

WW

WONDER WAVE SERIES

45
YEARS
OF INNOVATION



WW5064/1074/2074

50MS/s, 100MS/s or 200MS/s Four Channel Arbitrary Waveform Generators

- Four Channel waveform generators
- Sine waves to 80MHz and square to 50MHz
- 16 Bit amplitude resolution
- Up to 4M waveform memory
- 10Vp-p into 50Ω standard, double into high impedance
- Multiple run modes: trigger, timer and trigger delay
- Four separate SYNC outputs
- Powerful sequence generator links and loops segments in user-defined fashion. Stores up to 10 different sequence tables
- High resolution 3.8" LCD, color display
- LAN, USB and GPIB interfaces
- Multi-Instrument synchronization
- ArbConnection software for easy waveform creation

The WW5064/1074/2074 offer a 50/100/200 MS/s four-channel universal waveform synthesizer. Each is built in a small case size to save space and cost but without compromising bandwidth and signal integrity. The instrument outputs either standard or user-defined waveforms in the range of 100μHz and up to 80MHz in the 200MS/s model. 16-bit DAC's are used for building waveforms with excellent accuracy and resolution which are suitable for the finest test signals that are needed for today's sensitive instruments. Using the latest technology, you can be assured that the features and capabilities of the four channel models will be useful for many years.

Signal Integrity

As technology is evolving and new devices are developed every day, faster signals are needed to simulate and stimulate these new devices. The four channel models provide the highest bandwidth in their class and hence provide accurate duplication and simulation of test signals. With a wide range of sample clock generators (up to 200MS/s), 16-bit vertical resolution and

wide output bandwidth (up to 80MHz), one can create mathematical profiles, download the coordinates to the instrument and regenerate waveforms without compromising their fidelity and compatibility to the original design.

Four Synchronized Channels

The four channels models have four output channels which are all synchronized to the same reference clock and share the same sample clock. This is not a limitation because the output frequency is a function of the number of points which are used for creating the waveform shape. On the other hand, the advantage of having four synchronized channels is huge in applications that require accurate and controlled phase between channels. Many applications require XY drive so two channels is just what is needed however, for three phase power simulation and four channel MEMS micro engine actuators, the four channel model is the most suitable product to use.

High Speed Function Generator

Care to use the instrument as a function generator? No need to fuss with loading complex waveform coordinates, simply select the standard waveforms tab and start generating any one of the ten waveforms that are pre-computed and available for immediate use. Included are: sine, triangle, square, pulse, ramp, sinc and others.

Stable and Accurate Output Signals

As standard, the instrument is equipped with a frequency reference that has 1ppm accuracy and stability over a period of 1 year. An external frequency reference is provided on the rear panel for applications requiring greater accuracy and stability.

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.

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TABOR ELECTRONICS Inc.
Since 1971

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Waveform Memory and Memory Segmentation

Waveform memory is the internal "black board" where the waveforms are created and reside. Large memory bank provides for longer waveforms. One can use the entire memory for a single waveform or split the length to smaller segments. In this case, many waveforms can be stored in the same memory and replayed, one-at-a-time, when recalled to the output. The memory segmentation is combined with a sequence generator that can take different memory segments and link (and loop) them in any order as required for the test. The ability to loop waveform segments in a sequence saves a lot of memory space and hence, extends the capability of the generator to produce complex and much longer waveforms, which would otherwise require large banks of memory. The four channel models have four sequence generators that can be designed to generate unique sequences for each output channel.

Remote Control

Access speed is an increasingly important requirement for test systems. Included with each instrument is a variety of interfaces: Ethernet, USB and GPIB so one may select the most suitable interface for the application. Remote control of instrument functions, parameters and waveform download is easily tailored to specific system environment regardless if it is just a laptop to instrument or full-featured ATE system. IVI drivers and factory support will speed up system integration and hence minimize time-to-market as well as significantly reduce system development costs.

Remote Calibration

Normal calibration cycles in the industry range from one to three years where instruments are sent to a service center, opened to allow access to trimmers, calibrated and certified for repeated usage. Leading-edge technology was implemented to allow calibration from any interface, USB, GPIB or LAN. Calibration factors are stored in a flash memory thus eliminating the need to open instrument covers.

Multiple Environments to Write Your Code

All models come 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.

Multi-Instrument Synchronization

Multiple four channel models (of the same SCLK speed) can be synchronized using a Master-Slave arrangement allowing users to benefit from the same high quality performance in their multi-channels system.

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.

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Specification

CONFIGURATION

Output Channels 4, semi-independent

STANDARD WAVEFORMS

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

Frequency Range:

Sine	100µHz to 25MHz (WW5064) 100µHz to 50MHz (WW1074) 100µHz to 80MHz (WW2074)
Square, Pulse	100µHz to 12.5MHz (WW5064) 100µHz to 25MHz (WW1074) 100µHz to 50MHz (WW2074)
All others	100µHz to 6.25MHz (WW5064) 100µHz to 12.5MHz (WW1074) 100µHz to 25MHz (WW2074)

SINE

Start Phase: 0-360°

Phase Resolution: 0.01°

Harmonics Distortion, 3Vp-p (typ.):

DC to 2.5MHz	<-55dBc
2.5MHz to 25MHz	<-50dBc
25MHz to 40MHz	<-40dBc
40MHz to 80MHz	<-35dBc

Non-Harmonic Distortion:

DC to 50MHz	<-70dBc
50MHz to 80MHz	<-65dBc

Total Harmonic Distortion:

DC to 100kHz	0.1%
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Flatness (1kHz):

DC to 1MHz	1%
1MHz to 10MHz	3%
10MHz to 25MHz	5%
25MHz to 80MHz	10%

Phase Noise (8 points Sine, Max. SCLK)

100Hz Offset	-80dBc/Hz
1kHz Offset	-89dBc/Hz
10kHz Offset	-92dBc/Hz
100kHz Offset	-112dBc/Hz
1MHz Offset	-140dBc/Hz

TRIANGLE

Start Phase Range: 0-360°

Phase Resolution: 0.01°

Timing Ranges: 0%-99.9% of period

SQUARE

Duty Cycle Range: 0% to 99.9%

Timing Ranges: 0%-99.9% of period

Rise/Fall Time: <4ns (typ.)

Aberration: <5%+10mV

SINC (Sine(x)/x)

"0 Crossings": 4-100

GAUSSIAN

Time Constant: 10-200

EXPONENTIAL PULSE

Time Constant: -100 to 100

DC

Range: -5V to 5V

PULSE

Pulse Mode: Single or double, programmable
Polarity: Normal, inverted or complement

Period:

WW5064	80ns to 1000s
WW1074	40ns to 1000s
WW2074	20ns to 1000s

Resolution:

WW5064	20ns
WW1074	10ns
WW2074	5ns

Pulse Width:

WW5064	40ns to 1000s
WW1074	20ns to 1000s
WW2074	10ns to 1000s

Rise/Fall Time:

Fast	<4ns, typ. (WW5064) <6ns, typ. (WW1074) <8ns, typ. (WW2074)
Linear	20ns to 1000s (WW5064) 10ns to 1000s (WW1074) 5ns to 1000s (WW2074)

High Time, Delay &

Double Pulse Delay: 20ns to 1000s (WW5064)
10ns to 1000s (WW1074)
5ns to 1000s (WW2074)

Impedance:

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:

- 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 1,000,000 to 1. With the 2M/4M option, the ratio is extended to 2,000,000 (4,000,000) to 1, hence the specifications below do not show maximum limit as each must be computed from the above relationship.
- 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.
- The sum of all pulse parameters must not exceed the pulse period setting

HALF-CYCLE WAVEFORMS

Function Shape: Sine, Triangle, Square

Frequency Range: 0.01Hz to 1MHz

Phase (Sine/triangle): 0 to 360°

Phase Resolution: 0.01°

Duty Cycle Range: 0% to 99.9%

Run Modes: Continuous, Triggered

Delay Between Half Cycles

(Continuous only): 200ns to 20s

Delay Resolution 20ns

ARBITRARY WAVEFORMS

Sample Rate:

WW5064	1.5S/s to 50MS/s
WW1074	1.5S/s to 100MS/s
WW2074	1.5S/s to 200MS/s

Vertical Resolution: 16 Bits

Waveform Memory:

WW5064	512k points (1M optional)
WW1074/WW2074	1M points (2M/4M optional)

Min. Segment Size: 16 points

Resolution: 4 points

No. of Segments: 1 to 10k

SEQUENCED WAVEFORMS

Operation: Segments may be linked and repeated in a user-selectable order to generate extremely long waveforms. Segments are advanced using either a command or a trigger

Multi Sequence: 1 to 10, Selectable

Sequencer Steps: 1 to 4k

Segment Duration: 600ns min.

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

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Specification

COMMON CHARACTERISTICS

FREQUENCY

Resolution:

Display 11 digits (limited by 1 μ Hz)
Remote 14 digits (limited by 1 μ Hz)

Accuracy/Stability: Same as reference

ACCURACY REFERENCE CLOCK

Internal 0.0001% (1 ppm 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% \pm 2%, or 50 Ω \pm 5% 0dBm (jumper)

AMPLITUDE

Range: 10mV to 10Vp-p into 50 Ω ;
Double into open circuit
Resolution: 4 digits**Accuracy (1kHz):**

16mV to 160mVp-p \pm (1% + 5mV)
160mV to 1.6Vp-p \pm (1% + 10mV)
1.6V to 10Vp-p \pm (1% + 70mV)

OFFSET

Range: 0 to \pm 4.995V, into 50 Ω
Resolution: 1mV
Accuracy: \pm (1%+1% of Amplitude +5mV)

FILTERS

Type:

Bessel 25MHz or 50MHz
Elliptic 60MHz or 120MHz

OUTPUTS

MAIN OUTPUT

Coupling: DC coupled
Connector: Front panel BNC
Impedance: 50 Ω \pm 1%
Protection: Short Circuit to Case Ground, 10s max

SYNC OUTPUT

Connector: Rear panel BNC
Level: TTL
Sync Type:
Pulse Arbitrary and Standard waves
LCOM Sequence and Burst modes
Position:
WW5064 0 to 512k (1M optional)
WW1074/2074 0 to 1M (2M or 4M optional)
Resolution: 4 points

SAMPLE CLOCK OUTPUT

Connector: Rear panel SMB
Level: 400mVp-p
Impedance: 50 Ω

COUPLE OUTPUT

Connector: Rear panel SMB
Level: LVPECL
Impedance: 50 Ω , terminated to +1.3V

INPUTS

TRIGGER INPUT

Connector: Rear panel BNC
Input Impedance: 10k Ω
Polarity: Positive or negative, selectable
Level: \pm 5V
Sensitivity: 100mV
Damage Level: \pm 12V
Min. Pulse Width: 10ns

EXTERNAL REFERENCE INPUT

Connector: Rear panel SMB
Frequency: 10MHz
Impedance & Level:
Default 10k Ω \pm 5%, TTL, 50% \pm 2%
Option 50 Ω \pm 5%, 0dBm Sinewave

SAMPLE CLOCK INPUT

Connector: Rear panel SMB
Range:
WW5064 1.5Hz to 50MHz
WW1074 1.5Hz to 100MHz
WW2074 1.5Hz to 200MHz
Input Level: 300mVp-p to 1Vp-p
Impedance: 50k Ω
Min. Pulse Width: 4 ns

COUPLE INPUT

Connector: Rear panel SMB
Input Level: LVPECL
Impedance: 50 Ω , terminated to +1.3V
Min. Pulse Width: 4 ns

RUN MODES

Continuous: Free-run output of a waveform.
Triggered: Upon trigger, outputs one waveform cycle. Last cycle always completed.
Gated: External signal transition enables or disables generator output. Last cycle always completed
Burst: Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.**Mixed:**

First output cycle is initiated by a software trigger. Consequent output requires external triggers through the rear panel TRIG IN

TRIGGER CHARACTERISTICS

System Delay: 6 SCLK + 150ns
Trigger Delay: [(0; 200ns to 20s)+system delay]
Trigger Resolution: 20ns
Trigger Delay Error: 6 SCLK + 150ns

EXTERNAL

Source: Rear panel BNC
Trigger Level: \pm 5V
Resolution: 1mV
Input Frequency: DC to 2.5MHz
Min. Pulse Width: 10ns
Slope: Positive/Negative, selectable
Trigger Jitter: \pm 1 sample clock period

INTERNAL / TIMER

Range: 200ns to 20s
Resolution: 20ns
Error: 3 sample clock cycles+20ns

MANUAL

Source: Soft trigger command from the front panel or remote

FREQUENCY COUNTER / TIMER

Measurements: Frequency, Period, Averaged Period, Pulse Width & Totalize
Source: Trigger Input
Range: 10Hz to 100MHz (typ. 120MHz)
Sensitivity: 500mVpp
Accuracy: 1ppm
Slope: Positive/Negative transitions
Gate Time: 100 μ Sec to 1 Sec
Input Range: \pm 5V
Trigger Modes: Continuous, Hold and Gated
Period Averaged:
Range 10ns to 50ms
Resolution 7 digits / Sec
Period and Pulse Width:
Range 500ns to 50ms
Resolution 100ns
Totalize:
Range 10¹²-1
Overflow Led indication

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Specification

INTER-CHANNEL DEPENDENCY

Separate controls: Output on/off, amplitude, offset, standard waveforms, user waveforms, user waveform size, sequence table

Common Controls: Sample clock (Arb), frequency (Std), period (Pulse) reference source, trigger modes, trigger advance source, SYNC OUT.

PHASE OFFSET (LEADING EDGE)

DESCRIPTION: Channel 1 used as start reference channel 2, 3 and 4 can be offset by a programmable number of points. Channels 3&4 must have the same duration in one of the following run modes: Triggered, Burst, or gated.

Jitter Between Channels: 0ps

Offset Range:

WW5064 0 to $\pm 512k$ points (1M opt.)
WW1074/WW2074 0 to $\pm 1M$ points (2M/4M opt.)

Reference: Each CH. in reference to CH 1

Resolution and Accuracy:

Channels 1/2 1 point
Channels 3/4 4 points

Initial Skew: <1ns

Error 1 SCLK

MULTI-INSTRUMENT SYNCHRONIZATION

Initial Skew: <25 ns + 1 SCLK

Waveform Types: Standard, Arbitrary and Sequenced using the automatic sequence advance mode only

Run Modes: Continuous, Triggered, Gated and Counted Burst

LEADING EDGE OFFSET

Run Mode: Continuous run mode only

Offset Range: 200ns to 20s

Resolution: 20ns

GENERAL

Voltage Range: 85 to 265V

Frequency Range: 48 to 63Hz

Power Consumption: 60W

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°C - 50°C
Storage -40°C to + 70°C.

Humidity:

11°C - 30°C 85%
31°C - 40°C 75%
41°C - 50°C 45%

Safety:

EN61010-1, 2nd revision

Calibration:

1 year

Warranty (1):

5 years standard

ORDERING INFORMATION

MODEL	DESCRIPTION
WW5064	50MS/s Four Channel Arbitrary Waveform Generator
WW1074	100MS/s Four Channel Arbitrary Waveform Generator
WW2074	200MS/s Four Channel Arbitrary Waveform Generator

OPTIONS

WW5064:	
Option 1:	1M Memory (per channel)
WW1074/WW2074:	
Option 1:	2M Memory (per channel)
Option 2:	4M Memory (per channel)

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.