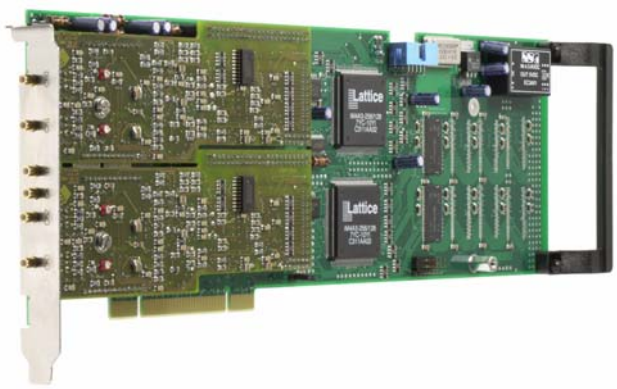
UltraFast

STRATEGIC TEST

UF3000 - 12 bit waveform digitizers up to 200 MS/s

- **Standard PCI format**
- **Fastest 12 bit A/D converter board**
- **Up to 200 MS/s on one channel**
- **Up to 100 MS/s on two channels**
- **Up to 60 MS/s on four channels**
- **Simultaneous sampling on all channels**
- **6 input ranges: ±200 mV up to ± 10 V**
- **Up to 256 MSample memory**
- **FIFO mode, up to 100 MB/s**
- **Window and pulsewidth trigger**
- **Input offset up to ±100%**
- **Multi-card synchronization**



Product range overview

There are 16 boards in the UF3000 series. All of these can use the complete on-board memory for recording at maximum sampling rates. Alternatively the FIFO mode can be used to transfer data continuously to the PC at rates to 100 MB/s.

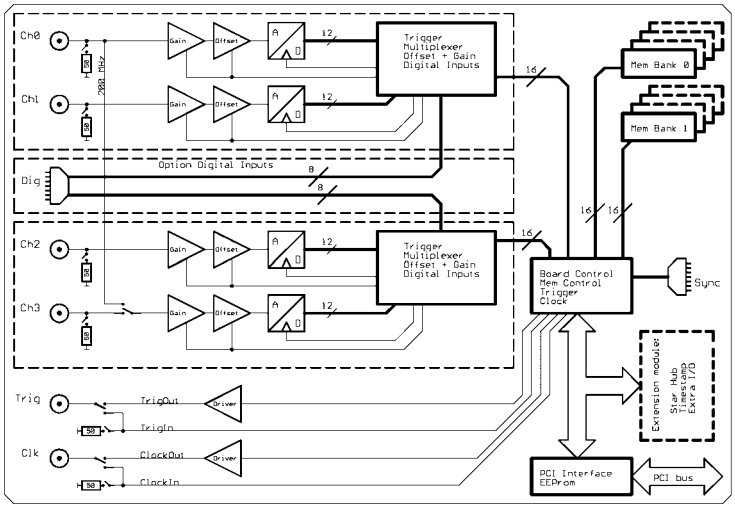
Model	1 channel	2 channels	4 channels
UF.3010	80 MS/s		
UF.3011	40 MS/s	40 MS/s	
UF.3012	80 MS/s	40 MS/s	
UF.3013	40 MS/s	40 MS/s	40 MS/s
UF.3014	80 MS/s	80 MS/s	40 MS/s
UF.3015	160 MS/s	80 MS/s	
UF.3016	160 MS/s	80 MS/s	40 MS/s
UF.3020	100 MS/s		
UF.3021	50 MS/s	50 MS/s	
UF.3022	100 MS/s	50 MS/s	
UF.3023	50 MS/s	50 MS/s	50 MS/s
UF.3024	100 MS/s	100 MS/s	50 MS/s
UF.3025	200 MS/s	100 MS/s	
UF.3026	200 MS/s	100 MS/s	50 MS/s
UF.3031	60 MS/s	60 MS/s	
UF.3033	60 MS/s	60 MS/s	60 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)

Hardware block diagram



Software programmable parameters

Sample rate	1 kS/s to max sample rate, external clock, ref clock
Input Range	±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	32 up to installed memory in steps of 32
Posttrigger	32 up to 128 M in steps of 32
Multiple Recording segmentsize	32 up to installed memory / 2 in steps of 32

Application examples

LDA/PDA	Production test	Laboratory equipment
Radar	Spectroscophy	Test of mobile communication
Ultrasound	Medical equipment	Sonar

2004-03-10

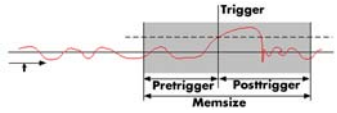
Strategic Test Corporation · One Broadway · Cambridge · MA 02142 · USA · Toll-free Phn.: (866)898-FAST · Fax: (617)577-1209
Strategic Test Scandinavia AB · 184 84 Åkersberga-Stockholm · Sweden · Tel.: +46 (854)400 490 · Fax: +46 (854)080 554
Email: sales@strategic-test.com · www.strategic-test.com

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.

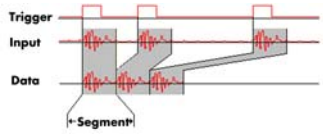
External trigger I/O

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

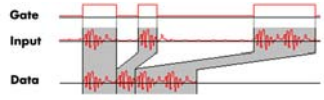
The pulsewidth trigger is similar to a time window. Once the time windows is defined, the pulsewidth trigger is combined with either the channel trigger, pattern trigger and external trigger.It is used to eliminate false triggerring due to noise spikes, but can also be used to capture short events only.

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

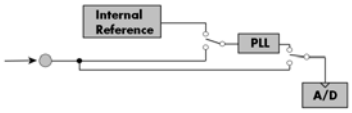


The Gated Sampling option ensures that data is only recorded to memory when the external gate signal reaches a pre-defined level. Effectively, this starts and stops the sampling clock. This option is typically used when you want to reduce the amount of data being recorded to only those signal segments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

External clock I/O

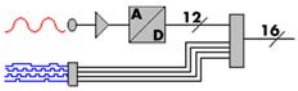
Each UltraFast board is supplied with an External Clock connector. This is used when you want to synchronize the board sampling rate with an external clock signal that may also synchronize other external instruments. It's also possible to output the board generated sampling clock to synchronise external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

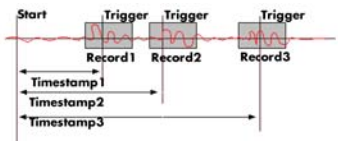
Star Hub

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
Differential linearity error	≤ 1 LSB (ADC)
Integral linearity error	≤ 1 LSB (ADC)
Offset error	adjustable by user
Gain error	< 1%
Crosstalk 1 MHz signal, 50 Ohm term	< -70 dB
Multi: Trigger to 1st sample delay	-10 to +20 samples (fix)
Multi: Recovery time	< 20 samples
ext. Trigger accuracy (<125 MS/s)	1 Samples
ext. Trigger accuracy (>160 MS/s)	2 Samples
int. Trigger accuracy	1 Sample
Trigger output delay	
Ext. clock: delay to internal clock	42 ns ± 2 ns
Min internal clock	1 kS/s
Min external clock	1 MS/s

Input signal with 50 Ohm termination	max 5 V rms
Input impedance	50 Ohm / 1 MOhm || 25 pF
Overvoltage protection	±20 V
Digital Inputs input impedance	110 Ohm @ 2.5 V
Dimension	312 mm x 107 mm
Width (Standard)	1 full size slot
Width (with digital inputs or star hub)	1 full size slot and 1 half size slot
Connector	3 mm SMB male
Warm up time	10 minutes
Operating temperature	0°C - 50°C
Storage temperature	-10°C - 70°C
Humidity	10% to 90%
Power consumption 5 V @ full speed	max 3.4 A (17.0 Watt)
Power consumption 5 V @ power down	max 2.3 A (11.5 Watt)

Dynamic Parameters

	UF.3011 UF.3013	UF.3021 UF.3023	UF.3031 UF.3033	UF.3010 UF.3012 UF.3014	UF.3020 UF.3022 UF.3024	UF.3015 UF.3016	UF.3025 UF.3026[1]
max internal clock	40 MS/s	50 MS/s	62.5 MS/s	80 MS/s	100 MS/s	160 MS/s	200 MS/s
max external clock	40 MS/s	50 MS/s	62.5 MS/s	80 MS/s	100 MS/s	80 MS/s	100 MS/s
-3 dB bandwidth	> 20 MHz	> 25 MHz	> 30 MHz	> 40 MHz	> 40 MHz	> 40 MHz	> 40 MHz
Zero noise level (< 125 MS/s)	< 1.5 LSB rms	< 1.5 LSB rms	< 1.75 LSB rms	< 2.0 LSB rms	< 2.0 LSB rms	< 2.0 LSB rms	< 2.0 LSB rms
Zero noise level (> 125 MS/s)	n.a.	n.a.	n.a.	n.a.	n.a.	< 3.0 LSB rms	< 3.0 LSB rms
Test sample rate	40 MS/s	50 MS/s	60 MS/s	80 MS/s	100 MS/s	80 MS/s	100 MS/s
Test signal frequency	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz	1 MHz
SNR (typ)	>65.5 dB	>65.5 dB	>63.7 dB	>65.3 dB	>65.1 dB	>65.3 dB	>63.9 dB
THD (typ)	<-74.5 dB	<-74.5 dB	<-73.6 dB	<-74.5 dB	<-74.5 dB	<-74.3 dB	<-74.0 dB
SFDR (typ), excl harm.	>79.5 dB	>79.5 dB	>74.3 dB	>79.1 dB	>78.8 dB	>79.0 dB	>75.3 dB
SINAD (typ)	>64.7 dB	>64.7 dB	>63.3 dB	>64.8 dB	>64.5 dB	>64.8 dB	>63.5 dB
ENOB (based on SINAD)	>10.5	>10.5	>10.2	>10.5	>10.4	>10.5	>10.3

Note 1: Bandwith > 90 MHz is possible using the High Bandwidth option.

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
UF3010	UF.3010 with 8 MSample memory and drivers/SBench 5.x	UF3000-16M	16 MSample onboard memory (total)
UF3011	UF.3011 with 8 MSample memory and drivers/SBench 5.x	UF3000-32M	32 MSample onboard memory (total)
UF3012	UF.3012 with 8 MSample memory and drivers/SBench 5.x	UF3000-64M	64 MSample onboard memory (total)
UF3013	UF.3013 with 8 MSample memory and drivers/SBench 5.x	UF3000-128M	128 MSample onboard memory (total)
UF3014	UF.3014 with 8 MSample memory and drivers/SBench 5.x	UF3000-256M	256 MSample onboard memory (total)
UF3015	UF.3015 with 8 MSample memory and drivers/SBench 5.x	UF3000-up	Additional handling costs for later memory upgrade
UF3016	UF.3016 with 8 MSample memory and drivers/SBench 5.x		
UF3020	UF.3020 with 8 MSample memory and drivers/SBench 5.x	UF3000-mr	Multiple Recording: Memory segmentation
UF3021	UF.3021 with 8 MSample memory and drivers/SBench 5.x	UF3000-gs	Gated Sampling: Gate signal controls acquisition
UF3022	UF.3022 with 8 MSample memory and drivers/SBench 5.x	UF3000-dig	Additional 4 synchronous digital inputs per channel, incl. cable
UF3023	UF.3023 with 8 MSample memory and drivers/SBench 5.x	UF3000-cs	Synchronisation of 2 - 4 boards, one option per system
UF3024	UF.3024 with 8 MSample memory and drivers/SBench 5.x		
UF3025	UF.3025 with 8 MSample memory and drivers/SBench 5.x	UF3000-dl	DASYLab driver for UF.3000 series
UF3026	UF.3026 with 8 MSample memory and drivers/SBench 5.x	UF3000-hp	VEE driver for UF.3000 series
UF3031	UF.3031 with 8 MSample memory and drivers/SBench 5.x	UF3000-lv	LabVIEW driver for UF.3000 series
UF3033	UF.3033 with 8 MSample memory and drivers/SBench 5.x	MATLAB	MATLAB driver for all UltraFast boards
UF302x-hbw	High Bandwidth option for UF3025 or UF3026 (>90 MHz)		
UF3000-smod	Star Hub: Synchronisation of 2 - 16 boards, one option per system	UF3000-time	Timestamp option: Extra memory for trigger time
UF3000.xio	Extra I/O, internal connector: 16 DI/O, 4 Analog out	UF3000-xmf	Extra I/O, external connector: 24 DI/O, 4 Analog out, incl. cable
Cab-3f-9m-80	Adapter cable: SMB female to BNV 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 BNV male 200 cm	Cab-3f-9f-200	Adapter cable: SMB female to BNC female 200 cm

Technical changes and printing errors are possible