A3000

3000 Megasample/s waveform digitizer with PCIe data transfer

The Blue Sky Electronics **A3000** is a high performance waveform digitizer with programmable real-time pulse processing capability and high speed PCI express data transfer. Optimized for automated data acquisition to disk, the A500 can acquire, process and transfer thousands of 150 microsecond scans with no intervention by the host PC.

Key Performance Specifications:

3000 Msps, 8 bits , 1 channel
1500 Msps, 8 bits, 2 channels
900 MB/s data transfer
Flexible stand-alone chassis
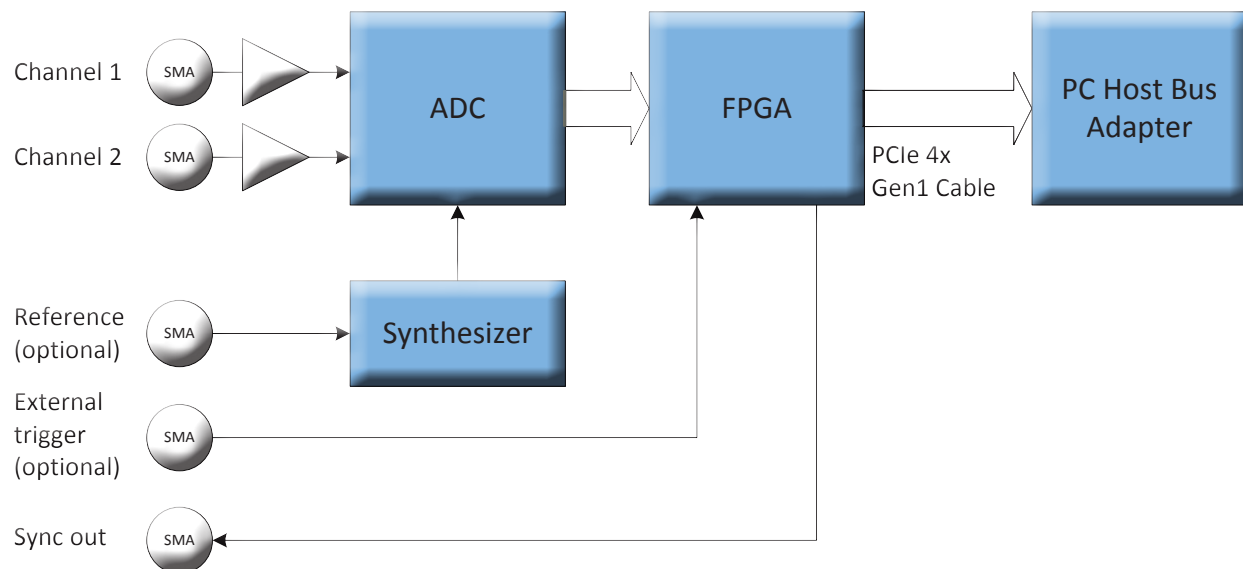Low power

Real-Time Digital Pulse Processing:

Edge Timing and Discrimination
Pulse Shape Discrimination
Signal Averaging and Compression
Coincidence
Custom

Applications:

Time-of-Flight Mass Spectrometry
Collider physics
LIDAR
Radio Astronomy
Fast, wideband signal acquisition

Blue Sky
Electronics

A3000

Model A3000 Block Diagram

Performance Summary

The A3000 digitizer can simultaneously sample one input signal at up to 3000 Msamples/sec (or 2 signals at up to 1500 Msamples/sec each) with 8 bit voltage resolution. When sampling two channels, the sample streams are coincident and are not interleaved. Data is buffered, processed and formatted in an FPGA and then transferred over a PCI express (Gen1, 4x) cable to a host PC. FPGA processing and formatting options are configured by the host PC when the user selects an operational mode.

The digitizer is packaged as a stand-alone chassis (7.3"W x 2.7"H x 9.9"L) and powered by an external DC power converter (16W nominal load) which is included with the unit.

The minimum host PC requirements are:
Windows7, 64 bit operating system
One open PCIe slot (8x or 16x)
Quad core 2 GHz CPU
4 Gbyte DDR RAM

A Windows 7 kernel mode driver and software GUI is included for standalone operation. A detailed application program interface and example application is available for integration into more complex instruments. Continuous scans can be up to 131K samples in length (1 channel).

Operational features include:

- Automatic acquisition of up to 10K scans with a single command.
- Scan alignment to an external trigger with accuracy of less than 1 sample period.
- Programmable scan length.
- Internal or external scan trigger. Internal trigger rate is programmable. Internal trigger signal is available to system as Sync Out.
- Scan histogramming (summation) in host PC application.
- Selection of data stream for transfer to PC: Chan1, Chan2 or both.
- Signal event on Chan1 can trigger Chan2 acquisition. The trigger event is visible in the data stream.

Input / Output Signals

All chassis signal connectors are SMA jacks.

Channel 1: 'Chan1' on front panel. Input voltage signal to be digitized. Nominal voltage range is [-600mV, +150mV]. Diode-protected for over and under voltage input. This input signal is not inverted before digitization.

Channel 2: 'Chan2' on front panel. Input voltage signal to be digitized. Nominal voltage range is [-600mV, +150mV]. Diode-protected for over and under voltage input. This input signal is inverted before digitization.

Reference: 'Clock' on front panel. Optional reference clock input. TTL voltage levels at nominal 10 Mhz frequency. Higher frequencies may be used - contact us for assistance.

External Trigger: 'Trigger' on front panel. Optional external trigger input. Used in some acquistion modes to begin each scan.

Sync Out: 'Sync' on rear panel. Optional system synchronization output. Used to synchronize digitizer operation with the user system when using internal scan triggering.

Power: DC power input. Internally fused. 7.5V to 36V. DC Power Jack, 2.5mm center pin, 5.5mm outside dia., 8.0mm ling. Center posititve. A 9V AC/DC power converter is provided.
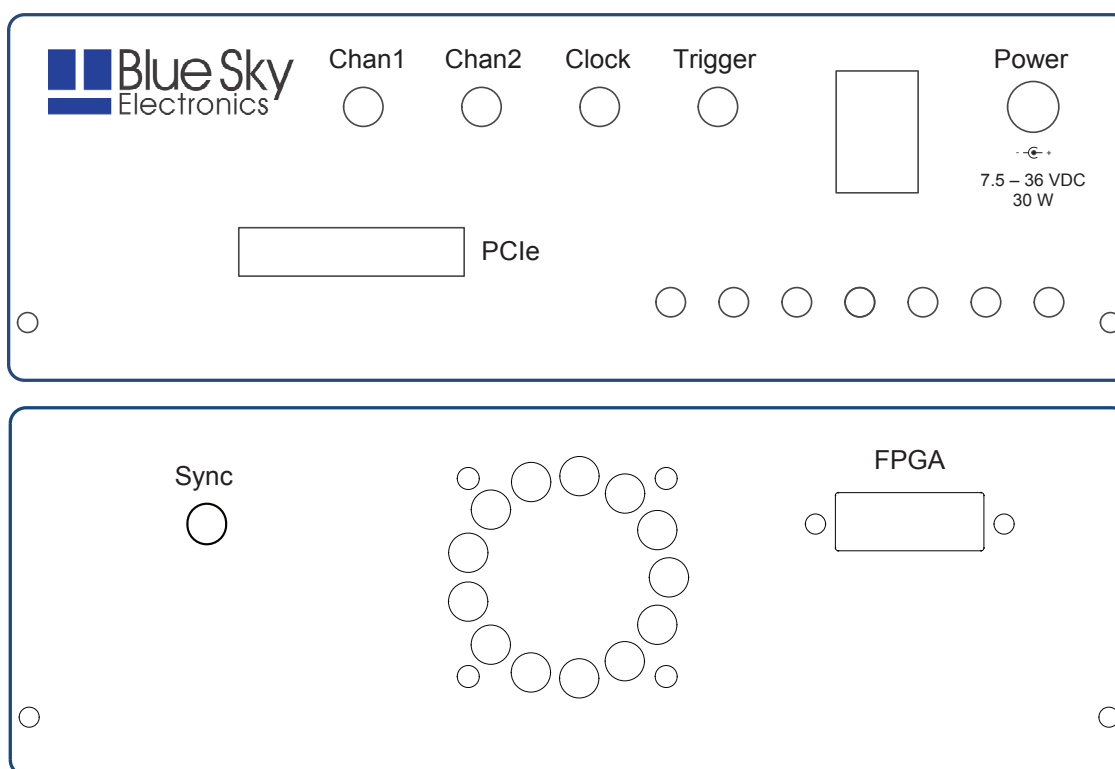

Model A3000 Font and Rear Panels

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Performance Specifications

	Min	Max	Units	Notes
Analog Input Bandwidth	900		Mhz	-3dB
Effective Number of Bits	7.3			10 Mhz @ 95% full scale
Signal to noise ratio	45		dBc	10 Mhz @ 95% full scale
Spurious free dynamic range	56		dBc	10 Mhz @ 95% full scale
Data transfer rate	900		MB/s	sustained, multiple scans
Acquisition length		131,072	samples	per scan
Time base stability	0.28		ppm	internal 10.0 MHz reference
Sample rate	200	3000	Msps	1 channel with interleaving

System Connections

	Min	Max	Units	Notes
Channel 1 input voltage range	- 600	+150	mV	inverting input; diode protected
Channel 2 input voltage range	-600	+150	mV	non-inverting input; diode protected
Reference Clock input level low (Vil)	0	0.8	V	
Reference Clock input level high (Vih)	2.0	5.0	V	nominal 3.3 V TTL
Reference Clock input impedance	1000		ohms	
Trigger input level low (Vil)	0	0.8	V	
Trigger input level high (Vih)	2.0	5.0	V	nominal 3.3V TTL;
Trigger input impedance	50		ohms	
Power	7.5	36	VDC	9 VDC nominal. 120 VAC to 9 VDC power converter is included. Typical operating current is 1.8 A @ 9 V.
PCIe				Host PC Interface board and cable are included.

Mechanical Specifications

	Min	Max	Units	Notes
Power consumption		16	W	
Size			in.	7.3W x 2.7H x 9.9L
Weight		3	lbs.	no cabling
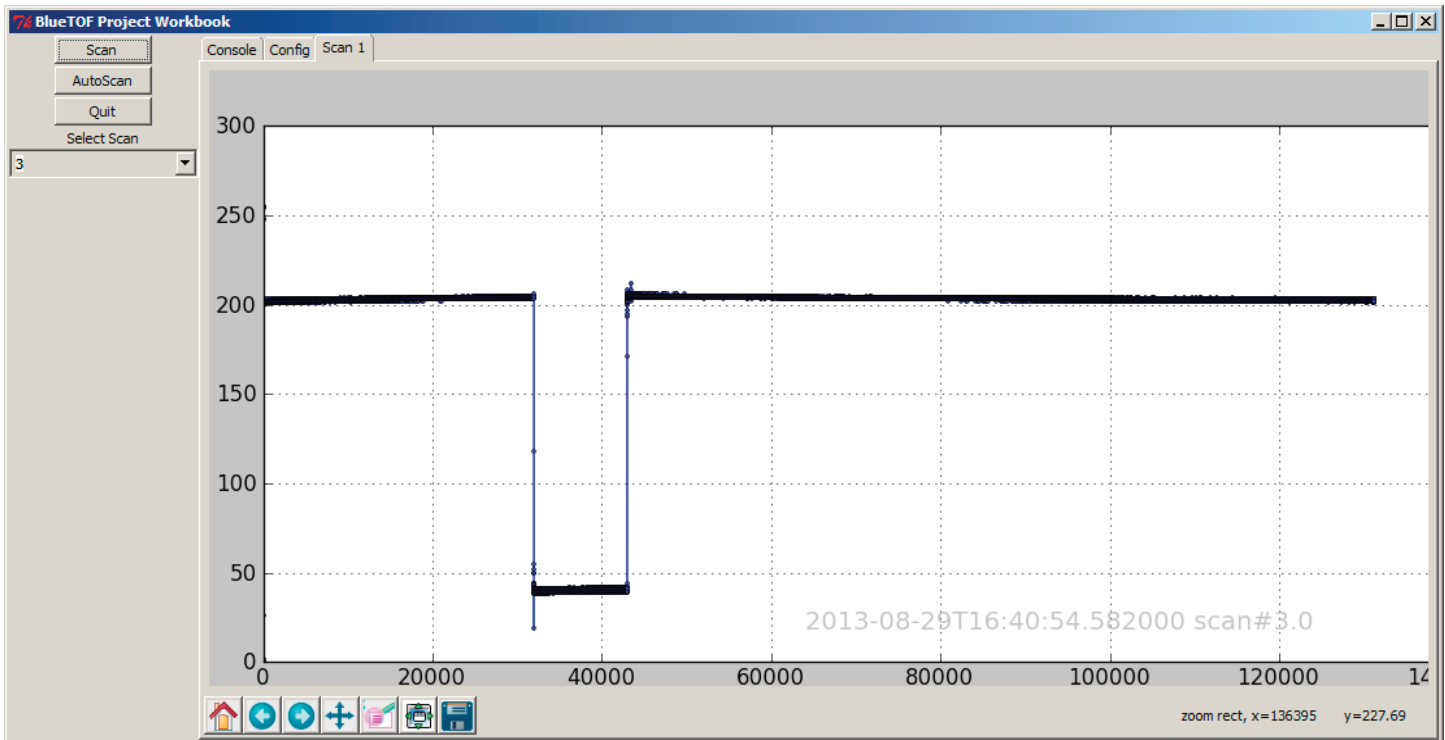
Model A3000 Graphical User Interface

Graphical User Interface

The graphical user interface application controls data acquisition and displays the acquired data. Data is automatically saved to disk. Filenames are created automatically with a system time stamp. Thousands of scans can be acquired automatically with a single command and saved as a single binary file. Each scan can then be viewed and saved independently. Groups of scans can be summed (histogrammed), with the scans aligned to within 1 sample period.

Components and Setup

The A3000 Digitizer system includes:
- A3000 chassis
- PCIe data cable
- PCIe host bus adapter board
- AC/DC power converter unit
- Signal cables (2 coax cables, SMA/BNC)
- Windows 7 64 bit driver software
- User Interface application software
- Installation and User Manuals

Document information:
This specification is preliminary and subject to change without prior notification.
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