

## AT-AWG-1102 performance specifications

Document name: AT-AWG-1102

Revision: B

Date: 20/03/2015

Unless otherwise noted the following conditions are used:

Ambient temperature between 0°C and 50°C

Warm up time > 20 minutes

 Humidity: 5% to 80% RH (non-condensating) at <= 30 (0°C to 40°C), 50% max RH (non-condensing) at 40degree C

Typical values cover the expected performance over ambient temperature ranges of 23°C ± 5°C with a 95% confidence level and humidity < 50%.

Specifications	Lin	nits
Channel operating mode	Arbitrary	DDS
Number of Channels		2
Waveforms	Sine, Cosine, Triangle, Rectangl Exponential, Sweep, DC, N	e, Sawtooth, Ramp, Pulse, Sinc, Noise, From File, Arbitrary
Sine Waves		· · · · · · · · · · · · · · · · · · ·
Frequency Range	2 µHz to 125 MHz	3.7 mHz to 110 MHz (@ Max sample rate)
Amplitude Flatness		
(1 Vp-p), typical		
DC to 125 MHz	< ± 0.1 dB	
DC to 110 MHz		< ± 0.1 dB
Harmonics Distortion		
(1 Vp-p), typical		
≤ 1 MHz	< -66dBc	< -66dBc
1 MHz to 5 MHz to	< -63dBc	< -63dBc
5 MHz to 10 MHz	< -59dBc	< -59dBc
10 MHz to 25 MHz	< -53dBc	< -53dBc
25 MHz to 75 MHz	< -38dBc	< -38dBc
75 MHz to 125 MHz	< -28dBc	
75 MHz to 110 MHz		< -31dBc
Non Harmonic Distortion (1 Vp-p, Frequency range DC to 200 MHz), typical		
≤ 1 MHz	< -71dBc	< -63dBc
1 MHz to 5 MHz to	< -71dBc	< -63dBc
5 MHz to 10 MHz	< -71dBc	< -63dBc
10 MHz to 25 MHz	< -66dBc	< -63dBc
25 MHz to 75 MHz	< -53dBc	< -61dBc
75 MHz to 125 MHz	< -47dBc	
75 MHz to 100 MHz		< -61dBc
100 MHz to 110MHz		< -30dBc
THD (100 KHz, 1 Vp-p), typical	< 0.15%	
Phase noise		
(20 MHz, 1 Vp-p), typical		
10 KHz offset	-130 dBc/Hz	
100 KHz offset	-132 d	Bc/Hz
1 MHz offset	-133 d	Bc/Hz
Analog Bandwith	125 MHz	110 MHz

Arbitrary Mode Specifications	
Square Wave, Pulse	
(1 Vp-p)	
Frequency Range	2 μHz to 62.5 MHz
Duty Cycle Range	1% to 99%
Rise/Fall Time, typical	< 3.5 ns
Overshoot, typical	< 5.5%
Random jitter (rms), typical	< 20 ps
Triangle	120 60
Frequency Range	2 μHz to 31.25 MHz
Start Phase Range	0 to 360°
Ramp	
Frequency Range	2 μHz to 31.25 MHz
Sinc (Sine(x)/x)	
Frequency Range	2 μHz to 15.5 MHz
Minimum Lobe Width	8 ns
Amplitude Modulation	
Modulation type	Arbitrary AM, ASK
Carrier waveform	All, From File, Arbitrary
Modulating waveforms	All, From File, Arbitrary
Modulating source	Internal
Modulating waveform sample	
clock (@ Max. sampling rate)	0.46 S/s to 125 MS/s
Memory size	2047 entries
Waveform sequencing	
Waveforms	All, From File, Arbitrary
Waveform repetitions	1 to (2^33 – 1)
Start source	Software, Internal, External
No. of waveforms	1 to 511
General	
Sample rate real time	4 S/s to 250 MS/s
Vertical res.	16 Bit
Waveform memory	2 MSamples / Ch.
Min. waveform length	8 points
Waveform resolution	2 points
Noise bandwidth (-3 dB	100 MHz
gaussian noise), typical	
Run Modes	Single, Continuous, Stepped, Burst
DDS Mode Specifications	
Phase/Frequency Modulation	
Modulation type	Arbitrary FM/PM, FSK, PSK
Carrier waveform	All,From File,Arbitrary
Modulating waveforms	All, From File, Arbitrary
Modulating source	Internal
Carrier frequency (@ Max.	
sample rate)	
Sine wave	3.7mHz to 110 MHz
Square	3.7mHz to 62.5 MHz
Triangle	3.7mHz to 31.25 MHz
Ramp	3.7mHz to 31.25 MHz
Modulating waveform sample	From 119.2S/s to 125 MS/s (per sample programmable)
clock (@ Max. sample rate)	" ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
Memory size	511 entries
Frequency resolution	0.0019 Hz (FSK), 2.15E-5° (PSK) @ 125 MS/s sample rate 0.0037 Hz (FSK), 4.30E-5° (PSK) @ 250 MS/s sample rate
Frequency sweep	
Carrier waveform	All,From File,Arbitrary
Sweep type	All waveforms
Sweep direction	Up or Down

O		
Sweep range (@ Max. sample		
rate)	2.7ml le to 440 ML le	
Sine wave	3.7mHz to 110 MHz	
Square	3.7mHz to 62.5 MHz	
Triangle	3.7mHz to 31.25 MHz	
Ramp	3.7mHz to 31.25 MHz	
Sweep time (@ Max. sample	100ns to 4.2s	
rate)		
General	405 MO/ + 050 MO/	
Sample Rate Real Time	125 MS/s to 250 MS/s	
Run Modes	Single, Continuous, Burst	
Carrier Waveform Memory	2048 Samples / Ch.	
Pulse Width Modulation	Dulan	
Carrier waveform	Pulse	
Carrier frequency	100 mHz to 20 MHz	
Duty cycle modulating waveform	Sine, Triangle, Ramp, Noise, Manual	
Duty cycle modulating frequency	10 μHz to 6.67 MHz	
Source	Internal	
Duty cycle deviation	0 % to 100 % of pulse period	
Frequency accuracy	. 5	
Stability	< ± 5 ppm	
Aging May Internal stad Sample Rete	< ± 2 ppm / year	
Max Interpolated Sample Rate	1 GS/s (4x interpolation)	
Interpolation Factors	1x, 2x, 4x	
Sampling Frequency Resolution	15 digits limited by 1 nHz	
Amplitude, 50 Ω Load (1 KHz)  Amplitude, Open Circuit	0V to +12 Vpp	
Amplitude Resolution	0V to +24Vpp < 1mV	
Amplitude Resolution	± 0.25% of amplitude range (within ±10 °C of calibration	
DC Accuracy, Open circuit (± 12 V	temperature T=25 °C, Humidity ≤ 80%)	
range)	± 0.3% of amplitude range (0 to 50°C)	
	± 0.25% of amplitude range (within ±10 °C of calibration	
DC Accuracy, 50 Ω Load (± 6 V	temperature T=25 °C, Humidity ≤ 80%)	
range)	± 0.3% of amplitude range (0 to 50°C)	
	± 0.25% of amplitude range (within ±10 °C of calibration	
AC Accuracy, Open circuit (0 Vpp	temperature T=25 °C, Humidity ≤ 80%)	
to +24 Vpp range, 1 KHz sine wave)	± 0.3% of amplitude range (0 to 50°C)	
101 1/01/	± 0.25% of amplitude range (within ±10 °C of calibration	
AC Accuracy, 50 Ω Load (0 Vpp to	± 0.25% of amplitude range (within ±10 °C of calibration	
AC Accuracy, 50 $\Omega$ Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)	
	± 0.25% of amplitude range (within ±10 °C of calibration	
+12 Vpp range, 1 KHz sine wave)  Output Impedance	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C) Selectable: 50 Ohm, Low or High Impedance	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector  Frequency range	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock  Input connector  Frequency range Min. input voltage swing	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz ΔVINmin > 2V  VINmax < 5V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock  Input connector  Frequency range  Min. input voltage swing  Damage level	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock  Input connector  Frequency range Min. input voltage swing  Damage level  External Trigger Input	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V  VINmin > -5V	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector  Frequency range Min. input voltage swing  Damage level  External Trigger Input Input connector	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V  VINmin > -5V  Front panel BNC	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector  Frequency range Min. input voltage swing  Damage level  External Trigger Input Input connector Frequency range	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V  VINmax < 5V  VINmin > -5V  Front panel BNC  DC to 125Mhz	
+12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (all channels loaded)  External Clock Input connector  Frequency range Min. input voltage swing  Damage level  External Trigger Input Input connector	± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance ± 120mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V  VINmin > -5V  Front panel BNC	

	VINmax < 6V
Damage level	VINITIAX < 6V VINmin > -2V
Slope	Rising Edge or Falling
External Trigger Output	
Output connector	Front panel BNC
Output level	TTL compatible into > 1 KOhm
Output impedance	50 Ohm nominal
Digital I/O	
Connector	50 pin high density (1.27mm) SCSI connector
Connector count	1
Multi Channel Specifications	
Sampling rate tuning	Programmable per channel couple (Ch1-2)
Skew between channels (all	. , , ,
channels at the same sampling	
rate)	
Average, typical	< 300 ps
Standard deviation, typical	< 35 ps
Math	Sum, Difference, Multiply between the two channels (Ch1-2)
General	
Power supply voltage range	100 +/- 10% to 240 +/- 10% VAC
Power consumption	35 W max.
Power Frequency range	50/60 Hz +/- 5%
PC interface	USB 2.0
External dimensions	TBD
Weight	TBD
	- CH1 BNC
	- CH2 BNC
Front panel connectors	- Trigger Input BNC
1 Tont panel connectors	- Trigger Output BNC
	- External clock input BNC
	- Digital I/O Pod A, 50 pin high density (1.27mm)
Rear panel connectors	- DC power jack
·	- USB
Minimum PC Requirements	
Operative system	Microsoft Windows 2000/XP SP2/Vista/7 32Bit Editions
Processor	Pentium III processor, or equivalent
Memory	512Mbytes RAM
Hard Disk	150Mbytes available free space
Display Resolution	800x600
Ports	USB 2.0 or 1.1



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## AT-AWG-1104 performance specifications

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Unless otherwise noted the following conditions are used:

- Ambient temperature between 0°C and 50°C
- Warm up time > 20 minutes
- Humidity: 5% to 80% RH (non-condensating) at <= 30 (0°C to 40°C), 50% max RH (non-condensing) at 40degree C

Typical values cover the expected performance over ambient temperature ranges of 23°C ± 5°C with a 95% confidence level and humidity < 50%.

Specifications	Limi	its
Channel operating mode	Arbitrary	DDS
Number of Channels	4	
Waveforms	Sine, Cosine, Triangle, Rectangle Exponential, Sweep, DC, N	
Sine Waves		•
Frequency Range	2 μHz to 125 MHz	3.7 mHz to 110 MHz (@ Max sample rate)
Amplitude Flatness		
(1 Vp-p), typical		
DC to 125 MHz	< ± 0.1 dB	
DC to 110 MHz		< ± 0.1 dB
Harmonics Distortion		
(1 Vp-p), typical		
≤ 1 MHz	< -66dBc	< -66dBc
1 MHz to 5 MHz to	< -63dBc	< -63dBc
5 MHz to 10 MHz	< -59dBc	< -59dBc
10 MHz to 25 MHz	< -53dBc	< -53dBc
25 MHz to 75 MHz	< -38dBc	< -38dBc
75 MHz to 125 MHz	< -28dBc	
75 MHz to 110 MHz		< -31dBc
Non Harmonic Distortion		
(1 Vp-p, Frequency range DC to 200 MHz), typical		
≤ 1 MHz	< -71dBc	< -63dBc
1 MHz to 5 MHz to	< -71dBc	< -63dBc
5 MHz to 10 MHz	< -71dBc	< -63dBc
10 MHz to 25 MHz	< -66dBc	< -63dBc
25 MHz to 75 MHz	< -53dBc	< -61dBc
75 MHz to 125 MHz	< -47dBc	
75 MHz to 100 MHz		< -61dBc
100 MHz to 110MHz		< -30dBc
THD (100 KHz, 1 Vp-p), typical	< 0.11	5%
Phase noise		
(20 MHz, 1 Vp-p), typical		
10 KHz offset	-130 dE	Bc/Hz
100 KHz offset	-132 dE	
1 MHz offset	-133 dE	
Analog Bandwith	125 MHz	110 MHz

Arbitrary Mode Specifications	
Square Wave, Pulse	
(1 Vp-p)	
Frequency Range	2 μHz to 62.5 MHz
Duty Cycle Range	1% to 99%
Rise/Fall Time, typical	< 3.5 ns
Overshoot, typical	< 5.5%
Random jitter (rms), typical	< 20 ps
Triangle	120 60
Frequency Range	2 μHz to 31.25 MHz
Start Phase Range	0 to 360°
Ramp	
Frequency Range	2 μHz to 31.25 MHz
Sinc (Sine(x)/x)	
Frequency Range	2 μHz to 15.5 MHz
Minimum Lobe Width	8 ns
Amplitude Modulation	
Modulation type	Arbitrary AM, ASK
Carrier waveform	All, From File, Arbitrary
Modulating waveforms	All, From File, Arbitrary
Modulating source	Internal
Modulating waveform sample	
clock (@ Max. sampling rate)	0.46 S/s to 125 MS/s
Memory size	2047 entries
Waveform sequencing	
Waveforms	All, From File, Arbitrary
Waveform repetitions	1 to (2^33 – 1)
Start source	Software, Internal, External
No. of waveforms	1 to 511
General	
Sample rate real time	4 S/s to 250 MS/s
Vertical res.	16 Bit
Waveform memory	2 MSamples / Ch.
Min. waveform length	8 points
Waveform resolution	2 points
Noise bandwidth (-3 dB	100 MHz
gaussian noise), typical	
Run Modes	Single, Continuous, Stepped, Burst
DDS Mode Specifications	
Phase/Frequency Modulation	
Modulation type	Arbitrary FM/PM, FSK, PSK
Carrier waveform	All,From File,Arbitrary
Modulating waveforms	All, From File, Arbitrary
Modulating source	Internal
Carrier frequency (@ Max.	
sample rate)	
Sine wave	3.7mHz to 110 MHz
Square	3.7mHz to 62.5 MHz
Triangle	3.7mHz to 31.25 MHz
Ramp	3.7mHz to 31.25 MHz
Modulating waveform sample	From 119.2S/s to 125 MS/s (per sample programmable)
clock (@ Max. sample rate)	" ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
Memory size	511 entries
Frequency resolution	0.0019 Hz (FSK), 2.15E-5° (PSK) @ 125 MS/s sample rate 0.0037 Hz (FSK), 4.30E-5° (PSK) @ 250 MS/s sample rate
Frequency sweep	
Carrier waveform	All,From File,Arbitrary
Sweep type	All waveforms
Sweep direction	Up or Down

0	
Sweep range (@ Max. sample	
rate)	
Sine wave	3.7mHz to 110 MHz
Square	3.7mHz to 62.5 MHz
Triangle	3.7mHz to 31.25 MHz
Ramp	3.7mHz to 31.25 MHz
Sweep time (@ Max. sample	100ns to 4.2s
rate)	100113 to 4.23
General	
Sample Rate Real Time	125 MS/s to 250 MS/s
Run Modes	Single, Continuous, Burst
Carrier Waveform Memory	2048 Samples / Ch.
Pulse Width Modulation	
Carrier waveform	Pulse
Carrier frequency	100 mHz to 20 MHz
Duty cycle modulating waveform	Sine, Triangle, Ramp, Noise, Manual
Duty cycle modulating frequency	10 µHz to 6.67 MHz
Source	Internal
Duty cycle deviation	0 % to 100 % of pulse period
Frequency accuracy	o /o to 100 /o of pariod portion
Stability	< ± 5 ppm
Aging	< ± 2 ppm / year
Max Interpolated Sample Rate	1 GS/s (4x interpolation)
Interpolation Factors	1x, 2x, 4x
Sampling Frequency Resolution	15 digits limited by 1 nHz
Amplitude, 50 Ω Load (1 KHz)	0V to +12 Vpp
Amplitude, Open Circuit	0V to +24Vpp
Amplitude Resolution	< 1mV
DC Accuracy, Open circuit (± 12 V	± 0.25% of amplitude range (within ±10 °C of calibration
range)	temperature T=25 °C, Humidity ≤ 80%)
<i>-</i> ,	± 0.3% of amplitude range (0 to 50°C)
DC Accuracy, 50 Ω Load (± 6 V	± 0.25% of amplitude range (within ±10 °C of calibration
range)	temperature T=25 °C, Humidity ≤ 80%)
<i>-</i> ,	± 0.3% of amplitude range (0 to 50°C)
AC Accuracy, Open circuit (0 Vpp	± 0.25% of amplitude range (within ±10 °C of calibration
	temperature T=25 °C, Humidity ≤ 80%)
to +24 Vpp range, 1 KHz sine wave)	± 0.3% of amplitude range (0 to 50°C)
to +24 Vpp range, 1 KHz sine wave)	± 0.3% of amplitude range (0 to 50°C) ± 0.25% of amplitude range (within ±10 °C of calibration
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to	± 0.3% of amplitude range (0 to 50°C) ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  Io max (1 or 2 channels loaded)	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)  External Clock  Input connector	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%)  ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)  External Clock  Input connector  Frequency range	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance lo max (1 or 2 channels loaded) lo max (all channels loaded)  External Clock  Input connector  Frequency range  Min. input voltage swing	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)  External Clock  Input connector  Frequency range	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)  External Clock  Input connector  Frequency range  Min. input voltage swing  Damage level	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  Io max (all channels loaded)  External Clock  Input connector  Frequency range  Min. input voltage swing  Damage level  External Trigger Input	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V  VINmin > -5V
to +24 Vpp range, 1 KHz sine wave)  AC Accuracy, 50 Ω Load (0 Vpp to +12 Vpp range, 1 KHz sine wave)  Output Impedance  Short Circuit Protection  CH1, CH2  Output connector  Voltage range (open circuit)  Output impedance  lo max (1 or 2 channels loaded)  lo max (all channels loaded)  External Clock  Input connector  Frequency range  Min. input voltage swing  Damage level	± 0.3% of amplitude range (0 to 50°C)  ± 0.25% of amplitude range (within ±10 °C of calibration temperature T=25 °C, Humidity ≤ 80%) ± 0.3% of amplitude range (0 to 50°C)  Selectable: 50 Ohm, Low or High Impedance  Signal outputs are robust against permanent shorts against floating ground  Front panel BNC  VOmin = -12V  VOmax = +12V  50 Ohm, Low or High Impedance  ± 120mA max per channel  ± 60mA max per channel  Front panel BNC  5 MHz to 125 MHz  ΔVINmin > 2V  VINmax < 5V

Threshold level	VILmax = 0.8V, VIHmin=2V
Voltage range	-0.5V to 4V
Domogo level	VINmax < 6V
Damage level	VINmin > -2V
Slope	Rising Edge or Falling
External Trigger Output	
Output connector	Front panel BNC
Output level	TTL compatible into > 1 KOhm
Output impedance	50 Ohm nominal
Digital I/O	
Connector	50 pin high density (1.27mm) SCSI connector
Connector count	1
Multi Channel Specifications	
Sampling rate tuning	Programmable per channel couple (Ch1-2)
Skew between channels (all	
channels at the same sampling	
rate)	
Average, typical	< 300 ps
Standard deviation, typical	< 35 ps
Math	Sum, Difference, Multiply between the two channels (Ch1-2)
General	
Power supply voltage range	100 +/- 10% to 240 +/- 10% VAC
Power consumption	35 W max.
Power Frequency range	50/60 Hz +/- 5%
PC interface	USB 2.0
External dimensions	TBD
Weight	TBD
	- CH1 BNC
	- CH2 BNC
Front panel connectors	- Trigger Input BNC
•	- Trigger Output BNC - External clock input BNC
	- Digital I/O Pod A, 50 pin high density (1.27mm)
	- Digital 1/0 Fod A, 30 pili high density (1.27 hilli) - DC power jack
Rear panel connectors	- DC power jack - USB
Minimum PC Requirements	- 000
Operative system	Microsoft Windows 2000/XP SP2/Vista/7 32Bit Editions
Processor	Pentium III processor, or equivalent
Memory	512Mbytes RAM
Hard Disk	150Mbytes available free space
Display Resolution	800x600
Ports	USB 2.0 or 1.1
1 3110	1 000 2.0 0

