WAVEXCITER SERIES

40 Years Celebration

New

MODELS WX1284C/ WX2184C

1.25GS/s or 2.3GS/s Four Channel Arbitrary Waveform Generators

- 1.25GS/s or 2.3GS/s, Four Channel 14 Bit waveform generator
- Programmable inter-channel control with 10ps resolution
- Up to 1GHz sine and 500MHz square waves
- 16M waveform memory, 32M memory optional
- 2 selectable output paths:
  - 2Vp-p into 50Ω with 700MHz bandwidth, Differential DC output
  - 4Vp-p into 50Ω with 350MHz bandwidth, Differential DC output
- AM, FM, FSK, PSK, ASK, Amp. Hop, Freq. Hop, Sweep & Chirp
- Powerful pulse composer for analog, digital and mixed signals
- Advanced sequencer for step, loop, nest and jumps scenarios
- 32 Bit LVDS Parallel / Separate Outputs (Option D)
- Four differential programmable markers
- Smart trigger allows: trigger hold-off, detect <=> pulse width, as well as wait-for-waveform-end or abort waveform and restart
- Two instrument synchronization to form an 8-channel system
- User friendly 4" color LCD display
- Remote control through LAN, USB and GPIB
- Store/recall capability on disk-on-key or 4GB internal memory
- LXI Class C compliant

The WX1284C, (1.25GS/s) and the WX2184C, (2.3GS/s) are four channel arbitrary waveform generators, which offer unrivaled performance, in unmatched case size and cost, without compromising bandwidth and signal integrity. Using the very same 12.5" width, 2U height box as the single and dual channel versions of the WX series, the four channel additions provide more channel density for high-speed AWG than ever revealed before in a benchtop, allowing customers to shrink, even further, their bench or system space.

Universal Waveform Source

Aside from its natural ability to generate arbitrary shapes with waveform granularity of 1 point, the WX series can also be used as a full-featured standard, modulation or pulse/ pattern generator to solve various applications. Equipped with up to 2.3GS/s, 14bit DAC and up to 32Mpoints memory, the WX series can generate literally any waveform, short or long, at frequencies up to 1GHz with 12 digits of resolution, resulting in the highest precision signal creation and regeneration without compromising signal fidelity or system integrity.

Signal Integrity and Purity

One of the most important requirements in today's testing and measurement applications is high signal quality. With a typical SSB phase noise of <-115dBc at 100MHz, and <-100dBc at 1GHz, at 10 kHz carrier offset and with exceptionally good SFDR of <-60dBc at 1GHz carrier, Tabor's WX series unique platform delivers one of the best quality signals available on the market today, answering the ever-growing demand for clear and precise signals.

Common or Separate Clocks

The new four channel architecture offers two SCLK sources, enabling users to choose between a common or separate SCLK feed. A common SCLK source allows for all outputs to be fully synchronized with 10ps of skew control for accurate and controlled phase between channels, ideal for many X-Y modes, I&Q output and even 4 channel MIMO link applications. Alternatively, users can select to work with two separate SCLK sources resulting in two separate channel couples (1&2 and 3&4) with each having the ability to be programmed to output different function shapes, frequency, amplitude levels and/or to operate in different run modes, in effect having two separate dual channel instruments in one box.

DC or HV Output Amplifiers

Have a requirement for different output paths in your lab? Great! The new four channels additions to the WX series offer two single or differential ended DC coupled output amplifiers: 2Vp-p into 50Ω with 700MHz bandwidth, for applications demanding optimized transitions and aberrations or 4Vp-p into 50Ω with 350MHz bandwidth, for applications demanding high voltage.

MODELS WX1284C/WX2184C

1.25GS/s or 2.3GS/s Four Channel Arbitrary Waveform Generators

40 Years Celebration

Powerful Segmentation and Sequencing
Solving almost every complex application, powerful segmentation and sequencing produces a nearly endless variety of complex 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, jump and nest, saving you precious memory space. The WX series also allows you to generate up to 1000 sequence scenarios and sequence between them to generate an even higher level of flexibility in waveform creation.

Dynamic Segment / Sequence Control
Working in the real-time world and need fast waveform switching? The WX series has a rear panel control designed specifically for that. Having the dynamic control feature, in effect, can serve as replacement of the sequence table where the real-time application can decide when and for how long a waveform will be generated. For much more complex applications, this same input may serve as a dynamic switch for complete sequences, creating real-life scenarios for real-time applications.

Smart Trigger
Until now, you've been forced to trigger on a specific event. Tabor's all-new SmarTrigger feature was designed to enhance the trigger capability and facilitate wider flexibility of a specific pulse event. It allows triggering on either a pulse having a larger pulse width than a programmed time value (<time), a pulse having a smaller pulse width than a programmed time value (>time), or even on a pulse having a pulse width between two limits (<>time). In addition, the SmarTrigger has a hold-off function, in which the output is held idle after the first trigger and starts a waveform cycle only with the first valid trigger after a hold-off interval has lapsed, allowing you to solve endless «negotiation» scenarios.

Pulse / Pattern Creation
Generating complex pulse trains has never been easier. The Pulse Composer is a powerful built-in tool that converts the WX series to a very sophisticated Pulse/ Pattern Generator, allowing to create literally any complex pulse train / pattern, whether it's a single pulse, multi-level, linear-points, initialization or preamble pattern definition, user-defined or even standard random patterns with programmable resolution, so it doesn't matter if your application is radar communications, nanotechnology or serial bus testing, the pulse/pattern composer is the right tool for your application. Moreover, all the WX series' advanced trigger modes are applicable, hence one can choose to use the "step" mode to advance every bit independently or the "once" mode to advance a complete data block in one trigger event, enabling even more applications, such as trigger, clock and data protocols.

Programmable Markers
The four channel WX is equipped with one programmable differential marker for each output channel. Differential simply means outstanding signal integrity for high frequencies, whereas the programmability allows you to set position, width, delay and amplitude for any required peripheral triggering need. While bench usage enables setting only one marker position, you can set multiple markers and program different marker properties for each transition instance remotely, allowing various triggering profiles.

Digital Outputs (Option D)
In today's world, many applications require multiple digital outputs or a parallel digital interpretation of the analog outputs. With the new digital option the WX now offers 32 programmable digital outputs, up to extra 16M of digital memory, up to 1.15Gb/s of data rate and controllable skew between outputs. Combined with Tabor's dedicated digital signal amplifier, WXD1, the WX is, by far, the best mixed signal source on the market to meet all of today's requirements.

8-Channel Capability
Need more than four channels to drive your application? With two 4-Channel WX units you can reach 8 synchronized channels system using a Master-Slave arrangement, allowing users to benefit from the same high quality performance even for multi-channel needs.

Easy to Use
Large and user-friendly 4" backlit color LCD display facilitates browsing through menus, updating parameters and displaying detailed and critical information for your waveform output. Combined with numeric keypad, ten quick-link function & run mode buttons, cursor position control and a dial, the front panel controls simplify the often complex operation of an arbitrary waveform generator.

Multiple Environments to Write Your Code
The WX series 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.

ArbConnection
ArbConnection is a graphical tool that provides an unlimited source of Arbitrary Waveforms. With the ArbConnection software you can control instruments functions, modes and features. You can also create a virtually infinite amount of test waveforms. Freehand sketch allows you to draw your own custom waveform for quick analysis of analog signals. You can use the built-in equation editor to create your own exotic functions. Add or subtract components of a Fourier series to characterize digital or analog filters or inject random noise into a signal to test immunity to auxiliary noise.

MODELS WX1284C/WX2184C

1.25GS/s or 2.3GS/s Four Channel Arbitrary Waveform Generators

40 Years Celebration

Specification

CONFIGURATION

Output Channels 4, Synchronized/semi separated

STANDARD WAVEFORMS

Type: Sine, triangle, square, ramp, pulse, sin(x)/x, exponential rise, exponential decay, gaussian, noise and DC.

Frequency Range:

Sine	
WX1284C	10kHz to 500MHz
WX2184C	10kHz to 1GHz
Square, Pulse	
WX1284C	10kHz to 350MHz
WX2184C	10kHz to 500MHz
All others	
WX1284C	10kHz to 125MHz
WX2184C	10kHz to 250MHz

SINE

Start Phase: 0 to 360°
Phase Resolution: 0.1°
SFDR (typ.): -60dBc
Harmonics Distortion (typ.):

	1Vpp DC	3Vpp HV
5MHz to 200MHz	<-44dBc	<-40dBc
200MHz to 325MHz	<-50dBc(1)	<-50dBc(1)
325MHz to 425MHz	<-60dBc(1)	<-60dBc(1)
425MHz to 500MHz	<-70dBc(1)	<-70dBc(1)
500MHz to 700MHz	<-32dBc(2)	<-32dBc(2)
700MHz to 1GHz	<-70dBc(2)	<-70dBc(2)

(1) Measured with 500MHz lowpass fiter
(2) Measured with 1GHz lowpass fiter

SSB Phase Noise (10kHz offset, typ.):

1MHz Carrier	<-120dBc/Hz
10MHz Carrier	<-118dBc/Hz
100MHz Carrier	<-115dBc/Hz
250MHz Carrier	<-110dBc/Hz
500MHz Carrier	<-105dBc/Hz
1GHz Carrier	<-100dBc/Hz

PULSE

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

WX1284C	4ns to 5s
WX2184C	2ns to 5s

Resolution:

WX1284C	1ns
WX2184C	500ps

Pulse Width:

WX1284C	2ns to 5s
WX2184C	1ns to 5s

Rise/Fall Time:

Fast	
DC Path	600ps (typical < 500ps)
HV Path	1ns (typical < 900ps)
Linear	
WX1284C	2ns to 100ms
WX2184C	1ns to 100ms

Delay, Double Pulse Delay:

WX1284C	2ns to 1s
WX2184C	1ns to 1s

Amplitude:

Range	
DC Path	50mVp-p to 2Vp-p into 50Ω
HV Path	100mVp-p to 4Vp-p into 50Ω
Levels	
Low Level	-2V to +1.95V
High Level	-1.95V to +2V

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 16,000,000 to 1.
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 1,000,000 to 1.
3. The sum of all pulse parameters must not exceed the pulse period setting.

PULSE / PATTERN COMPOSER

MULTI-LEVEL / LINEAR-POINTS

Number of Levels: 1 to 1000
Dwell Time:

WX1284C	1ns to 1s
WX2184C	500ps to 1s

Memory: 100k
Amp. Resolution: 4 digits
Time Resolution:

WX1284C	1ns
WX2184C	500ps

PATTERN

Pattern Source: PRBS or user-defined
PRBS Type: PRBS7, PRBS9, PRBS11, PRBS15, PRBS23, PRBS31, USER
Data Rate:

WX1284C	1Bit/s to 250MBit/s
WX2184C	1Bit/s to 500MBit/s

Number of Levels: 2, 3, 4, 5
High/Low Levels: ±2V
Resolution: 4 digits
Loops: 1 to 1e6
Preamble: 1 to 16e6
Length: 2 to 16e6

ARBITRARY WAVEFORMS

Sample Rate:

WX1284C	75MS/s to 1.25GS/s
WX2184C	75MS/s to 2.3GS/s

Vertical Resolution: 14 bits
Waveform Memory: 16M points standard, 32M points optional
Min. Segment Size: 192 points
Resolution: 16 points
No. of Segments: 1 to 32k
Waveform Granularity: 1 point
Dynamic control: Software command or rear panel segment control port
Jump Timing: Coherent or asynchronous

SEQUENCED WAVEFORMS

Multi Sequence: 1 to 1,000 unique scenarios
Sequencer Steps: 1 to 48k steps.
Segment Loops: 1 to 16M cycles, each segment
Sequence Loops: 1 to 1M ("Once" mode only)
Step Advance Modes: Continuous, once and stepped

SEQUENCED SEQUENCES

Sequence Scenarios: 1 Scenario
Dynamic Control: Software command or rear panel sequence control port
Table Length: 1 to 1k steps
Advance Control: Continuous, once and stepped
Sequence Loops: 1 to 1,000,000 cycles

MODULATION

COMMON CHARACTERISTICS

Carrier Waveform: Sine
Carrier Frequency:

WX1284C	10kHz to 500MHz
WX2184C	10kHz to 1GHz

Modulation Source: Internal

FM

Modulation Shape: Sine, square, triangle, ramp
Modulation Freq.:

WX1284C	100Hz to 50MHz
WX2184C	100Hz to 100MHz

Deviation Range:

WX1284C	10mHz to 250MHz
WX2184C	10mHz to 500MHz

SWEEP / CHIRP

Sweep Type: Linear or log
Sweep Direction: Up or down
Sweep Time: 1.4 µs to 10ms
Modulation Shape: Pulse
Pulse Repetition:

Range	200ns to 20s
Resolution	3 digits
Accuracy	100ppm

MODELS WX1284C/WX2184C

1.25GS/s or 2.3GS/s Four Channel Arbitrary Waveform Generators

40 Years Celebration

Specification

FSK / FREQUENCY HOPPING

FSK Baud Rate:	
WX1284C	10mbps to 250Mbps
WX2184C	10mbps to 500Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	
WX1284C	4ns to 10s
WX2184C	2ns to 10s
Dwell Time Res.:	
WX1284C	4ns
WX2184C	2ns

AM

Modulation Shape:	Sine, square, triangle, ramp
Modulation Freq.:	100Hz to 1MHz
Modulation Depth:	0.1 to 200%

ASK / AMPLITUDE HOPPING

ASK Baud Rate:	
WX1284C	10mbps to 250Mbps
WX2184C	10mbps to 500Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	
WX1284C	4ns to 10s
WX2184C	2ns to 10s
Dwell Time Res.:	
WX1284C	4ns
WX2184C	2ns

(n)PSK and (n)QAM

Modulation Type:	PSK, BPSK, QPSK, OQPSK, PI/4 DQPSK, 8PSK, 16PSK, 16QAM, 64QAM, 256QAM and User Defined
Symbol Rate Range:	
WX1284C	10mbps to 250Mbps
WX2184C	10mbps to 500Mbps
Symbol Accuracy:	1ppm
Table Size:	2 to 256

COMMON CHARACTERISTICS

FREQUENCY

Resolution:	12 digits
Accuracy/Stability:	Same as reference

ACCURACY REFERENCE CLOCK

Internal	1 ppm from 19°C to 29°C; 1ppm/°C below 19°C or above 29°C; 1 ppm/year aging rate
External	Same as accuracy and stability of the external ref.

OUTPUTS

MAIN OUTPUTS

Coupling:	DC-coupled
Connectors:	Front panel SMAs
Impedance:	50Ω nominal, each output
Protection:	Protected against temporary short to case ground

DC-COUPLED

Type:	Single-ended or differential
Resolution:	4 digits
Accuracy:	±(2% +2 mV), offset = 0V
Overshoot:	5%, typical

DC PATH

Rise/Fall Time:	<600ps (typical <500ps)
Amplitude Range:	
Single-ended	50mVp-p to 2Vp-p*
Differential	100mVp-p to 4Vp-p*

HV PATH

Rise/Fall Time:	1ns (typical < 900ps)
Amplitude Range:	
Single-ended	50mVp-p to 4Vp-p*
Differential	100mVp-p to 8Vp-p*

* Double into high impedance

OFFSET

Offset Range:	-1V to + 1V into 50Ω
Offset Resolution:	4 digits
Offset Accuracy:	±2% + 15mV

MARKER OUTPUTS

Number of Markers:	Four markers, one per channel
Type:	Differential (+) and (-) outputs
Connectors:	SMB
Skew Between Markers:	100ps, typical
Impedance:	50Ω
Amplitude Voltage:	
Low level	0V
High level	0.5V to 1.2V, single-ended; 0V to 2.4V, differential
Resolution:	10mV
Accuracy:	10% of setting
Width control:	2 SCLK to segment length;
Position control:	
Range	0 to segment length
Resolution	2 points
Initial delay:	4ns±½ clock (Output to marker)
Variable delay:	
Control	Separate for each channel
Range	0 to 3ns
Resolution	10ps
Accuracy	±(10% of setting +20ps)
Rise/Fall Time:	<1ns, typical

DIGITAL OUTPUTS (OPTION D)

Number of Bits:	32 output channels
Type:	Differential (+) and (-) outputs
Connectors:	High speed I/O receptacle, 68-pin VRDPC
Skew Between Bits:	100ps, typical
Level:	LVDS
Impedance:	100Ω
Max. Data Rate:	
WX1284C	625Mb/s
WX2184C	1.15Gb/s
Pattern Memory:	Up to 16MWord
Source	Dedicated or parallel

SYNC OUTPUT

Connector:	Rear panel BNC
Source:	Channels 1/2 or channels 3/4
Type:	Single ended
Waveform Type:	
Pulse	16 points width
WCOM	Waveform complete
Impedance:	50Ω
Amplitude:	1V; doubles into high impedance
Variable Position Control:	
Range	0 to segment length
Resolution	16 points
Rise/Fall Time	2ns, typical

INPUTS

TRIGGER INPUT

Connector:	Rear panel BNC
Input Impedance:	10kΩ or 50Ω, selectable
Polarity:	Positive, negative, or both
Damage Level:	±20Vdc
Frequency Range:	0 to 15MHz
Trigger Level Control:	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
Min. Pulse Width:	10 ns

EVENT INPUT

Connector:	Rear panel BNC
Input Impedance:	10kΩ or 50Ω, selectable
Polarity:	Positive, negative or either
Damage Level:	±20Vdc
Frequency Range:	0 to 15MHz
Trigger Level Control:	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2 Vp-p minimum
Min. Pulse Width:	10 ns

MODELS WX1284C/WX2184C

1.25GS/s or 2.3GS/s Four Channel Arbitrary Waveform Generators

40 Years Celebration

Specification

SEQUENCE/SEGMENT CONTROL INPUT

Connectors:	Rear panel D-sub, 8 bit lines
Input Impedance:	10kΩ
Input Level:	TTL

EXTERNAL REFERENCE INPUT

Connector:	Rear panel BNC
Input Frequency:	10, 20, 50 or 100MHz
Input Impedance:	50Ω
Voltage Swing:	-5dBm to 5dBm
Damage Level:	10dBm

EXTERNAL SAMPLE CLOCK INPUT

Connector:	Rear panel SMA
Input Impedance:	50Ω
Voltage Swing:	-20dBm to 5dBm
Input Frequency:	
WX1284C	75MHz to 1.25GHz
WX2184C	75MHz to 2.3GHz
Clock Divider:	1/1, 1/2, 1/4, 1/8, 1/16 separate for channels 1/2 & 3/4
Damage Level:	15dBm

RUN MODES

Continuous:	A selected output function shape is output continuously.
Self Armed:	No start commands are required to generate waveforms.
Armed:	The output dwells on a DC level and waits for an enable command and then the output waveform is output continuously; An abort command turns off the waveform.
Triggered:	A trigger signal activates a single-shot or counted burst of output waveforms and then the instrument waits for the next trigger signal.
Normal Mode	The first trigger signal activates the output; consecutive triggers are ignored for the duration of the output waveform.
Override Mode:	The first trigger signal activates the output; consecutive triggers restart the output waveform regardless if the current waveform has been completed or not.
Gated:	A waveform is output when a gate signal is asserted. The waveform is repeated until the gate signal is de-asserted. Last period is always completed.
Burst:	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.

TRIGGER CHARACTERISTICS

EXTERNAL

Connector:	Rear panel BNC
Input Impedance:	10kΩ or 50Ω, selectable
Polarity:	Positive, negative, or both
Damage Level:	±20Vdc
Frequency Range:	0 to 15MHz
Trigger Level Control:	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
Pulse Width:	10 ns, minimum
System Delay:	200 SCLK periods + 50ns
Trigger Delay:	Separate for each channel
Range	0 to 4,000,000 SCLK periods
Resolution	4 points
Accuracy	Same as SCLK accuracy
Smart Trigger:	Detects a unique pulse width
Conditioned Trigger:	< pulse width, > pulse width or <>pulse width
Pulse Width Range	50ns to 2s
Resolution	2ns
Accuracy	±(5% of setting +20ns)
Trigger Hold-off:	Ignores triggers for a hold-off
Hold-off range	100ns to 2s
Resolution	2ns
Accuracy	±(5% of setting +20ns)
Trigger jitter:	4 SCLK periods;

INTERNAL

Source:	Common or separate
Modes:	
Timer	Waveform start to waveform start
Delayed	Waveform stop to waveform start
Timer:	
Range	200ns to 2s
Resolution	3 digits
Accuracy	100ppm
Delay	
Range	80 to 4,000,000 SCLK periods
Resolution	Divisible by 4

MANUAL

Source:	Soft trigger command from the front panel or remote

INTER-CHANNEL SKEW CONTROL

Initial skew:	200ps
Control:	
Range	
1/2 to 3/4	-3ns to +3ns
1 to 2 & 3 to 4	-100ps to +100ps
Resolution	10ps
Accuracy:	(10% of setting + 20ps)

CHANNELS 1/2 TO 3/4 OFFSET CONTROL

Initial skew:	200ps
Control:	
Range	0 to waveform-length points
Resolution	4 points
Accuracy:	Same as SCLK accuracy

TWO INSTRUMENTS SYNCHRONIZATION

Initial Skew:	20ns + 0 to 8 SCLK
Offset Control:	0 to Waveform length
Offset Resolution:	4 SCLK increments
Skew Control:	-5ns to 5ns
Skew Resolution:	10ps

GENERAL

Voltage Range:	100VAC to 240VAC
Frequency Range:	50Hz to 60Hz
Power Consumption:	150VA
Display Type:	TFT LCD, 4 “, 320 x 240 pixels
Interfaces:	
USB	1 x front, USB host, (A type); 1 x rear, USB device, (B type)
LAN	1000/100/10 BASE-T
GPIB	IEEE 488.2 standard interface
Segment control	2 x D-sub, 9 pin
Dimensions:	
With Feet	315 x 102 x 395 mm (WxHxD)
Without Feet	315 x 88 x 395 mm (WxHxD)
Weight:	
Without Package	4.5kg
Shipping Weight	6kg
Temperature:	
Operating	0°C to 40°C
Storage	-40°C to 70°C
Humidity:	85% RH, non condensing
Safety:	CE Marked, IEC61010-1
EMC:	IEC 61326-1:2006
Calibration:	2 years
Warranty [1]:	5 years standard

ORDERING INFORMATION

MODEL	DESCRIPTION
WX1284C	1.25GS/s Four Channel Arbitrary Waveform Generator
WX2184C	2.3GS/s Four Channel Arbitrary Waveform Generator

OPTIONS

Option 1:	32M Memory (per channel)
Option D:	32 Bits / Digital Outputs

ACCESSORIES

Sync Cable:	Multi-instrument synchronization
S-Rack Mount:	19” Single Rack Mounting Kit
Case Kit:	Professional Carrying Bag

[1] Standard warranty in India is 1 year.

[2] Options and Accessories must be specified at the time of your purchase.