GFT6022
12-bit High speed Digitizer

FEATURES

- 4 analog channels in only 1U space
- Up to 4GS/s sampling rate per channel
- 12 bits vertical resolution
- DC to 925 MHz Analog Bandwidth
- 100 mV to 5 V full scale range
- Variable bias control
- Internal and external clock reference
- Internal and external trigger
- Trigger output
- Time stamp for real time operation
- 1 GByte DRAM data memory
- Controlled via USB
- Compact packaging: 19" W x 300 mm D x 1U H
- Options:
  Data interface Ethernet
  GPIO for communication to external equipment

APPLICATIONS

- RADAR , LIDAR
- Diagnostics on Laser system and High-Energy physics
- High speed data acquisition
- Test and measurement
- Ultrasonic ranging
- Short pulse capture
- Spectroscopy
- Test on high speed circuits
- Automatic Test Equipment

DESCRIPTION

The GFT6022 is the ideal digitizer for characterizing high speed signal. This compact digitizer can record four analog inputs at speeds of 2 Giga Samples by second (or 4GS/s on only two analog input) with 12 bits resolution.

This digitizer with selected number of channels 2 or 4, a full flexible DC coupled analog front end meet the requirement of a large variety of detectors in the most advanced measurement situation.

The flexible DC coupled analog front end contains a variable gain, variable bias control, over voltage protection and anti-aliasing noise suppression filter.

The GFT6022 is available in several sample rates from 1GS/s to 4GS/s per channel.

The digitizer is supplied with windows software application which includes a front panel graphical interface. This software application can be used to control and explore the capabilities of the high speed digitizer.

The GFT6022 is a low profile 19", 1U rack instrument with USB interface. In option an Ethernet interface and a built in Web server provide a remote control via a standard Web Browser.

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Specifications

Parameter		Value					
General parameters							
Vertical resolution		12					
Analog channels		2/4					
	Signal range setting	100mV to 5000 mV					
	Range setting step size	0.25 dB					
	Bias setting	Full signal range					
	Bias setting steps	3000 levels					
	Impedance DC	50 Ω					
	Connector	BNC					
Sample rate options							
	Options	2GS		3GS		4GS	
	Number of channels	4	2	4	2	4	2
	Sampling rate per channel (GS/s)	1	2	1.8	3.6	2	4
	Analog banwidth (MHz)	925	775	925	775	925	775
Bias settings (examples)							
	RANGE	MIN		MAX			
	100 mV	-50 mV		50 mV			
	200 mV	-100 mV		100 mV			
	1000 mV	-500 mV		500 mV			
	5000 mV	-2500 mV		2500 mV			
GPIO							
Number of GPIO		4					
Output impedance		100 Ω					
Output (low – high)		0.1 – 3.2 V					
Input impedance		10 KΩ					
Input (low – high)		1 – 2.3 V					
Connector		Micro DSUB 9 way					
Clock reference input							
Internal clock reference							
	Frequency	10 MHz					
	Accuracy	+/- 5 ppm, +/- 0.5/y ppm					
External clock reference							
	Frequency (min-max)	1 – 250 MHz					
	Signal level (min –max)	0.8 – 3.3 Vpp					
	Impedance AC	50 Ω					
	Duty cycle	50% ± 5%					
External trigger input							
Impedance DC		50 Ω					
Input range (min – max)		–0.4 to 2.4 V					
Threshold rising/falling edge		500 mV					
Sensitivity		200 mV					
Jitter		25 ps					
Connector		BNC					
Power supply							
Power and Voltage requirements		50 W / 90 – 240 V/ 50 – 60 Hz					
Physical size		19" W x 300 mm D x 1U H					

Absolute maximum rating

Analog inputs:		
	DC	-5 V / +5 V, 160 mA
	AC	10 Vpp , 160 mA
Trigger input (to GND)		-3 V , +3.7 V
Clock reference (AC)		3.3 Vpp
Ambient temperature (operation)		0°C to 40°C

Dynamic performance

Frequency response

	In 4 channels mode	In 2 channels mode
Bandwidth (-3 dB)	925 MHz	775 MHz
1 dB flatness	250 MHz	180 MHz

ENOB in dB

ENOB at 1.8 GS/s in 4 channel mode

	Frequency Input		
Range	32MHz	200MHz	400Mhz
100 mV	7.9	7.7	7.6
200 mV	8.5	8.3	8.0
1000 mV	8.6	8.3	8.1
5000 mV	8.6	8.4	7.9

ENOB at 3.6 GS/s in 2 channel mode

	Frequency Input		
Range	32MHz	200MHz	400Mhz
100 mV	7.6	7.7	7.4
200 mV	8.5	8.2	7.8
1000 mV	8.5	8.2	7.9
5000 mV	8.5	8.2	7.9

SNR in dB

SNR at 1.8 GS/s in 4 channel mode

	Frequency Input		
Range	32MHz	200MHz	400Mhz
100 mV	49	48	47
200 mV	54	52	50
1000 mV	54	52	50
5000 mV	54	52	49

SNR at 3.6 GS/s in 2 channel mode

	Frequency Input		
range	32MHz	200MHz	400Mhz
100 mV	48	48	46
200 mV	53	52	50
1000 mV	54	52	50
5000 mV	54	52	49

Functional overview

Block diagram

The digitizer include an analog front-end with signal conditioning and A/D conversions and a digital back-end for data flow control, triggering and host communication, see figure 1.

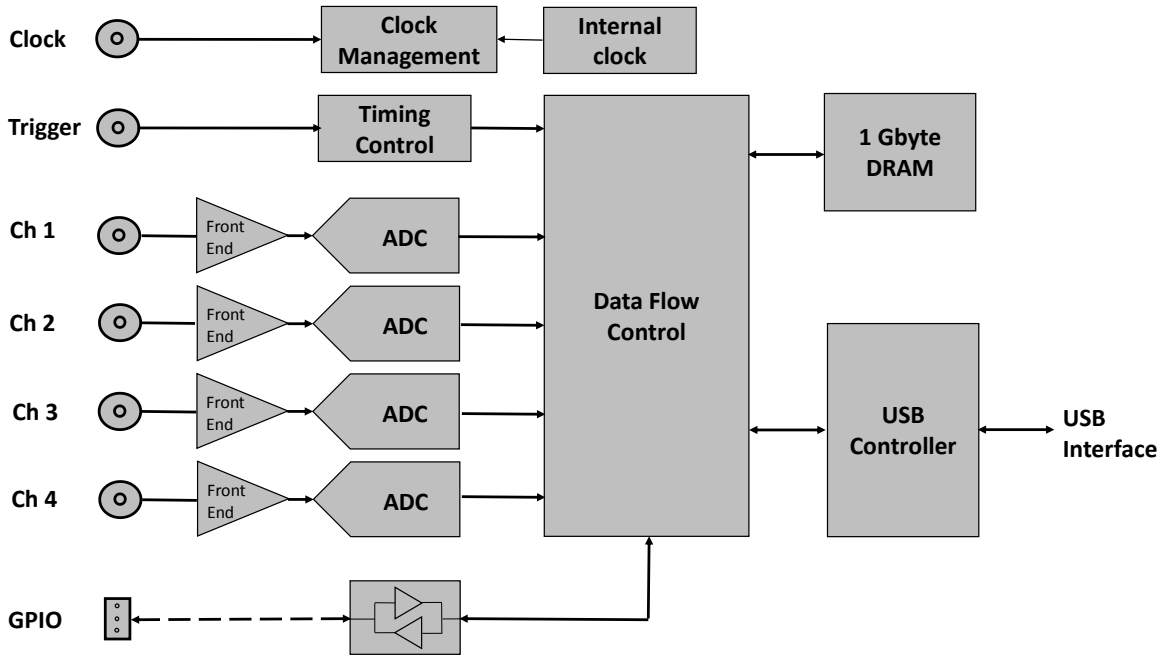

Figure 1: Block diagram 4-channel mode

Analog front end

The analog front end contains over-voltage protection, variable gain setting, variable DC bias and noise suppression filter. The gain is set in steps of 0.25 dB to get full scale signal range from 100 mV to 5 000 mV. The bias is set in 3000 steps and the range is covering the selected gain setting.
The settings are user controlled via software.

The GFT6022 can operate in a 4 channel mode where each ADC is connected to one analog input channel (see figure 1). In the 2 channel mode, two ADCs operate on the same analog input in an interleaved mode. Switching between 2 and 4 channel mode is user controlled via software.

Data recording

Three methods for data recording to serve different use cases:

- Continuous Multi-record recording in on board DRAM for very long records.
- Triggered streaming for fast data transfer and long measurement time.
- Individual level trigger for multi-channel pulse capture

Signal processing

There is support for real time signal processing on the digitizer:

- Real time waveform averaging
- Level trigger for event detection
- Gain and offset calibration
- Custom real time signal processing can be implemented (For more information ask the factory)

Trigger

There are several trigger modes for data recording:

- External for synchronization
- Level trigger for data driven acquisition
- Software for user's control
- Internal for automatic sequencing

There is also a trigger output for triggering external equipment. Tre trigger timing is controlled by pre-trigger buffer and trigger delay parameter settings.

Clock

There are several modes to clocking the digitizer:

- Internal clock for stand alone operation
- External clock for synchronization

There is also a clock reference output for clocking external equipment.

GPIO (Option)

The GPIO (general purpose digital input output) is intended for connecting to external equipment and offers 4 digital bi-directional signals. The direction of each pin is set individually.
The GPIOs are controlled from software.

Software tools

The GFT6022 is supplied with the Lab software that provides quick and easy control of the digitizer. The tool offers both time-domain and frequency domain analysis. Data can be saved in different file formats for off-line analysis. With lab software the GFT6022 operate as a desktop oscilloscope.

Data interface

The USB (USB 2.0) interface is intended for stand-alone operation and allows the GFT6022 to be integrated with sensor system.
With the USB interface the digitizer is easily connected to any computer. The sustained data rate can be to 200 Mbytes/s and combined with on-board signal processing an efficient solution is available. USB interface is only supported under Windows 7 and Windows 8. Please contact our company for information about Linux support.

Ordering information

Ordering information	**Reference**
12-bit High Speed Digitizer	GFT6022
Sampling rate option (4ch/2Ch)	
1.0 / 2.0 GS/s	-2GS
1.8 /3.6 GS/s	-3GS
2.0 /4.0 GS/s	-4GS
Option Data interface	
USB interface	-USB
Ethernet (available in 2016)	-ETH
Option GPIO	
4 x GPIO	-GPIO

Ordering example: GFT6022-3GS-USB-GPIO