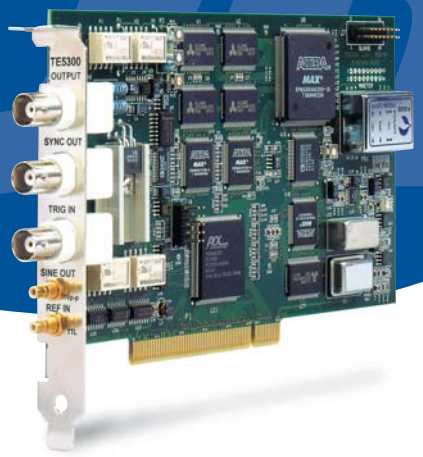
125MS/s PCIBus Arbitrary Waveform Generator



MODEL TE5300

- **Single-channel 125 MS/s waveform generator**
- **Multiple instrument synchronization**
- **14 Bit vertical resolution**
- **2 M waveform memory**
- **1 ppm clock accuracy and stability**
- **Extensive modulation capabilities AM, FM, Arbitrary FM, FSK, Ramped FSK and Sweep**
- **10 digits sample clock frequency setting, limited by 1µS/s**
- **Waveform sequencing with up to 4096 segments and sequences**
- **Occupies a single PCI slot only**
- **Ultra fast waveform downloads using DMA**
- **Extremely low phase noise carrier**
- **ArbConnection software for easy waveform creation & control**

Model 5300 is a Single-Channel PCI-based Arbitrary Waveform Generator. It is a high performance waveform generator that combines many powerful functions in one small package. Supplied free with the instrument is ArbConnection software, which is used for controlling the 5300 and for generating, editing and downloading waveforms from a remote computer.

PCIbus: A Cost Effective Format
The 5300 is a sensible alternative to a GPIB-based waveform generator when developing a PCI-based test system. The 5300 provides a synergistic combination of a function generator, arbitrary waveform synthesizer, programmable sequencer, pulse generator, and modulation generator in one instrument. The 5300 delivers all this at a lower cost than comparable bench-type, or VXI-based instruments. This versatility ensures that the Model 5300 will adapt to future testing needs as well as current ones.

125 MS/s Sample Rate
New technology requirements are driving communications systems to use increasingly narrow channel width. A high sample rate of 125 MS/s makes the 5300 an ideal modulation source for troubleshooting new encoding schemes. The 5300 also provides high-speed waveforms to simulate signal distortion, power line cycle dropouts, video signals, component failures and power supply transients.

14 Bit Resolution
The 14-bit resolution provides 16,384 output levels. This means that even audio waveforms can be generated with excellent fidelity. It also allows video - and other complex waveforms - to be generated with small details superimposed on large signals, in order to test the response of receiving systems.

2M Waveform Memory
The 5300 provides 2M of waveform memory as standard, far more than competitive models. This waveform memory is accessible via a high-speed interface. Also, waveform memory is segmentable, allowing the storage of up to 4096 different waveforms of variable size. 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.

Sequences of up to 4096 Waveforms
Powerful sequencing capability allows linkage of up to 4096 waveform segments and/or bursts (repeated segments) into strings. A segment can be repeated up to 128K times in burst mode. Sequenced functions run continuously or are initiated by a trigger. It is also possible to mix continuous and triggered segments within one sequence. These sequencing features permit the creation of complex waveform or pulse patterns using minimal amounts of memory. Sequences are created by writing a sequence table.
Sequence table download is extremely fast because ArbConnection writes to registers and does not require the overhead of an embedded controller.

TABOR ELECTRONICS Ltd.

125MS/s PCIBus Arbitrary Waveform Generator

Model TE5300



Flexible Triggering Capability
Combining PCIbus trigger lines with the 5300 sync capability transforms the instrument into an Arbitrary Trigger Generator. In addition to continuous output, the instrument can also wait for a trigger to initiate a single waveform, a burst of waveforms or a sequence of waveforms. Triggers can also be used to advance a sequence of waveforms one segment at a time. The 5300 accepts the trigger s for multiple sources: eight backplane trigger lines plus STAR trigger, front panel trigger input, and manual commands such as *TRG

Sample Clock Agility
The Model 5300 has outstanding low phase noise characteristics and carrier stability. Such characteristics are very much needed for telecommunication and channel separation applications. On the other hand, the output of the 5300 can be made extremely agile for applications needing sweep, FSK and FM. The sample clock of the instrument is derived from a DDS (Direct Digital Synthesis) circuit so controlling instantaneous frequency is a matter of changing its input bits. You, as a user, should not really care how it is done but the end result is magnificent: functions like wide-band FM, wander, linear and logarithmic sweep are easily created and executed by the generator. A unique and extremely useful feature of ArbConnection is the FM Composer. The FM composer screen looks very much like the Wave Composer screen except the "Y" axis is given in units of frequency, so waveforms you create using the FM composer generate frequency change over time. You can create any arbitrary waveform shape or even use the equation editor to generate exotic shapes which eventually you can use to frequency modulate your main output.

Arbitrary Waveforms
The last but not least is flexibility of the 5300 as an Arbitrary Waveform Generator. 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 MathLab, ASCII files etc. Anything you can show on one of the composer screens is downloaded in a split of a second and generated by the main output. Place 2 or more Model 5300`s in a chassis and harness the power of multi-instrument synchronization to create multiple, phase-controlled output channels. Then vary module-to-module phase offsets to create multi-phase signal source. Really exciting!

ArbConnection
Unlimited Source of Arbitrary Waveforms. With the ArbConnection software you can control instruments functions, modes and features. You can also create virtually an unlimited variety 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

125MS/s PCIBus Arbitrary Waveform Generator

Model TE5300



Service and Support
Beyond providing precision Test & Measurement instruments, Tabor Electronics provides unparalleled service and support, and is continuously finding new ways to bring added value to its customers.

Our after-sales services are comprehensive. They include all types of repair and calibration, and a single point of contact that you can turn to whenever you need assistance. As part of our extensive support, we offer individualized, personal attention Help Desk, both online and offline, via e-mail, phone or fax.

Tabor Electronics maintains a complete repair and calibration lab as well as a standards laboratory in Israel and USA. Service is also available at regional authorized repair/calibration facilities.

Contact Tabor Electronics for the address of service facilities nearest you.

Applications
For expert technical assistance with your specific needs and objectives, contact your local sales representative or our in-house applications engineers.

Manuals, Drivers, and Software Support
Every instrument comes equipped with a dedicated manual, developer libraries, IVI drivers, and software. However, if your specific manual is lost or outdated, Tabor Electronics makes it possible to log-on to its Download Center and get the latest data “in a click”.

Product Demonstrations
If your application requires that you evaluate an instrument before you purchase it, a hands-on demonstration can be arranged by contacting your local Tabor Electronics representative or the Sales Department at our Corporate Headquarters.

Three-year Warranty
Every Tabor Electronics instrument comes with a three-year warrantee. Each one has full test results, calibration certificate, and CD containing product's manual and complete software package. Our obligation under this warranty is to repair or replace any instrument or part thereof which, within three years after shipment, proves defective upon examination. To exercise this warranty, write or call your local Tabor representative, or contact Tabor Headquarters and you will be given prompt assistance and shipping instructions.

Specification 125MS/s PCIBus Arbitrary Waveform Generator

Model TE5300



STANDARD WAVEFORMS

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

Frequency Range: Waveform dependent
Source: Internal synthesizer

SINE

Frequency Range: 100µHz to 50MHz
Band Flatness: 5% to 10MHz; 20%, to 50MHz

Programmable Parameters: Start phase, 0 to 360°

Harmonics and non-related spurious: at 5Vp-p < -55dBc for carrie frequencies 1MHz
< -45dBc for carrier frequencies 5MHz
< -35dBc for carrier frequencies 10MHz
< -22dBc for carrier frequencies 50MHz

Total Harmonic Distortion: 0.05% to 100kHz

TRIANGLE

Frequency Range: 100µHz to 12.5MHz
Start phase: 0 to 360°C

SQUARE

Frequency Range: 100µHz to 50MHz
Duty cycle: 1% to 99%
Rise/Fall time: <10ns
Aberration: <5% ±10mV

PULSE

Frequency Range: 100µHz to 6.25MHz
Adjustable Parameters:

Delay	0% to 99.9% of period
Rise Time	0% to 99.9% of period
High Time	0% to 99.9% of period
Fall Time	0% to 99.9% of period

Rise/Fall time: <10ns
Aberration: <5% ±10mV

RAMP

Frequency Range: 100µHz to 12.5MHz
Adjustable Parameters:

Delay	0% to 99.9% of period
Rise Time	0% to 99.9% of period
Fall Time	0% to 99.9% of period

SINC (SINE(x)/x)

Frequency Range: 100µHz to 6.25MHz
"0" Crossing: 4 to 100 cycles

GAUSSIAN PULSE

Frequency Range: 100µHz to 6.25MHz
Time Constant: 10 to 200

EXPONENTIAL FALL/RISING PULSE

Frequency Range: 100µHz to 6.25MHz
Time Constant: -20 to 20

REPETITIVE NOISE

Bandwidth: 25MHz

DC

Range: -100% to 100% of amplitude

ARBITRARY WAVEFORMS

SAMPLE CLOCK

Range: 100mS/s to 125MS/s
Vertical Resolution: 14bits
Waveform Memory: 2M points standard
Download Rate: 5M points per second

MEMORY SEGMENTATION

No. of Segments: 1 to 4096
Min Segment Size: 16 points
Memory Interleave: 4 (All trace lengths must be multiples of 4)

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.

Advance Modes: Automatic Sequence Advance
No triggers required to step from one segment to the next. Sequence is repeated continuously through a pre-programmed sequence table

Stepped Sequence Advance: Current segment is sampled continuously, external trigger advances to next programmed segment. Control input is TRIG IN connector.

Single Sequence Advance: Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment. Control input is TRIG IN connector.

Mixed Sequence Advance: Each step of a sequence can be programmed to advance either a) automatically (Automatic Sequence Advance), or b) with a trigger (Stepped Sequence Advance)

Advance Source: External, Internal or software trigger
Sequencer steps: From 1 to 4096
Segment loops: From 1 to 128k

COMMON CHARACTERISTICS

MAIN OUTPUT

Connector: Front panel BNC
Stand-by: Output Off or Normal
Impedance: 50Ω, ±1%
Protection: Protected against temporary short to case ground

FREQUENCY

Resolution: 10 digits limited by 1S/s
Accuracy: 1ppm
Stability: 1ppm

REFERENCE

Standard: 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% ±2% duty cycle

AMPLITUDE

Range: 100mV to 10Vp-p, into 50Ω; Double into open circuit
Resolution: 4 digits

Specification 125MS/s PCIBus Arbitrary Waveform Generator

Model TE5300



ACCURACY(1kHZ)

1V to 10Vp-p	±(1% + 10mV)
100mV to 999.9mVp-p	±(1% + 1mV)

OFFSET

Range:	0 to ±4.5V, amplitude dependent
Resolution:	2.2mV

ACCURACY

4V window:	±(1% of reading + 1% of amplitude + 2mV)
400mV window:	±(1% of reading + 1% of amplitude + 200V)

FILTERS	50MHz Elliptic 25MHz Elliptic

SYNC/MARKER OUTPUT

Outputs:	Front panel SYNC Output BNC connector
Impedance:	50Ω, ±1%
Level:	>2V into 50Ω, 4V nominal into 10kΩ
Protection:	Protected against temporary short to case ground
Validators:	BIT, LCOM
Position:	Point 0 to n, Programmable with 4-point resolution
Width Control:	Programmable
Range:	4 to 100000 waveform points
Resolution:	4 points
Source:	Main output

SINEWAVE OUTPUT

Connector:	Front panel SMB
Impedance:	50Ω, ±1%
Level:	1V into 50Ω
Protection:	Protected against temporary short to case ground
Source:	Sample clock frequency
Frequency Range and Resolution:	Same as Sample clock
Flatness:	-3dB at 100MHz
Total Harmonic Distortion:	0.3% to 100kHz
Harmonics and non-related spurious:	-55dBc to 1MHz -45dBc to 10MHz -35dBc to 100MHz

INPUTS

TRIG Input

Connector:	Front panel BNC
Impedance:	10kΩ, ±5%
Threshold Level:	TTL
Min Pulse Width:	20ns
Slope:	Positive or negative going edge.

10 MHz REFERENCE INPUT

Connector:	Front panel SMB
Impedance:	10kΩ, ±5%
Threshold Level:	TTL
Duty Cycle:	50%, ±5%

MODULATION

FM

Waveform Modulation:	Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian Pulse, Exponential Fall, Rising Pulse, Noise, DC, Arb
Source:	Internal
Resolution:	10 digits
Accuracy:	0.1%
Modulating Frequency Distortion:	<0.1%
Deviation Range:	100mS/s to 125MS/s
Trigger Advanced Mode:	Automatic, Triggered, Gated or Software Command
Marker	
Output & Level:	Same as SYNC output.
Position:	Fixed at carrier frequency

FM - BUILT-IN STANDARD WAVEFORMS

Carrier Waveforms:	Sine, Square, Triangle and Ramp
Modulation Frequency Range:	1 mHz to 100 kHz

FM - DOWNLOADED ARBITRARY WAVEFORMS

Modulation Source:	User waveform, any shape, 10 to 20000 waveform points
Modulation sample clock Range:	1mS/s to 2MS/s
Download Rate:	5Meg points per second

FSK

Carrier Sample Clock Range:	100mS/s to 125MS/s
Source:	External, Front panel Trigger input BNC. Low level Carrier sample clock High level Hop frequency
Frequency Range:	From 10MHz to DC
FSK Delay:	Minimum 1 waveform cycle + 50ns

RAMPED FSK

Ramp Time Range:	10s to 1s, 3 digits, ±0.1%

Sweep

Carrier Waveforms:	Sine, Square, Triangle, Ramp, Arb
Type:	Linear or Logarithmic
Direction:	Up or down, depending on the start and stop setting
Sweep Time:	1ms to 1000 s, 7 digits, ±0.1%
Range:	100mS/s to 125MS/s
Trigger Advanced Mode:	Automatic, Triggered, Gated or Software Command
Marker	
Output & Level:	Same as SYNC output.
Position:	Programmable for selected frequency

TRIGGERING CHARACTERISTICS

TRIGGER SOURCES

EXTERNAL

Connector:	Front panel BNC
Level:	TTL
Slope:	Positive or negative
Frequency:	DC to 5MHz
Impedance:	10kΩ, DC coupled

INTERNAL

Range:	100mHz to 2MHz
Resolution:	7 digits
Accuracy:	0.01%

Software:	SCPI command

Specification 125MS/s PCIBus Arbitrary Waveform Generator

Model TE5300



TRIGGER START PHASE

Description:	Waveform starts from point n and completes at point n-1.
Range:	0 to 1999999 waveform points (2M)
Resolution:	4 points

START/STOP CONTROL (BREAKPOINT)

Range:	0 to 1999999 waveform points (2M)
Source:	External (Rear Panel Trigger Input BNC) or software command
Resolution:	4 points
Breakpoint Error:	±4 points

SYSTEM DELAY

Trigger to waveform output:	1 Sample Clock+120ns

GATED MODE	External signal enables generator. First output cycle synchronous with the active slope of the triggering signal. Last cycle of output waveform always completed

BURST

Waveforms:	Sine, Triangle, Square, Pulse, Ramp, Sinc (Sine(x)/x), Gaussian Pulse, Exponential Fall, Rising Pulse, Noise, DC, Arb
Number of cycles per burst:	1 to 128k
Trigger source:	Manual, External or Internal

MULTI-INSTRUMENT SYNCHRONIZATION

Description	Multiple instruments can be connected together and synchronized to provide multi-channel synchronization.

SAMPLE CLOCK

Source:	From Master card to slave boards through the local bus
Range and Resolution:	Same as Sample Clock, but limited to 80MS/s
Initial Skew:	<20ns to the first master; 20ns cumulative to additional slaves

Phase Offset Between Instruments:	Programmable from 0 to n points

GENERAL

Power Requirements:	10Wmax
Current Consumption:	+5V - 30mA +12V - 200mA -12V - 200mA +3.3V - 1.4A
Operating temperature:	0ºC - 40ºC
Humidity (non-condensing)	11ºC to 30ºC: 85 % 31ºC to 40ºC: 75 %
Storage temperature:	-40ºC to + 70ºC.
Dimensions:	Single width, 3U high
Weight:	Approx 0.5kg
Safety:	Designed to meet IEC 1010-1, UL 3111-1, CSA 22.2 #1010
EMC:	CE marked.
Reliability:	MTBF per MIL-HDBK-217E, 25°C, Ground Benign
Workmanship Standards:	Conform to IPC-A-610D
Supplied Accessories:	CD containing Operating Manual, ArbConnection software and developer libraries.
Warranty:	3 years standard

ORDERING INFORMATION

MODEL	5300
125MS/s PCIBus Arbitrary Waveform Generator	

TABOR ELECTRONICS Ltd.