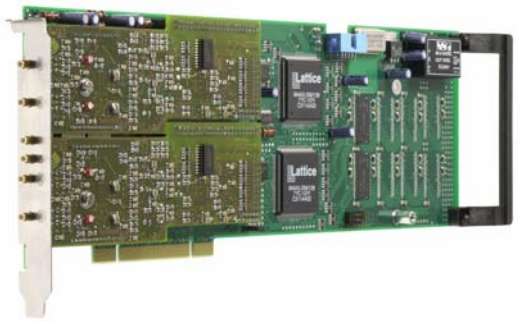
UltraFast

STRATEGIC TEST

UF3100 - 12 bit Digitizer PCI cards, 2 to 8 channels and up to 25 MS/s

- **Standard PCI format**
- **12 bit A/D converter board**
- **1 MS/s, 10 Ms/s or 25 MS/s**
- **2, 4 or 8 channels per board**
- **Simultaneously sampling on all channels**
- **8 input ranges: ±50 mV up to ± 10 V**
- **Up to 256 MSample memory**
- **FIFO mode, up to 100 MB/s to PC**
- **Window and Pulsewidth trigger**
- **Input offset up to ±100%**
- **Multi-card synchronization possible**
- **Windows program SBench 5.x included**



Product range overview

Model	1 channel	2 channels	4 channels	8 channels
UF.3110	1 MS/s	1 MS/s		
UF.3111	1 MS/s	1 MS/s	1 MS/s	
UF.3112	1 MS/s	1 MS/s	1 MS/s	1 MS/s
UF.3120	10 MS/s	10 MS/s		
UF.3121	10 MS/s	10 MS/s	10 MS/s	
UF.3122	10 MS/s	10 MS/s	10 MS/s	10 MS/s
UF.3130	25 MS/s	25 MS/s		
UF.3131	25 MS/s	25 MS/s	25 MS/s	
UF.3132	25 MS/s	25 MS/s	25 MS/s	25 MS/s

Software/Drivers

A wide variety of drivers and examples are delivered with the board or are available as an option:

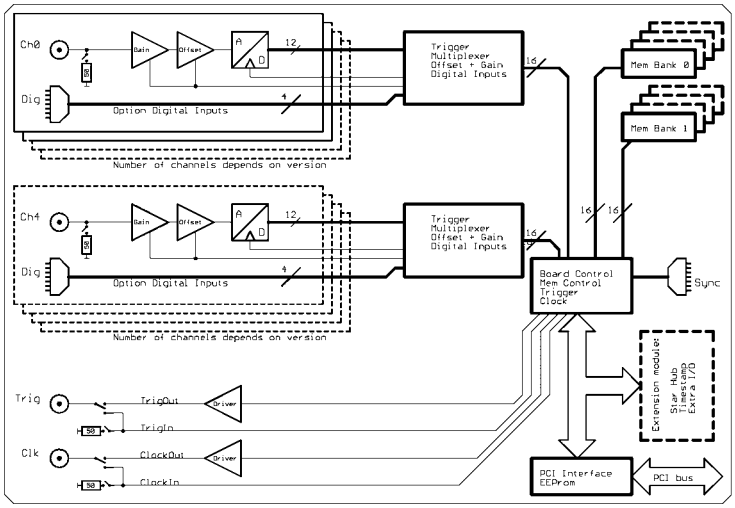
- Windows 98/ME/NT/2000/XP - drivers
- Linux - drivers
- SBench 5.2
- Microsoft Visual C++ examples
- Borland Delphi examples
- Microsoft Visual Basic examples
- Microsoft Excel examples
- LabWindows/CVI examples
- FlexPro support with SBench
- LabVIEW - drivers (as option)
- DASYLab - drivers (as option)
- MATLAB - drivers (as option)
- Agilent VEE - drivers (as option)

General Information

There are 9 different UF3100 Digitizer PCI boards available offering two, four or eight input channels with maximum sample rates of 1 MS/s, 10 MS/s or 25 MS/s - so that the most effective price/performance solution to be selected.

It's also possible to simultaneous record digital signals as the UF3100-dig option adds 4 digital inputs for each analog channel, making up to 32 inputs possible. The digital channels are often used to record external status or timing information synchronously with the analog signals. With up to 256 MSamples of onboard signal memory the UF3100 boards can be used to record long signals even at the highest sampling rates. The memory may also be used in FIFO mode for continuous data transfer to the host PC for immediated processing or saving to hard disk.

Hardware block diagram



Software programmable parameters

Sample rate	1 kS/s to max sample rate, external clock, ref clock
Input Range	±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V
Input impedance	50 Ohm / 1 MOhm
Input Offset	±100% in steps of 1%
Clock impedance	50 Ohm / 1 MOhm
Trigger impedance	50 Ohm / 1 MOhm
Trigger mode	Channel, External, Software, Auto, Windows, Pulse
Trigger level	1/256 to 255/256 of input range
Trigger edge	rising edge, falling edge or both edges
Trigger pulsewidth	1 to 255 samples in steps of 1 sample
Memory depth	16 up to installed memory in steps of 16
Posttrigger	16 up to 128 M in steps of 16

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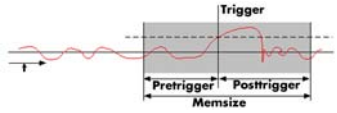
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Possibilities and options

Input impedance

All inputs can be individually switched by software between 50 Ohm and 1 MOhm input impedance. If using fast signals and high sampling rates or you have 50 Ohm cable impedance, then the use of the 50 Ohm termination is recommended to minimise noise and signal reflections. If using weak signal sources or standard probes the use of the 1 MOhm termination is preferred.

Ring buffer mode



The ring buffer mode is the standard mode for all oscilloscope boards. Data is written in a ring memory on the board until a trigger event is detected. After the event the posttrigger values are recorded. Because the data is continuously recorded the pretrigger samples before the event are recorded also : Pretrigger = Memsize - Posttrigger.

FIFO mode

The FIFO mode is designed for continuous data transfer between measurement board and PC memory (up to 100 MB /s) or hard disk (up to 50 MB/s). The data stream is controlled automatically by the driver on interrupt request.

Channel trigger

The data acquisition boards offer a wide variety of trigger modes. In addition to the standard level and edge trigers found on traditional oscilloscopes, it is also possible to define a window trigger where the signal is inside or outside two defined amplitude limits. All trigger modes can be combined with the pulsewidth trigger which is similar to a time window. This is useful for eliminating false triggering due to noise spikes and can also be used to only capture short pulses.

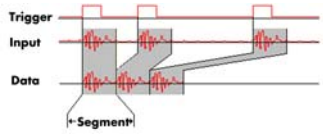
External trigger I/O

All boards include an External Trigger connector for triggering using an external TTL signal. It is possible to use positive or negative edge and this may be combined with a programmable pulsewidth time window trigger. If triggering on a channel or by software, then this trigger event can be output though the external trigger connector to start external instruments.

Pulse width

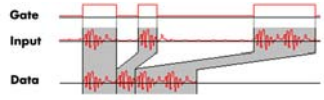
The pulsewidth trigger is similar to a time window. Once the time windows is defined, the pulsewidth trigger is combined with either the channel trigger, pattern trigger and external trigger.It is used to eliminate false triggerring due to noise spikes, but can also be used to capture short events only.

Multiple Recording



The Multiple Recording option is used to record the signals from several trigger events without restarting the hardware. As a result it is possible to record a series of high speed signals, such as RADAR signals where several thousand may need to be captured in a short time. The user defines the number of waveforms to be recorded and the on-board memory is automatically divided in this number of equal-sized segments. Each segment is then filled with data as a trigger event occurs.

Gated Sampling

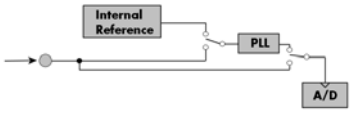


The Gated Sampling option ensures that data is only recorded to memory when the external gate signal reaches a pre-defined level. Effectively, this starts and stops the sampling clock. This option is typically used when you want to reduce the amount of data being recorded to only those signal segments of interest.

External clock I/O

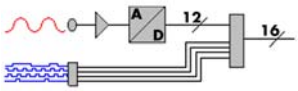
Each UltraFast board is supplied with an External Clock connector. This is used when you want to synchronize the board sampling rate with an external clock signal that may also synchronize other external instruments. It's also possible to output the board generated sampling clock to synchronise external equipment to the board.

Reference clock



This option allows you to use a precise external reference clock (normally 10 MHz) in order to synchronize the board for high-quality measurements with external equipment (like a signal source). It's also possible to enhance the quality of the sampling clock this way. The driver automatically generates the requested sampling clock from the external reference clock signal.

Digital inputs



The Digital Inputs options allows the UltraFast board to record digital signals at the same time as the analog signals. Both signal types are measured synchronously and use the same sample rate.When the option is installed there are 4 additional digital inputs for every analog A/D channel.

Cascading

The Cascading option is the easiest method to create multi-cards systems. Up to 4 UltraFast boards make be connected. The user is able to define the board that will generate the sampling rate clock which is then fed to the other boards. These other boards can subdivide the sampling rate if required using the onboard hardware divider. Similarly, one board is defined by the user as the trigger master. This board then transmits the trigger signals so that all boards start at the same time. There is a phase delay between two boards of about 500 pico seconds when this synchronisation option is used.

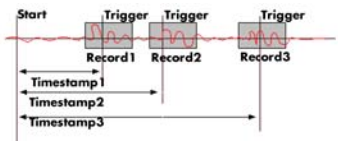
Star Hub

The Star Hub is an additional daughterboard module that allows up to 16 UltraFast boards to be configured as a totally synchronized multi-card system. Unlike the Cascading option, there is no clock or trigger signal phase delay between the boards. The Star Hub module distributes the trigger and clock information between all boards so thatall connected boards are running with the exactly same clock and trigger; athough it is possible to use each boards programmable hardware divider to reduce the sampling rate on different boards.

Extra I/O

The Extra I/O External module adds 24 additional digital I/O lines and 4 analog outputs to the UltraFast board. These additional channels are independent from the high-speed channels and can be controlled asynchronously. An additional PCI backpanel is supplied that houses these additional connectors. There is also an Extra I/O Internal version available with 16 digital I/O and 4 analog output channels. This version is intended for equipment manufacturers who need to route the cables inside the enclosure.

Timestamp



The Timestamp option is used to record the effective time when trigger events occur, into a separate memory buffer. Each timestamp value is derived from the number of samples since the start of the measurement, to a defined zero time or externally synchronised to a radio clock or a GPS receiver. With this option measurements performed on systems at different locations can be synchronized.

Technical Data

Resolution	12 bit	Dimension	312 mm x 107 mm
Differential linearity error	≤ 1 LSB (ADC)	Width (Standard)	1 full size slot
Integral linearity error	≤ 2.5 LSB (ADC)	Width (with digital inputs)	1 full size slot and 1 half size slot
Multi: Trigger to 1st sample delay	fix	Connector	3 mm SMB male
Multi: Recovery time	< 20 samples	Input impedance	50 Ohm / 1 MOhm || 25 pF
ext. Trigger accuracy	1 Samples	Overvoltage protection	±20 V
int. Trigger accuracy	1 Sample	Warm up time	10 minutes
Ext. clock: delay to internal clock	42 ns ±2 ns	Operating temperature	0°C - 50°C
input signal with 50 ohm termination	max 5 V rms	Storage temperature	-10°C - 70°C
Digital Inputs input impedance	110 Ohm @ 2.5 V	Humidity	10% to 90%
Min internal clock	1 kS/s	Power consumption 5 V @ full speed	max 3.3 A (16.5 Watt)
Min external clock	1 kS/s	Power consumption 5 V @ power down	max 2.5 A (12.5 Watt)

Input range	±50 mV	±100 mV	±200 mV	±500 mV	±1 V	±2 V	±5 V	±10 V
Software programmable offset	±50 mV	±100 mV	±200 mV	±500 mV	±1 V	±2 V	±5 V	±10 V
Offset error	< 1 LSB, adjustable by user							
Gain error	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %
Noise (rms): 50 Ohm, 25 MS/s	< 1.5 LSB	< 1.2 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB
Crosstalk 500 kHz signal, ±50 mV input, 50 Ohm	< -70 dB							

Dynamic Parameters

	UF.3110 UF.3111	UF.3112	UF.3120 UF.3121	UF.3122	UF.3130 UF.3131	UF.3132
max internal clock	1 MS/s	1 MS/s	10 MS/s	10 MS/s	25 MS/s	25 MS/s
max external clock	1 MS/s	1 MS/s	10 MS/s	10 MS/s	25 MS/s	25 MS/s
-3 dB bandwidth	> 500 kHz	> 500 kHz	> 5 MHz	> 5 MHz	> 12.5 MHz	> 12.5 MHz
Test - Sample rate	1 MS/s	1 MS/s	10 MS/s	10 MS/s	25 MS/s	25 MS/s
Test signal frequency	90 kHz	90 kHz	1 MHz	1 MHz	1 MHz	1 MHz
SNR (typ)	> 68.2 dB	> 67.5 dB	> 65.5 dB	> 65.4 dB	> 63.5 dB	> 62.8 dB
THD (typ)	< -62.8 dB	< -62.8 dB	< -62.5 dB	< -62.5 dB	< -62.5 dB	< -62.5 dB
SFDR (typ), excl harm.	> 80.8 dB	> 80.5 dB	> 80.5 dB	> 78.5 dB	> 79.5 dB	> 79.3 dB
SINAD (typ)	> 61.7 dB	> 61.5 dB	> 60.7 dB	> 60.7 dB	> 60.0 dB	> 59.6 dB
ENOB (based on SINAD)	10.0	9.9	9.8	9.8	9.7	9.6

Dynamic parameters are measured at ± 1 V input range and 50 Ohm termination with the sample rate specified in the table. Measured parameters are averaged 20 times to get typical values. Test signal is a pure sine wave of the specified frequency with > 99% amplitude. SNR and RMS noise parameters may differ depending on the quality of the used PC. SNR = Signal to Noise Ratio, THD = Total Harmonic Distortion, SFDR = Spurious Free Dynamic Range, SINAD = Signal Noise and Distortion, ENOB = Effective Number of Bits

Ordering information

Order No	Description	Order No	Description
UF3110	UF.3110 with 8 MSample memory and drivers/SBench 5.x	UF3100-16M	16 MSample onboard memory (total)
UF3111	UF.3111 with 8 MSample memory and drivers/SBench 5.x	UF3100-32M	32 MSample onboard memory (total)
UF3112	UF.3112 with 8 MSample memory and drivers/SBench 5.x	UF3100-64M	64 MSample onboard memory (total)
UF3120	UF.3120 with 8 MSample memory and drivers/SBench 5.x	UF3100-128M	128 MSample onboard memory (total)
UF3121	UF.3121 with 8 MSample memory and drivers/SBench 5.x	UF3100-256M	256 MSample onboard memory (total)
UF3122	UF.3122 with 8 MSample memory and drivers/SBench 5.x	UF3100-up	Additional handling costs for later memory upgrade
UF3130	UF.3130 with 8 MSample memory and drivers/SBench 5.x		
UF3131	UF.3131 with 8 MSample memory and drivers/SBench 5.x	UF3100-mr	Multiple Recording: Memory segmentation
UF3132	UF.3132 with 8 MSample memory and drivers/SBench 5.x	UF3100-gs	Gated Sampling: Gate signal controls acquisition
		UF3100-dig	Additional 4 synchronous digital inputs per channel, incl. cable
UF3100-smod	Star Hub: Synchronisation of 2 - 16 boards, one option per system		
UF3100.xio	Extra I/O, internal connector: 16 DI/O, 4 Analog out	UF3100-dl	DASYLab driver for UF.3100 series
UF3100-time	Timestamp option: Extra memory for trigger time	UF3100-hp	VEE driver for UF.3100 series
UF3100-xmf	Extra I/O, external connector: 24 DI/O, 4 Analog out, incl. cable	UF3100-lv	LabVIEW driver for UF.3100 series
UF3100-cs	Synchronisation of 2 - 4 boards, one option per system	MATLAB	MATLAB driver for all UltraFast boards
Cab-3f-9m-80	Adapter cable: SMB female to BNC male 80 cm	Cab-3f-9f-80	Adapter cable: SMB female to BNC female 80 cm
Cab-3f-9m-200	Adapter cable: SMB female to BNC male 200 cm	Cab-3f-9f-200	Adapter cable: SMB female to BNC female 200 cm

Technical changes and printing errors are possible