WONDER WAVE SERIES

MODELS WW5061/2
50MS/s Single/Dual Channel
Arbitrary Waveform Generators

- Single / Dual Channel 50MS/s waveform generator
- Sine waves to 25MHz, Square to 15MHz
- SINE OUT to 50MHz, 1Vp-p
- 11 Built-in popular standard waveforms
- 14 Bit amplitude resolution
- 11 digits frequency resolution (limited by 1µHz)
- 512k standard waveform memory (1M option)
- 10Vp-p into 50 , double into high impedance

- AM, FM, Arbitrary FM, FSK, Ramped FSK modulation
- Comprehensive memory management
- 1 ppm clock accuracy and stability
- Linear and Logarithmic Sweep
- User friendly and menu driven 3.8" color LCD display
- LAN, USB and GPIB interfaces
- Multi-Instrument synchronization
- ArbConnection software for easy waveform creation

Model WW5061/2 represents the next generation of products in the field of function, pulse and arbitrary waveform generators. This instrument is superior and far more versatile than any existing equivalent whether it is an analog or digital product. As a waveform source, this model can replace analog generators in almost every application. The Instrument combines high-frequency performance, versatility and compact size in a boxed format. Featuring signal output in the range of 1µHz to 25MHz and 14-bit vertical DAC resolution and up to 1M arbitrary waveform buffer, these instruments exhibit performance and provide solutions to the most demanding test stimulus challenge.

Versatility
Four waveform types may be generated: standard, arbitrary, sequenced arbitrary, and modulated. It is virtually like having four different generators in a single, compact package.

As a Function Generator
Most applications require simple and controllable waveforms such as sine and square waves; these functions and more are resident in a built-in library and can be called to the output using simple and easy keystrokes. The built-in waveforms are generated digitally from lookup tables that ensure accuracy and fidelity. The use of DDS technology to generate the controlling clock enhances clock stability and thus provides jitter-free and excellent spectral purity. Sine waves can be generated at up to 25MHz. There are ten additional waveforms which have controllable parameters, all accessible from the front panel.

Arbitrary Waveform Generator
Complex waveforms are used for testing purposes throughout the industry. While coordinates for such waveforms can easily be generated on paper or on computers, there is a need for digital instruments to take this data and convert it to electronical signals. An arbitrary waveform generator is about the only tool that can take a set of

X-Y coordinates and convert them to real life signals.
Combined with the power of ArbConnection, there is no limit to what you can create and generate. Waveform coordinates can be imported from a variety of sources such as MATLAB, ASCII files etc. Anything you can display on one of the composer screens is downloaded in split-second time and generated by the main output.

Waveform Memory for High Speed Testing
The instruments are sold with 512k waveform memory as standard. Optional 1M waveform memory is offered for applications requiring longer waveforms, placing the WW5061/2 in a far better position than its traditional competitors. The waveform memory is accessible from a remote host, using fast GPIB, USB or LAN interface thus minimizing test time needed when downloading multiple waveforms for one or more tests.

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The entire space of the waveform memory is backed up by rechargeable batteries allowing waveforms to be downloaded in the lab and the generator moved to another location for field operation.

Sequence Generator
Memory management is a must in today's arbitrary waveform generators. While very few applications require one long memory, most of the waveforms require a limited number of horizontal points. As a sequence generator, the WW5061/2 lets you divide the entire memory into 2048 smaller segments, load each segment with a different waveform, and then, select the order in which these segments will be linked and the number of loops that each segment will perform. This allows test software to switch between many different waveforms rapidly and without having to download multiple times, enhancing test throughput in a way that cannot be duplicated by other competing products.

Modulation Capability
Agility and modulation capabilities open the door to diverse applications. In addition to the power to generate any shape and any style of waveforms with the arbitrary waveform generation power, the product can generate standard modulation schemes such as AM, FM, Arbitrary FM, FSK, and Linear and Logarithmic sweep, all of which are easily created and executed by the generator.

Flexible Triggering Capability
Continuity of signals is required in most applications. However, at times when single output cycles are required or synchronization to other devices is mandatory, the WW5061/2 can be placed in different run modes that provides synchronization to other system components. Built into the product are gated, triggered and burst modes of which the last two can be operated with the built-in, free-running trigger generator, when external stimulating devices are not available.

Easy to use
Large and user-friendly 3.8" back-lit color LCD display facilitates browsing through menus, updating parameters and displaying detailed and critical information for your waveform output. Combined with numeric keypad, cursor position control and a dial, the front panel controls simplify the often complex operation of an arbitrary waveform generator.

High Speed Access
Access speed is an increasingly important requirement for test systems. Included with the instrument is a variety of interfaces: LAN, USB and GPIB, so one may select the interface most compatible to individual requirements. Using any of the external interfaces, controlling instrument functions and features as well as downloading waveforms and sequences is fast, time saving and easily tailored to every system regardless, if it is just a laptop to instrument or full-featured ATE system. IVI drivers and factory support will speed up system integration thus minimizing time-to-market and reduce system development costs significantly.

Multiple Environments to Write Your Code
Model WW5061/2 comes with a complete set of drivers, allowing you to write your application in various environments such as: Labview, CVI, C++, VB and MATLAB. You may also link the supplied dll to other Windows based API's or, use low level SCPI commands (Standard Commands for Programmable Instruments) to program the instrument, regardless if your application is written for Windows, Linux or Macintosh operating systems.

Precise Inter-Channel Phase Control (WW5062)
In the WW5062, both channels share a common sample clock, and both channels are triggered from the same source assuring tightly synchronized channel-to-channel timing. Precise control over channel-to-channel phase offset is achieved by allowing control over channel start phase with a resolution down to as small as 1 waveform point. This enables extremely accurate timing or phase dependencies to be studied, such as those found in high speed digital communication systems.

Multi-Instrument Synchronization
Multiple WW5061/2s can be synchronized using a Master-Slave arrangement allowing users to benefit from the same high quality performance in their multi-channels needs.

ArbConnection
The ArbConnection software provides you with full control of instrument functions, modes and features. ArbConnection is a powerful editorial tool that allows you to easily design any type of waveform. Whether it is the built in wave, pulse or serial data composers, or the built in equation editor with which you can create your own exotic functions, with ArbConnection virtually any application is possible.

MODELS WW5061/2

50MS/s Single/Dual Channel Arbitrary Waveform Generators

Specification

CONFIGURATION

No. of Channels: 1/2, semi-independent

STANDARD WAVEFORMS

Waveforms: Sine, Triangle, Square, Pulse, Ramp, Sine(x)/x, Gaussian, Exponential, Repetitive Noise, DC.

Frequency Range:
Sine	100µHz to 25MHz
Square, Pulse	100µHz to 15MHz
All others	100µHz to 7.5MHz

SINE

Start Phase: 0 to 360°
Phase Resolution: 0.1°
Harmonics Distortion, 3Vp-p (typ.):
DC to 2.5MHz	<-55dBc
2.5MHz to 25MHz	<-40dBc

Non-Harmonic Distortion (typ.):
DC to 15MHz	<-70dBc
15MHz to 25MHz	<-60dBc

Total Harmonic Distortion:
DC to 100kHz	0.1%

Flatness (1kHz)(typical):
DC to 1MHz	1%
1MHz to 25MHz	5%

Phase Noise (8 points Sine, Max. SCLK)
100Hz Offset	<-103dBc/Hz
1kHz Offset	<-110dBc/Hz
10kHz Offset	<-118dBc/Hz
100kHz Offset	<-124dBc/Hz
1MHz Offset	<-135dBc/Hz

TRIANGLE, RAMP

Start Phase: 0 to 360°
Phase Resolution: 0.1°
Timing Ranges: 0%-99.9% of period

SQUARE, PULSE

Duty cycle: 1% to 99%
Timing Ranges: 0%-99.9% of period
Rise/Fall time: <8ns
Aberration: <5%

SINC (SINE(x)/x)

"0" Crossing: 4 to 100 cycles

GAUSSIAN PULSE

Time Constant: 1 to 200

EXPONENTIAL FALL/RISING PULSE

Time Constant: -100 to 100

DC

Range: -5V to 5V

DIGITAL PULSE GENERATOR OPTION

Pulse Mode: Single or double, programmable
Polarity: Normal, inverted, complement
Period: 80ns to 1000s
Resolution: 20ns
Pulse Width: 40ns to 1000s
Rise/Fall Time:
Fast	<8ns (typ.)
Linear	20ns to 1000s

High Time, Delay & Double Pulse Delay: 20ns to 1000s
Amplitude Window: 10mVp-p to 10Vp-p(1)
Low Level	-5V to +4.995V(1)
High Level	-4.995V to +5V(1)

(1) Double into high impedance

NOTES:
1. All pulse parameters, except rise and fall times, may be freely programmed within the selected pulse period provided that the ratio between the period and the smallest incremental unit does not exceed the ratio of 512,000 to 1. With the 1M option, the ratio is extended to 1,000,000 to 1, hence the specifications below do not show maximum limit as each must be computed from the above relationship.
2. Rise and fall times, may be freely programmed provided that the ratio between the rise/fall time and the smallest incremental unit does not exceed the ratio of 100,000 to 1.
3. The sum of all pulse parameters must not exceed the pulse period setting

ARBITRARY WAVEFORMS

Sample Rate: 100mS/s to 50MS/s
Vertical Resolution: 14 Bits
Waveform Memory: 512k points standard 1M points option (per channel)
Min. Segment Size: 16 points
Resolution: 4 points
No. of Segments: 1 to 2k

SEQUENCED ARBITRARY WAVEFORMS

Operation: Permits division of the memory bank into smaller segments. Segments may be linked, and repeated in user selectable fashion to generate extremely long waveforms.
Sequencer steps: 1 to 2k
Min. Seg. Duration: 1µs

Segment loops: 1 to 1M

ADVANCE MODES

Automatic: No triggers required to step from one segment to the next. Sequence is repeated continuously through a pre-programmed sequence table.
Stepped: Current segment is sampled continuously, external trigger advances to next programmed segment.
Single: Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment.
Mixed: Each step of a sequence can be programmed to advance either: a) automatic (Automatic mode), or b) with a trigger (Stepped mode)
Advance Source: External (TRIG IN), Internal or software

MODULATION

COMMON CHARACTERISTICS

Carrier Waveform: Sine, Triangle, Square, Pulse, Ramp, Sine(x)/x, Gaussian, Exponential, Repetitive Noise, DC and Arb
Carrier SCLK: 100mS/s to 50MS/s
Carrier Frequency: Waveform dependent
Resolution: 12 digits, limited by 1µHz
Accuracy: 0.1%
Freq. Distortion: <0.1%
Modulation Source:
Internal	FM, Arbitrary FM, Sweep
External	AM, FSK

FM

Modulating Shape: Sine, Square, Triangle / Ramp
Modulation Freq.: 1mHz to 100kHz
Deviation Range: 100mS/s to 25MS/s

ARBITRARY FM

Modulating Shape: Arbitrary waveform, 10 to 20000 waveform points
Modulating SCLK: 1mS/s to 2MS/s
Deviation Range: 100mS/s to 25MS/s

AM

Envelope Freq.: 1µHz to 500kHz
Sensitivity: 0V to +5V (5Vp-p)
Modulation Depth: 0% to 100%

MODELS WW5061/2

50MS/s Single/Dual Channel Arbitrary
Waveform Generators Specification

FSK

Type:	Hop or Ramp
Low level:	Carrier sample clock
High level:	Hop frequency
Baud Rate Range:	1bits/sec to 10Mbits/sec
Min. FSK Delay:	1 waveform cycle + 50ns
Ramp FSK:	
Time	10µs to 1s
Resolution	3 digits

SWEEP

Sweep Time:	1ms to 1000s
Sweep Step:	Linear, Logarithmic or Arb
Sweep Direction:	Up or down

COMMON CHARACTERISTICS

FREQUENCY

Resolution:	
Display	11 digits (limited by 1µHz)
Remote	14 digits (limited by 1µHz)
Accuracy/Stability:	Same as reference

ACCURACY REFERENCE CLOCK

Internal	0.0001% (1ppm TCXO) initial tolerance over a 19°C to 29°C temperature range; 1ppm/°C below 19°C and above 29°C; 1ppm/year aging rate
External	10MHz TTL, 50% duty cycle

AMPLITUDE

Range:	10mV to 10Vp-p, into 50Ω; Double into open circuit
Resolution:	4 digits
Accuracy (1kHz):	
100mV to 1Vp-p	±(1% + 5mV)
1Vp-p to 10Vp-p	±(1% + 25mV)

OFFSET

Range:	0 to ±4.5V
Resolution:	2.2 mV
Accuracy:	1%

FILTERS

Type:	12.5MHz / 25MHz Elliptic

OUTPUTS

MAIN OUTPUTS

Coupling:	DC coupled
Connector:	Front panel BNC
Impedance:	50Ω, ±1%
Protection:	Protected against temporary short to case ground

SYNC/MARKER OUTPUT

Connector:	Front panel BNC
Impedance:	50Ω, ±1%
Level:	>2V into 50Ω, 4V into 10kΩ
Validators:	BIT, LCOM
Protection:	Protected against temporary short to case ground
Position:	Point 0 to n
Width:	4 to 100000 points
Resolution:	4 points
Source:	Channel 1

SAMPLE CLOCK OUTPUT

Connector:	Rear panel SMB
Level:	ECL
Impedance:	50Ω, terminated to −2V

SINEWAVE OUTPUT

Connector:	Rear panel BNC
Impedance:	50Ω, ±1%
Level:	1V into 50Ω
Protection:	Protected against temporary short to case ground
Source:	Sample clock frequency
Frequency Range:	100mHz to 50MHz
Resolution:	Same as Sample clock
THD:	0.05% to 100kHz
SFDR:	<-30dBc to 50MHz

INPUTS

TRIGGER INPUT

Connector:	Rear panel BNC
Input Impedance:	10kΩ, ±5%
Polarity:	Positive or negative
Threshold Level:	TTL
Min. Pulse Width:	20ns

EXTERNAL REFERENCE INPUT

Connector:	Rear panel BNC
Frequency:	10MHz
Impedance & Level:	10kΩ ±5%, TTL, 50% ±5%

AM INPUT

Modulation Input:	Rear panel BNC
Impedance:	1MΩ, ±5%
Max. Input Voltage:	12V

SAMPLE CLOCK INPUT

Connector:	Rear panel SMB
Input Level:	ECL
Impedance:	50Ω, terminated to −2V
Range:	100mHz to 50MHz
Min. Pulse Width:	4 ns

SYNCHRONIZATION CONNECTOR

Connector:	Rear panel 9-pin D-SUB
SYNC Cable:	Optional, consult factory at the time of purchase

RUN MODES

Continuous:	Free-run output of a waveform
Triggered:	Upon trigger, outputs one waveform cycle. Last cycle always completed
Gated:	External signal enables generator. First output cycle synchronous with the active slope of the triggering signal.Last cycle of output waveform always completed
Burst:	Upon trigger, outputs a single or multiple pre-programmed number of waveform cycles from 1 through 1M

TRIGGER CHARACTERISTICS

System Delay:	1 Sample Clock + 150ns
Trigger Start, Stop &	
Phase Control:	0 to 512k (1M optional)
Resolution:	4 points
Breakpoint Error:	±4 points
Breakpoint Source:	External, Manual, or command

EXTERNAL

Connector:	Rear panel BNC
Level:	TTL
Slope:	Positive or negative
Frequency:	DC to 2MHz
Impedance:	10kΩ, DC coupled

INTERNAL

Range:	100mHz to 2MHz
Resolution:	14 digits, limited by 1µHz
Accuracy:	0.1%

MANUAL

Source:	Soft trigger command from the front panel or remote

INTER-CHANNEL DEPENDENCY (WW5062)

Separate controls:	Output on/off, amplitude, AM, offset, standard waveforms, user waveforms, waveform size, sequence table, channel 2 clock divider, trigger start phase, breakpoints

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Specification

Common Controls: SCLK, frequency, reference source, trigger and sequence advance mode, SYNC OUT, FM, FSK, sweep and arm

PHASE OFFSET (LEADING EDGE)

Range:	0 to 512k points (1M option)
Resolution/Accuracy:	1 point, or 1 SCLK of CH. 2
Initial Skew:	<±2ns, with sclk divider = 1; <±3ns, with sclk divider > 1

CHANNEL 2 SAMPLE CLOCK DIVIDER

Range:	1 to 65,535 points
Resolution:	1 point

MULTI-INSTRUMENT SYNCHRONIZATION

PHASE OFFSET (LEADING EDGE)

Range:	0 to 512k points (1M optional)

Resolution:	4 point
Initial Skew:	<±15ns, depending on cable length and quality, typically with 0.5 meter coax cables

GENERAL

Voltage Range:	85 to 265V
Frequency Range:	48 to 63Hz
Power Consumption:	60W max
Display Type:	Color LCD, back-lit
Size	3.8" reflective
Resolution	320 x 240 pixels,
Interfaces:	
USB Device	1 x rear, USB device, (A type)
LAN	100/10 BASE-T
GPIB	IEEE 488.2 standard interface
Dimensions:	
With Feet	212 x 102 x 415mm (WxHxD)
Without Feet	212 x 88 x 415mm (WxHxD)
Weight:	
Without Package	3.5Kg
Shipping Weight	4Kg
Temperature:	
Operating	0 - 50°C
Storage	-40°C to + 70°C.
Humidity:	
11°C to 30°C:	85%;
31°C to 50°C:	75%

Safety:	EN61010-1, 2nd revision
Calibration:	1 year
Warranty [1]:	5 years standard

ORDERING INFORMATION

MODEL	DESCRIPTION
WW5061	50MS/s Single Channel Arbitrary Waveform Generator
WW5062	50MS/s Dual Channel Arbitrary Waveform Generator

OPTIONS

Option 1:	1M Memory

ACCESSORIES

Sync Cable:	Multi-instrument synchronization
S-Rack Mount:	19" Single Rack Mounting Kit
D-Rack Mount:	19" Dual Rack Mounting Kit
Case Kit:	Professional Carrying Bag
Note:	Options and Accessories must be specified at the time of your purchase.

[1] Standard warranty in India is 1 year.