

20 bit / 2MSPS Arbitrary Waveform Generator

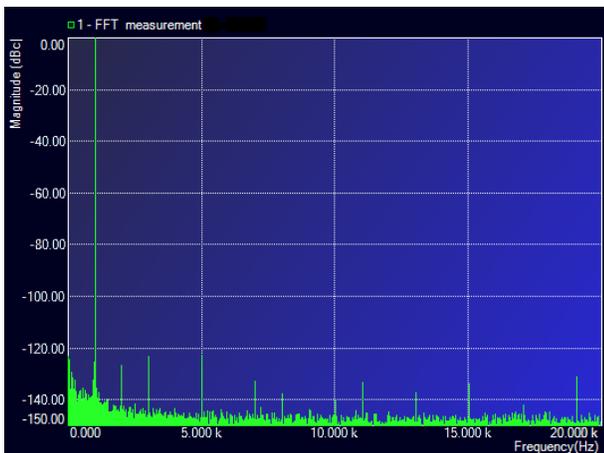
AWG20

- 2 MHz max sample speed
- 20 bit resolution
- Differential outputs
- 8 output ranges
- Selectable filters to improve signal quality
- -118dB THD typical at 1kHz with 1.2kHz filter
- 95dB SNR typical (DC-800kHz)
- Programmable common mode voltage
- For ATX series hardware platform



The AWG20 is a 20 bit Arbitrary Waveform Generator for medium-speed / high resolution waveform generation. The module combines an excellent dynamic performance with a very high DC accuracy.

The module features differential outputs with a programmable common-mode voltage. For single ended applications the positive output as well as the negative output can be used. There are 8 filter paths available, 4 of them can be user configured.



DC to 20kHz spectrum, 1KHz carrier, 1.2kHz filter-on

The module has 8 output ranges starting at 80mVpp up to 10.24Vpp, which covers a wide range of Unit Under Test input voltages.

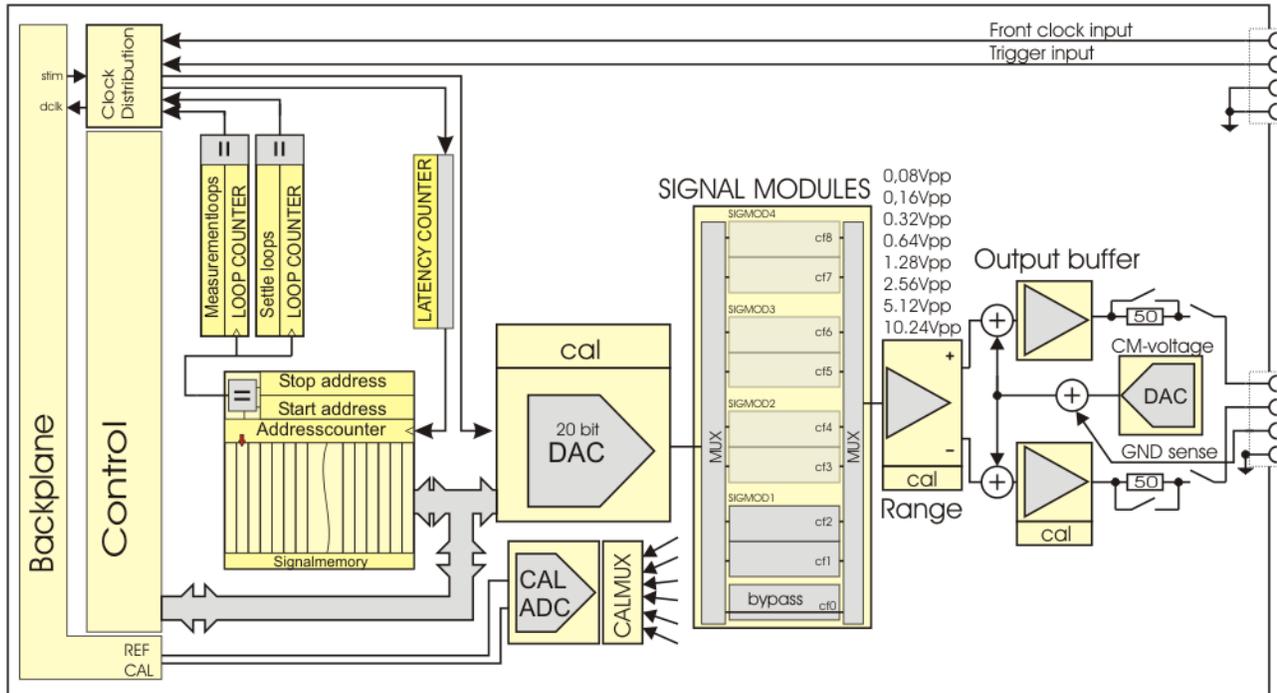
A filter-bank with 4 Low Pass filters (1.2kHz, 12kHz, 40kHz, and 200kHz) provide excellent signal conditioning to obtain the best possible signal integrity. In addition there are 4 software selectable signal paths available for user defined filters.

The Module uses a combination of multiple DACs, sub-ranging and error correction to achieve a full 20 bit performance level. The result is an excellent SNR, THD, linearity and step response, making it very suitable for sine wave generation, ultra linear ramp generation and fast stepping signals. With 4M-word (12M-byte) of memory very complex signal shapes can be generated.

All these features ensure a very accurate result when performing analog measurements. The unit is very suitable for testing ADCs on linearity and dynamic performance.

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Block diagram



Specifications (conditions: after 1 hour warm-up, $T_A=25^\circ\text{C}$, filter bypass unless otherwise mentioned)

General

Resolution	20 bit
Update rate	DC - 2MHz
Pattern depth	4M words

Output characteristics

Output impedance	50Ω or Low impedance (< 1Ω)
Ranges Single Ended (Vpp)	80mV, 0.16V, 0.32V, 0.64V, 1.28V, 2.56V, 5.12V, 10.24V
Ranges differential (Vpp)	0.16V, 0.32V, 0.64V, 1.28V, 2.56V, 5.12V, 10.24V, 20.48V
Output filters (4 pole Butterw.)	Bypass, 1.2kHz, 12kHz, 40kHz, 200kHz, plus 4 user signal paths
Bandwidth, -3dB (typical)	500kHz (5.12Vpp range)
0.1dB flatness (typical)	150kHz (5.12Vpp range)
Output configuration	Differential, Single Ended, 50Ω
Output operating range	+/- 10.24V

Accuracy (filter bypass)

Absolute accuracy	$\pm(40\mu\text{V} + 10\text{ppm of range})$
Non Linearity	$\pm 8\text{ppm of range (4ppm typical)}$
Temperature drift (typical)	$\pm(1\text{ppm of range} + 2\text{ppm of value})/^\circ\text{C}$

Common mode voltage source

Resolution	20-bit (10μV)
Voltage range	-5.12V to +5.12V
DC-offset accuracy	$\pm(20\mu\text{V} + 8\text{ppm of value})$
Non Linearity	$\pm 10\text{ppm of range}$

Dynamic characteristics

(5Vpp output signal, 1.67MSPS, BW DC-800kHz)	
SNR (f _{out} =1kHz)	92dB
SNR (f _{out} =10kHz)	91dB
SNR (f _{out} =100kHz)	88dB
SNR (f _{out} =1kHz, A-weighted)	104dB (BW 20Hz - 20kHz)
THD (f _{out} =1kHz)	-108dB
THD (1kHz with 1.2kHz filter)	-115dB
THD (f _{out} =10kHz)	-106dB
THD (f _{out} =100kHz)	-83dB
THD (f _{out} =100kHz, 2Vpp)	-90dB (typical)
SFDR (f _{out} =1kHz)	108dB

Clock & Trigger inputs

Input impedance	>1MΩ
Input levels	3.3V CMOS/TTL (5V tolerant)