



UX.2000 : 8 bit A/D Digitizers / Oscilloscopes, up to 200 MS/s

- PXI 3U / CompactPCI 3U format
- Up to 200 MS/s on one channel
- Up to 100 MS/s on two channels
- Simultaneous sampling on all channels
- 7 input ranges: ± 50 mV up to ± 5 V
- Up to 128 MSample memory
- FIFO mode for slower sampling rates
- Window and pulsewidth trigger
- Input offset up to $\pm 400\%$
- Synchronization possible
- Windows program SBench 5.x included



Product range overview

The UltraFast PXI cards are based on more than 16 years design experience. The cards are high-quality, low-noise PC-based instruments that have deeper memory and more flexibility than traditional oscilloscopes and transient recorders.

Model	1 channel	2 channels	4 channels
UX.2020	50 MS/s	50 MS/s	
UX.2030	200 MS/s	100 MS/s	

Software/Drivers

A large number 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
- Streaming Software SPviewIT 6.2 (as option)
- Visual C++/Borland C++ Builder 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)

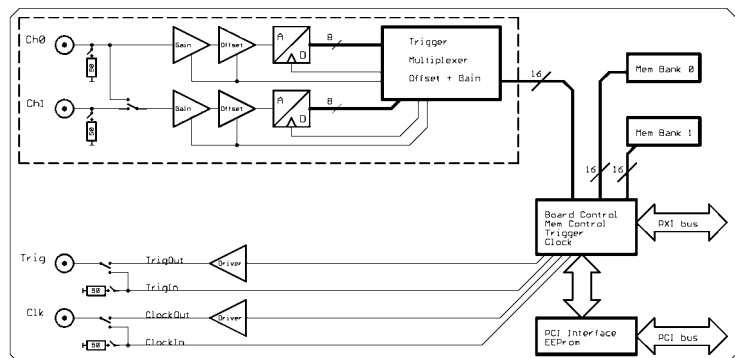
General Information

The UX.2000 cards offer a dynamic performance and flexibility that is best in class, at a competitive price.

Each channel has its own A/D converter so there is no phase error between channels. The voltage range, signal offset and input impedance can be programmed for each channel to match a wide variety of signal sources.

Data is written to the internal 16 MSamples up to 128 MSample memory. This memory can also be used as a FIFO buffer so that data can be transferred on-line directly into the PC RAM or to hard disk.

Hardware block diagram



Software programmable parameters

Sampling rate	1 kS/s to max sampling rate, external clock, ref clock, PXI clock
Input Range	± 50 mV, ± 100 mV, ± 200 mV, ± 500 mV, ± 1 V, ± 2 V, ± 5 V
Input impedance	50 Ohm / 1 MOhm
Input Offset	$\pm 400\%$ in steps of 1%
Clock mode	internal PLL, internal quartz, external, external divided, external reference clock, PXI reference clock
Clock impedance	50 Ohm / 1 MOhm
Trigger impedance	50 Ohm / 1 MOhm
Trigger mode	Channel, External, Software, Auto, Windows, Pulse, PXI Line[5..0], PXI Startrigger
Trigger level	1/64 to 63/64 of input range (6 bit)
Trigger edge	rising edge, falling edge or both edges
Trigger pulsewidth	1 to 255 samples in steps of 1 sample
Memory depth	64 up to installed memory in steps of 64
Posttrigger	64 up to 128 M in steps of 64
Multiple Recording segmentsize	64 up to installed memory / 2 in steps of 64

Application examples

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

Possibilities and options

PXI bus

The PXI bus (PCI eXtension for instrumentation) offers a variety of additional standard possibilities for synchronising different components in one system. It is possible to connect several Strategic Test cards with each other or to connect a Strategic Test card with cards of other manufacturers.

PXI reference clock

The card is able to use the 10 MHz reference clock that is supplied by the PXI system. Enabled by software the PXI reference clock is fed into the on-board PLL. This feature allows the cards to run with a fixed phase relation.

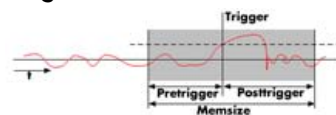
PXI trigger

The UX cards support star trigger as well as the PXI trigger bus. Using a simple software command one or more trigger lines can be used as trigger source. This feature allows easy setup of OR connected triggers from different cards.

Input impedance

All inputs could individually be switched by software between 50 Ohm and 1 MOhm input impedance. If using fast signals and high sampling rates or have 50 Ohm cable impedance 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 helpful.

Ring buffer mode



The ring buffer mode is the standard mode for all oscilloscope boards. Data is written in a ring memory of the board until a trigger event is

detected. After the event the posttrigger values are recorded. This allows the user to record events both before and after the trigger: $\text{Pretrigger} = \text{Memsize} - \text{Posttrigger}$.

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 control of the data stream is done automatically by the driver on interrupt request.

Channel trigger

The data acquisition boards offer a wide variety of trigger modes. Besides the standard level and edge triggers known from oscilloscopes, it's also possible to define a window trigger. All trigger modes can be combined with the pulsewidth trigger. This makes it possible to trigger on signal errors like too long or too short pulses.

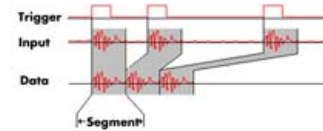
External trigger I/O

All boards can be triggered using an external TTL signal. It's possible to use positive or negative edge also in combination with a programmable pulse width. A software trigger event can, when activated by software, be routed to the trigger connector to start external instruments.

Pulse width

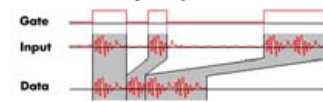
Defines the minimum or maximum width that a trigger pulse must have to generate a trigger event. Pulse width can be combined with channel trigger, pattern trigger and external trigger.

Multiple Recording



The Multiple Recording option allows the recording of several trigger events without restarting the hardware. This enables very fast repetition rates to be achieved. The on-board memory is divided in several segments of same size. Each of them is filled with data if a trigger event occurs.

Gated Sampling

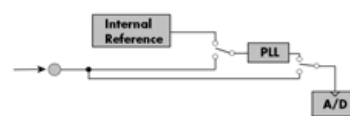


The Gated Sampling option allows data recording controlled by an external gate signal. Data is only recorded if the gate signal has a programmed level.

External clock I/O

Using a dedicated connector a sampling clock can be fed in from an external system. It's also possible to output the internal sampling clock to synchronise external equipment to this clock.

Reference clock



The option to use a precise external reference clock (normally 10 MHz) is necessary to synchronise 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 in this way. The driver automatically generates the requested sampling clock from the fed in reference clock.

Technical Data

Resolution	8 bit	Dimension	160 mm x 100 mm (Standard 6U)
Differential linearity error (ADC)	0.5 LSB typ.	Width (Standard)	1 slot
Integral linearity error (ADC)	0.5 LSB typ.	Analogue Connector	3 mm SMB male
Multi: Trigger to 1st sample delay	fixed	Overvoltage protection (range < ±500 mV)	±5 V
Multi: Recovery (re-arm) time	< 20 samples	Overvoltage protection (range > ±500 mV)	±50 V
Trigger accuracy 2/4 channel mode	1 Sample	Warm up time	10 minutes
Trigger accuracy 1 channel mode	2 Samples	Operating temperature	0°C - 50°C
Ext. clock: delay to internal clock	42 ns ± 2 ns	Storage temperature	-10°C - 70°C
input signal with 50 ohm termination	max 5 V rms	Humidity	10% to 90%
Trigger output delay	1 Sample	Power consumption 3.3 V @ full speed	max. 1.43 A (4.7 Watt)
Input impedance	50 Ohm / 1 MOhm 25 pF	Power consumption 5 V @ full speed	max. 0.88 A (4.4 Watt)
Min internal clock	1 kS/s	Clock input: Standard TTL level	Low: -0.5 V > level < 0.8 V High: 2.0 V > level < 5.5 V Rising edge. Duty cycle: 50% ± 5%
Min external clock	1 MS/s	Clock output	Standard TTL, capable of driving 50 Ohm Low < 0.4 V (@ 20 mA, max 64 mA) High > 2.4 V (@ -20 mA, max -48 mA)
Trigger input: Standard TTL level	Low: -0.5 V > level < 0.8 V High: 2.0 V > level < 5.5 V Trigger pulse must be valid ≥ 2 clock periods.		
Trigger output	Standard TTL, capable of driving 50 Ohm. Low < 0.4 V (@ 20 mA, max 64 mA) High > 2.4 V (@ -20 mA, max -48 mA) One positive edge after the first internal trigger		

Input range	±50 mV	±100 mV	±200 mV	±500 mV	±1 V	±2 V	±5 V
Software programmable offset	±200 mV	±400 mV	±800 mV	±2 V	±4 V	±8 V	±20 V
Offset error	< 1 LSB, adjustable by user						
Gain error	< 2 %	< 2 %	< 2 %	< 2 %	< 2 %	< 2 %	< 2 %
UX.2020: Noise (rms): 50 Ohm, 50 MS/s	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB	< 1.0 LSB
UX.2030: Noise (rms): 50 Ohm, 100/200 MS/s	< 2.0 LSB	< 1.5 LSB	< 1.5 LSB	< 1.5 LSB	< 1.5 LSB	< 1.5 LSB	< 1.5 LSB
Crosstalk 5 MHz signal, ±50 mV input, 50 Ohm	< 62 dB						
	UX.2020	UX.2030					
max internal clock	50 MS/s	200 MS/s					
max external clock	50 MS/s	100 MS/s					
-3 dB bandwidth	> 25 MHz	> 90 MHz					

Dynamic Parameters

	UX.2020	UX.2030
Test - Sample rate	50 MS/s	100 MS/s
Test signal frequency	1 MHz	1 MHz
SNR (typ)	> 47.5 dB	> 45.9 dB
THD (typ)	< -52.5 dB	< -49.1 dB
SFDR (typ), incl harm.	> 57.0 dB	> 55.5 dB
SINAD (typ)	> 46.0 dB	> 44.2
ENOB (based on SINAD)	> 7.3	> 7.1

Dynamic parameters are measured at ± 1 V input range (if no other range is stated) and 50 Ohm termination with the samplerate 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. For a detailed description please see application note 002.

Order information

All cards are supplied with two year hardware warranty, lifetime technical support and lifetime software updates. These include future Windows / Linux version drivers.

Order No	Description	Order No	Description
UX.2020	UX..2020 with 16 MSample memory and drivers/SBench 5.0	UX.2000-32M	Option:32 MSample memory instead of 16 MSample standard mem
UX.2030	UX..2030 with 16 MSample memory and drivers/SBench 5.0	UX.2000-64M	Option:64 MSample memory instead of 16 MSample standard mem
		UX.2000-128M	Option:128 MSample memory instead of 16 MSample standard
UX.2000-mr	Option Multiple Recording: Memory segmentation	UX.2000-up	Additional handling costs for later memory upgrade
UX.2000-gs	Option Gated Sampling: Gate signal controls acquisition		
Cab-3f-9m-80	Adapter cable: SMB female to BNC male 80 cm	UX.2000-dl	DASyLab driver for UX.2000 series
Cab-3f-9m-200	Adapter cable: SMB female to BNC male 200 cm	UX.2000-hp	VEE driver for UX.2000 series
Cab-3f-9f-80	Adapter cable: SMB female to BNC female 80 cm	UX.2000-lv	LabVIEW driver for UX.2000 series
Cab-3f-9f-200	Adapter cable: SMB female to BNC female 200 cm	UF/UC/UX-ml	MATLAB driver for all UF/UC/UX series.

technical changes and printing errors possible