

CompuScope Cobra digitizer product introduction

The GaGe CompuScope Cobra™ family of 8-bit digitizers provides the most powerful combination of speed, memory, and bandwidth as well as a wide portfolio of advanced acquisition features such as up to 2 channels in a single-slot PCI card with up to 2GS/s sampling per channel, and up to 4 GS of on-board acquisition memory.

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

- 1 or 2 digitizing channels
- 1 or 2 GS/s maximum sampling rate per channel
- 256 MS to 4 GS on-board acquisition memory in a single full-length PCI slot
- 8-bit vertical resolution
- Data transfer rates from CompuScope memory to PC memory as high as 200 MB/s through PCI Bus Mastering on a 66 MHz, 32 bit PCI bus
- Up to 1 GHz input analog bandwidth
- 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, LabWindows/CVI, and Delphi is also possible from the C/C# Software Development Kit
- Pre-Trigger Multiple Record functionality, which helps optimize the use of the on-board memory by stacking data from successive acquisitions
- Accuracy of $\pm 1\%$ for precise absolute measurements
- 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 filters.
- Excellent frequency response and minimal phase distortion characteristics; designed for optimal cross-channel synchronization and smooth frequency response that is constant within 1 dB up to a signal frequency of over 100 MHz.
- 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 source.
- On-board Phase Lock Loop (PLL) circuitry allows an external 10 MHz clock reference to synchronize the on-board internal sampling oscillator to provide the sampling clock signal.

Cobra CompuScope digitizer connectors and headers

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

The connectors and headers on the 2-channel, and single-channel Cobra digitizers are shown below:

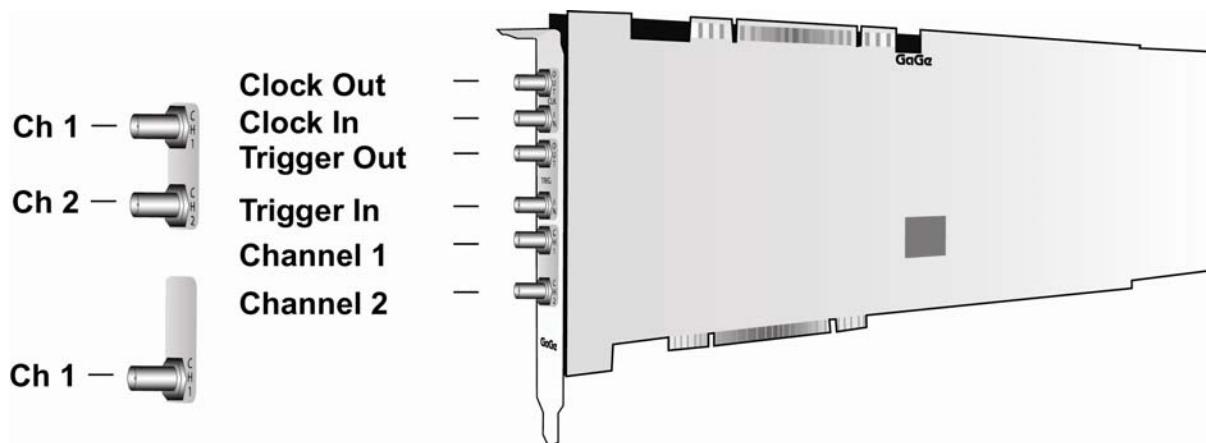


Figure 1: Connectors on the Cobra Digitizer

- **Channel 1 SMA** connector is the single-ended signal input for Channel 1.
- **Channel 2 SMA** connector is the single-ended signal input for Channel 2.
- **Clock In 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 In 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 Out 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 Out SMA** connector is used to supply a trigger signal generated by the card to another module of the test system or experimental setup.

Cobra CompuScope digitizer frequency response

A graph indicating the input frequency response of the input channels is shown below.

Designed to satisfy a wide range of applications, Cobra digitizers provide frequency measurements as precise and reliable as possible over the analog bandwidth of the card.

The Cobra digitizers have a very flat frequency response, minimizing the attenuation or amplification of frequency components, so that the signals from each input channel are as identical as possible from the SMA connectors to the ADCs. 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 Cobra digitizers using the following acquisition parameters. The sampling rate is 1 GS/s. The input range is $\pm 500\text{mV}$ with DC input coupling and $50\ \Omega$ terminating input impedance.

A software-selectable low-pass Bessel filter with a 3 dB roll-off frequency of 200 MHz may be applied within the Cobra input signal conditioning circuitry. Application of this filter provides improved noise performance by removing high-frequency noise components from lower-frequency input signals.

A Bessel filter produces an extremely smooth response curve at all frequencies. Bessel filters are also ideal for their flat in-band group delay, flat pass-band response, and limited in-band distortion.

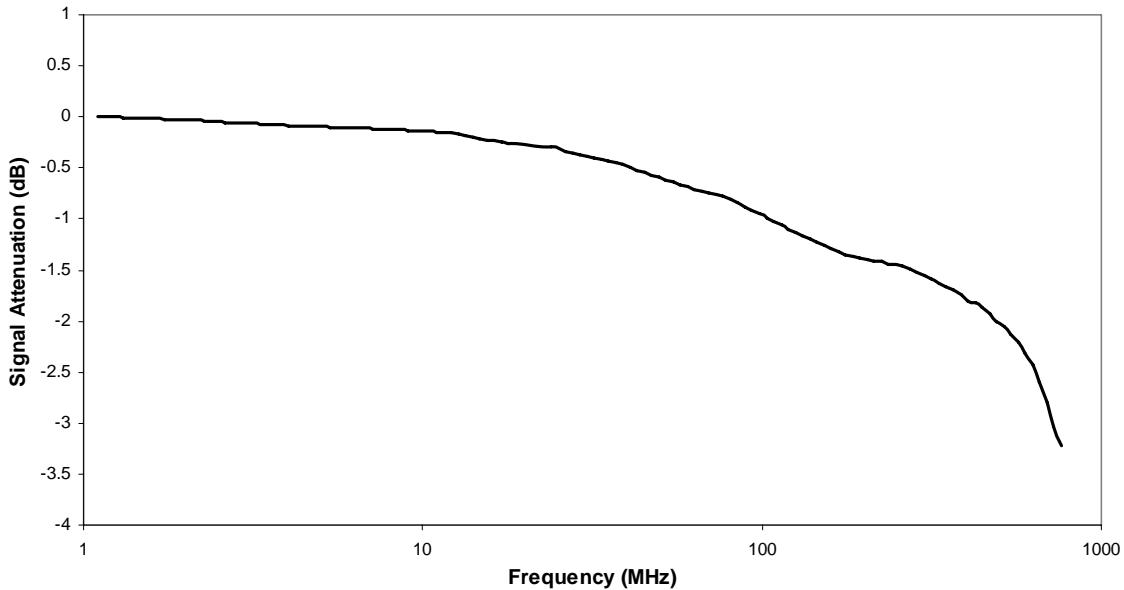


Figure 2: Illustration of the frequency response

Cobra CompuScope digitizer throughput & maximum PRF

A number of applications require the Cobra digitizer to acquire data based on a rapidly occurring trigger signal. These high Pulse Repeat Frequency (PRF) applications include radar, lidar, and ultrasound signal acquisition.

Representative repetitive capture benchmarks in Single Record mode are shown below for the Cobra digitizer. In Single Record 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.

Curves are shown for the Cobra digitizer in single and dual channel acquisition modes as a function of capture depth. Results are shown for a 32-bit, 33 MHz PCI bus and for a 32-bit, 66 MHz PCI bus.

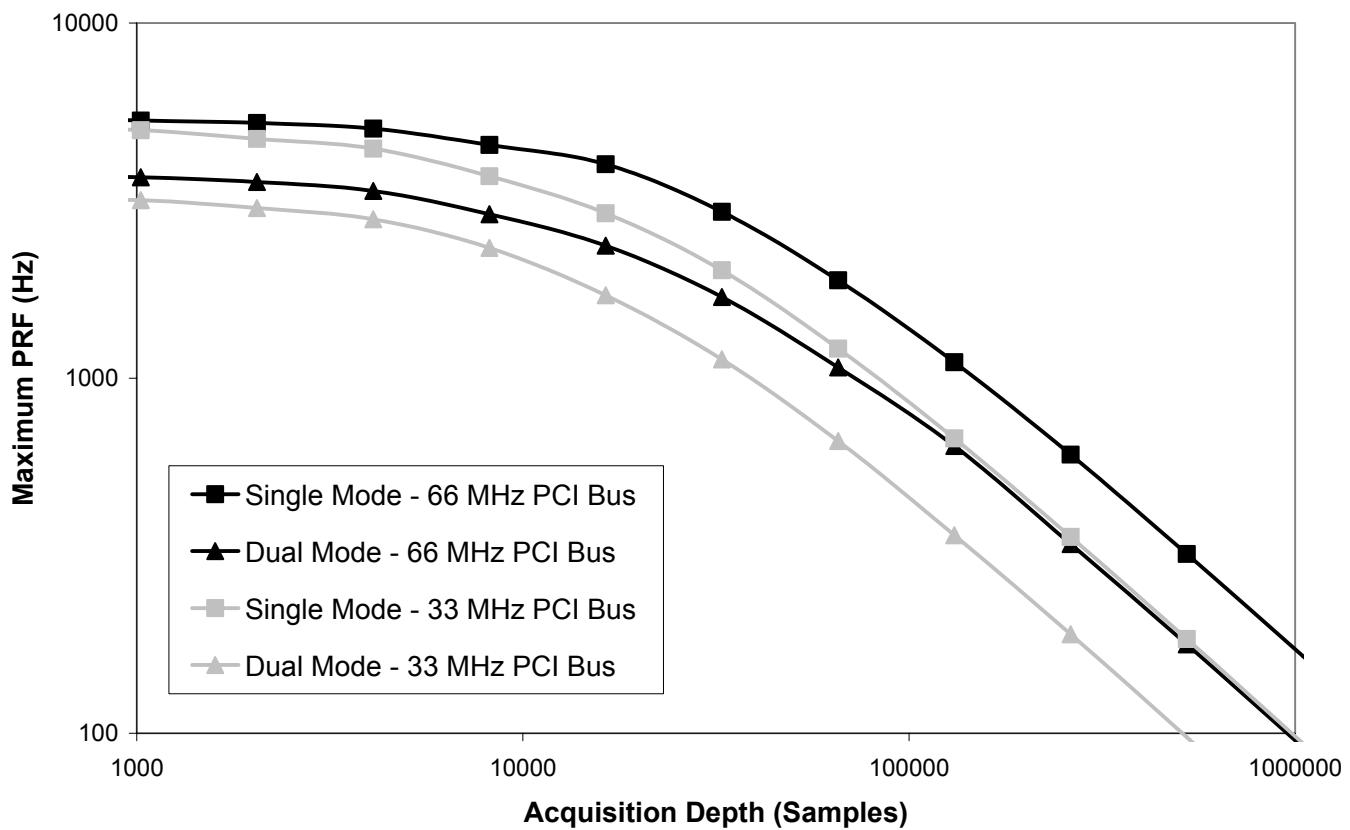


Figure 3: Maximum PRF vs. acquisition length

The GaGe Cobra™ family of digitizers features up to 2 channels in a single-slot PCI card with up to 2 GS/s sampling per channel, and up to 4 GB of on-board acquisition memory. Combine several Cobra cards for up to 16 simultaneous channels in a single system.

APPLICATIONS

Wireless Communications
Military & Aerospace
Manufacturing Test
Signal Intelligence
Non-destructive Testing
Synthetic instrumentation
Electro-optic
Radar/Lidar
Laser Optics
Embedded digitizer
Scope replacement

Cobra CompuScope Family

Next-Generation High-Speed Digitizers for the PCI Bus



The Cobra CompuScope family is a new generation of GaGe high-speed 8-bit digitizers that provides the most powerful combination of speed, memory, and bandwidth as well as a wide portfolio of advanced acquisition features.

FEATURES

- 1 or 2 digitizing channels
- 1 or 2 GS/s maximum sampling rate per channel
- 8 bits vertical resolution
- 256 MS to 4 GS on-board acquisition memory
- Up to 1 GHz bandwidth
- Full-size, single-slot PCI card
- Full-featured front-end, with software selection of all signal conditioning settings
- 32 bits, 66 MHz PCI standard for 200 MB/s transfer to PC memory
- Ease of integration with External or Reference Clock In and Clock Out, External Trigger In and Trigger Event Out
- Programming-free operation with GageScope® oscilloscope software
- Software Development Kits available for LabVIEW, MATLAB, C/C# and more