

MULTIFUNCTION GENERATOR

WF1973 / WF1974

Effortless waveform generation via an intuitive graphical user interface

Upcoming general-purpose signal source that is a must for engineers

1CH / 30 MHz



Wide Frequency Range
0.01 μ Hz to 30 MHz

Various Types of Output Waveforms

Equipped with standard, arbitrary and "parameter-variable" waveforms

Useful Programming Function

The sequence function enables you to easily program output patterns.

Wide Array of Oscillation Modes

Continuous, burst/trigger/gate, internal/external modulation, sweep, and sequence oscillation

2-channel Mode

Two independent channels, two phases, constant frequency difference, constant frequency ratio, and differential output

Pursuit of Usability

Flat and lightweight (88 mm high, 2.1 kg), each channel insulated from the housing, USB/GPIB interface, and more

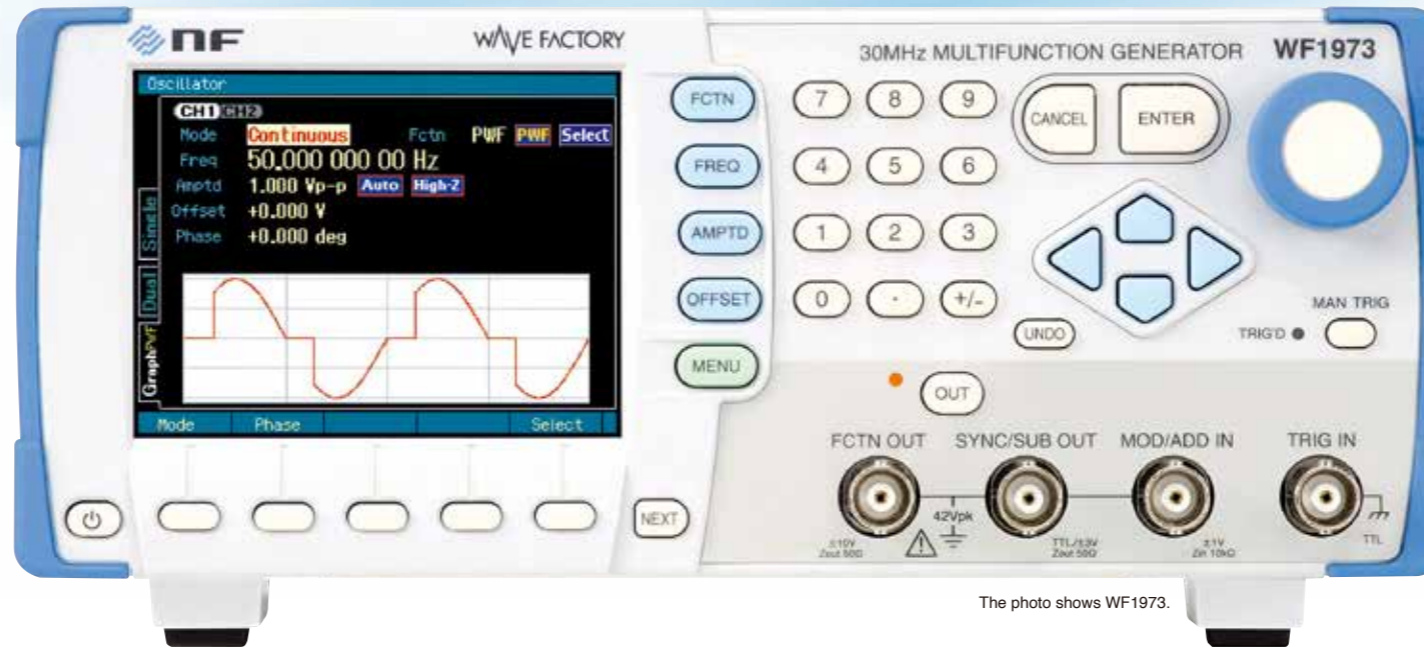
Functions

Synchronous operation of multiple units, usable as a pulse generator, external addition input, user-defined units and more

Generate the waveforms you need—effortlessly!

Wide array of functions for a broad range of applications

While the WF1973 and WF1974 can generate standard waveforms such as sine and square waves, application-specific waveforms such as Gaussian pulse and chattering, and arbitrary waveforms, these generators also have a wide array of functions, including sequence, modulation, and sweep. These are up-and-coming general-purpose signal sources that are a must for engineers and should be kept on hand for a wide variety of applications.



WAVE FACTORY

MULTIFUNCTION GENERATOR

WF1973 [1CH] WF1974 [2CH]

0.01 μ Hz to 30 MHz

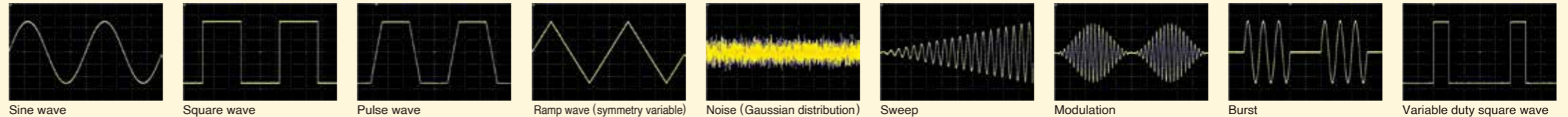


The photo shows WF1973.

Anytime, Anywhere

Handy signal source generates basic functions quickly and reliably

The WF1973 and WF1974 are easy to use as general-purpose signal sources for routine tests. Both standard waveforms and various modifying functions, including sweep, modulation, burst and duty variable, can be operated intuitively. Use of direct digital synthesis (DDS) ensures superior stability and repeatability, and so supports reliable testing.



Three methods allow you to generate or program Any Waveform!

The desired waveform can be quickly found and generated.
Parameter-Variable Waveform

NF has incorporated an innovative waveform library called a parameter-variable waveform function. The parameter-variable waveform offers an easy-order waveform system. The appropriate waveform for your purpose can be generated easily: just select a preprogrammed waveform and edit it using parameters specific to your requirements. The 25 types of available waveforms include circuit-related, communication-related, and machine-related waveforms.

For Example
The CF (crest factor) can be set within a range from 1.41 to 10.00 and varied easily using the modify knob. Waveforms generated in this way can be treated as standard waveforms with respect to frequency, amplitude, oscillation mode and other parameters.

Names and Variable Parameters of Incorporated Waveforms

1 Unbalanced sine • 1st half amplitude • 2nd half amplitude	2 Clipped sine • Clip rate	3 CF controlled sine • Crest Factor	4 Conduction angle controlled sine • Conduction angle	5 Staircase sine • Number of steps
6 Multi-cycle sine • Number of cycles • Start phase	7 On-phase controlled sine • Complete-on phase • On-slope time	8 Off-phase controlled sine • Off-phase • Off-slope time	9 Chattering-on sine • On-phase • Number of chattering • On-state time • Off-state time	10 Chattering-off sine • Off-phase • Number of chattering • On-state time • Off-state time
11 Gaussian pulse • Standard deviation	12 Lorentz pulse • Half value of width	13 Haversine • Width	14 Half-sine pulse • Width	15 Trapezoid pulse • Slope width • Upper base width
16 Sin(x)/x • Number of zero crossings	17 Exponential rise • Time constant	18 Exponential fall • Time constant	19 2nd-order LPF step response • LPF natural frequency • LPF Q	20 Damped oscillation • Oscillation frequency • Damping time constant
21 Oscillation surge • Oscillation frequency • Damping time constant • Trailing time constant	22 Pulse surge • Rising time • Duration time	23 Trapezoid wave with offset • Leading delay • Rising-slope width • Upper base width • Falling-slope width • Offset	24 Half-sine edge pulse • Leading edge time • Trailing edge time • Duty	25 Bottom-referenced ramp • Symmetry

Flexible Program Output Patterns Sequence Function

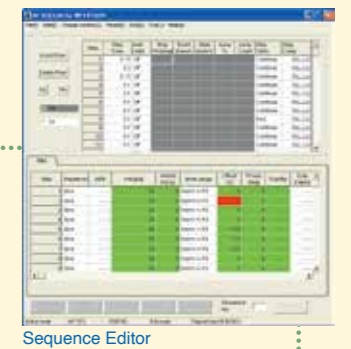
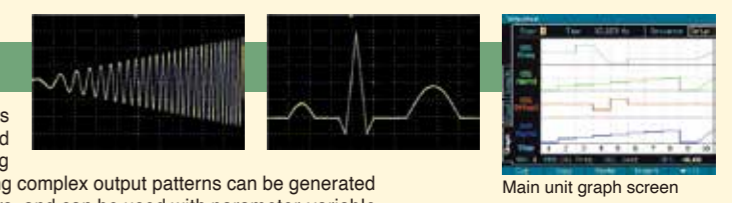
The sequence function programs and sequentially outputs parameters such as waveform, frequency and amplitude. Repetition, jump and other such behavior can be programmed, so constantly changing signals—such as machine vibration and voltage fluctuation—and long complex output patterns can be generated easily. The sequence function allows sudden changes to parameters, and can be used with parameter-variable waveforms and sweep functions. The sequence function substantially expands the range of applications for which our function generators are suitable.

- Parameters: waveform, frequency, phase, amplitude, DC offset, square wave duty, step time, hold operation, jump destination, number of jumps, step stop phase, branch operation, step termination control, and more
- Number of steps: 1 to 255 per sequence
- Number of saved sequences: 10
- Maximum number of usable waveforms: 128

Program Example Using the Sequence Function

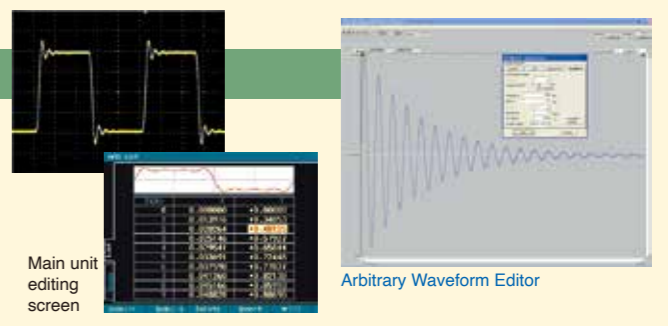
The table on the right shows the program (sequence list) used to generate the signal on the left. The WF1973 and WF1974 can execute such simple programs automatically. The **Sequence Editor** facilitates generation, editing, and a number of other processes for more complicated programs.

Step	Waveform	Frequency [Hz]	Amplitude [Vp-p]	Offset [V]	Step time [s]	Sweep
1	DC	—	0	0	0.15	—
2	DC	—	0	5	0.2	ON
3	Sine	20	2	5	0.15	—
4	DC	—	0	5	0.1	—
5	DC	—	0	3.75	0.1	—
6	DC	—	0	2.5	0.1	—
7	DC	—	0	1.25	0.1	—
8	DC	—	0	0	0.1	—



Up to 512 K words/Waveform, 4 M words Arbitrary Waveforms

Arbitrary waveforms up to 512 K words can be output. Up to 128 waveforms can be stored in the large 4 M words memory. Highly precise waveforms are generated using high-resolution (14-bit), high-speed (120M samples/sec) sampling. Waveforms can be generated easily either via the control panel (linear interpolation of control points) or in software using the **Arbitrary Waveform Editor**, which also allows external data to be imported and mathematical expressions to be applied. Preprogrammed parameter-variable waveforms can be retrieved and edited as required.



Fully equipped with the functions and performance that are required for function generators. The WF1973 and WF1974 are simple to operate and provide high-precision waveforms for a wide range of applications.

Multifunction || A variety of oscillation modes and flexible scalability

Sweep and modulation functions

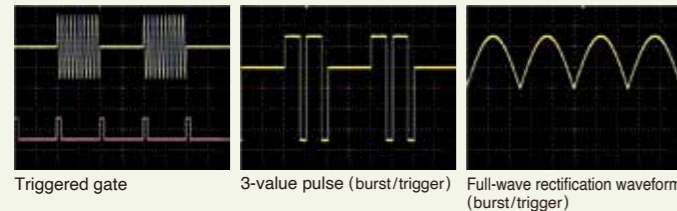


Gated sweep Offset modulation PWM

Frequency, phase, amplitude, DC offset and duty sweeps can be performed in one-way or shuttle, linear or logarithmic slope*, and continuous, single-shot or gated single-shot modes. Marker and X-drive outputs are available. DC offset modulation and PWM modes are supported as well as FM, FSK, PM, PSK, and AM—both internal and external modulation. These function generators can address a wide range of applications.

* Logarithmic mode is supported only for frequency sweeping.

Burst/trigger/gate



Triggered gate 3-value pulse (burst/trigger) Full-wave rectification waveform (burst/trigger)

In the burst oscillation mode, oscillation can be started or stopped at any wave count.

WF1973 and WF1974 support four modes;

Auto burst: No trigger is needed

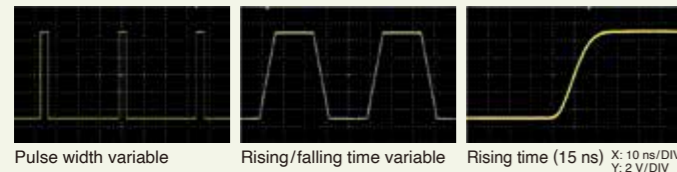
Trigger burst: Oscillation in sync with the trigger

Gate: Oscillation in sync with the gate signal

Triggered gate: Gate oscillation switched on/off by gate upon trigger

The phase where oscillation starts/stops and the level at which oscillation starts/stops can be set.

As pulse generator



Pulse width variable Rising/falling time variable Rising time (15 ns) X: 10 ns/DIV Y: 2 V/DIV

With great speed and operability, the WF1973 and WF1974 show excellent performance when used as a pulse generator or signal source for digital circuits. The duty/time, rising time, and falling time of pulse waves can be individually set, so these generators are best suited to operation testing of a wide variety of digital equipment and devices, data transmission equipment, and more.

External 10 MHz frequency reference input, synchronous operation of multiple generators

A high-accuracy frequency can be output when an external 10 MHz standard signal is input into the external 10 MHz frequency reference input (REF IN).

Synchronous operation of up to six units is possible in the form of master/slave connections*, using the frequency reference output (REF OUT) and frequency reference input (REF IN). A multi-channel (multi-phase) oscillator can be configured.

* A BNC cable is used for connection.



WF1973 rear panel

2 Channels || Ideal 2-channel generator



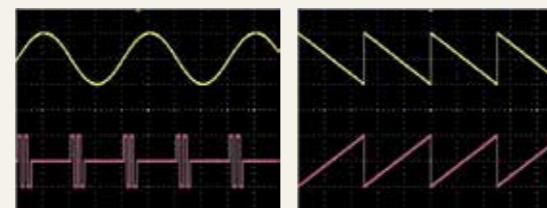
WF1974



WF1974 rear panel

The WF1974 is a dual-channel function generator. Each channel is insulated from the housing and has the same functions and performance as a single-channel WF1973. In addition, the WF1974 offers two phase, constant frequency difference, constant frequency ratio and differential output—all features that are unique to NF dual-channel function generators.

- Independent output (Indep) : Two channels programmed separately.
- Two phase (2-Phase) : Same frequency.
- Constant frequency difference (2-Tone) : Difference in frequencies is constant.
- Constant frequency ratio (Ratio) : Ratio of frequencies is constant.
- Differential output (Diff) : Reverse phase waveform with identical frequency, amplitude, and DC offset.



Two channels independent

Differential output

High Accuracy || High specifications to generate quality waveforms

Above all else, function generators must be very accurate. The WF1973 and WF1974 are high-specification instruments that deliver exceptional precision, stability and reliability in support of a wide variety of applications.

- Frequency accuracy : $\pm(3 \text{ ppm of setting} + 2 \text{ pHz})$
(External frequency reference of 10 MHz usable.)
- Frequency resolution : 0.01 μHz
- Amplitude accuracy : $\pm(1\% \text{ of amplitude setting } [V_{p-p}] + 2 \text{ mV}_{p-p})/\text{open}$
- Phase setting resolution1: 0.001 (setting range: -1800.000 to $+1800.000$)
- Duty setting range : 0.0000% to 100.0000%; resolution: 0.0001%
- Pulse wave rising/falling time: 15.0 ns to 58.8 Ms; 3-digit resolution/0.1 ns
- Resolution of arbitrary waveform data amplitude: 16 bits

Operability || Thorough pursuit of usability



Waveform display

The TFT color LCD display with the QVGA high resolution has been adopted. A variety of setup parameters can be seen at a glance and the set waveform is also displayed. Setting errors can be avoided because the waveform to be output can be intuitively checked.

User-defined unit function

The frequency, period, phase, amplitude, DC offset and duty can be set and displayed in desired unit (up to four characters), using a specified conversion expression.

Other features

- Input/output signal ground independent of housing and signal ground between channels also insulated.
- Output voltage under specified load impedance can be set and displayed.
- External signals can be added and output.
- Up to ten settings can be saved.
- USB and GPIB interfaces.
- LabVIEW driver included.
- Power supply input for 90 V AC to 250 V AC enables worldwide use.
- Flat and light body (88 mm high, about 2.1 kg)

Applications || We can satisfy a variety of waveform-related needs.

Electronic equipment and parts

Ultrasonic motor drive testing, differential/balanced input testing, LCD panel operation testing, copier drum (developing bias) testing, digital circuit evaluation testing, and evaluation of ICs

Communication and audio equipment

Testing of echo cancellers which act as IQ signal generator/clock sources for mobile communication systems, amplifier and speaker tone burst testing and linearity measurement, and wireless communication equipment evaluation testing

Automobiles

Gear rotation signal simulation, precision work for turbo chargers, inverter evaluation, ABS and power-steering device testing, ECU and sensor operation testing

Machinery, controls, and construction

Industrial robot and servo system adjustment and testing, pulse motor driving, building vibration experiments (for incorporating vibration testers), water-tank-based wave generation tests, and material fatigue testing

Other applications

Simulation of biosignals, electrolysis, electroplating, and battery charge/discharge testing, breaker testing, three-phase power source simulation, power source modulation testing, a frequency standard for measurement equipment management room, experiments and science projects in universities and technical colleges

Power amplifier that boosts output

High-Speed Bipolar Amplifier —BA4825/HSA Series



Example when combined with BA4825

NF recommends using our high-speed bipolar power amplifiers (BA4825/HSA Series) as power amplifiers for drive testing and other applications where a high voltage is applied to DUT, such as electronic parts or devices. These power amplifiers attain high-speed response and high voltage output, as well as wide frequency range. In addition, four-quadrant operation enables them to serve as the source (supply) and sink (absorption) for positive/negative voltage and current. They stably operate (output power) under capacitive or inductive loads such as a piezoelectric element or solenoid.

BA4825

- Wide band: DC, up to 2 MHz
- High voltage output: 300 V_{p-p}
- Output current: 0.5 Arms
- Slew rate: 500 V/ μs
- Low output impedance
- Output polarity switching function and more






HSA Series

- Wide band: DC, up to 1 MHz
- High voltage output: up to 300 V_{p-p}
- Slew rate: up to 475 V/ μs
- Low output impedance
- DC offset and more



WAVE FACTORY Lineup/Selection Guide

The following list summarizes the features of each model. For detailed specifications, refer to their respective catalogs, Web pages, or other documents.

	30 MHz				200 MHz		
Model name	WF1973	WF1974	WF1947	WF1948	WF1967	WF1968	
Appearance	 WF1974		 WF1948		 WF1968		
Oscillation frequency	0.01 μHz to 30 MHz		0.01 μHz to 30 MHz		0.01 μHz to 200 MHz		
Number of channels	1	2	1	2	1	2	
Vertical resolution for waveform	14 bits		16 bits		16 bits		
Waveform and frequency range	0.01 μHz to 30 MHz		0.01 μHz to 30 MHz		0.01 μHz to 200 MHz		
	0.01 μHz to 15 MHz		0.01 μHz to 20 MHz		0.01 μHz to 70 MHz		
	0.01 μHz to 15 MHz		0.01 μHz to 20 MHz		0.01 μHz to 70 MHz		
	0.01 μHz to 5 MHz		0.01 μHz to 5 MHz		0.01 μHz to 20 MHz		
	0.01 μHz to 5 MHz		—		0.01 μHz to 20 MHz		
Parameter-variable waveforms (25 types)	0.01 μHz to 5 MHz		—		0.01 μHz to 20 MHz		
Arbitrary waveform	0.01 μHz to 5 MHz		0.01 μHz to 5 MHz		0.01 μHz to 20 MHz		
Noise	Bandwidth: 26 MHz		Bandwidth: 26 MHz		Equivalent bandwidth: Select from 100 M/30 M/10 M/3 M/1 M/300 k/100 kHz		
Frequency setting resolution	0.01 μHz				0.01 μHz (< 50MHz), 0.1 μHz (50MHz ≤)		
Rising/falling variable	Pulse: 15 ns to 58.8 Ms		Pulse: 15 ns to 62.5 Ms		Pulse: 4.21 ns to 58.8 Ms		
Arbitrary waveform data length/number of waves	4K words to 512 K words/ 128 waves, 4 M words				4 Ki words to 1 Mi words/ 128 waves, 4 Mi words*1		
Maximum output voltage/resolution	20 Vp-p/open, 10 Vp-p/50 Ω, Resolution: 0.1 mVp-p or 1 mVp-p (depending on conditions)						
Oscillation mode	Continuous oscillation	○	○	○	○	○	
	Burst/trigger/gate/triggered gate	○	○	○	○	○	
	Sweep	Frequency, phase, amplitude, DC offset, duty ratio					
	Internal modulation	FM, FSK, PM, PSK, AM, DC offset and PWM					
	External modulation	FM, FSK, PM, PSK, AM, DC offset and PWM					
	Burst with modulation/Sweep with modulation	—	—	—	—	○	○
Sequence	○	○	—	—	○	○	
Two channel mode	—	○	—	○	—	○	
Synchronous operation	○	○	○	○	○	○	
Synclator function	—	—	—	—	○	○	
Synchronization/sub-output	Sync signals/Internal modulation sync/Sweep X drive				Sync signals/Internal modulation sync/Sweep X drive/Sub output*3		
Input/output floating	○	○	○	○	○	○	
Isolation between channels	—	○	—	○	—	○	
External addition	○	○	○	○	○	○	
GPIB interface	○	○	○	○	○	○	
USB interface	○	○	○	○	○	○	
Arbitrary Waveform Editor	○	○	○	○	○	○	
Sequence Editor	○	○	—	—	○	○	
Power supply	90 to 250 V AC						
Power consumption	50 VA or less	75 VA or less	50 VA or less	75 VA or less	65 VA or less	85 VA or less	
External dimensions (mm)**2	216 (W) × 88 (H) × 332 (D)		216 (W) × 132.5 (H) × 288 (D)		216 (W) × 132.5 (H) × 332 (D)		
Weight	approx. 2.1 kg		approx. 2.6 kg		approx. 3.0 kg		

*1 Ki and Mi represent 2¹⁰=1024 and 2²⁰=1048576

**2 Not including projections

**3 Available waveform : sine, square (duty 50%), ramp (symmetry 50%), rising ramp, falling ramp, noise and arbitrary waveform.

Note: The contents of this catalog are current as of October 25th, 2024

*Products appearance and specifications are subject to change without notice.

*Before purchase contact us to confirm the latest specifications, price and delivery date.

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