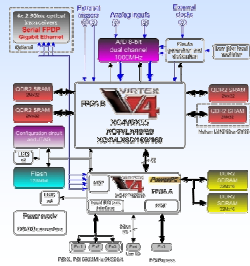
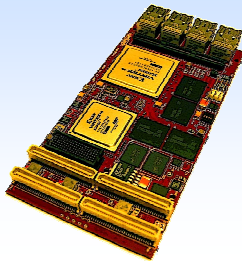




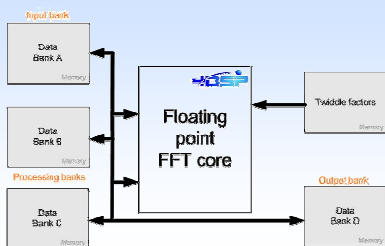
### AD491 · Dual 1GSPS ADC



### FM482 · Virtex-4 FPGA



### IEEE-754 FFT · Floating-pt



### VID471 · Camera Link



## AD491 · 1000MSPS dual channel digitizer

The [AD491](#) is a wide bandwidth PMC with two 8-bit A/D channels and great processing power from the Virtex-4 FPGA devices. Sampling from 50MSPS up to 1GSPS, each channel's clock can either be generated by the on-board VCO or by an external input reference. Both channels can also be synchronized from an external trigger input directly connected to the FPGA controlling the A/D device.

The data samples are directly transferred without loss to the main FPGA processor via the on-board LVDS interface. Real time [signal processing algorithms](#) such like Fourier transforms can easily be implemented with high precision in the DSP resources inside the programmable device. A second FPGA with integrated PowerPC processor performs high bandwidth DMA transfers over a PCI-X bus (133/66MHz - 64-bit) thus offering sustained bandwidth in excess of 400 to 700Mbytes/s. Up to four optical transceivers are optionally available on this card when processed data need to be transferred to a remote system over Fiber optics using the sFPDP protocol.

The [AD491](#) is renowned for high-speed digital scopes, I/Q communication receivers, radar, ECM and SATCOM applications. Board support package is available for Windows and Linux operating systems.

## Instrumentation · Real time FFT processing

The [AD491](#) is ideal for high-speed data acquisition and wide bandwidth systems. A typical application in Aerospace is laser Doppler anemometry measurements.

The laser Doppler anemometry consists of a single point optical measuring technique which enables the velocity of seeded particles conveyed by a fluid flow to be measured in a non-intrusive manner. For instance, aircraft manufacturers are especially interested in reducing aircraft drag in order to reduce fuel consumption and optimize engine performance. The objective is to perform a steeper take-off and achieve a lower landing speed, as well as reducing air turbulence on the runway created during these operations.

In this particular application, the AD491 is used for data acquisition from the laser equipment and to compute the spectral analysis. The results are output via the backplane or the optical transceivers for recording on high density SATA disks. The Virtex-4 SX FPGA implements a [rapid Fast Fourier Transform](#) to achieve spectral measurements. A "Hanning" window function is added prior the FFT stage to reduce the leakage. The A/D sampling frequency is 800MHz to achieve a data analysis from 0 to 400MHz. The data is fed to 4 FFT cores in parallel running at 200MHz thus performing continuous processing without any data loss. Optionally, a power spectrum computation and series of accumulation could be implemented to decrease the output bandwidth for recording purposes.

The Virtex-4 FX FPGA then buffers the results and transfer them via the PCI bus or fiber optics. The receiving stores the result spectrum onto a hard drive disk.