



GFT6042

14-bit High Speed Digitizer

KEY FEATURES

- Up to 4 analog channels in only 1U space
- Up to 2GS/s sampling rate per channel
- 14 bits vertical resolution
- DC coupled with up to 1.2 GHz bandwidth
- Programmable DC offset
- Internal and external clock reference
- Internal and external trigger
- Trigger output
- Time stamp for real time operations
- 2 GByte DRAM data memory
- Controlled via Ethernet
- Compact packaging: 19" W x 300 mm D x 1U H
- Option:
GPIO for communication to external equipment
AC coupled Analog Input (ask to factory)

APPLICATIONS

- RADA, LIDAR
- Wireless communication
- High speed data acquisition
- Test and measurement
- Ultrasonic ranging
- Short pulse capture
- Spectroscopy
- Test on high speed circuits
- Automatic Test Equipment
- Time of Flight



DESCRIPTION

The GFT6042 is a versatile 14-bit data acquisition system designed to meet the most challenging measurement situations. This compact digitizer can record 1 to 4 analog inputs at speeds of 0.5GS/s up to 2 GS/s per channel with 14 bits resolution.

This digitizer with selected number of channels 1, 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 (in option), variable bias control, over voltage protection and anti-aliasing noise suppression filter.

The GFT6042 is available in several sample rates from 0.5GS/s to 2GS/s per channel.

The digitizer is supplied with a built in Web server application which includes a front panel graphical interface via Ethernet that provide a remote control via a standard Web Browser.. This application can be used to control and explore the capabilities of the high speed digitizer.

The GFT6042 is a low profile 19", 1U rack instrument with Ethernet interface.



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SPECIFICATIONS

Parameter	Value						
General parameters							
Vertical resolution	14						
Data memory	2 Gbyte						
Sample rate/channel options							
	Options	2GS		1GS		0.5GS	
	Number of channels	2	1	4	2	4	2
	Sampling rate per channel (GS/s)	2	2	1	1	0.5	0.5
Analog inputs fixed gain							
	Input impedance (Ω)	50	50	50	50	50	50
	Input Range Vp-p	1	1	0.5	0.5	0.5	0.5
	Analog bandwidth -3dB (MHz)	1200	1200	700	700	250	250
Analog inputs Variable Gain (option)							
Analog Bandwidth -3dB (MHz)	0.2, 0.5 Vpp	900	900	500	500	500	250
	1, 2, 5 Vpp	700	700	400	400	250	250
Variable DC-offset							
	Fixed gain	+/- 0.25V					
	Variable gain option	Full range of each range setting					
Clock reference							
Internal clock reference							
	Frequency	10 MHz					
	Accuracy	+/- 3 ppm, +/- 1/year ppm					
External clock reference input							
	Frequency (min-max)	10 MHz +/- 5 ppm					
	Signal level (min –max)	0.5 – 3.3 Vpp					
	Impedance AC	50 Ω					
	Impedance AC (high)	200 Ω (soft controlled)					
	Duty cycle	TBD					
Clock reference output							
	Frequency	Set by selected clock reference					
	Signal level	1.2 Vpp (into 50 Ω load)					
	Impedance AC/DC	50 Ω / 10 K Ω					
Trigger							
External trigger input							
	Trigger frequency	>1 MHz					
	Impedance DC	50 Ω					
	High impedance DC	>500 Ω (soft controlled)					
	Input range (min – max)	-0.5 to 3.3 V					
	Threshold	Programmable					
	Sensitivity	200 mV					
	Time resolution	125 ps					
	Excess jitter	25 ps (added inside the unit)					
Trigger output							
	PRF (max)	100 MHz					
	Signal level output low max	0.1 V					
	Signal level output high min	1.2 V (into 50 Ω load)					
	Impedance DC	50 Ω					
	GPIO data rate	TBD when used as GPIO					
	Connector	Shared with trigger input					



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Parameter	Value
Multi-unit Synchronization	
External sync input	
PRF (max)	>1 MHz
Signal level input high min	0.8 V
Signal level input low max	2 V
Impedance DC	50 Ω
High impedance DC	>500 Ω
GPIO data rate	100 MHz
Connector	BNC (Shared with Sync output)
Sync output	
PRF (max)	>1 MHz
Signal level output low max	0.1 V
Signal level output high min	1.2 V (into 50 Ω)
Impedance DC	50 Ω
GPIO data rate	100 MHz
Connector	BNC (Shared with Sync input)
GPIO	
Standard GPIO	
Trigger input/output	See trigger specification
Sync input/output	See trigger specification
GPIO option (included with the variable gain option)	
Number of GPIO signals	4
Signal level input high min	0.8 V
Signal level input low max	2 V
Input impedance	10 K Ω
Signal level output low max	0.1 V (no load)
Signal level output high min	3.1 V (no load)
Output impedance	90 Ω
Max data rate	100 Mbit/s per pin
GPIO power out	3.3 V / 100 mA
Connector	subD 9 ways
General specifications	
Power supply and Voltage requirements	50 W / 90 – 240 V/ 50 – 60 Hz
Physical size	19" W x 300 mm D x 1U H
Operating temperature range	0 to 40°C

Absolute maximum rating

Analog inputs:		
DC		-4 V / +4 V
VG option range 5Vp-p		+/- 5 V
VG option other range		+/- 4 V
AC		TBD
External trigger input (to GND)		-2.3 V , +5 V
External Clock reference (AC / DC)		5 Vpp / +/-5 V
Ambient temperature (operation)		0°C to 40°C



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Dynamic performance

@ 71 MHz -1dBFS input signal

Channels / Sample rate options						
Number of channels	2	1	4	2	4	2
Sampling rate per channel (GS/s)	2	2	1	1	0.5	0.5
Analog performance fixed gain						
ENOB (bits)	9.3	9.3	9.7	9.7	10	10
SNR (dB)	58	58	60	60	62	62
SFDR (dB)	75	75	75	75	75	75
Analog performance variable gain (option) 0.5, 1, 2, 5 Vp-p						
ENOB (bits)	9.3	9.3	9.7	9.7	10	10
SFRD (dB)	75	75	75	75	75	75
Analog performance variable gain (option) 0.2 Vp-p						
ENOB (bits)	-	-	9.1	9.1	9.4	9.4
SFRD (dB)	-	-	75	75	75	75

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.

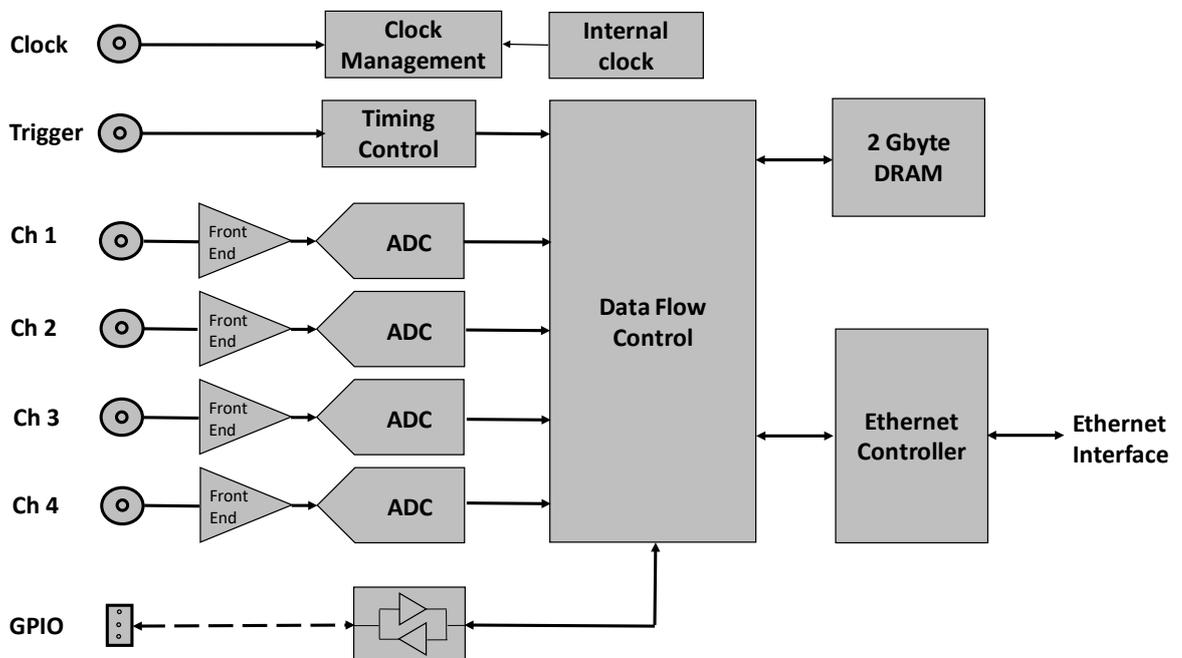


Figure 1: Block diagram 4-channel mode

Analog front end

The analog front end contains over-voltage protection, variable gain setting (option), variable DC bias and noise suppression filter. The gain is set in steps of 1-2-5 to get full scale signal range from 200 mV to 5 000 mV. The bias is set in 31 steps and the range is covering the selected gain setting.

The settings are user controlled via software.

When the GFT6042 is configured in a 0.5GS and 1GS sample rate, each ADC is connected to one analog input channel (see figure 1). In a 2GS sample rate configuration, two ADCs operate on the same analog input in an interleaved mode.

Data recording

Three methods for data recording to serve different use cases:

- Continuous Multi-record recording in on board DRAM for very long records.
- Individual level trigger for multi-channel pulse capture

Signal processing

There is support (For more information ask the factory) for real time signal processing on the digitizer:

- Real time waveform averaging
- Level trigger for event detection
- Custom real time signal processing can be implemented



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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. The 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.

Data interface

The Ethernet interface is intended for stand-alone operation and allows the GFT6042 to be integrated with sensor system. With Ethernet interface the digitizer is easily connected to any computer.

The GFT6042 has an embedded Web server. This allows all parameters to be controlled and viewed by any PC with browser.

SOFTWARE TOOLS

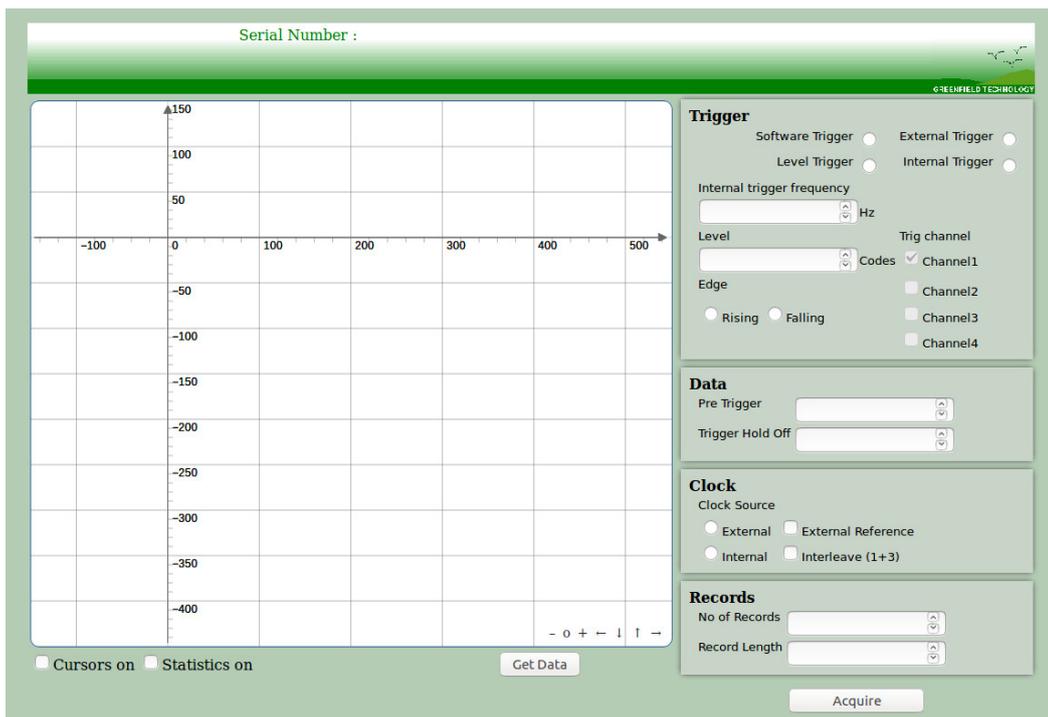
They are two ways to control the GFT6042 Digitizer

- **“Quick way”** via Internet and control panel web page (see below). Web page from embedded server, provides an easy and quick method to configure settings (Trigger, Data, clock, record) to control operation, to display data recorded and to save data for off-line analysis

With Control panel web page the GFT6042 operate as a desktop oscilloscope. The control panel is constituted of two parts.

- Right part to select the settings and run the records
- Left part to display the different record and to read the value with cursor.

Internet connection: The web page can be quickly opened via standard browser like internet explorer, Mozilla Firefox or Chrome (without any DLL or specific software). After connecting a cable from the GFT6024's Ethernet port to your computer network, enter the GFT6024's IP address into your PC's browser (the IP address can be identified or assigned via the web page). The browser will automatically open the control panel web page on your PC.



Control panel web page

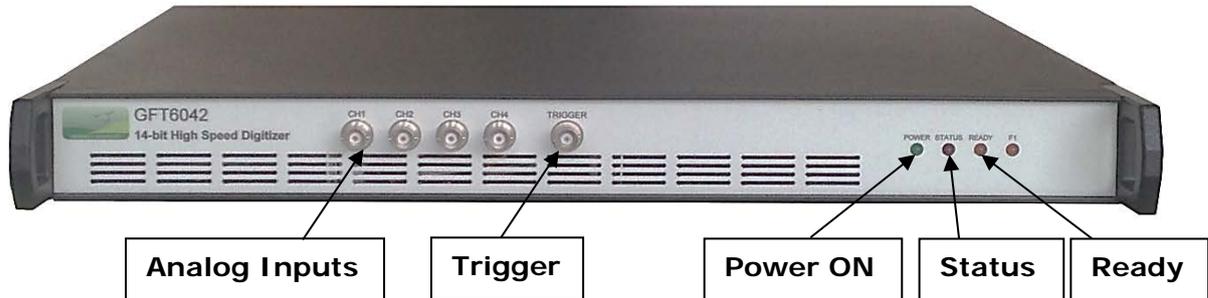
- **“General remote way”** via Ethernet and LabVIEW software application or other PC software application. GFT6042 offers a set of command to configure settings for each channel and trigger, Read the measurements, Control operation and status of the instrument.
Example of use is provided in a user's manual.

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FRONT AND REAR PANEL

Front panel



Rear panel



ORDERING INFORMATION

Ordering information		Reference
14-bit High Speed Digitizer		GFT6042
Sampling rate option		
Sample rate per channel	Channel number	
2 GS/s	2	2GS-2C
2 GS/s	1	2GS-1C
1 GS/s	4	1GS-4C
1 GS/s	2	1GS-2C
0.5 GS/s	4	0.5GS-4C
0.5 GS/s	2	0.5GS-2C
Analog input variable gain option Full scale range 0.2, 0.5, 0.1, 0.2, 0.5 V _{pp}		VG
Option GPIO		
4 x GPIO		-GPIO
AC coupled Analog Input option (ask to factory)		AC

Ordering example: GFT6042-2GS-1C-GPIO (model GFT6042, with 2GS/s sampling rate per channel, with 1 channel and with option GPIO)