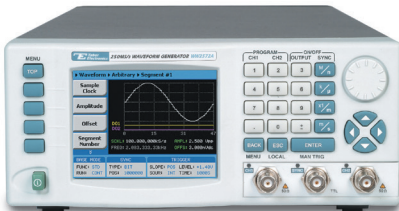



**WONDER WAVE  
SERIES**


## MODELS WW2571/2A

### 250MS/s Single/Dual Channel Arbitrary Waveform Generators

- Single / Dual Channel 250MS/s waveform generator
- Sine waves to 100MHz and Square to 62.5MHz
- 16 Bit amplitude resolution
- 1M waveform memory, 2M/4M optional
- 16Vp-p into 50Ω standard, 20Vp-p into 50Ω (option 3)
- Multiple run modes: trigger, timer and trigger delay
- AM, FM, Arbitrary FM, FSK, ASK, (n)PSK, (n)QAM, Frequency Hop, 3D and sweep
- Powerful sequence generator links and loops segments in user-defined fashion. Stores up to 10 different sequence tables
- 16 Bit LVDS parallel output
- High resolution 3.8" LCD, color display
- LAN, USB and GPIB interfaces
- Multi-Instrument synchronization
- ArbConnection software for easy waveform creation

Model WW2571/2A, is a single/dual channel frequency agile waveform synthesizer that combines industry leading performance, frequency agility and modulation capability in a stand-alone, bench-type product. Having 1.5Hz to 250MHz clock and 16-bit vertical DAC resolution provides the test stimuli required for the decades to come. It can be used as an arbitrary waveform generator, modulating generator, as well as function and pulse generator.

#### 250MS/s Performance

Higher performance test equipment and systems are needed as products which use increasing signal bandwidths are developed. The sample rate generator can be programmed from frequencies as low as 1.5Hz to 250MHz with superior waveform quality and purity. For example, phase noise is typically below 120dB/Hz at 10kHz offset for a 10MHz sine wave.

#### High Speed Function Generator

Interested in standard functions? There are 10 built-in functions that cover most routine

requirements. These are sine, triangle, square, pulse, ramp, sinx/x, Gaussian, exponential, noise, as well as DC. Sine and square waves can be generated from frequencies as low as 100μHz to frequencies as high as 100MHz. All functions and their respective parameters are accessible via the front panel.

#### Waveform Memory

Longer waveform memory minimizes test duration by allowing multiple waveforms to be loaded simultaneously and retrieved as needed for the specific test. Each channel comes with 1M points of memory as standard. Optional 2M or 4M memory is available for applications requiring longer memory.

#### Digital Outputs

16-bits are available as digital patterns from a rear-panel VHDC connector. Output level is LVDS which is efficient and sufficient for high speed digital data transmissions. Digital patterns are built the same way as arbitrary waveforms; thus the immense power of the waveform generator with all its functions and features is harnessed behind this output

turning the WW2571/2A into the most powerful pattern generator in its class.

#### Frequency Agility

Decrypting radio transmission often employs frequency hopping. The WW2571/2A provides breakthrough technology that allows simulation of 12-bit decrypted code as easy as writing a simple hop table. The frequency hop mode is fast, coherent and provides a great tool for simulating code transmission without losing speed and integrity.

#### Accurate Output

As standard, the instrument is equipped with an internal 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 or stability, supported by the instrument's up to 14 digits resolution from remote.

Memory Segmentation and Sequencing Solving almost every complex application, powerful segmentation and sequencing produce an endless variety of complex

# MODELS WW2571/2A

## 250MS/s Single/Dual Channel Arbitrary Waveform Generators

waveforms. The waveform memory can be divided into multiple waveform segments and sequenced in user-selectable fashion to create complex waveforms that have repeatable segments and thus saving precious memory space. Five different advance modes are available for the WW2571/2A series to step through the sequence table, including stepped and mixed advance modes and thus increasing efficiency of the test system. To solve even the toughest application, the products allow generation of up to 10 different sequences, each capable of linking 10k waveform fragments and looping each waveform up to 1M times.

### Modulation Capability

Agility and modulation capabilities open the door to diverse applications. In addition to the capability of generating any shape and style of waveform with the arbitrary waveform generation power, the products can also do standard modulation schemes such as FM, AM, FSK, ASK, (n)PSK, (n)QAM, amplitude and frequency hops, 3D and sweep without sacrificing the power of the instrument control and output run modes.

### Automated External Self-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.

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 WW2571/2A comes with a complete set of drivers, allowing you to write your application in various environments such as: Labview, CVI, C++, VB, 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.

### Phase Control (WW2571/2A)

In the WW2572A, 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 WW2571/2As 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 WW2571/2A

## 250MS/s Single/Dual Channel Arbitrary Waveform Generators

### Specification

#### CONFIGURATION

**Output Channels** 1/2, semi-independent

#### STANDARD WAVEFORMS

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

#### Frequency Range:

Sine 100µHz to 100MHz  
Square, Pulse 100µHz to 62.5MHz  
All others 100µHz to 31.25MHz

#### 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 50MHz <-35dBc  
50MHz to 100MHz <-28dBc

#### Non-Harmonic Distortion:

DC to 50MHz <-70dBc  
50MHz to 100MHz <-65dBc

#### Total Harmonic Distortion:

DC to 100kHz 0.1%

#### Flatness (1kHz)(typical):

DC to 1MHz 1%  
1MHz to 10MHz 3%  
10MHz to 25MHz 5%  
25MHz to 80MHz 10%  
80MHz to 100MHz 15%

#### 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:** -8V to 8V, standard  
-10V to 10V (with option 3)

#### PULSE

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

**Period:** 16ns to 1000s  
**Resolution:** 4ns  
**Pulse Width:** 8ns to 1000s  
**Rise/Fall Time:**  
Fast <4ns (typ.)  
Linear 4ns to 1000s

#### High Time, Delay & Double Pulse Delay:

4ns to 1000s

#### Impedance:

50Ω  
**Amplitude Window:** 16mVp-p to 16Vp-p(1)  
20mVp-p to 20Vp-p (opt. 3)  
Low Level -8V to +7.990V (1)  
-10V to +9.990V (opt. 3)  
High Level -7.990V to +8V (1)  
-9.990V to +10V (opt. 3)  
(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:** 1.5S/s to 250MS/s (typ. 300MS/s)

**Vertical Resolution:** 16 Bits  
**Waveform Memory:** 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

#### MODULATION

#### COMMON CHARACTERISTICS

**Carrier Waveform:** Sinewave  
**Carrier Frequency:** 10Hz to 100MHz  
**Modulation Source:** Internal  
**Run Modes:** Off (Outputs CW), Continuous, Triggered, Delayed Trigger, Burst, Timer and Gated  
**Advance Source:** Front panel button, Software commands, TRIG IN  
**Carrier Idle Mode:** On or Off, programmable  
**Marker Position:** TTL, Programmable at selectable frequency

# MODELS WW2571/2A

## 250MS/s Single/Dual Channel Arbitrary Waveform Generators

### Specification

#### FM

**Modulating Shape:** Sine, square, triangle, ramp  
**Modulation Freq.:** 10mHz to 100kHz  
**Deviation Range:** Up to 50MHz

#### ARBITRARY FM

**Modulating Shape:** Arbitrary waveform  
**Modulating SCLK:** 1S/s to 2.5MS/s  
**Freq. Array Size:** 4 to 10,000 frequencies

#### AM

**Envelope Freq.:** 10mHz to 100kHz  
**Envelope Shape:** Sine, square, triangle, ramp  
**Modulation Depth:** 0% to 100%

#### FSK

**Baud Rate Range:** 1bits/sec to 10Mbits/sec  
**Data Bits Length:** 2 to 4,000

#### PSK

**Carrier Phase:** 0 to 360°  
**Baud Rate Range:** 1bits/sec to 10Mbits/sec  
**Data Bits Length:** 2 to 4,000

#### FREQUENCY HOPPING

**Hop Table Size:** 2 to 1,000  
**Dwell Time Mode:** Fixed / Programmable per step  
**Dwell Time:** 200ns to 20s  
**Time Resolution:** 20ns

#### ASK

**Start/Shift Amp.:** 16mVp-p to 16Vpp into 50Ω  
**Resolution:** Maximum amplitude/4096  
**Baud Rate Range:** 1Bits/s to 10Mbits/s  
**Data Bits Length:** 2 to 4,000

#### AMPLITUDE HOPPING

**Range:** 16mVp-p to 16Vpp into 50Ω  
**Resolution:** Maximum amplitude/4096  
**Dwell Time Mode:** Fixed / Programmable per step  
**Dwell Time:** 200ns to 20s  
**Time Resolution:** 20ns

#### ARBITRARY 3D

**Modulating Shape:** Arbitrary waveform  
**Modulating Type:** Amplitude CH1, Amplitude CH2, Frequency and Phase  
**Modulating SCLK:** 1S/s to 2.5MS/s  
**Memory Size:** 4 to 30,000

#### (n)PSK and (n)QAM

**Carrier Frequency:** 1Hz to 75MHz  
**Carrier Control:** On/Off  
**Modulation Type:** PSK, BPSK, QPSK, OQPSK, PI/4 DQPSK, 8PSK, 16PSK, 16QAM,

64QAM, 256QAM and User Defined

**Symbol Rate:** 1S/s to 1MS/s  
**Carrier Control:** On/Off  
**Symbol Accuracy:** ±(500ns + Carrier Period)  
**Table Size:** 2 to 4096

#### SWEEP

**Sweep Step:** Linear or log  
**Sweep Direction:** Up or Down  
**Sweep Range:** 10Hz to 100MHz  
**Sweep Time:** 1μs to 40s

#### 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% (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% ±2%, or 50Ω ±5% 0dBm (jumper)

##### AMPLITUDE

**Range:**  
 Standard 16mV to 16Vpp, into 50Ω;  
 32mV to 32Vpp, into open Z  
 Option 3 21mV to 20Vpp, into 50Ω;  
 42mV to 32Vpp, into open Z  
 Option 4 16mV to 10Vpp, into 50Ω;  
 32mV to 20Vpp, into open Z  
 4 digits

##### Resolution:

**Accuracy (1kHz):**  
 16mV to 160mVp-p ±(1% + 5mV)  
 160mV to 1.6Vp-p ±(1% + 10mV)  
 1.6V to 12Vp-p ±(1% + 70mV)  
 12V to 16Vp-p ±2%  
 16V to 20Vp-p ±5%

##### OFFSET

**Range:**  
 Standard 0 to ±7.992V, into 50Ω  
 Option 3 0 to ±9.981V, into 50Ω  
 Option 4 0 to ±4.992V, into 50Ω  
**Resolution:** 1mV  
**Accuracy:** ±(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:** 50Ω ±1%  
**Protection:** Short Circuit to Case Ground, 10s max

##### SYNC OUTPUT

**Connector:** Front panel BNC  
**Level:** TTL  
**Sync Type:**  
 Pulse Arbitrary and Standard waves  
 LCOM Sequence and Burst modes  
**Position:** 0 to 1M (2M or 4M optional)  
**Resolution:** 4 points

##### SAMPLE CLOCK OUTPUT

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

##### COUPLE OUTPUT

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

##### DIGITAL PATTERN OUTPUTS

**Connector:** Rear panel SCSI-2, 68-pin VHDC  
**Pattern Width:** 16-bits, differential  
**Source:** Channel 1 only  
**Output Level:** LVDS  
**Pattern Length:**  
 Dedicated Memory 1 to 128k  
 Arbitrary Memory 16 to 1M (2M or 4M optional)  
**Update Frequency:** 100μpps to 250Mpps

#### INPUTS

##### TRIGGER INPUT

**Connector:** Rear panel BNC  
**Input Impedance:** 10kΩ  
**Polarity:** Positive or negative, selectable  
**Level:** ±5V  
**Sensitivity:** 100mV  
**Damage Level:** ±12V  
**Min. Pulse Width:** 10ns

##### EXTERNAL REFERENCE INPUT

**Connector:** Rear panel SMB  
**Frequency:** 10MHz  
**Impedance & Level:**

# MODELS WW2571/2A

## 250MS/s Single/Dual Channel Arbitrary Waveform Generators

### Specification

Default Option 10kΩ ±5%, TTL, 50% ±2%  
50Ω ±5%, 0dBm Sinewave

#### SAMPLE CLOCK INPUT

Connector: Rear panel SMB  
Input Level: 300mVp-p to 1Vp-p  
Impedance: 50kΩ  
Range: 1.5Hz to 250MHz  
Min. Pulse Width: 4 ns

#### COUPLE INPUT

Connector: Rear panel SMB  
Input Level: LVPECL  
Impedance: 50Ω, 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: ±5V  
Resolution: 1mV  
Input Frequency: DC to 2.5MHz  
Min. Pulse Width: 10ns  
Slope: Positive/Negative, selectable  
Trigger Jitter: ±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:** 100µSec to 1 Sec  
**Input Range:** ±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 10<sup>12</sup>-1  
Overflow Led indication

#### INTER-CHANNEL DEPENDENCY (WW2572A)

**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)

Range: 0 to 1M points, 2M/4M optional  
Resolution: 1 point  
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

#### PHASE OFFSET (LEADING EDGE)

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  
GPIO 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%

<sup>(1)</sup> Standard warranty in India is 1 year.

# MODELS WW2571/2A

## 250MS/s Single/Dual Channel Arbitrary Waveform Generators Specification

Safety: EN61010-1, 2nd revision  
Calibration: 1 year  
Warranty <sup>(1)</sup>: 5 years standard

### ORDERING INFORMATION

MODEL	DESCRIPTION
WW2571A	250MS/s Single Channel Arbitrary Waveform Generator
WW2572A	250MS/s Dual Channel Arbitrary Waveform Generator

### OPTIONS

Option 1: 2M Memory (per channel)  
Option 2: 4M Memory (per channel)  
Option 3: 20Vp-p into 50Ω

### 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.