave		
Phase deviation	0.00 °~ 360.00 °		
Modulation frequency	1 μHz~2 MHz (Internal)		
ASK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal (50% Duty ratio square) / external (TTL level)		
Modulation frequency	1 μHz~2 MHz (Internal)		
FSK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal (50% Duty ratio square) / external (TTL level)		
Modulation frequency	1 μHz~2 MHz (Internal)		
Hopping frequency 1	Any frequency within the carrier signal's range		
PSK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, ramp, arbitrary wave		
Source	Internal (50 % Duty ratio square) / external (TTL level)		
Modulation frequency	1 μHz~2 MHz (Internal)		
Hopping phase	0.00 °~ 360.00 °		
3FSK Modulation			

Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal (50 % Duty ratio square)		
Modulation frequency	1 μHz~2 MHz (Internal)		
Hopping frequency 1	Any frequency within the carrier signal's range		
Hopping frequency 2	Any frequency within the carrier signal's range		
4FSK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave		
Source	Internal (50 % Duty ratio square)		
Modulation frequency	1 μHz~2 MHz (Internal)		
Hopping frequency 1	Any frequency within the carrier signal's range		
Hopping frequency 2	Any frequency within the carrier signal's range		
Hopping frequency 3	Any frequency within the carrier signal's range		
BPSK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, ramp, arbitrary wave		
PN code	PN3, PN5, PN7, PN9, PN11, PN13, PN15, PN17, PN21, PN23, PN25, PN27, PN29, PN31, PN33		
Bit rate	1 μbps~2 Mbps		
Phase 1	0.00 °~ 360.00 °		
Phase 2	0.00 °~ 360.00 °		
QPSK Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, ramp, arbitrary wave		
PN code	PN3, PN5, PN7, PN9, PN11, PN13, PN15, PN17, PN21, PN23, PN25, PN27, PN29, PN31, PN33		
Bit rate	1 μbps~2 Mbps		
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	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine		
Trigger source	Internal/external		
Modulation frequency	1 μHz~2 MHz (Internal)		
Oscillation time	1 ns~500 ks		
SUM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	Sine, square, pulse, ramp, arbitrary wave, harmonic, noise		
Source	Internal/external		
Modulation wave	Sine, square, rising ramp, falling ramp, noise, arbitrary wave		
Modulation frequency	1 μHz~2 MHz (Internal)		
Modulation depth	0.00 %~100.00 %		
QAM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
IQ map	QAM4, QAM8, QAM16, QAM32, QAM64, QAM128, QAM256		
PN Code	PN3, PN5, PN7, PN9, PN11, PN13, PN15, PN17, PN21, PN23, PN25, PN27, PN29, PN31, PN33		
Bit rate	1 μbps~2 Mbps		
PWM Modulation			
Model	UTG9604T	UTG9504T	UTG9354T
Carrier wave	pulse		
Source	Internal/external		
Modulation wave	Sine, square, rising ramp, falling ramp, noise, arbitrary wave		
Modulation frequency	1 μHz~2 MHz (Internal)		
Width deviation	0.000000%~49.999999% of pulse width		

Sweep

Linear Frequency Sweep			
Model	UTG9604T	UTG9504T	UTG9354T
Trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
Start frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz

Stop frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Frequency sweep time	1 ms~500 s		
Logarithm Frequency Sweep			
Model	UTG9604T	UTG9504T	UTG9354T
Trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
Start frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Stop frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Frequency sweep time	1 ms~500 s		
Stepping Frequency Sweep			
Model	UTG9604T	UTG9504T	UTG9354T
Trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
Start frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Stop frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Dwell time	1 ms~500 s		
Step	2 ~2048 steps		
List Frequency Sweep			
Model	UTG9604T	UTG9504T	UTG9354T
Trigger source	Internal, external rising edge, external falling edge, manual		
Trigger output	Close, rising edge, falling edge		
Start frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz

Stop frequency			
CH1 & CH2	1μHz ~ 600MHz	1μHz ~ 500MHz	1μHz ~ 350MHz
CH3 & CH4	1μHz ~ 200MHz	1μHz ~ 200MHz	1μHz ~ 160MHz
Dwell time	1 ms~500 s		
List file	Maximum 2048 frequency points for a single file		

Burst pulse

N cycle	
Waveform	Sine, square, pulse, ramp, arbitrary wave
Trigger source	Internal, external rising edge, external falling edge, manual
Trigger output	Close, rising edge, falling edge
Trigger cycle	1 us~500 s
Cycle number	1~50000
phase	0.00 °~360.00 °
Gate	
Waveform	Sine, square, pulse, ramp, arbitrary wave, noise
Polarity	Positive, negative (TTL LEVEL)
Phase	0.00 °~360.00 °
Infinite	
Waveform	Sine, square, pulse, ramp, arbitrary wave
Trigger source	Internal, external rising edge, external falling edge, manual
Trigger output	Close, rising edge, falling edge
phase	0.00 °~360.00 °

Accessibility

Frequency Counter			
Measurement parameter	Frequency, period, duty ratio, positive pulse width, negative pulse width		
Accuracy	± 5 ppm		
Frequency resolution	8 bit		
Frequency range	100 MHz~800 MHz	100 MHz~60 MHz	≥100m Vrms
		60 MHz~300 MHz	≥200m Vrms
		300 MHz~500 MHz	≥500m Vrms
		500 MHz~800 MHz	≥1 Vrms

Coupling mode	AC, DC, HF reject		
Trigger level	-2.5 V~2.5 V		
Sensitivity	0 %~100 %		
Digital Protocol	**SPI Characteristics**		
Interface	CH2 - SCLK, CH3 - CS, CH4 - MOSI		
Amplitude	1 mV~10 V		
Clock frequency	1 Hz~50 MHz		
Send way	Auto, manual		
Interval time	20 ns~1000 s in auto mode of send way		
Data format	Hexadecimal, character		
Data length	Maximum 2048 bytes		
Digital Protocol	**I2C Characteristics**		
Interface	CH3 - SCL, CH4 - SDA		
Amplitude	1 mV~10 V		
Clock frequency	1 Hz~50 MHz		
Address	7 bits, 10 bits		
Send way	Auto, manual		
Interval time	20 ns~1000 s in auto mode of send way		
Data format	Hexadecimal, character		
Data length	Maximum 2048 bytes		
Digital Protocol	**UART Characteristics**		
Interface	CH4 - TX		
Amplitude	1mV~10V		
Baud rate	1~1000000 (customized)		
Date bit	4, 5, 6, 7, 8		
Stop bit	1 bit, 2 bits		
Verify bit	None, even, odd		
Send way	Auto, manual		
Interval time	20 ns~1000 s in auto mode of send way		
Data format	Hexadecimal, character		
Data length	Maximum 2048 bytes		
Channel	**Coupling & Merge**		
Model	UTG9604T	UTG9504T	UTG9354T
Frequency coupling			

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	Ratio	0.0001~10000	
	Deviation	-720 °~ 720 °	
Amplitude coupling	Ratio	0.0001~10000	
	Deviation	-9.999 Vpp~9.999 Vpp (50 Ω)	
Channel Merge	CH1 merge with CH2, CH3 merge with CH4		

Interface and display

Communication interface	
Standard	USB Host, USB Device, LAN
Sync output	
Frequency range	≤60 MHz (CH3 is synchronized with CH1, CH4 is synchronized with CH2, CH3 can't synchronize with CH4)
Level	Compatible with TTL
Output impedance	50 Ω, typical value
External Modulation Input	
Input frequency	< 50 kHz
Modulation depth	± 5Vpk = 100%
Input impedance	5 kΩ (typical value)
External Reference Input	
Input frequency	10 MHz ± 50Hz (clock frequency adjustable)
Level range	Compatible with TTL
Input impedance	10kΩ (typical value, DC coupling)
Lock time	< 1s
Internal Reference Output	
Input frequency	10 MHz
Level range	Compatible with TTL
Level range	50 Ω (typical value, DC coupling)
Trigger input	
Slop	Rising or falling, optional
Input level	Compatible with TTL
Pulse width	> 100 ns

Input impedance	>10 kΩ, DC coupling
Response time	<1 μs, typical value
Trigger output	
Maximum frequency	1 MHz
Input level	Compatible with TTL
Pulse width	>400 ns, typical value
Output impedance	50 Ω, typical value
Display	
Mode	10.1" TFT capacitive touch
Resolution	1280*800

General Technical Specification

Power Supply	
Supply voltage	100 ~ 240 VAC (Fluctuations: ± 10 %), 50 Hz/60 Hz 100 ~ 120 VAC (Fluctuations: ± 10 %), 400 Hz
Power dissipation	Less than 100 W
Fuse wire	2.5 A, T-class, 250 V
environmental	
Temperature range	Operating: +10 °C ~ +40 °C Non-operating: -20 °C ~ +60 °C
Cooling method	Forced cooling by fan
Humidity range	Below +35 °C: ≤ 90 % relative humidity
	+35 °C ~ +40 °C: ≤ 60 % relative humidity
Altitude	Operating: below 2000 meters
	Non-operating: below 15000 meters
Temperature range	Operating: +10 °C ~ +40 °C Non-operating: -20 °C ~ +60 °C
pollution degree	2
Usage environment	Indoor use
Mechanical Specifications	
Size (reference)	370 mm×115 mm×185 mm
Net weight	4.04 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, 150 kHz-30 MHz
Radiation disturbance	CISPR 11/EN 55011	CLASS B group 1, 30 MHz-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	

Order Information and Warranty Period

	Description	Order Number
Model	Maximum of output frequency 600 MHz	UTG9604T
	Maximum of output frequency 500 MHz	UTG9504T
	Maximum of output frequency 350 MHz	UTG9354T
Accessories	Power cable x1	
	USB data cable x1	UT-D14
	BNC-BNC x4	UT-L45

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

Warranty and Service

UNI-T Technical Support Hotline: 400-876-7822

If the instrument is under warranty or is covered by a maintenance contract, it will be repaired under the terms of warranty as below. If the instrument is no longer under warranty, UNI-T will notify you of the cost of repair after examining the instrument.

This instrument provide 3- years warranty for mainframes and 1-year warranty for accessories as standard.

The above warranty applies to all UNI-TREND test measurement instrument products procured through the UNI-TREND authorized distributors. Product purchased from outside the UNI-TREND instruments network will be serviced by the selling agents and not UNI-TREND TECHNOLOGY. Please Go to UNI-T official website ->instruments->support->Where to buy to find the authorized test and measurement instrument distributors.