

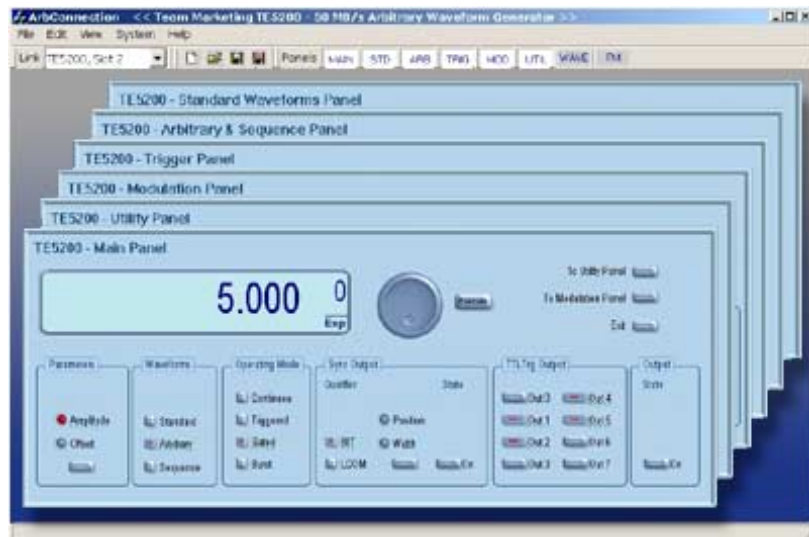
# ARBITRARY WAVEFORM GENERATOR

TE5200/1

- 50 MS/Sec clock (TE5200)
- 100 MS/Sec clock (TE5201)
- 10 digits resolution
- Multiple instrument synchronization
- 14-bit vertical resolution
- 2 Meg memory depth (opt)
- Ultra fast waveform downloads using DMA
- 1ppm clock stability (opt)
- Low phase noise carrier
- Internal trigger gen.
- Frequency agility: FSK, Ramped FSK, sweep, FM
- Sequence generator controls 128K segments



The TE5201 is a 100MS/Sec, (TE5100 is 50MS/Sec.) full performance, Arbitrary Waveform Generator on a 3U PXI format. The single channel AWG generates waveforms with up to 2MS in length. Clock in/clock out connector provides a synchronized platform for up to six plug-in arbitrary generators, as well as for other plug-in instruments. Built in sequencing technology links up to 4096 memory segments and repeats each segment up to 32K times.



**Output Channels 1**

**Multiple 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 & Resolution	Same as Sample Clock range and resolution
Initial Skew	<15 nSec to the first master; 15 nSec cumulative to additional slaves
Sample Clock: Internal	
Range (TE5200)	50 S/Sec to 50 MS/Sec
Range (TE5201)	50 S/Sec to 100 MS/Sec
Resolution	10 digits limited by 1 μHz
Accuracy	Same as reference
Stability	Same as reference
Reference	
Standard	System clock, ≥0.01% (100 ppm)
Option	≥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	10 MHz TTL, 50% ±2% duty cycle

**SAMPLE CLOCK MODULATION**

**FM**

Description	Sample clock can be frequency modulated by internal waveforms that are resident in internal memory (fixed waveforms)
Modulation Source	Internal sine square, triangle and ramp
Modulation Freq. Range	2 mHz to 100 KHz
Resolution	10 digits
Accuracy	0.1%
Peak Freq. Deviation	DC 50 MHz (DC 25 MHz TE5200)
Advance	Automatic, triggered, gated or software command
Marker	
Output and level	Same as SYNC output.
Position	Fixed at carrier frequency

**FM-Downloaded Arbitrary Waveforms**

Description	Sample clock can be frequency modulated arbitrary waveforms that are downloaded by the user (user waveforms).
Modulation Source	User waveform, anyu shape, 10 to 20000 waveform points
Mod. Sample Clk. Range	1mS/Sec
Resolution	7 digits
Accuracy	0.1%
Peak Sample Clk Dev	DC to100 MHz (DC to 50 MHz TE5200)
Advance	Automatic, triggered, gated or software command
Marker	
Output and Level	Same as SYNC output
Position	Programmable for selected sample clock frequency
Waveform Download	5M points per sec.

**FSK**

Description	Current segment is sampled continuously. External low TTL level programs carrier sample clock, external high TTL level programs shifted sample clock frequency. Sample clock changes coherently between frequencies. FSK operates in arbitrary waveforms only.
<b>Carrier Sample Clk Range</b>	50 S/Sec to 50 MS/Sec (TE5200); 50 S/Sec to 100 MS/Sec (TE5201)
FSK Stimuli	
External	Front panel Trigger input BNC. Low level = carrier sample clock; High level = hop frequency
Frequency	Range From 10 MHz to DC
Internal	Same as internal trigger range
FSK Delay	Minimum 1 waveform cycle + 50 ns

**Ramped FSK**

Description	Same as FSK except carrier sample clock ramps to shifted frequency at a rate defined by the ramp time parameter. External low TTL level programs carrier sample clock, external high TTL level programs shifted frequency.
Ramp Time Range	10μS to 1S, 3 digits, ±0.1%

**Sweep**

Description	Sample Clock sweeps continuously from start to stop, at a rate defined by the sweep time. More complex sweep modes and types can be generated using the FM mode in conjunction with the FM composer program.
Type	Linear or logarithmic
Direction	Up or down, depending on the start and stop setting
Range	50mS/Sec to 50MS/s (TE5200); 50mS/Sec to 100MS/s (TE5201)
Time	1mS to 1000 Sec, 7 digits, ±0.1%
Advance	Automatic, triggered, gated or software command
Marker	
Output and Level	Same as SYNC output.
Position	Programmable for selected frequency

**OPERATING MODES**

Normal	Continuous waveform is generated
Triggered	Each input cycle generates a single output cycle.
Gated	External signal enables generator. First output cycle synchronous with the active slope of the triggering signal. Last cycle of output waveform always completed
External Burst	Preset number of up to 128 K cycles stimulated by an internal, or external This mode is not available in Sequencer mode.

### Trigger Sources

External	
Input	Front panel BNC
Level	TTL
Slope	Positive or negative, programmable
Frequency	5 MHz to DC
Internal	
Range	100 mHz to 2 MHz
Resolution	7 digits
Accuracy	0.1%
Backplane	TTL Trig0 through TTL Trig7, STAR
Software	SCPI command
System Delay	
Trigger to waveform out	1 Sample Clock+120 nS

### STANDARD WAVEFORMS LIBRARY

Waveforms	Sine, Triangle, Square, Pulse, Ramp, Sinc, Gaussian Pulse, Exponential decay/Rise Pulse, Noise, DC
Frequency Range	Waveform dependent

### ARBITRARY WAVEFORM

Waveform Memory	1 Meg points, 2 Meg points optional
Memory Segmentation	
Number of Segments	1 to 64K (128K with 2Mb option)
Min Segment Size	16 points
Memory Interleave	4 (All trace lengths must be multiples of 4)
Vertical Resolution	14 bits (16,384 points)
Sine Wave Performance	
Description	Sine wave performance is measured using the maximum sample clock rate, at 5Vp-p, the maximum amplitude resolution of the DAC (14-bit) and without filters. Spectrum analyzer settings: Start frequency = 0MHz; stop frequency = 50MHz (Nyquist frequency)
Sinewave Total Harmonic Distortion	0.3% to 1 MHz
Harmonics and non-related spurious below 10MHz	< -55dBc for carrier frequencies $\leq 1$ MHz < -40dBc for carrier frequencies $\leq 5$ MHz < -25dBc for carrier frequencies $\leq 25$ MHz

### SEQUENCED ARBITRARY WAVEFORM

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 soft trigger
Sequencer steps From	1 to 4096
Segment loops From	1 to 128 K

### OUTPUTS

Waveform Output	
Connector	Front panel BNC
Stand-by	Output Off or Normal
Impedance	50 $\Omega$ , $\pm 1\%$
Protection	Protected against temporary short to case ground
Amplitude	
Range	80 mV to 8 Vp-p, into 50 $\Omega$ ; Double into open circuit
Resolution	3.5 digits
Accuracy (1 KHz)	$\pm(1\% + 25 \text{ mV})$ , 1.000 V to 10 Vp-p $\pm(1\% + 5 \text{ mV})$ , 80 mV to 999.9 mVp-p
Offset	Offset is attenuated with amplitude
Range	0 to $\pm 3.6$ V, amplitude dependent
Resolution	22 mV
Accuracy	
$\pm 4$ V window	$\pm(1\% \text{ of reading} + 1\% \text{ if amplitude} + 2\text{mV})$
$\pm 400$ mV window	$\pm(1\% \text{ of reading} + 1\% \text{ if amplitude} + 200\mu\text{V})$
Filters	25MHz and 50 MHz, 7-pole elliptic
<b>Square Wave, Pulse</b>	
Rise/Fall time	<10 nSec, 10% to 90% of amplitude
Aberration	<5%
SYNC/Marker Output	
Description	Provides dual functionality. All functions and modes, this output generates sync pulse, which is synchronous with the output waveform. In FM and sweep modes only, this output generates a marker having properties similar to the sync pulse output.
Connector	Front panel BNC
Impedance	50 $\Omega$ , $\pm 1\%$
Level	>2 V into 50 $\Omega$ , 4V nominal into 10K $\Omega$
Protection	Protected against temporary short to case ground
Position	Point 0 to n, Programmable with 4-point resolution

**TEAM**  
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SPECIFICATIONS

