Model 5201/5300 is a Single-Channel Arbitrary Waveform / Function Generator that combines many powerful functions in one small package. Supplied free with the instrument is ArbConnection software, which is used for controlling the 5201/5300 and for generating, editing and downloading waveforms from a remote computer.

A Cost Effective Format
The 5201/5300 is a sensible alternative to a GPIB-based waveform generator when developing a PXI or PCI based test system. The 5201/5300 provides a synergistic combination of a function generator, arbitrary waveform synthesizer, programmable sequencer, pulse generator, and modulation generator in one instrument. The 5201/5300 delivers all this at a lower cost than comparable bench-type, or VXI-based instruments. This versatility ensures that the Model 5201/5300 will adapt to future testing needs as well as current ones.

Sample Rate
New technology requirements are driving communications systems to use increasingly narrow channel width. A sample rate of 125MS/s makes the 5201/5300 an ideal modulation source for troubleshooting new encoding schemes. The 5201/5300 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 5201/5300 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.

Arbitrary Waveforms
The last but not least is flexibility of the 5201/5300 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 MATLAB, 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.
**MODELS 5201/5300**

125MS/s PXIBus / PCIBus Arbitrary Waveform / Function Generators

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**Sample Clock Agility**

The Model 5201/5300 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 5201/5300 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.

**Flexible Triggering Capability (5201 only)**

Combining PXibus trigger lines with the 5201 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 5201 accepts the triggers from multiple sources: eight backplane trigger lines plus STAR trigger, front panel trigger input, and manual commands such as *TRG.

**Multi-Instrument Synchronization**

Place 2 or more Model 5201/5300’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 Fourier series to characterize digital or analog filters or, inject random noise into a signal to test immunity to auxiliary noise.

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45 YEARS OF INNOVATION
MODELS 5201/5300
125MS/s PXIBus / PCIBus Arbitrary Waveform / Function Generators

Specification

CONFIGURATION
No. of Channels: 1
Interface: 5201 PXIBus
5300 PCIBus

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

Frequency Range:
- Sine: 100µHz to 50MHz
- Square: 100µHz to 50MHz
- Pulse: 100µHz to 50MHz
- All others: 100µHz to 15MHz

ARBITRARY WAVEFORMS
Sample Rate: 100MS/s to 125MS/s
Vertical Resolution: 14 Bits
Waveform Memory: 2M points standard
Min. Segment Size: 16 points
Resolution: 4 points
No. of Segments: 1 to 4k
Download Rate: 5Mpoint per second

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.

Sequencer steps: 1 to 4k
Min. Seg. Duration: 1µs
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 idle time. 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 II), Internal or software

MODULATION
COMMON CHARACTERISTICS
Carrier Waveform: Sine, Triangle, Square, Pulse, Ramp, Sine(x)/x, Gaussian, Repetitive Noise, DC and Arb

Carrier SCLK: 100MS/s to 125MS/s
Carrier Frequency: Waveform dependent
Resolution: 14 digits, limited by 1µHz
Accuracy: 0.1%
Freq. Distortion: <0.1%

Modulation Source: AM, FM, Arbitrary FM, Sweep

FM
Modulating Shape: Sine, Square, Triangle / Ramp
Modulation Freq.: 1mHz to 100kHz
Deviation Range: 100mS/s to 50MS/s

ARBITRARY FM
Modulating Shape: Arbitrary waveform, 10 to 20000 waveform points
Modulating SCLK: 1mS/s to 2MS/s
Deviation Range: 100mS/s to 50MS/s

AM
Envelope Freq.: 1µHz to 50kHz
Modulation Depth: 0% to 100%

FSK
Type: Hop or Ramp
Low level: Carrier sample clock
High level: Hop frequency
Baud Rate Range: 1bits/sec to 10Mbits/sec
Min. FSK Delay: 1 waveform cycle + 50ns
Ramp FSK:
Time: 10µs to 1s
Resolution: 3 digits

SWEEP
Sweep Time: 1ms to 1000s
Sweep Step: Linear, Logarithmic or Arb
Sweep Direction: Up or down

COMMON CHARACTERISTICS
FREQUENCY
Resolution: 14 digits limited by 1µC/s
Accuracy/Stability: Same as reference

ACCURACY REFERENCE CLOCK
Internal: 0.0001% (1ppm TCXO)
initial tolerance over a 10°C to 30°C temperature range; 1ppm/year below 18°C and above 28°C; 1ppm/year aging rate
10MHz TTL, 50% duty cycle

EXTERNAL: 5201 5300

AMPLITUDE
Range: 5201 80mV to 8Vp-p, into 50Ω
5300 100mV to 10Vp-p, into 50Ω
* Double into open circuit
Resolution: 4 digits
Accuracy (1kHz): 100mV to 1Vp-p ±(1% + 1mV)
1Vp-p to 10Vp-p ±(1% + 10mV)

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MODELS 5201/5300
125MS/s PXIBus / PCIBus Arbitrary Waveform / Function Generators

Specification

OFFSET
Range:
5201 0 to ±3.6V
5300 0 to ±4.5V
Resolution: 2.2 mV
Accuracy:
500mV Window ±1% of reading + 1% of amplitude + 2mV)
5V Window ±1% of reading + 1% of amplitude + 20mV)

FILTERS
Type: 25MHz / 50MHz Elliptic

OUTPUTS
MAIN OUTPUT
Coupling: DC coupled
Connector: Front panel BNC
Impedance: 50Ω, ±1%
Protection: Protected against temporary short to case ground

SYNC/MARKER OUTPUT
Connector: Front panel BNC
Impedance: 50Ω, ±1%
Level: >2V into 50Ω, 4V into 10kΩ
Validators: BIT, LCOM
Protection: Protected against temporary short to case ground
Position: Point 0 to n
Width: 4 to 100000 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: 100MHz to 125MHz
Resolution: Same as Sample clock
THD: 0.25% to 100kHz
SFDR: <-30dBc to 125MHz

INPUTS
TRIGGER INPUT
Connector: Front panel BNC
Input Impedance: 10kΩ, ±5%
Polarity: Positive or negative
Threshold Level: TTL
Min. Pulse Width: 20ns

EXTERNAL REFERENCE INPUT
Connector: Front panel SMB
Frequency: 10MHz
Impedance & Level: 10kΩ ±5%, TTL, 50% ±5%

RUN MODES
Continuous: Free-run output of a waveform
Triggered: Upon trigger, outputs one waveform cycle. Last cycle always completed
Gated: External signal enables generator. First output cycle synchronous with the active slope of the triggering signal. Last cycle of output waveform always completed
Burst: Upon trigger, outputs a single or multiple pre-programmed number of waveform cycles from 1 through 1M

TRIGGER CHARACTERISTICS
System Delay: 1 Sample Clock+150ns
Trigger Start, Stop & Phase Control: 0 to 2M
Resolution: 4 points
Breakpoint Error: ±4 points
Breakpoint Source: External, Manual, or command

EXTERNAL
Connector: Front panel BNC
Level: TTL
Slope: Positive or negative
Frequency: DC to 2MHz
Impedance: 10kΩ, DC coupled

INTERNAL
Range: 100MHz to 2MHz
Resolution: 14 digits, limited by 1µHz
Accuracy: 0.1%

MANUAL
Source: Soft trigger command from the front panel or remote

MULTI-INSTRUMENT SYNCHRONIZATION
PHASE OFFSET (LEADING EDGE)
Range: 0 to 2M
Resolution: 4 point
Initial Skew: <20ns, to the first master; 20ns cumulative to additional slaves

GENERAL
Power Consumption: 10W max
Current Consumption:
+3.3V 1.4A max.
+5V 30mA max.
+12V 200mA max.
-12V 200mA max.
Interfaces:
5201 PXIBus
5300 PCIBus
Dimensions: Single Slot
Weight:
Without Package 0.5Kg
Shipping Weight 1Kg
Temperature:
Operating: 0 - 50°C
Storage: -40°C to + 70°C
Humidity:
11°C to 30°C: 85%;
31°C to 50°C: 75%
Safety:
EN61010-1, 2nd revision
Calibration: 1 year
Warranty (1): 3 years standard

ORDERING INFORMATION
MODEL DESCRIPTION
5201 125MS/s Single Channel PXIBus Arbitrary Waveform Generator
5300 125MS/s Single Channel PCIBus Arbitrary Waveform Generator

(1) Standard warranty in India is 1 year.

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