CompuScope 14200 product introduction

The CompuScope 14200 is a 14 bit, 200 MS/s dual channel general-purpose waveform digitizer card for the PCI Bus.

The CompuScope 14200 represents a new generation of GaGe digitizers and has the advanced features you would expect from a top performance signal capture card:

- 2 synchronous channels at maximum sampling speed of 200 MS/s.
- Up to a total of 2 billion samples of on-board acquisition memory in a single full-length PCI slot format.
- Data transfer rates from CompuScope memory to PC memory as high as 200 MB/s through Bus Mastering on a 66 MHz, 32 bit PCI bus.
- 100 MHz bandwidth specification.
- Ease of integration with External Clock In and Out, External Trigger In and Out.
- Ease of system development with Software Development Kits (SDKs) for C/C#, MATLAB, and LabVIEW. Operation under Visual Basic.NET and LabWindows/CVI is also possible from the C/C# Software Development Kit.
- Pre-Trigger Multiple Record functionality, which help optimize the use of the on-board memory by stacking data from successive acquisitions.
- A nominal resolution of 14 bits, combined to an accuracy of ± 0.5% for precise absolute measurements of fine signal details.
- On-board self-calibration to guarantee consistent accuracy across input ranges and modes of operation. Self-calibration can be automatic or user-controlled to minimize down time and ensure availability of the card for measurement in test systems.
- Full-featured front-end, with software control over input ranges, coupling and impedances.
- Excellent frequency response and minimal phase distortion characteristics; designed for optimal cross-channel synchronization and smooth frequency response that is constant within 1 dB over most of the available input analog bandwidth.
- Time-stamping acquired records using an on-board 44 bit counter that is clocked by a 66 MHz crystal oscillator. This is particularly useful in Multiple Record mode. Optionally, the time-stamp counter can use the sample clock as its reference.
- On-board Phase Lock Loop (PLL) circuitry allows an external 10 MHz clock reference to synchronize the on-board oscillator to provide the sampling clock signal.

CompuScope 14200 connectors and headers

CompuScope cards connect to the outside world through connectors, both analog (SMAs or BNCs) and digital (PCI bus). This section describes these connectors for the CS14200 card.

The connectors and headers on the CS14200 card are shown below:

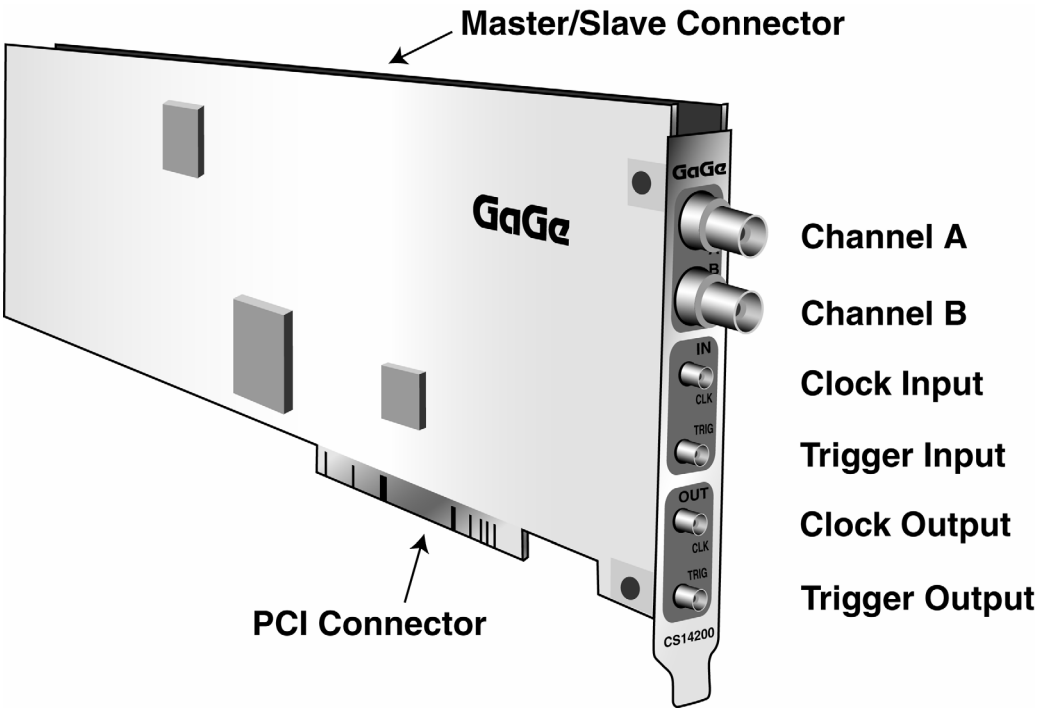

Figure 1: Connectors on CS14200

- **Channel A BNC** connector is the single-ended signal input for Channel 1 on an independent CompuScope card or the Master card in a Master/Slave multi-card system. Refer to the section on CompuScope digitizer channel enumeration for more information on channel enumeration in Master/Slave multi-card systems.
- **Channel B BNC** connector is the single-ended signal input for Channel 2 on an independent CompuScope card or the Master card in a Master/Slave multi-card system. Refer to the section on CompuScope digitizer channel enumeration for more information on channel enumeration in Master/Slave multi-card systems.
- **Clock Input SMA** connector is used to input a signal to be used as the sampling clock. This signal is referred to as the External Clock signal.
- **Trigger Input SMA** connector is used to input a signal that is used as an External Trigger. External Trigger is defined exactly as in an oscilloscope. This signal can be used to trigger the system but cannot be viewed or digitized.
- **Clock Output SMA** connector is used to supply the clock signal, either from the internal oscillator or from the External Clock Input, to another module of the test system or experimental setup. The characteristics of the Output are detailed in the Specifications section.
- **Trigger Output SMA** connector is used to supply a trigger signal generated by the card to another module of the test system or experimental setup.
- **Master/Slave connector** The Master/Slave connector is located near the top edge of the CS14200 card.

  The Master/Slave Timing Module is used to pass all the signals necessary to synchronize Slave CS14200 cards with the Master. A unique feature of the CS14200 is its ability to automatically reconfigure itself to Master/Slave or Independent multi-card system simply by adding or removing the Master/Slave Timing Module.

CompuScope 14200 frequency response

Designed to satisfy a wide range of applications, it is critical that the CS14200 provides frequency measurements as precise and reliable as possible over the analog bandwidth of the card.

The CS14200 has a very flat frequency response, minimizing the attenuation or amplification of frequency components, so that the signals from the BNC connectors to the ADCs are as identical as possible. The paths of clocking signals to the ADCs are also as similar to one another as possible

The figure below illustrates the actual frequency response of the CS14200 using the following acquisition parameters. The sampling rate is 200 MS/s. The input range is ±1V with DC input coupling and 50 Ω terminating input impedance.

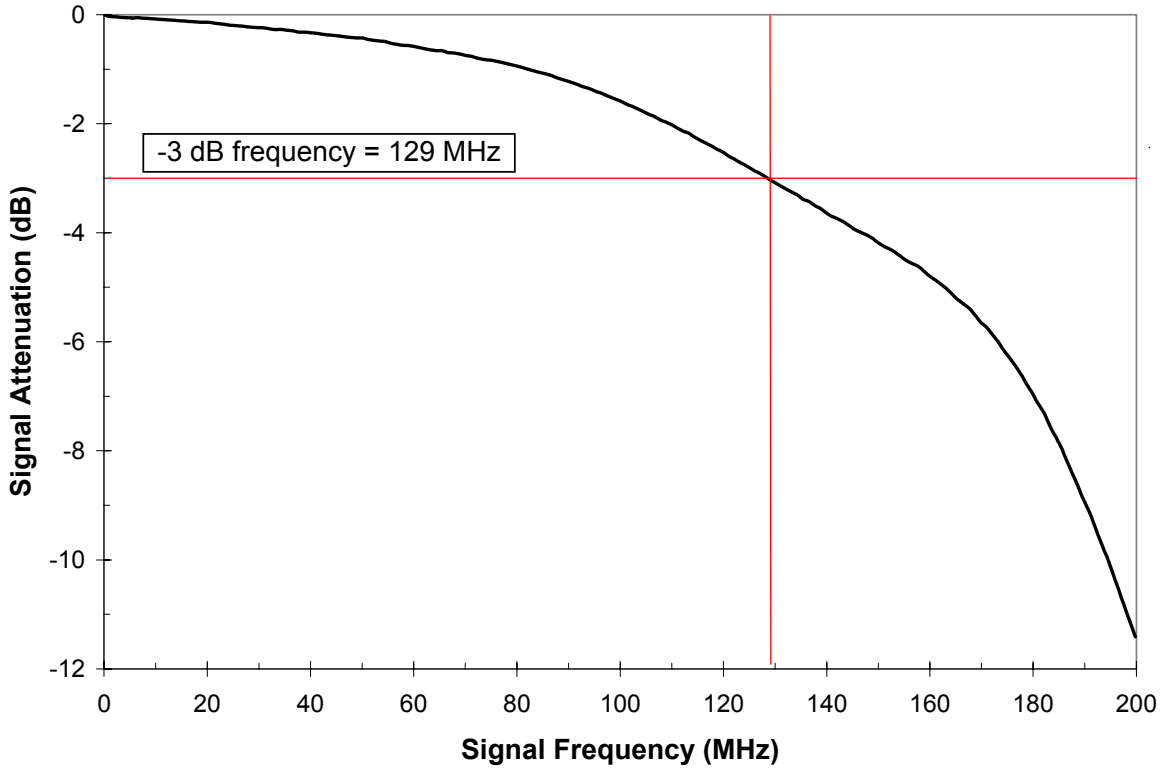

Figure 2: Illustration of the frequency response

CompuScope 14200 throughput & maximum PRF

A number of applications require the CompuScope 14200 to acquire data based on a rapidly occurring trigger signal. These high Pulse Repeat Frequency (PRF) applications include radio, radar and ultrasound signal capture.

We have performed extensive repetitive capture benchmarks in Single Record mode. In this mode, the signal is captured into on-board CompuScope memory and the captured data are transferred through the PCI bus using PCI bus mastering to PC RAM.

Please note that much higher PRFs will be achieved using CompuScope Multiple Record mode.

The following test results were obtained using a computer configured as follows:

- Dual Pentium II, 400 MHz processor,
- L440GX Intel motherboard
- 512 MB RAM
- 20 GB disk drive
- Windows 2000
- NT File System
- 66 MHz, 32 bit PCI bus
- All slots support bus mastering

The application software used for throughput measurements was CSTest.

The CS14200 was operated using CSTest in both single and dual channel mode for many different capture depths and the results are plotted as points in the graph below. The PCI transfer rates were calculated from the linear portion of the curves at high depths.

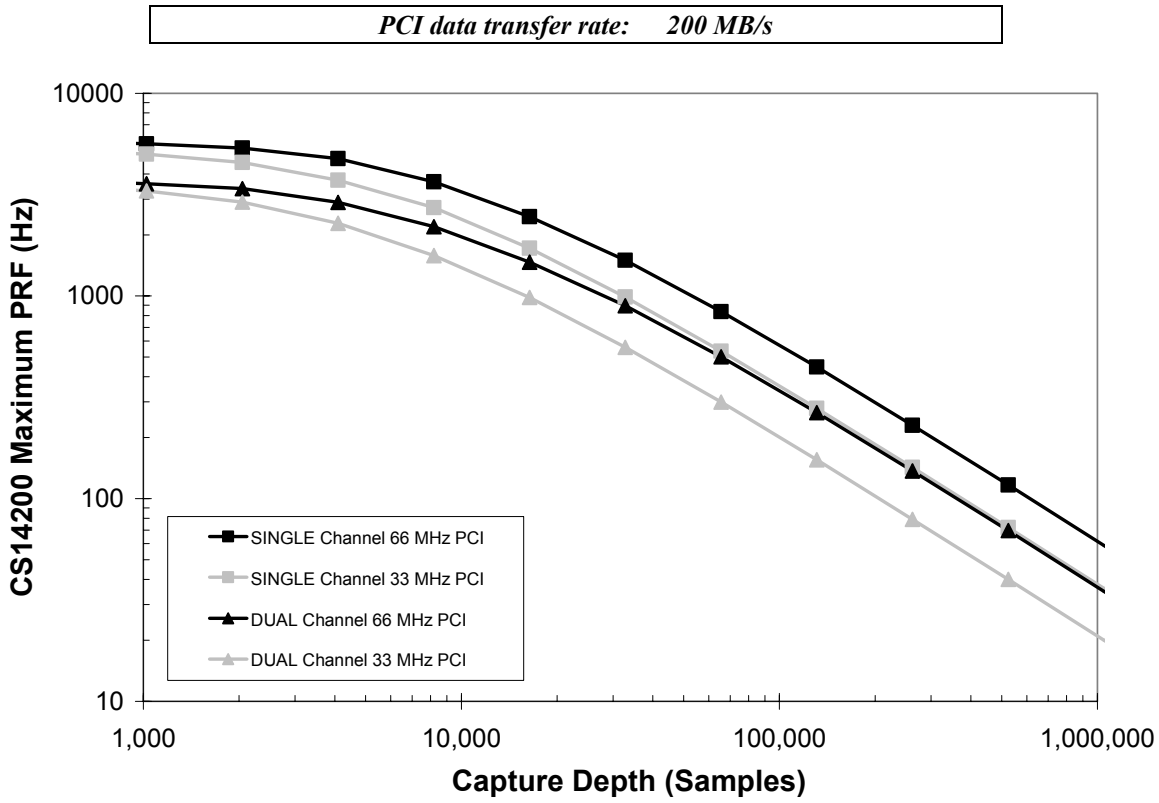

Figure 3: Maximum PRF vs. acquisition length