

# Arbitrary Waveform Generators

## AWG5200 Series Datasheet



The AWG5200 Series arbitrary waveform generator (AWG) leads the way in signal generation by enabling bleeding-edge innovation for engineers and researchers. The AWG5200 Series of AWGs delivers unparalleled signal fidelity coupled with class-leading sample rate and memory depth, giving you the industry's best signal stimulus solution for complex RF baseband signal generation and precision experimental applications. With up to 5 GS/s sample rate (10 GS/s with interpolation) and 16-bit vertical resolution, the AWG5200 Series offers easy generation of complex signals as well as accurate playback of existing captured signals.

### Key performance specifications

- Sample rates up to 10 GS/s (with 2x interpolation)
- 2, 4, and 8 channel configurations
- -70 dBc spurious free dynamic range
- 16 bits vertical resolution
- 2 GSamples waveform memory per channel

### Key features

- Complete solution for complex RF signal generation in a single box
  - Direct generation of signals with carriers up to 4 GHz, removing the need for external RF conversion
- Simulate real-world analog effects on high speed digital data streams
- Generate high precision RF signals
  - Spurious Free Dynamic Range performance better than -70 dBc
- Create long complex waveforms without compromising bandwidth
  - Up to 2 GSamples of Waveform Memory plays 400 ms of data at 5 GS/s
- Synchronize multiple units to achieve a multi-channel high speed AWG system
- Fully operational without external PC
  - Built-in display and buttons make it possible to quickly select, edit, play waveforms and trigger on events directly from the AWG front panel

- Simulate real-world environments by playing back captured signals
  - Waveforms captured with Oscilloscopes or Real-Time Spectrum Analyzers can be played back, edited or re-sampled on the AWG
- Smooth transition from simulation to the real-world testing environment
  - Waveform vectors imported from third-party tools such as MATLAB

### Applications

- RF/MW waveform generation for communications and defense electronics testing and development
  - Output RF signals directly up to 4 GHz
- Leading edge research in electronics, physics & chemistry
  - High speed, low jitter signal source generates uniquely specified analog signals, fast pulses, data streams and clocks

### Seamless transition from simulation to generation

If a waveform can be defined or captured, then the AWG5200 can reproduce this signal. The creation of the waveform can happen in many ways. An extensive and growing library of waveform generation plugins which are optimized to work specifically with the Tektronix AWG family, provide specific waveform creation capabilities, while 3rd party solutions like MATLAB, Excel, or others, have the flexibility to create and import any waveform you desire. Waveforms created in any of these packages can be imported and played back in the AWG5200, seamlessly transitioning from the simulation world to the real world.

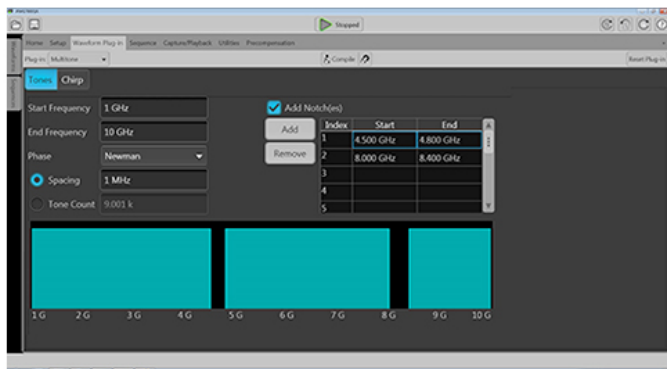
### Advanced remote instrument control and waveform generation

The new SourceXpress platform brings all of your AWG instrument control and waveform generation capabilities to your Windows PC. Load waveforms, create sequences, and enable playback without ever having to touch an AWG. All waveform creation plug-ins run natively on the SourceXpress platform, allowing you to quickly iterate through test signals without having to set foot in the lab.



### RF signal generation

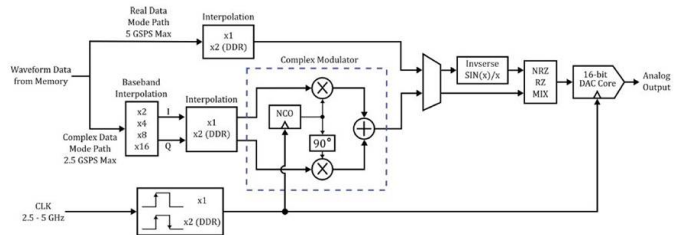
RF signals are becoming more and more complex, making it difficult for RF engineers to accurately create the signals required for conformance and margin testing. When combined with the RF Generic waveform creation plug-in, the AWG5200 Series can address these tough design challenges. The RF Generic plug-in is a software package that digitally synthesizes modulated baseband, IF, and RF signals taking signal generation to new levels by fully exploiting the advanced signal generation capabilities of the AWG5200 Series arbitrary waveform generators.



### Built in digital IQ modulator

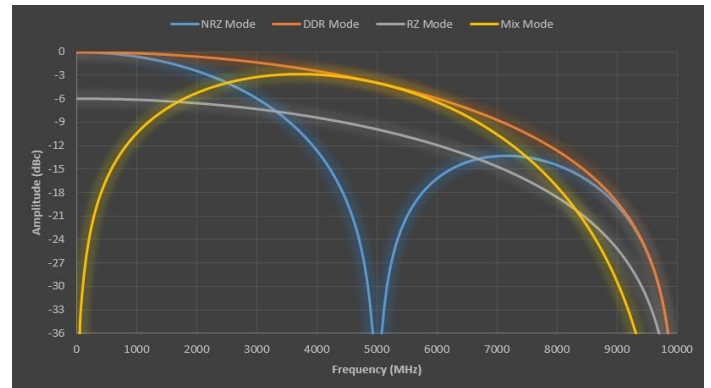
Reducing the size and cost for telecommunication and military systems is driving the evolution of modern DAC's to integrate more functionality into a single chip. Some of the more advanced high-speed DAC's also incorporate digital signal processing and conditioning functionalities such as digital interpolation, complex modulation, and numerically controlled oscillators (NCO). This enables direct generation of complex RF signals in an efficient and compact way.

The Tektronix AWG5200 series features a digital complex modulator and multi-rate interpolation. With this internal IQ modulation feature, you remove the IQ mismatches that are attributed to external modulators and mixers. Also with this modulator, there is no in-band carrier feed-through, and there are no images. With its built in interpolators, it also affords the ability to create waveforms most efficiently reducing waveform size and compilation times as well as extending playback time.



### Several DAC modes available

With the AWG5200 DAC there are several modes that enable you to output your signal at the cleanest portion of the DAC BW and frequency roll off positions.



### Environment signal generation

The mission-critical nature of many radar signals requires that they coexist with standards-based commercial signals sharing the same spectrum without performance degradation. To meet this expectation, a radar designer has to thoroughly test all the corner cases at the design/debug stage. The AWG5200 offers the extreme flexibility and precision needed to play back these worst-case scenarios.

## Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

### Model overview

	AWG5202	AWG5204	AWG5208
Sample rate (nominal)	1.5 kS/s to 5 GS/s (10 GS/s Interpolated - Double Data Rate)		
Resolution (nominal)	16 bits with no markers active, 15 bits with 1 marker active, 14 bits with 2 markers active, 13 bits with 3 markers active, 12 bits with 4 markers active		
Sin(x)/x (-3dB)	2.22 GHz @ 5 GS/s, 4.44 GHz Interpolated @ 10 GS/s		

### Frequency domain characteristics

**Effective frequency output** Fmaximum (specified) is determined as "sample rate / oversampling rate" or "SR / 2.5".  
2 GHz  
4 GHz (Double Data Rate - DDR mode)

**DC HBW output** Amplitude levels are measured as singled-ended outputs. Output doubles when using differential (both) outputs.  
**Amplitude range** 100 mV<sub>p-p</sub> to 0.75 V<sub>p-p</sub>  
**Amplitude accuracy** ±2% of setting  
**Offset** ±2V (50 Ω into gnd), ±4V into DC voltage terminated  
**Analog bandwidth** 2 GHz (-3 dB), 4 GHz (-6 dB)

**DC HBW Amplified output (option)** Amplitude levels are measured as singled-ended outputs. Output doubles when using differential (both) outputs.  
**Amplitude range** 100 mV<sub>p-p</sub> to 1.5 V<sub>p-p</sub>  
**Amplitude accuracy** ±2% of setting  
**Offset** ±2V (50 Ω into gnd), ±4V into DC voltage terminated  
**Analog bandwidth** 1.3 GHz (-3 dB), 2.6 GHz (-6 dB)

**AC Direct output** Amplitude levels are measured as singled-ended outputs.  
**Range** -17 dBm to -5 dBm  
**DC bias** ± 5 V @ 150 mA  
**Analog bandwidth** 10 MHz - 2 GHz (-3 dB), 10 MHz - 4 GHz (-6 dB)

**AC amplified output (option)** Amplitude levels are measured as singled-ended outputs.  
**Range** -85 dBm to +10 dBm  
**DC bias** ± 5 V @ 150 mA  
**Analog bandwidth** 10 MHz - 2 GHz (-3 dB), 10 MHz - 4 GHz (-6 dB)

## Frequency domain characteristics

### Output flatness (typical)

Mathematically corrected for characteristic  $\text{Sin}(x)/x$  roll-off, uncorrected by external calibration methods.

Output path	Specification
DC HBW	±1.0 dB DC to 1 GHz ±2.0 dB DC to 2 GHz ±0.1 dB DC to 3 GHz (w/predistortion)
DC HBW Amplified (option)	±1.0 dB DC to 1 GHz ±2.0 dB DC to 1.3 GHz ±0.1 dB DC to 1.3 GHz (w/predistortion)
AC Direct	±1.0 dB 10 MHz to 1 GHz ±2.0 dB 10 MHz to 2 GHz ±0.1 dB 10 MHz to 3 GHz (w/predistortion)
AC Amplified (option)	±1.0 dB 10 MHz to 1 GHz ±2.0 dB 10 MHz to 2 GHz ±0.1 dB 10 MHz to 3 GHz (w/predistortion)

### Output match SWR (typical)

Mathematically corrected for characteristic  $\text{Sin}(x)/x$  roll-off, uncorrected by external calibration methods.

Output path	Specification
DC HBW	DC to 1 GHz = 1.4:1 1 GHz to 2 GHz = 1.7:1 2 GHz to 4 GHz = 2.0:1
DC HBW Amplified (option)	DC to 1 GHz = 1.4:1 1 GHz to 2 GHz = 1.7:1 2 GHz to 4 GHz = 2.0:1
AC Direct	10 MHz to 2 GHz = 1.2:1 2 GHz to 4 GHz = 1.4:1
AC Amplified (option)	10 MHz to 2 GHz = 1.2:1 2 GHz to 4 GHz = 1.4:1

## Time domain characteristics

### Bit rate

Bit rate determined as "sample rate / 4 points per cycle", allowing full impairment generation.

1.25 Gb/s

### Rise/fall time (typical)

Rise/fall time measured at 20% to 80% levels.

< 110 ps @ 750 mV<sub>p-p</sub> single-ended

< 180 ps @ 1.5 V<sub>p-p</sub> single-ended

## Sequencer characteristics

### Maximum sequencing steps

16,383

### Sub sequencing

Single level of depth

### Waveform granularity resolution

1

### Minimum waveform length

2048

### Spurious Free Dynamic Range (SFDR) characteristics

SFDR characteristics (typical)

Frequency output of AWG, AC Direct Out <sup>1</sup>

2.5 GS/s

Analog channel output frequency	In band performance		Adjacent band performance	
	Measured across	Specification	Measured across	Specification
100 MHz	DC - 500 MHz	-80 dBc	DC - 1.25 GHz	-72 dBc
DC - 625 MHz	DC - 625 MHz	-70 dBc	DC - 1.25 GHz	-62 dBc
DC - 1 GHz	DC - 1 GHz	-60 dBc	DC - 1.25 GHz	-58 dBc
1 - 1.25 GHz	1 - 1.25 GHz	-60 dBc	DC - 1.25 GHz	-50 dBc

5 GS/s

Analog channel output frequency	In band performance		Adjacent band performance	
	Measured across	Specification	Measured across	Specification
100 MHz	DC - 1 GHz	-80 dBc	DC - 2.5 GHz	-72 dBc
DC - 1.25 GHz	DC - 1.25 GHz	-70 dBc	DC - 2.5 GHz	-62 dBc
DC - 2 GHz	DC - 2 GHz	-60 dBc	DC - 2.5 GHz	-58 dBc
2 GHz - 2.5 GHz	DC - 2.5 GHz	-60 dBc	DC - 2.5 GHz	-50 dBc

10 GS/s

Analog channel output frequency	In band performance		Adjacent band performance	
	Measured across	Specification	Measured across	Specification
100 MHz	DC - 1 GHz	-80 dBc	DC - 5 GHz	-72 dBc
DC - 1.25 GHz	DC - 1.25 GHz	-70 dBc	DC - 5 GHz	-57 dBc
DC - 2 GHz	DC - 2 GHz	-62 dBc	DC - 5 GHz	-57 dBc
2 GHz - 4 GHz	2 GHz - 4 GHz	-56 dBc	DC - 5 GHz	-50 dBc
Two-tone IMD		Specification		
1 GHz ±1 MHz		-70 dBc		
2 GHz ±1 MHz		-65 dBc		
3 GHz ±1 MHz		-65 dBc		
4 GHz ±1 MHz		-65 dBc		

### Output distortion characteristics

Jitter (typical)

Random jitter 700 fs<sub>rms</sub>

Total jitter 10 ps<sub>p-p</sub>

<sup>1</sup> SFDR is determined as a function of the directly generated carrier frequency. Harmonics not included.

## Channel timing characteristics

Channel to channel skew (typical) <25 ps

### Skew adjust (typical)

Range  $\pm 2$  ns

Resolution 0.5 ps

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## Hardware characteristics

### Number of analog outputs

AWG5202 2

AWG5204 4

AWG5208 8

Output connector SMA female

Output impedance 50  $\Omega$

Waveform length 2 GSamples

Waveform granularity 1 point

### Run modes

**Continuous** Waveform is continuously repeated

**Triggered** Waveform is output only once after a trigger is received

**Triggered Continuous** Waveform is continuously repeated after a trigger is received

**Gated** Waveform is continuously repeated while the trigger is enabled

### Sampling clock

Resolution Up to 8 digits

Accuracy (typical) Within  $\pm(1$  ppm + Aging), Aging:  $\pm 1$  ppm per year

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## Waveform capability

<b>Waveform file import capability</b>	<p>Import waveform format by series:</p> <ul style="list-style-type: none"> <li>.AWGX file created by Tektronix AWG5200/70000 Series</li> <li>.AWG file created by Tektronix AWG5000 or AWG7000 Series</li> <li>.PAT and *.WFM file formats created by Tektronix AWG400/500/600/700 Series</li> <li>.IQT file format created by Tektronix RSA3000 Series</li> <li>.TIQ file format created by Tektronix RSA6000/5000 Series or MDO4000 Series</li> <li>.WFM or *.ISF file formats created by Tektronix TDS/DPO/MSO/DSA Series</li> <li>.TXT file format</li> <li>.MAT Matlab file format</li> <li>.SEQX file format created by Tektronix AWG5200 Series</li> <li>.SEQ file format created by the Tektronix AWG400/500/600/700 Series</li> <li>.TMP or .PRM file formats; Midas Blue (Data Type 1000/1001; Scalar and complex data; 8-,16-, 32-, and 64-bit integer and 32- and 64-bit float data format types)</li> </ul>
<b>Waveform file export capability</b>	<ul style="list-style-type: none"> <li>.WFMX file format, AWG5200/70000 series native format</li> <li>.WFM file format, AWG400/500/600/700 waveform file</li> <li>.TIQ file format, RSA6000 IQ Pair</li> <li>.TXT file format</li> </ul>

## Computer characteristics

<b>Operating system / peripherals / IO</b>	<p>Windows OS</p> <ul style="list-style-type: none"> <li>USB 2.0 compliant ports (2 front)</li> <li>USB 3.0 compliant ports (4 rear)</li> <li>RJ-45 Ethernet connector (rear panel) supports 10/100/1000BASE-T</li> <li>VGA video (rear panel) for external monitor</li> <li>eSATA (rear panel)</li> </ul>
<b>Display characteristics</b>	LED backlit touch screen display, 165 mm (6.5 in.) diagonal, 1024 × 768 XGA
<b>Software driver for third-party applications</b>	<ul style="list-style-type: none"> <li>IVI-COM driver</li> <li>IVI-C driver</li> </ul>

## Inputs

<b>Trigger</b>	
<b>Number</b>	2 (A and B)
<b>Polarity</b>	Pos or Neg
<b>Impedance</b>	50 Ω, 1 kΩ
<b>Range</b>	50 Ω: <5 V <sub>rms</sub>
	1 kΩ: ±10 V
<b>Connector</b>	SMA (rear panel)

## Inputs

Threshold	Range	-5.0 V to 5.0 V
	Resolution	0.1 V
	Accuracy (typical)	±(5% +100 mV)

Trigger minimum pulse width 20 ns

### Reference in

Input amplitude	-5 dBm to +5 dBm
Fixed frequency range	10 MHz, ±10 ppm
Variable frequency range	35 MHz to 250 MHz
Connector	SMA (rear panel)
Impedance	50 Ω, AC coupled

### External Clock in

Connector	SMA (rear panel)
Input impedance	50 Ω, AC coupled
Frequency range	2.5 GHz to 5 GHz
Input amplitude	0 dBm to +10 dBm

## Utility outputs

### Markers

Number	AWG5202: Total of 8 (4 per channel)
	AWG5204: Total of 16 (4 per channel)
	AWG5208: Total of 32 (4 per channel)
Marker sample rate	Up to 5 GS/s
Minimum pulse width	400 ps
Max data rate	2.5 GS/s
Style	Single-ended
Connector	SMA (rear panel)
Impedance	50 Ω
Level into 50 Ω	Window: -0.5 V to 1.75 V
	Amplitude: 200 mV to 1.75 V
	Resolution: 100 μV
	Rise time (20% - 80%): 150 ps
Timing skew	Inter-channel: <25 ps (between Marker 1, 2, 3, and 4 outputs)
Delay control	±3 ns
Random jitter	5 ps <sub>rms</sub>

### 10 MHz reference out

Connector	SMA (rear panel)
Impedance	50 Ω, AC coupled
Amplitude	+4 dBm ±2 dBm
Frequency	10 MHz ±(1 ppm + aging)

### Synchronization clock output

Frequency	External clock output /32
Amplitude	1.0 V ±150 mV <sub>p-p</sub> into 50 Ω



**Utility outputs**

Connector	SMA (rear panel)
Impedance	50 $\Omega$ , AC coupled

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**Auxiliary Outputs**

Number	AWG5202: 4
	AWG5204: 4
	AWG5208: 8
Connector	SMB on rear-panel
Output amplitude	High 3.3 V
	Low 0 V
Output impedance	50 $\Omega$

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**External clock output**

Connector	SMA on rear-panel
Output impedance	50 $\Omega$ AC Coupled
Frequency range	2.5 GHz to 5 GHz
Output amplitude	+5 dBm to +10 dBm

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**Physical characteristics****Dimensions**

Height	153.6 mm
Width	460.5 mm
Depth	603 mm

**Weight**

AWG5202	44 lb (19.96 kg), 46.35 lb (21.02 kg) with packaging
AWG5204	45.45 lb (20.62 kg), 47.75 lb (21.66 kg) with packaging
AWG5208	50.7 lb (23 kg), 53 lb (24.04 kg) with packaging

**Cooling clearance**

Top	0 in
Bottom	0 in
Left side	50 mm
Right side	50 mm
Rear	0 in

**Power supply**

AC line input	100 to 240 V AC, 50/60 Hz
Consumption	650 Watts

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**EMC, Environment, Safety**

**Temperature**

**Operating** 0 °C to +50 °C  
**Non-operating** -20 °C to +60 °C

**Humidity**

**Operating** 5% to 90% relative humidity (% RH) at up to 30 °C  
 5% to 45% relative humidity above 30 °C up to 50 °C  
 Non-condensing  
**Non-operating** 5% to 90% relative humidity (% RH) at up to 30 °C  
 5% to 45% relative humidity above 30 °C up to 60 °C  
 Non-condensing

**Altitude**

**Operating** Up to 3,000 meters (9,843 feet)  
 Derate maximum operating temperature by 1 °C per 300 meters above 1500 meters.  
**Nonoperating** Up to 12,000 meters (39,370 feet)

**Mechanical shock**

**Operating** Half-sine mechanical shocks, 30 g peak, 11 ms duration, 3 drops in each direction of each axis.

**Regulatory**

**Safety** UL61010-1, CAN/CSA-22.2, No.61010-1-04, EN61010-1, IEC61010-1  
**Emissions** EN55011 (Class A), IEC61000-3-2, IEC61000-3-3  
**Immunity** IEC61326, IEC61000-4-2/3/4/5/6/8/11

**Regional certifications**

Europe	Australia/New Zealand
EN61326	AS/NZS 2064

## Ordering information

### AWG5200 family

<b>AWG5202</b>	16 bit, 2 GSamples/channel record length, 2-channel arbitrary waveform generator
<b>AWG5200-225</b>	2.5 GS/s
<b>AWG5200-250</b>	5 GS/s (10 GS/s interpolated)
<b>AWG5200-2DC</b>	High Bandwidth Amplified outputs
<b>AWG5200-2AC</b>	AC Amplified outputs
<b>AWG5200-2DIGUP</b>	Digital up conversion (requires AWG5200-250)
<b>AWG5200-SEQ</b>	Sequencing
<b>AWG5202-ACCY01</b>	USB mouse, compact USB keyboard, touch screen stylus
<b>AWG5204</b>	16 bit, 2 GSamples/channel record length, 4-channel arbitrary waveform generator
<b>AWG5200-425</b>	2.5 GS/s
<b>AWG5200-450</b>	5 GS/s (10 GS/s interpolated)
<b>AWG5200-4DC</b>	High Bandwidth Amplified outputs
<b>AWG5200-4AC</b>	AC Amplified outputs
<b>AWG5200-4DIGUP</b>	Digital up conversion (requires AWG5200-450)
<b>AWG5200-SEQ</b>	Sequencing
<b>AWG5204-ACCY01</b>	USB mouse, compact USB keyboard, touch screen stylus
<b>AWG5208</b>	16 bit, 2 GSamples/channel record length, 8-channel arbitrary waveform generator
<b>AWG5200-825</b>	2.5 GS/s
<b>AWG5200-850</b>	5 GS/s (10 GS/s interpolated)
<b>AWG5200-8DC</b>	High Bandwidth Amplified outputs
<b>AWG5200-8AC</b>	AC Amplified outputs
<b>AWG5200-8DIGUP</b>	Digital up conversion (requires AWG5200-850)
<b>AWG5200-SEQ</b>	Sequencing
<b>AWG5208-ACCY01</b>	USB mouse, compact USB keyboard, touch screen stylus

### Standard accessories <sup>2</sup>

<b>136-7162-xx</b>	Two 50 $\Omega$ SMA terminators per channel
<b>071-3529-xx</b>	Installation and safety manual
—	Certificate of calibration
—	Power cord

<sup>2</sup> Specify power cord and language option at time of order

## Options

### Power plug options

Opt. A10                                      China power plug (50 Hz)

### Recommended accessories

Item	Description	Part number
GPIB to USB Adapter	Enables GPIB control through USB B port	TEK-USB-488
Power Splitters	1.5 kHz - 18 GHz	Mini-Circuits ZX10-2-183-S+
	DC-18 GHz	Picosecond Pulse Labs 5331
Amplifiers	2.5 kHz - 10 GHz, 26 dB gain	Picosecond Pulse Labs 5866
	0.01 - 20 GHz, 30 dB gain	RF-Lambda RAMP00G20GA
Adapter	SMB female to SMA female	Mouser 565-72979
Programmer manual	Programming commands, English only	Visit Tektronix website

### Rack mount kit

GF-RACK3U                                      Rack mount kit

### Product upgrades

#### AWG5202

**AWG52UP Opt SSD**                                      Provides an additional (or replacement) preprogrammed solid state drive  
**AWG5200-2-2550**                                      Increases sampling rate from 2.5 GS/s to 5 GS/s (10 GS/s interpolated)  
**AWG5200-2DC**    Adds DC High Bandwidth Amplified outputs  
**AWG5200-2AC**    Adds AC Amplified outputs  
**AWG5200-2DIGUP**                                      Adds digital up conversion (requires AWG5200-250 or AWG5200-2-2550)  
**AWG5200-SEQ**    Adds Sequencing

#### AWG5204

**AWG52UP Opt SSD**                                      Provides an additional (or replacement) preprogrammed solid state drive  
**AWG5200-4-2550**                                      Increases sampling rate from 2.5 GS/s to 5 GS/s (10 GS/s interpolated)  
**AWG5200-4DC**    Adds DC High Bandwidth Amplified outputs  
**AWG5200-4AC**    Adds AC Amplified outputs  
**AWG5200-4DIGUP**                                      Adds digital up conversion (requires AWG5200-450 or AWG5200-4-2550)  
**AWG5200-SEQ**    Adds Sequencing

#### AWG5208

**AWG52UP Opt SSD**                                      Provides an additional (or replacement) preprogrammed solid state drive  
**AWG5200-8-2550**                                      Increases sampling rate from 2.5 GS/s to 5 GS/s (10 GS/s interpolated)  
**AWG5200-8DC**    Adds DC High Bandwidth Amplified outputs  
**AWG5200-8AC**    Adds AC Amplified outputs  
**AWG5200-8DIGUP**                                      Adds digital up conversion (requires AWG5200-850 or AWG5200-8-2550)  
**AWG5200-SEQ**    Adds Sequencing

## Warranty

One-year parts and labor.

## Plug-ins

Plug-ins increase the capabilities of the arbitrary waveform generators. Various plug-ins are available providing unique types of waveforms or additional compensation. Each plug-in has its own installation file which installs seamlessly into the generators. After installation, it simply becomes a new menu selection. No other configuration is necessary.

Plug-in	Description	Nomenclature	Licensed enhancements
Multitone & Chirp plug-in	Generate chirps, notches and tones	MTONENL-SS01 MTONEFL-SS01	
PreCompensation plug-in	Create correction coefficients that can be applied on waveforms to get flat frequency and linear phase response	PRECOMNL-SS01 PRECOMFL-SS01	
High Speed Serial plug-in	Create pre-distorted waveforms to test a device's conformance to standards	HSSNL-SS01 HSSFL-SS01 HSSPACKFL-SS01 HSSPACKNL-SS01	S-Parameters and Intersymbol Interference Spread Spectrum Clocking (Enhancements are included with HSSPACK)
RF Generic plug-in	Create digitally modulated signals with multiple carrier groups	RFGENNL-SS01 RFGENFL-SS01	S-Parameters
Optical plug-in	Create waveforms with complex modulation schemes for optical testing	OPTICALNL-SS01 OPTICALFL-SS01	S-Parameters Spread Spectrum Clocking
OFDM plug-in	Create Single or Multiple OFDM based Frames with one or more bursts	OFDMNL-SS01 OFDMFL-SS01	S-Parameters
RADAR plug-in	Create RADAR pulsed waveforms with various modulations and impairments	RADARNL-SS01 RADARFL-SS01	S-Parameters
Spread Spectrum Clocking plug-in	Adds SSC capability to the High Speed Serial and Optical plug-ins	SSCFLNL-SS01 SSCFLFL-SS01	
S-Parameters plug-in	Adds S-Parameter capability to the RF Generic, High Speed Serial, Optical, OFDM, and RADAR plug-ins.	SPARAFL-SS01 SPARANL-SS01	

Plug-ins require the purchase of a license before they are fully functional.

There are two types of licenses available for each plug-in: node-locked (NL) and floating (FL).

- Node Locked Licenses (NL) provide your own copy of the application on your instrument and are permanently assigned to a product model/serial number.
- Floating Licenses (FL) can be moved between product models.



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