

20 bit / 2MSPS Waveform Digitizer

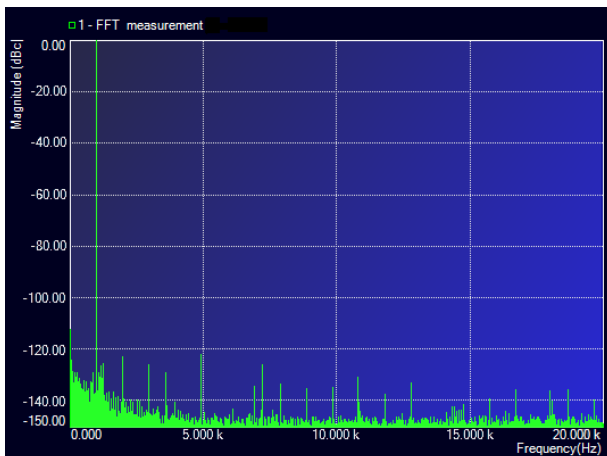
WFD20

- 2 MHz max sample speed
- 20 bit resolution
- Fully differential input
- 8 input ranges
- Selectable filters to reduce out-of-band noise
- -119dB THD typical (f-in=1kHz)
- 96dB SNR typical (DC-800kHz)
- Programmable DC-offset voltage
- For ATX series hardware platform



The WFD20 is a 20 bit Waveform Digitizer for medium-speed / high resolution waveform capturing and analyzing. The module combines an excellent dynamic performance with a very high DC accuracy.

The module features a fully differential input path to reduce common-mode level disturbances. If the internal DC-offset voltage source is used, the negative input can still be used as a GND Sense input, so the DC performance won't be compromised due to ground currents.



DC to 20kHz spectrum, 1kHz carrier, 800kHz filter-on

The module has 8 input ranges from 0.544Vpp to 8.16Vpp, which allows easy adaptation to a wide range of Unit Under Test output voltages.

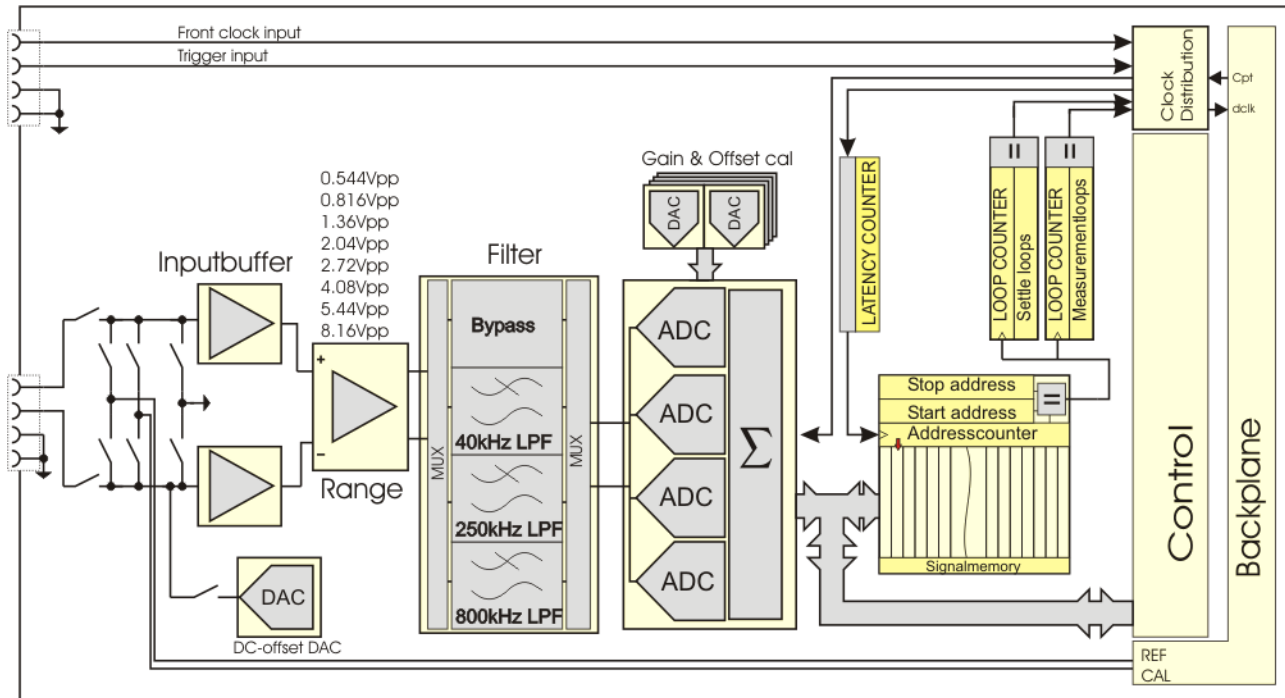
A filter-bank with 3 Low Pass filters (40kHz, 250kHz and 800kHz) provide excellent signal conditioning to obtain the best result in dynamic performance: low noise and anti-aliasing.

The special combination of four 18 bit ADCs to a 20 bit converter gives an excellent SNR and linearity and a resolution down to 0.52 μ V. With 4M-word (12M-byte) of memory a large number of samples can be captured.

All these features ensure a very accurate result when performing analog measurements. The unit is very suitable for testing DAC 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
Sample rate	1.5kHz - 2MHz in warp mode, 0 - 1.5MHz in normal mode
Pattern depth	4M words

Input characteristics

Input impedance	100M Ω
Input ranges	0.544Vpp, 0.816Vpp, 1.36Vpp, 2.04Vpp, 2.72Vpp, 4.08Vpp, 5.44Vpp, 8.16Vpp
Input filters	Bypass, 40kHz (4-pole Butterw.), 250kHz (5-pole Butterworth), 800kHz (7-pole elliptic)
Bandwidth -3dB (typical)	2MHz (8.16Vpp range)
0.1dB flatness (typical)	400kHz (8.16Vpp range)
Input configuration	Differential / Single Ended (-Input to Gnd, Gnd-sense or DC offset)
Input Common mode range	+/- 10V

Accuracy (DC-offset off, filter bypass)

Absolute accuracy	$\pm(40\mu\text{V} + 10\text{ppm of range})$
Non Linearity error	$\pm 8\text{ppm of range}$ (3ppm typical)

Temperature drift (typical)	$\pm(1\text{ppm of range} + 2\text{ppm of reading})/^\circ\text{C}$
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DC-offset source

Resolution	19-bit (20 μV)
Voltage range	-5V to +5V
DC-offset accuracy	$\pm(50\mu\text{V} + 12\text{ppm of value})$
Non Linearity error	$\pm 10\text{ppm of range}$

Dynamic characteristics

(conditions: 1.67MSPS, 800kHz filter on)

SNR (5Vpp, 1kHz input)	93dB
SNR (5Vpp, 10kHz input)	92dB
SNR (5Vpp, 100kHz input)	91dB
SNR (1kHz input, A-weighted)	105dB (BW 20Hz - 20kHz)
THD (2Vpp, 1kHz input)	-110dB
THD (2Vpp, 10kHz input)	-106dB
THD (2Vpp, 100kHz input)	-92dB
SFDR (2Vpp, 1kHz input)	108dB

Clock & Trigger inputs

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