임의 파형 발생기

AWG5200 시리즈 데이터 시트

AWG5200 시리즈 AWG (임의 파형 발생기)는 엔지니어와 연구원을 위한 최첨단 혁신을 가능하게하여 신호 생성 방식을 선도합니다. AWG5200 AWG 시리즈는 동급 최고의 샘플 속도 및 메모리 깊이와 결합 된 탁월한 신호 충실도를 제공하여 복잡한 RF베이스 밴드 신호 생성 및 정밀 실험 애플리케이션을위한 업계 최고의 신호 자극 솔루션을 제공합니다. AWG5200 시리즈는 최대 5GS / s 샘플링 속도 (보간 10GS / s) 및 16 비트 수직 분해능으로 복잡한 신호를 쉽게 생성하고 기존 캡처 된 신호를 정확하게 재생할 수 있습니다.

주요 성능 사양

- 최대 10 GS/s의 샘플링 속도 (2 배 보간)
- 2, 4 및 8 채널 구성
- -70 dBc 스퓨리어스없는 다이내믹 레인지
- 16 비트 수직 해상도
- 채널당 2 GSample 파형 메모리

주요 특징

- 단일 박스에서 복잡한 RF 신호 생성을 위한 완벽한 솔루션
  - 최대 4 GHz의 반송파로 신호를 직접 생성하므로 외부 RF 변환이 필요하지 않습니다.
- 고속 디지털 데이터 스트림에서 실제 아날로그 효과 시뮬레이션
- 고정밀 RF 신호 생성
  - 스퓨리어스 프리다이내믹 레인지 성능이 -70 dBc 보다 우수
- 대역폭을 손상시키지 않으면 서 길고 복잡한 파형 생성
  - 최대 2G의 Waveform Memory 샘플은 5 GS/s에서 400 ms 의 데이터를, 2.5 GS/s에서 800 ms의 데이터를 재생합니다
- 다중 채널 고속 AWG 시스템을 달성하기 위해 여러 장치를 동기화
- 외부 PC없이 완벽하게 작동
  - 내장 디스플레이 및 버튼을 통해 AWG 전면 패널에서 직접 파형 을 신속하게 선택, 편집, 재생 및 이벤트 트리거 할 수 있습니다

- 캡처 된 신호를 재생하여 실제 환경을 시뮬레이션
  - 오실로스코프 또는 실시간 스펙트럼 분석기로 캡처한 파형 을 AWG에서 재생, 편집 또는 재 샘플링 할 수 있습니다.
- 시뮬레이션에서 실제 테스트 환경으로 원활하게 전환
  - MATLAB과 같은 타사 도구에서 가져온 파형 벡터

응용분야

- 통신 및 방위 전자 테스트 및 개발을 위한 RF / MW 파형 생성
  - 최대 4 GHz까지 직접 RF 신호 출력
- 전자, 물리 및 화학 분야의 첨단 연구
  - 고속, 낮은 지터 신호 소스는 고유하게 지정된 아날로그 신 호, 빠른 펄스, 데이터 스트림 및 클록을 생성합니다〃

시뮬레이션에서 생성으로의 원활한 전환

파형을 정의하거나 캡처 할 수 있으면 AWG5200이이 신호를 재생할 수 있습니다. 파형 생성은 여러 가지 방법으로 발생할 수 있습니다.Tektronix AWG 제품군과 함께 특별히 작동하도록 최적화 된 광범위한 파형 생성 플러그인 라이브러리는 특정 파형 생성 기능을 제공하며, MATLAB, Excel 등과 같은 타사 솔루션은 원하는 파형을 생성하고 가져올 수 있는 유연성을 제공합니다. 이러한 패키지로 생성된 파형은 AWG5200에서 가져 와서 재생할 수 있으며 시뮬레이션 세계에서 실제 세계로 완벽하게 전환됩니다.
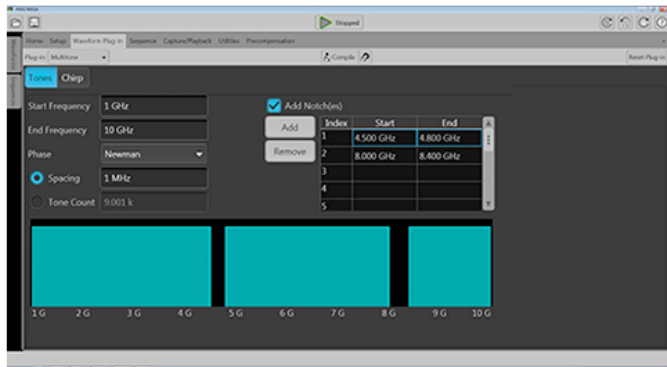
고급 원격 기기 제어 및 파형 생성

새로운 SourceXpress 플랫폼은 모든 AWG 계측기 제어 및 파형 생성 기능을 Microsoft® Windows PC에 제공합니다. AWG를 건드리지 않고도 파형을 로드하고 시퀀스를 생성하며 재생할 수 있습니다. 모든 파형 생성 플러그인은 SourceXpress 플랫폼에서 기본적으로 실행되므로 실험실에서 발을 딛지 않고도 테스트 신호를 신속하게 반복 할 수 있습니다.

Tektronix AWG5200 시리즈는 디지털 복합 변조기와 다중 속도 보간 기능을 갖추고 있습니다. 이 내부 IQ 변조 기능을 사용하면 외부 변조기와 믹서로 인한 IQ 불일치를 제거 할 수 있습니다. 또한 이 변조기를 사용하면 대역 내 반송파 피드 스루가 없으며 이미지가 없습니다. 보간 기가 내장되어있어 파형을 가장 효율적으로 생성하여 파형 크기와 컴파일 시간을 줄이면서 재생 시간을 연장 할 수 있습니다.
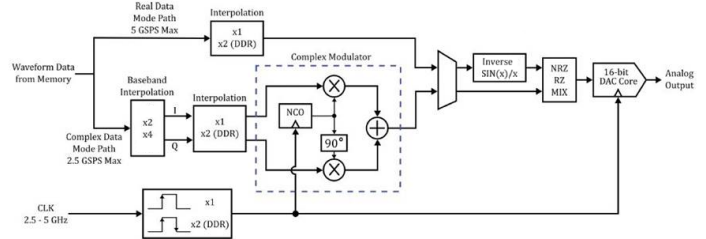

RF 신호 생성

RF 신호가 점점 더 복잡 해짐에 따라 RF 엔지니어는 적합성 및 마진 테스트에 필요한 신호를 정확하게 생성하기가 어렵습니다. AWG5200 시리즈는 RF 일반 파형 생성 플러그인과 함께 사용하면 이러한 까다로운 설계 문제를 해결할 수 있습니다. RF Generic 플러그인은 AWG5200 시리즈 임의 파형 발생기의 고급 신호 생성 기능을 완전히 활용하여 신호 생성을 새로운 수준으로 끌어 올린 변조 된 기저 대역, IF 및 RF 신호를 디지털로 합성하는 소프트웨어 패키지입니다.

여러 DAC 모드 사용 가능

AWG5200 DAC에는 DAC BW의 가장 깨끗한 부분과 주파수 롤오프 위치에서 신호를 출력 할 수 있는 몇 가지 모드가 있습니다.

환경 신호 생성

많은 레이더 신호의 미션 크리티컬 한 특성은 성능 저하 없이 동일한 스펙트럼을 공유하는 표준 기반 상용 신호와 공존해야 합니다. 이러한 기대를 충족시키기 위해 레이더 설계자는 설계 / 디버그 단계에서 모든 코너 케이스를 철저히 테스트해야 합니다. AWG5200은 이러한 최악의 시나리오를 재생하는 데 필요한 최고의 유연성과 정밀성을 제공합니다.
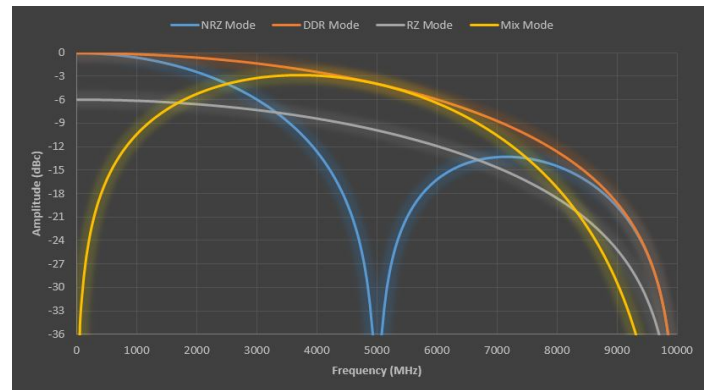
내장 디지털 IQ 변조기

통신 및 군용 시스템의 크기와 비용을 줄이면 최신 DAC가 더 많은 기능을 단일 칩에 통합하기 위해 진화하고 있습니다. 고급 고속 DAC 중 일부에는 디지털 보간, 복잡한 변조 및 수치 제어 발진기 (NCO)와 같은 디지털 신호 처리 및 컨디셔닝 기능도 포함되어 있습니다. 이를 통해 복잡한 RF 신호를 효율적이고 컴팩트 한 방식으로 직접 생성 할 수 있습니다.

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명세서

별도로 명시되지 않는 한 모든 사양은 일반적입니다. 별도 명시되지 않는 한 모든 사양은 모든 모델에 적용됩니다.

Hardware characteristics

Number of analog outputs	
AWG5202	2
AWG5204	4
AWG5208	8
Analog output connector type	SMA female
Analog output impedance	50 Ω
Number of marker outputs	
AWG5202	8
AWG5204	16
AWG5208	32
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
Waveform memory	2 GS/channel
Waveform granularity	1 sample
Waveform minimum size	2400 samples
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
Sample rate (nominal)	300 S/s to 5 GS/s (10 GS/s Interpolated - Double Data Rate)
Sin(x)/x (-3dB)	2.22 GHz @ 5 GS/s, 4.44 GHz Interpolated @ 10 GS/s

Computer characteristics

Operating system / peripherals / IO	Microsoft® Windows OS
	USB 2.0 compliant ports (2 front)
	USB 3.0 compliant ports (4 rear)
	RJ-45 Ethernet connector (rear panel) supports 10/100/1000BASE-T
	VGA video (rear panel) for external monitor
	eSATA (rear panel)
Display characteristics	LED backlit touch screen display, 165 mm (6.5 in.) diagonal, 1024 × 768 XGA
Software driver for third-party applications	IVI-COM driver
	IVI-C driver

Analog output 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	25 mV_{p-p} to 0.75 V_{p-p} (single ended, 50 Ω terminated)
	50 mV_{p-p} to 1.5 V_{p-p} (differential mode, 100 Ω terminated)
Amplitude accuracy (guaranteed)	±2% of setting ≥ 100 mV_{p-p}
	±5% of setting < 100 mV_{p-p}
Offset	±2 V (50 Ω into gnd), ±4 V into DC voltage terminated
Offset accuracy	±(2% of |offset| + 10 mV); into 50 Ω to Gnd. (Common mode, guaranteed.)
	±25 mV; into 100 Ω differential. (Differential mode.)
Analog bandwidth (@ 750 mV_{p-p})	DC to 2 GHz (-3 dB), DC to 4 GHz (-6 dB)
Rise/fall time	Rise/fall time measured at 20% to 80% levels.
	< 110 ps at 750 mV_{p-p} single-ended

DC HBW Amplified output (option)	Amplitude levels are measured as singled-ended outputs. Output doubles when using differential (both) outputs.
Amplitude range	25 mV_{p-p} to 1.5 V_{p-p} (single ended, 50 Ω terminated)
	50 mV_{p-p} to 3.0 V_{p-p} (differential mode, 100 Ω terminated)
Amplitude accuracy (guaranteed)	±2% of setting ≥ 100 mV_{p-p}
	±5% of setting < 100 mV_{p-p}
Offset	±2 V (50 Ω into gnd), ±4 V into DC voltage terminated
Offset accuracy	±(2% of |offset| + 10 mV); into 50 Ω to Gnd. (Common mode, guaranteed.)
	±25 mV; into 100 Ω differential. (Differential mode.)
Analog bandwidth	DC to 1.3 GHz (-3 dB), DC to 2.6 GHz (-6 dB) (at 1.5 V_{p-p})
Rise/fall time	Rise/fall time measured at 20% to 80% levels.
	< 180 ps at 1.5 V_{p-p} single-ended

DC High Voltage output (option)	Amplitude levels are measured as singled-ended outputs. Output doubles when using differential (both) outputs.
Amplitude range	10 mV_{p-p} to 5.0 V_{p-p} (single ended, 50 Ω terminated)
	20 mV_{p-p} to 10.0 V_{p-p} (differential mode, 100 Ω terminated)
Amplitude accuracy (guaranteed)	±2% of setting ≥ 160 mV_{p-p}
	±5% of setting < 160 mV_{p-p}
Offset	±2 V (50 Ω into gnd), ±4 V into DC voltage terminated
Offset accuracy	±(2% of |offset| + 1% of amplitude + 20 mV). (Common mode guaranteed.)
	± 88 mV; into 100 Ω. (Differential mode.)
Analog bandwidth	DC – 370 MHz (-3 dB) (at 2 V_{p-p}) DC – 200 MHz (-3 dB) (at 4 V_{p-p})
Rise/fall time	Rise/fall time measured at 20% to 80% levels.
	< 1.3 ns, at 5 V_{p-p} single-ended.
	< 1.1 ns, at 4 V_{p-p} single-ended.
	< 0.8 ns, at 3 V_{p-p} single-ended.
	< 0.6 ns, at 2 V_{p-p} single-ended.

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Analog output characteristics

AC Direct output	Amplitude levels are measured as singled-ended outputs.
Amplitude range	-17 dBm to -5 dBm
Amplitude accuracy	±0.5 dBm at 100 MHz
DC bias	±5 V at 150 mA
DC bias accuracy (guaranteed)	±(2% of bias + 20 mV); into an open circuit (zero load current)
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.
Amplitude range	-85 dBm to +10 dBm (10 MHz to 3.5 GHz)
	-50 dBm to +10 dBm (>3.5 GHz to 5 GHz)
Amplitude accuracy	±0.5 dBm at 100 MHz
DC bias	±5 V at 150 mA
DC bias accuracy (guaranteed)	±(2% of bias + 20 mV); into an open circuit (zero load current)
Analog bandwidth	10 MHz - 2 GHz (-3 dB), 10 MHz - 4 GHz (-6 dB)

Output match VSWR   Mathematically corrected for characteristic 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 3 GHz < 1.6:1 3 GHz to 4 GHz < 2.0:1
DC HBW Amplified (option)	DC to 1 GHz < 1.4:1 1 GHz to 3 GHz < 1.6:1 3 GHz to 4 GHz < 2.0:1
AC Direct	10 MHz to 1 GHz < 1.6:1 1 GHz to 4 GHz < 2:1
AC Amplified (option)	10 MHz to 2 GHz < 1.4:1 2 GHz to 4 GHz < 1.5:1

Bit rate	Bit rate determined as "sample rate / 4 points per cycle", allowing full impairment generation.
	1.25 Gb/s at 5 GS/s

Channel timing characteristics

Channel to channel skew	±25 ps
Skew adjust	
Range	±2 ns
Resolution	250 fs

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Sequencer characteristics

Maximum sequencing steps	16,384
Sub sequencing	Single level of depth

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Spurious Free Dynamic Range (SFDR) characteristics

SFDR characteristics

SFDR is determined as a function of the directly generated carrier frequency.

Harmonics not included. Measured with a balun and with output amplitude set to 500 mV.

DC Direct Out

2.5 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	10 – 500 MHz	–80 dBc	0.01 – 1.25 GHz	–72 dBc
	10 – 625 MHz	10 – 625 MHz	–70 dBc	0.01 – 1.25 GHz	–62 dBc
	0.01 – 1 GHz	0.01 – 1 GHz	–60 dBc	0.01 – 1.25 GHz	–58 dBc
	1 – 1.25 GHz	1 – 1.25 GHz	–60 dBc	0.01 – 1.25 GHz	–54 dBc

5 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	0.01 – 1 GHz	–80 dBc	0.01 – 2.5 GHz	–72 dBc
	0.01 – 1.25 GHz	0.01 – 1.25 GHz	–70 dBc	0.01 – 2.5 GHz	–62 dBc
	0.01 – 2 GHz	0.01 – 2 GHz	–60 dBc	0.01 – 2.5 GHz	–58 dBc
	2 – 2.5 GHz	2 – 2.5 GHz	–60 dBc	0.01 – 2.5 GHz	–54 dBc

10 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	0.01 – 1 GHz	–80 dBc	0.01 – 5 GHz	–72 dBc
	0.01 – 1.25 GHz	0.01 – 1.25 GHz	–70 dBc	0.01 – 5 GHz	–57 dBc
	0.01 – 2 GHz	0.01 – 2 GHz	–60 dBc	0.01 – 5 GHz	–57 dBc
	2 – 3.5 GHz	2 – 3.5 GHz	–60 dBc	0.01 – 5 GHz	–54 dBc
	3.5 – 4 GHz	3.5 – 4 GHz	–56 dBc	0.01 – 5 GHz	–50 dBc

AC Direct Out

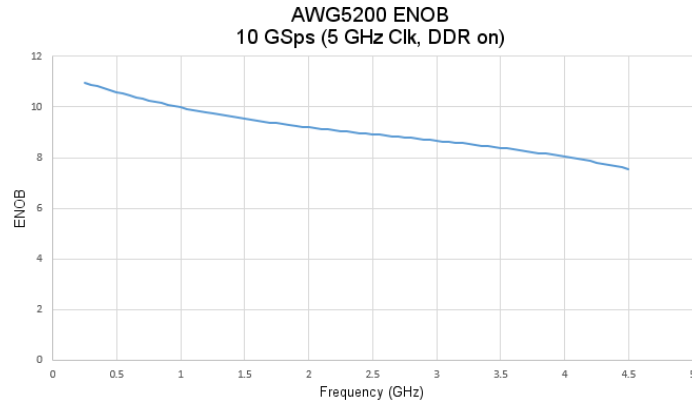Harmonics not included. Measured at the maximum output amplitude.

2.5 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	10 – 500 MHz	–80 dBc	0.01 – 1.25 GHz	–72 dBc
	10 – 625 MHz	10 – 625 MHz	–70 dBc	0.01 – 1.25 GHz	–62 dBc
	0.01 – 1 GHz	0.01 – 1 GHz	–60 dBc	0.01 – 1.25 GHz	–58 dBc
	1 – 1.25 GHz	1 – 1.25 GHz	–60 dBc	0.01 – 1.25 GHz	–54 dBc

5 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	0.01 – 1 GHz	–80 dBc	0.01 – 2.5 GHz	–72 dBc
	0.01 – 1.25 GHz	0.01 – 1.25 GHz	–70 dBc	0.01 – 2.5 GHz	–62 dBc
	0.01 – 2 GHz	0.01 – 2 GHz	–60 dBc	0.01 – 2.5 GHz	–58 dBc
	2 – 2.5 GHz	2 GHz – 2.5 GHz	–60 dBc	0.01 – 2.5 GHz	–54 dBc

Spurious Free Dynamic Range (SFDR) characteristics

10 GS/s		In band performance		Adjacent band performance	
	Analog channel output frequency	Measured across	Specification	Measured across	Specification
	100 MHz	0.01 – 1 GHz	–80 dBc	0.01 – 5 GHz	–72 dBc
	0.01 – 1.25 GHz	0.01 – 1.25 GHz	–70 dBc	0.01 – 5 GHz	–62 dBc
	0.01 – 2 GHz	0.01 – 2 GHz	–60 dBc	0.01 – 5 GHz	–58 dBc
	2 – 3.5 GHz	2 – 3.5 GHz	–60 dBc	0.01 – 5 GHz	–54 dBc
	3.5 – 4 GHz	3.5 – 4 GHz	–56 dBc	0.01 – 5 GHz	–50 dBc

Effective number of bits (ENOB)

AWG5200 ENOB
10 GSps (5 GHz Clk, DDR on)

Clock characteristics

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

Clock output

Connector	SMA on rear-panel
Output impedance	50 Ω AC Coupled
Frequency range	2.5 GHz to 5 GHz
Output amplitude	+3 dBm to +10 dBm

Sampling clock

Resolution	Up to 8 digits
Accuracy	Dependent on reference frequency accuracy

Synchronization clock output

Frequency	External clock output /32
Amplitude	0.85 V to 1.25 V$_{p-p}$ into 50 Ω
Connector	SMA (rear panel)
Impedance	50 Ω, AC coupled

Trigger in

Inputs	2 (A and B)
Polarity	Pos or Neg
Impedance	50 Ω, 1 kΩ
Input range	50 Ω: <5 V_{rms}
	1 kΩ: ±10 V
Connector	SMA (rear panel)

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

Trigger Delay to Analog Output	Asynchronous	8760/ fclk +68 ns ± 20 ns
	Synchronous	8275 / fclk + 30 ns ±20 ns

Asynchronous Trigger Jitter	1k Ω is selected	440 ps_{p-p} for 2.5 GHz DAC sampling clock 240 ps_{p-p} for 5 GHz DAC sampling clock
	50 Ω is selected	420 ps_{p-p}, 24 ps_{rms} for 2.5 GHz DAC sampling clock 220 ps_{p-p}, 14 ps_{rms} for 5 GHz DAC sampling clock

Synchronous Trigger Jitter	Trigger synchronized to Internal or Ext Clock	300 fs_{rms}
	Trigger synchronized to Variable Reference	400 fs_{rms}
	Trigger synchronized to Fixed 10 MHz Reference	1.7 ps_{rms}

Trigger minimum pulse width	20 ns
Trigger hold-off	>2 μs

Reference in

Input amplitude	–5 dBm to +5 dBm
Fixed frequency range	10 MHz, ±40 Hz
Variable frequency range	35 MHz to 240 MHz
Connector	SMA (rear panel)
Impedance	50 Ω, AC coupled

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10 MHz reference

Connector	SMA (rear panel)
Impedance	50 Ω, AC coupled
Amplitude	+4 dBm ±2 dBm
Frequency (guaranteed)	Within ±(1 ppm + Aging), Aging: ±1 ppm per year

Auxiliary outputs (Flags)

Number	AWG5202: 4
	AWG5204: 4
	AWG5208: 8
Connector	SMB on rear-panel
Output amplitude	High 2.0 V into 50 Ω
	Low 0.7 V when sinking 10 mA
Output impedance	50 Ω

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	2.5 GS/s to 5 GS/s
Minimum pulse width	400 ps
Max data rate	2.5 GS/s
Type	Single-ended
Connector	SMA (rear panel)
Impedance	50 Ω
Output into 50 Ω	Window: -0.5 V to 1.7 V
	Amplitude: 200 mV to 1.75 V
	Resolution: 100 µV
Rise time	(20% - 80%): 150 ps
Skew between markers of the same channel	<25 ps
Delay control	±2 ns
Random jitter	5 ps

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Pattern jump

Pin assignments

Pin		Pin		Pin	
1	GND	6	GND	11	Data bit 5, input
2	Data bit 0, input	7	Strobe, input	12	Data bit 6, input
3	Data bit 1, input	8	GND	13	Data bit 7, input
4	Data bit 2, input	9	GND	14	GND
5	Data bit 3, input	10	Data bit 4, input	15	GND

Input impedance   1 kΩ pull-down to GND

Input levels   3.3 V LVCMOS

5 V TTL compliant

Number of destinations 256

Strobe polarity   Negative edge

Strobe Minimum Pulse Width 64 ns

Strobe Setup and Hold   Setup: 5 ns

Hold: 5 ns

Waveform capability

Waveform file import capability

Import waveform format by series:

.AWGX file created by Tektronix AWG5200/70000 Series

.AWG file created by Tektronix AWG5000 or AWG7000 Series

.PAT and *.WFM file formats created by Tektronix AWG400/500/600/700 Series

.IQT file format created by Tektronix RSA3000 Series

.TIQ file format created by Tektronix RSA6000/5000 Series or MDO4000 Series

.WFM or *.ISF file formats created by Tektronix TDS/DPO/MSO/DSA Series

.TXT file format

.MAT Matlab file format

.SEQX file format created by Tektronix AWG5200 Series

.SEQ file format created by the Tektronix AWG400/500/600/700 Series

.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)

Waveform file export capability

.WFMX file format, AWG5200/70000 series native format

.WFM file format, AWG400/500/600/700 waveform file

.TIQ file format, RSA6000 IQ Pair

.TXT file format

Datasheet

Physical characteristics

Dimensions

Height	153.6 mm (6.05 in)
Width	460.5 mm (18.13 in)
Depth	603 mm (23.76 in)

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 (2 in)
Right side	50 mm (2 in)
Rear	0 in

Power supply

AC line input	100 to 240 V AC, 50/60 Hz
Consumption	750 Watts, maximum

EMC, Environment, Safety

Temperature

Operating	0 ℃ to +50 ℃ (+32 ℉ to +122 ℉)
Non-operating	-20 ℃ to +60 ℃ (-4 ℉ to +140 ℉)

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

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

Standard accessories [1]

136-7162-xx	Two 50 Ω, 18 GHz, SMA terminators per channel
071-3529-xx	Installation and safety manual (English)
—	Certificate of calibration
—	Power cord

[1] Specify power cord and language option at time of order

Options

Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Language options

Opt. L0	English manual
Opt. L5	Japanese manual
Opt. L7	Simplified Chinese manual
Opt. L8	Traditional Chinese manual
Opt. L10	Russian manual
Opt. L99	No manual

Service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. CA1	Single Calibration or Functional Verification
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration, and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration, and more)
Opt. IF	Upgrade Installation Service
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

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Post sales service options

CA1	Single calibration or functional verification
R5DW	Repair service coverage 5 years
R2PW	Repair service coverage 2 years post warranty
R1PW	Repair service coverage 1 year post warranty

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
AWG5200-2HV	Adds DC High Voltage outputs (SN B020000 and above only)
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
AWG5200-4HV	Adds DC High Voltage outputs (SN B020000 and above only)
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
AWG5200-8HV	Adds DC High Voltage outputs (SN B020000 and above only)
AWG5200-8AC	Adds AC Amplified outputs

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텍트로닉스 공식대리점

AWG5200-8DIGUP	Adds digital up conversion (requires AWG5200-850 or AWG5200-8-2550)
AWG5200-SEQ	Adds Sequencing

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	Create 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 HSSPACKNL-SS01 HSSPACKFL-SS01	S-Parameters and Intersymbol Interference Spread Spectrum Clocking (Licensed 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
Environment plug-in	Create real world scenarios for commercial, electronic warfare, and simulations for monitoring and receiver testing	ENVNL-SS01 ENVFL-SS01	
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	SPARANL-SS01 SPARAFL-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.

Warranty

One-year parts and labor.

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

GPIB
IEEE-488

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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Datasheet

For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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