CompuScope 12100 product introduction

CompuScope 12100 is a 12 bit, waveform digitizer card for the PCI Bus, capable of 100 MS/s sampling on one channel and 50 MS/s sampling on two simultaneous channels.

Recognizing that until very recently, almost all multi-Megahertz data acquisition was done using Digital Storage Oscilloscopes under GPIB or IEEE 488 control, GaGe has ported all the features of these DSOs onto the CompuScope card. This means that you do not have to rethink the solution in terms of a completely unknown data acquisition card. You can simply develop the data acquisition system as if an oscilloscope were being used, but instead use a CompuScope card to take advantage of its attractive price and performance.

Of course, CompuScope cards are much more than just another DSO under GPIB control:

- CS12100 features 12 bit vertical resolution as opposed to the 8 bit resolution offered by DSOs.
- CS12100 features up to 8 million samples of on-board acquisition memory.
- Multi-card Master/Slave systems provide from 2 to 16 channels of simultaneous A/D conversion, something normal DSOs simply cannot do.
- Data transfer rates from CompuScope memory to PC memory or extended memory run as high as 80 MB/s for the CS12100 as compared to a few hundred KB/s for GPIB.
- CompuScope cards are easier to program, as Software Development Kits are available for C/C#, MATLAB, and LabVIEW. Operation under Visual Basic.NET and LabWindows/CVI is also possible from the C/C# Software Development Kit.
- CompuScope cards are installed inside the PCI bus chassis, so there is no external box such as a DSO.
- CS12100 cards have standard features such as Multiple Record, which help optimize the use of the on-board memory by stacking data from successive bursts.
- You can also write software for a multi-card system in which all the cards are not in a Master/Slave configuration. GaGe drivers support all these multi-card configurations.

Special features of the CompuScope 12100 include:

- Bus Mastering

  CompuScope 12100 cards are fully capable of becoming a bus master in order to transfer data at the maximum rate of 80 MB/s.

  A bus Master is a card that can take control of the bus and transfer data to any PCI target device such as system RAM without any involvement from the CPU.

CompuScope 12100 connectors and headers

CompuScope cards connect to the outside world through connectors, both analog (BNC) and digital (PCI Bus, Master/Slave, etc.). This section describes these connectors for the CS12100 card.

The connectors and headers on the CS12100 card are shown below:

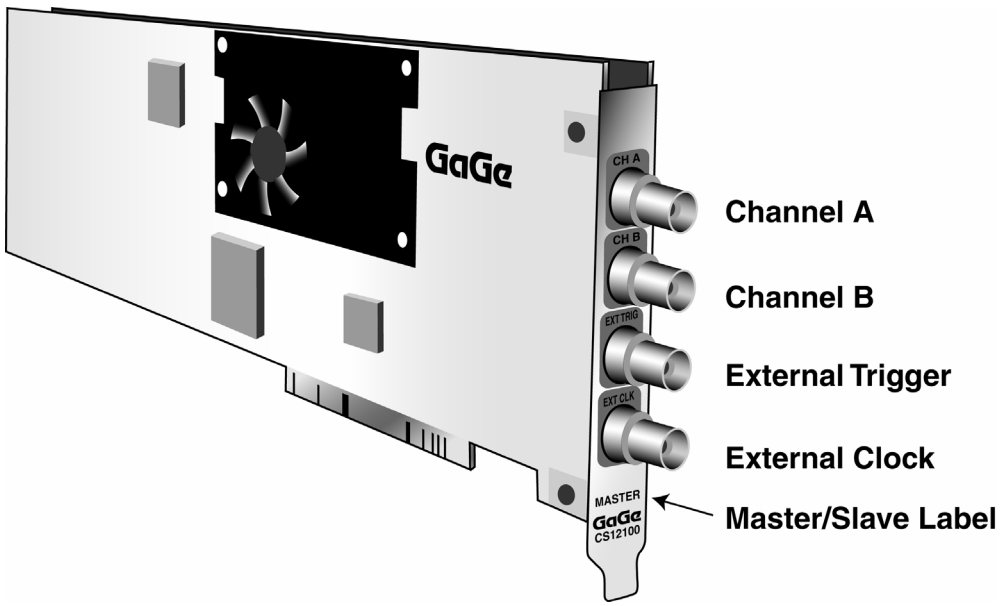

Figure 1: Connectors on CS12100

- **CH 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.
- **CH 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.
- **External Trigger BNC** connector is used to input an analog or digital signal, which may be 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.
- **External Clock** connector is used for the **External Clock Input**, as described in the section labeled *External Clock*.
- **PCI bus connector** is located at the bottom of the printed circuit board. This is an industry standard connector that complies with all specifications of the PCI bus.

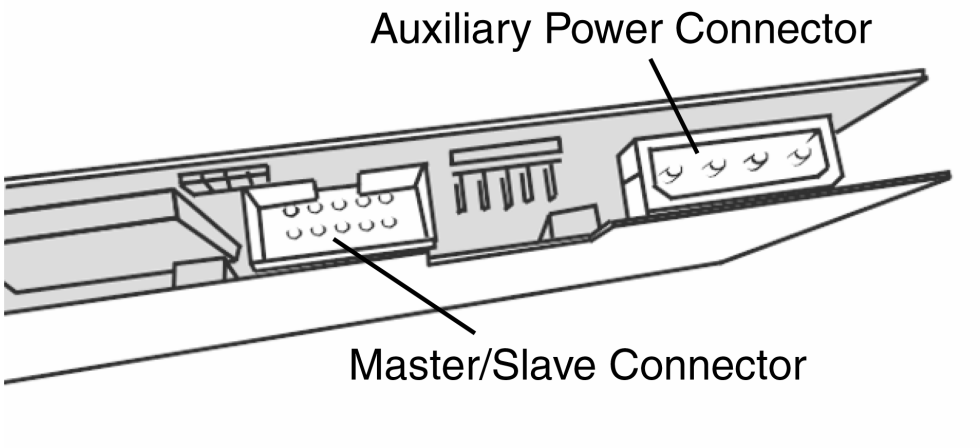

Figure 2: Auxiliary power connector and Master/Slave connector

- **Auxiliary Power Connector.** Power is supplied to the CompuScope 12100 card via the PCI bus and the Auxiliary Power Connector.

  It is not necessary to use the Auxiliary Power Connector unless more than one CompuScope 12100 card is to be installed in the same backplane or motherboard.

  This distribution of power is implemented to optimize the power management on the CompuScope 12100 in multi-card systems. Refer to the CompuScope 12100 specifications within this manual where the cumulative power consumption for the CompuScope 12100 is tabulated.

NOTE FOR MULTI-CARD COMPUSCOPE 12100 USERS:
IF Y-CABLES ARE NOT CONNECTED TO THE AUXILIARY POWER CONNECTORS OF YOUR COMPUSCOPE CARDS, THEY WILL NOT FUNCTION PROPERLY

- **Master/Slave Timing Module (MSTM) connector.** The MSTM connector is located near the top-left corner of the CompuScope 12100. In case of an Independent card (i.e. a card not upgraded to either a Master or a Slave), this connector may not be present.

  The Master/Slave Timing Module is used to pass all the signals necessary to synchronize Slave CompuScope 12100 cards with the Master. The MSTM connector on the CS12100 card is shown in *Figure 2*.

CompuScope 12100 compliance statement

CompuScope 12100 meets the following EMC standards:

Category	Standards or description
EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities: EN 61326 EMC requirements for Class A electrical equipment for measurement, control and laboratory use. [1, 2, 3] IEC61000-4-2 Electrostatic Discharge (Performance criterion B) IEC61000-4-3 RF Electromagnetic Field (Performance criterion A) IEC61000-4-4 Electrical Fast Transient/Burst Immunity (Performance criterion B) IEC61000-4-5 Power Line Surge Immunity (Performance criterion B) IEC61000-4-6 Conducted RF Immunity (Performance criterion A) IEC61000-4-11 Voltage Dips and Interruptions Immunity (Performance criterion B) EN 61000-3-2 AC Power Line Harmonic Emissions
Australia / New Zealand Declaration of Conformity - EMC	Complies with EMC provision of Radio communications Act per the following standard(s): AS/NZS 2064.1/2 Industrial, Scientific and Medical Equipment: 1992 [1, 2, 3]

CONDITIONS
In order to maintain continued compliance, the following conditions must be met:

1. High-quality shielded cables must be used to ensure compliance to the above listed standards
2. Compliance demonstrated on a three card Master/Slave configuration (qty 3 cards maximum)
3. On the host PC used by the customer, all unused back panel slots must be covered with EMI blocking plates

CompuScope 12100 throughput & maximum PRF

A number of applications require the CompuScope 12100 to acquire data based on a rapidly occurring trigger signal. These high Pulse Repeat Frequency (PRF) applications include imaging, radar, ultrasound and lightning test.

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:

- Pentium III, 1 GHz processor
- 512 MB RAM
- 20 GB disk drive
- Windows 2000
- NT File System
- 33 MHz, 32 bit PCI bus
- All slots support bus mastering

A C application program optimized for fast repetitive capture in single record mode was used for throughput measurements. The CS12100 was operated using this application in both single and dual channel mode for many different capture depths and the results are plotted as points in the graphs below. The PCI transfer rates were calculated from the linear portion of the curves at high depths.

PCI data transfer rate (single channel):	***80 MB/s***
PCI data transfer rate (dual channel):	***50 MB/s***

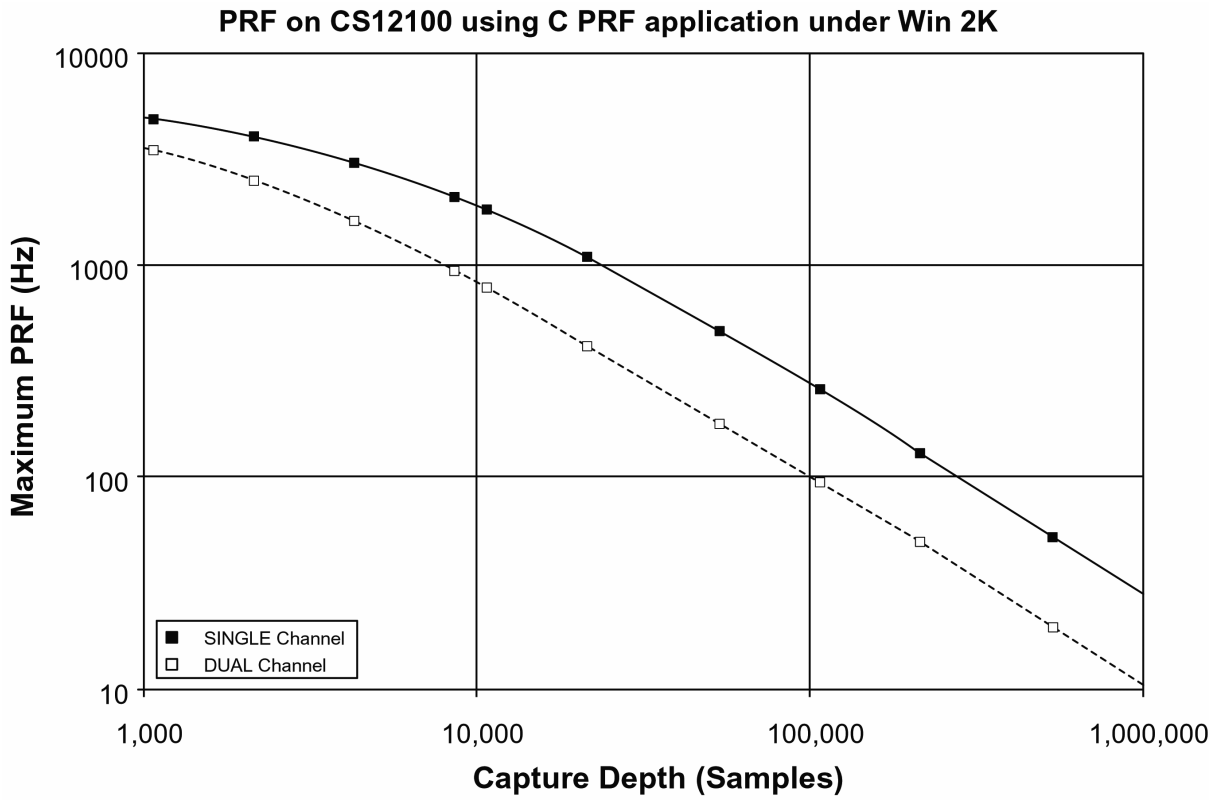

Figure 3: Maximum PRF vs. acquisition length on CS12100