

ChronoLogic CL4000 – 14 bit Oscilloscope / Digitizer

- 100MS/s sample rate
- 200 MHz front-end analog Bandwidth
- 85dBc SFDN
- Input ranges from 80mVpp to 80Vpp
- Fully Isolated inputs
- Probe calibration output
- Over 100 channels
(synchronized with USB-inSync™)



Distributed Virtual Instrument

Overview

The Distributed Virtual Instrument (DVI) product range provides users with the ultimate in test & measurement flexibility. Each DVI is a stand-alone unit that provides a specific functionality in a small, rugged form factor with all of the plug-and-play benefits of USB. In addition, DVI's can be combined and used as building blocks to create large, synchronous test setups consisting over more than 100 devices with multiple functionalities. ChronoLogic's Maestro – Master Timing Hub further ensures nanosecond phase accuracy of all measurements and clocks.

The CL4000 Oscilloscope/Digitizer can be combined with any other member of the ChronoLogic DVI or USB-inSync™ family to create a truly expandable virtual instrument.

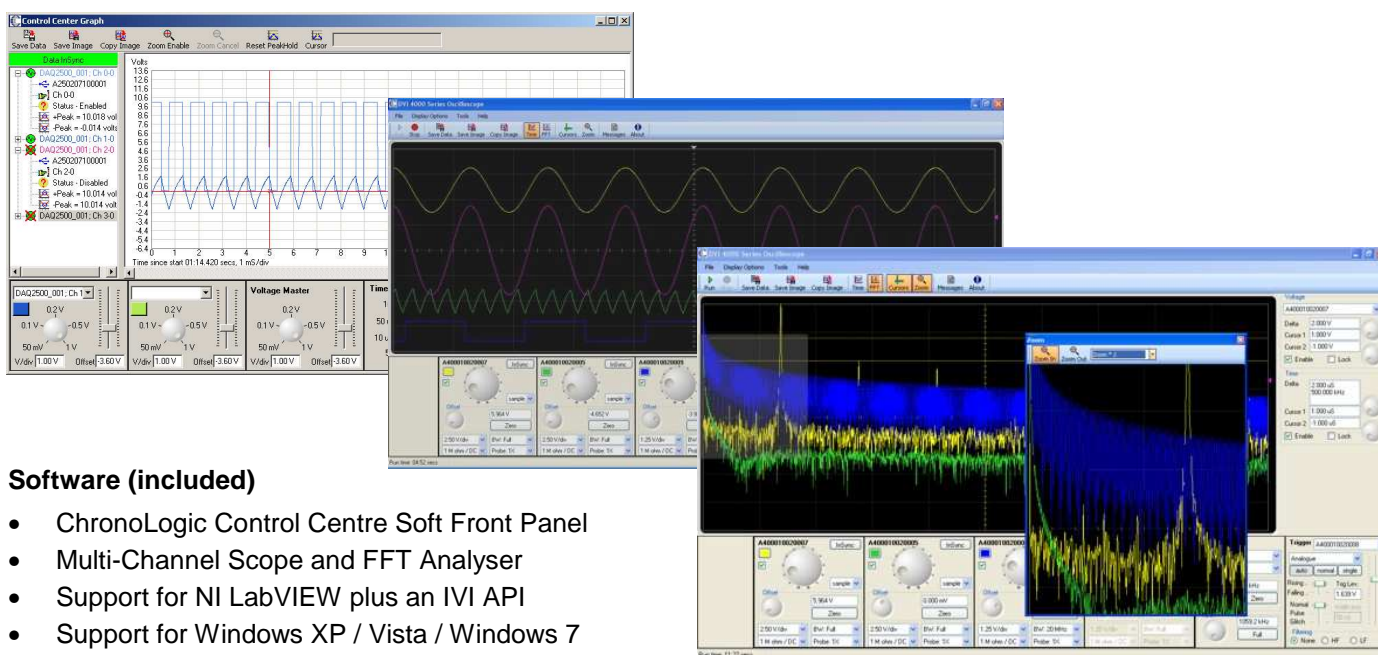
The CL4000 offers all of the flexibility of a standard scope, with 10 fixed input ranges from 80mVpp to 80Vpp and an adjustable DC offset. A variable gain feature allows nearly step-less gain adjustment over the entire input range. It also features a 128 MB onboard memory for measurements requiring extended data captures. The compact plug-and-play form factor and rugged aluminium enclosure makes the DVI Scope ideal for portable, bench top, and OEM applications. ChronoLogic's free Control Centre Software provides an interactive interface with the ability to combine different functionality into one virtual device.

Features and Benefits

- 14 bit, 100MS/s sample rate
- 200MHz front-end analog bandwidth
 - Pristine frequency response well beyond Nyquist
 - Trigger off and capture high speed transients
- Very low noise floor and input ranges from 80mVpp to 80Vpp
- High-spec Oscilloscope/Digitizer in a small, portable USB module
- Fully expandable Oscilloscope system – add channels as you require
- All modules synchronized to 1ns using USB-inSync™ technology
- Plug and Play functionality of USB means fast set-up times
- Supplied with FREE ChronoLogic Control Center software and dedicated DVI 4000 Series Oscilloscope Software
- LabVIEW™ drivers and IVI Programming API are also included

Software

The CL4000 DVI is supplied with ChronoLogic's Control Center software, complete with a simple to use Graphical User Interface (GUI). Also provided is ChronoLogic's sophisticated scope and FFT analyser software which combines multiple devices in one user interface. For advanced users, access to extended low-level device functionality is available through our IVI Programming API. This enables interfacing through Windows based software application including MS Office, Visual Studio and National Instruments LabVIEW™. Additional LabVIEW™ device drivers are available so that USB-inSync™ devices can be quickly implemented within an existing test environment.



Software (included)

- ChronoLogic Control Centre Soft Front Panel
- Multi-Channel Scope and FFT Analyser
- Support for NI LabVIEW plus an IVI API
- Support for Windows XP / Vista / Windows 7

Detailed Product Specifications

The CL4000 is a universal 14-bit 100 MSPS digitizer which can be used as an oscilloscope or FFT analyzer. It has a wide bandwidth analog input with a switchable 20 MHz bandwidth limiter. With its 14-bit vertical resolution, the CL4000 is perfectly suitable for FFT analysis or for time domain signals where a high zoom factor can reveal usually invisible signal details. Together with the CL4000's large acquisition memory for 64 million real-time measurements and its sophisticated trigger settings, you will never miss the signal you want to capture. If you need more than one channel you can combine several CL4000 devices by using standard USB hubs. You can have over 100 channels and they will all sample synchronously without using any trigger cabling. Furthermore, it is possible to combine the CL4000 with other devices of ChronoLogic's DVI family, e.g. sensor interfaces or sophisticated digital I/O devices, or analog outputs, to build complex measurement systems. Connecting the devices using one of our USB Master-HUBs via standard USB cables and hubs ensures nanosecond phase accuracy. All devices will be automatically synchronized to better than one nano second. ChronoLogic's Control Centre software combines the functionality of all devices in one virtual software interface so all connected units appear as one multi-functional device. Advanced users can implement the functionality in LabView or any other programming software using our IVI programming API.

Typical data at 25°C if not otherwise noted
Acquisition System

Number of channels: 1
 Vertical resolution: 14 bits
 Input, Gain and Offset Ranges:

Input Range (pp)	Variable Range (pp)	Vertical Offset Range
80 mV	40 mV to 80 mV	±4 V
100 mV	50 mV to 100 mV	±4 V
200 mV	100 mV to 200 mV	±4 V
400 mV	200 mV to 400 mV	±4 V
800 mV	400 mV to 800 mV	±4 V
1 V	0.5 V to 1 V	±4 V
2 V	1 V to 2 V	±4 V
4 V	2 V to 4 V	±4 V
8 V	4 V to 8 V	±4 V
10 V	5 V to 10 V	±40 V
20 V	10 V to 20 V	±40 V
40 V	20 V to 40 V	±40 V
80 V	40 V to 80 V	±40 V

Note: Variable ranges are not calibrated

Bandwidth limit filters: 20 MHz (-3db)
 (Software selectable)
 Maximum Sampling rate: 100 MS/s
 Onboard sample memory: 128 MB
 (64 million samples)
 Input impedance: 1 MΩ || 12 pF
 50 Ω (switchable)
 Maximum input overload: ±100V peak @ 1 MΩ
 5V RMS @ 50 Ω
 Input coupling: AC, DC, GND
 AC coupling cut-off frequency: 7 Hz

DC Performance

Gain Error (all ranges): ±0.5 %FS
 Offset Error (80V to 10V range): ±0.05 %FS
 Offset Error (8V to 80mV range): ±0.2 %FS

AC Performance

Measured at 50 Ohm input and full analog bandwidth:

Input Range (pp)	RMS Noise Typical	SNR dBFS Typical	Minimum Bandwidth
80 mV	76 µV	60.4	100 MHz
100 mV	79 µV	62	100 MHz
200 mV	81 µV	67.8	100 MHz
400 mV	88 µV	73.2	100 MHz
800 mV	112 µV	77.1	200 MHz
1 V	316 µV	70	200 MHz
2 V	377 µV	74.5	200 MHz
4 V	521 µV	77.7	200 MHz
8 V	877 µV	79.2	200 MHz
10 V	1.8 mV	75	200 MHz
20 V	2.7 mV	77.4	200 MHz
40 V	4.5 mV	79	200 MHz
80 V	8.4 mV	79.6	200 MHz

Probe Calibration output

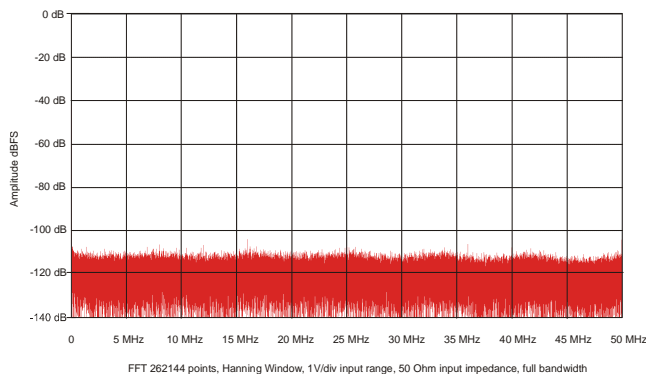
Output Voltage: 1 Vpp square wave
 Frequency: 1 kHz
 Impedance: 50 Ω

Isolation

Maximum isolation Voltage: ±100 V peak
 Isolation resistance: > 10 MOhm
 Coupling capacitance: < 10µF

Noise Spectrum

System noise at 8 Volt (1V/Div) input range:


Time base System

Sampling clock frequency: 100 MHz
 Jitter: 15 ps RMS
 Phase noise: -160 dBc/Hz
 (100 kHz to 1 MHz)
 Time base accuracy: ±50 ppm, 1ns across modules
 using Maestro MTH

Trigger System

Modes: Edge, digital, software, LF rej,
 RF rej, glitch, pulse
 Sources: Analog, digital, other DVI
 devices, software
 Slope: Rising or falling

External Trigger

Input impedance: 10 kΩ
 Input voltage range: 0 to 5 V
 High level Input voltage: 2.1 V min
 Low level input voltage: 0.9 V max
 Maximum overload: ±10 V

Power Requirements (typical)

USB +5V DC: 500mA, 900mA peak
 (if external power not used)
 External power: 12V/ 300mA max
 External power connector: DIN 45323 (2mm pin)
 Switchover USB/External: Automatically

Mechanical

Enclosure: Aluminium
 Dimensions (L x W x H): 130 x 68 x 34 mm
 Weight: 250 gram

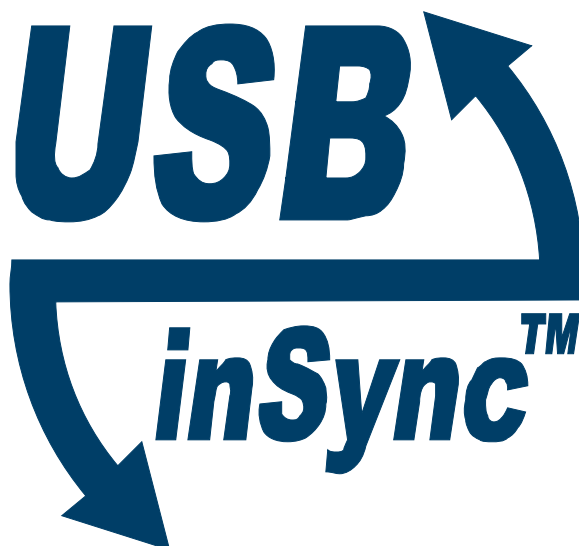
Environment

Operating temperature: 0 to 45 °C
 Storage temperature: -20 to 70 °C
 Relative humidity: 10 to 90%, non condensing

Calibration

Self-Calibration: Offset, time base
 External calibration: 1 year
 Internal reference drift: 50 ppm/1000 h

Certifications currently pending



USB-inSync™ is a revolutionary technology which adds highly accurate timing and synchronization to the already powerful Universal Serial Bus (USB). While preserving all the features of USB, the enhanced capability of USB-inSync™ enables new applications and solutions never before possible. USB-inSync™ has transformed the fundamental properties of USB and opened up a new range of possibilities. USB-inSync™ will become the solution of choice for PC I/O applications where portability, expandability, synchronous performance, and cost are significant considerations.

ChronoLogic's USB-inSync™ specification defines a rugged PC-based I/O platform for test, measurement and automation systems. USB-inSync™ builds upon the USB specification that has become the preferred connectivity standard for portable, office and home computer environments. USB-inSync™ is an extension to USB that combines the widespread inter-compatibility features of USB with the advanced timing and software features required for an industrial PC I/O communication platform. These advances open up a new world of possibilities in the development of synchronized systems for distributed test and measurement, data acquisition, automation and manufacturing applications.

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