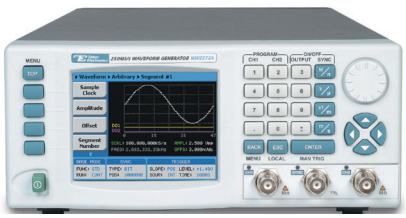
WONDER WAVE SERIES



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

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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:

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 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.

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

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
Resolution:	4 digits
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:	
Default	10kΩ ±5%, TTL, 50% ±2%
Option	50Ω ±5%, 0dBm Sinewave

MODELS WW2571/2A

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

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^{12}-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
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
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.

[1] Standard warranty in India is 1 year.