

DAQ413 – 3.6 GSPS 12-bit Data Acquisition Module

PRODUCT DESCRIPTION

The **DAQ413** is the latest member of the Euvis DAQ family. The **DAQ413** module digitizes incoming signals at 3.6 GSPS with 12 bits of resolution. A 1.2 GHz analog bandwidth coupled with a 1024M x 12-bit data memory makes the DAQ413 ideal for wideband IF/RF data acquisition. A built-in hardware error correction system allows for increased sample accuracy and decreased noise. The on-board DRAMs provide up to 1024M x 12-bit data memory. The 1.8 GHz RF clock input is single-ended, 50-Ω terminated with a minimum power of 6 dBm. The module accepts a high-speed trigger signal for operation in burst mode, which makes the **DAQ413** ideal for high-speed data recording. Two burst modes are offered: single burst and multiple-burst modes. The multiple-burst mode allows users to capture multiple folds of signals with trigger events. The DAQ413 comes with an intuitive companion GUI application for easy bench-top operation as well as a companion API for integration into any application. The DAQ413 comes standard with a USB 2.0 interface to connect to a PC host and an optional 1-lane PCIe interface is available for faster data downloads.

KEY FEATURES

- 12-bit ADC resolution
- Standard 3600 MSPS sampling rate
- ENOB: 8-bits
- Hardware distortion correction
- 1024M x 12-bit memory depth
- Up to 284 millisecond waveform at 3.6 GSPS
- Accepts external trigger
- Multiple-burst mode for acquiring multiple triggered signals
- Standard USB 2.0 interface
- 1-lane PCIe DMA interface for faster data download
- 12V power supply (included)
- GUI for module control, waveform display, and analysis
- Companion API and software drivers included for easy system development
- Anodized aluminum enclosure: 8.25 x 3.5 x 10.7 (W x H x D) inches

APPLICATIONS

- OFDM Receiver
- Ultra-Wideband Receiver
- High-Speed Data Acquisition
- High-Speed Test and Measurement
- Wireless Networking
- Electronic Warfare
- RF Digital Receiver
- Software Radio

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Min	Typical	Max	Unit
Operating Temperature	T_o		25		°C
Sampling Rate	f_{data}		3600		MSPS
Clock Frequency	f_{CK}		1800		MHz
Clock Input Power	P_{CK}	6	12	16	dBm
Input Frequency	f_{in}	0		1800	MHz
Input Swing ¹	V_{in}			500	mV
Clock Port Return Loss	RL_{CK}		15		dB
Output Port Return Loss	RL_{RF}		15		dB
Power Supply ²	+12V		+12		V
	I_{+12}		1.5		A

1. Differential with 50% duty cycle
2. Current consumption varies with clock frequency.

TERMINAL DESCRIPTION

Name	Function	I/O	Signal
GND	Ground		DC
+12V	Power, +12 V		DC
IP	Waveform Input Positive	I	RF
IN	Waveform Input Negative	I	RF
CK	Input Clock Source	I	RF
TRIG	Trigger	I	
SYNCO	Synchronize Output	O	

DETAILED SPECIFICATIONS

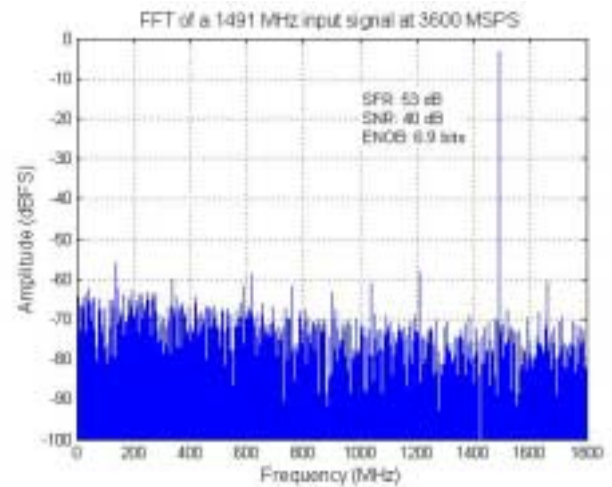
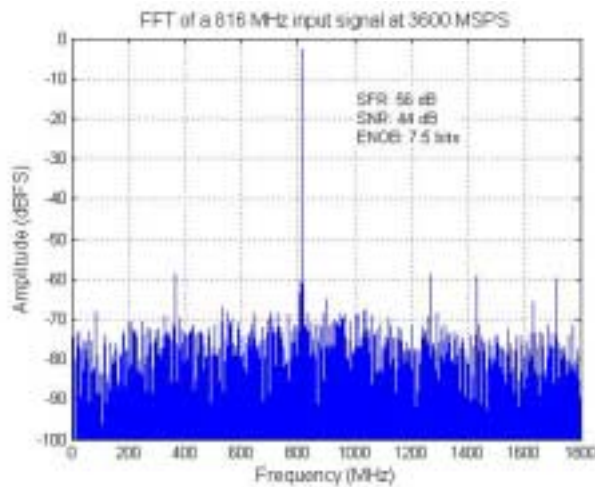
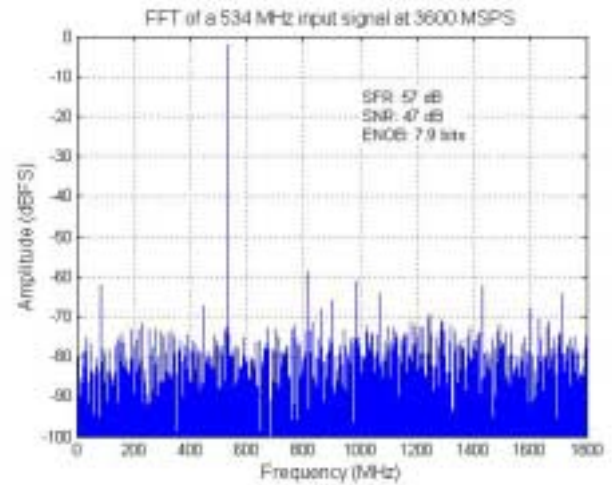
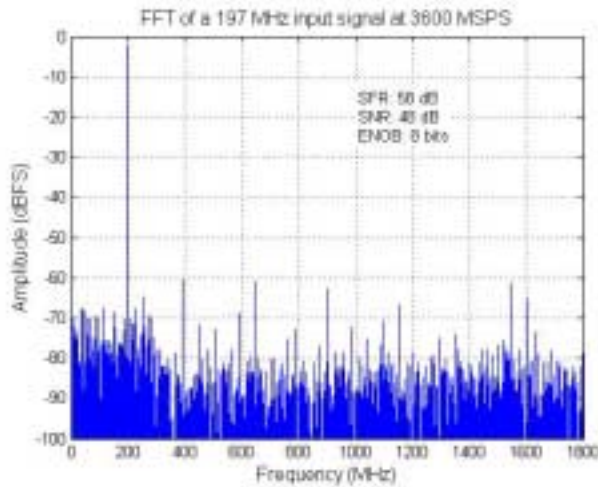
General	
Input Amplitude Resolution	12 bits
Running Modes	Continuous Burst Multiple Burst
User Interface	Windows Graphical User Interface, USB 2.0
Input Clock	
Type	Single-ended, 50- Ω terminated
Connector Type	SMA
Frequency Range	Standard: 3.6 GHz
Power Level	6 dBm to 16 dBm
Return Loss	15 dB
Input	
Type	Differential, 100- Ω terminated, AC coupled
Connector Type	SMA
Input Frequency Range	100 KHz to 1.8 GHz
Input Level	-250 ~ 250 mV
Input Return Loss	15 dB
Trigger	
Connector	SMA
Source	External or Software
Recommended External Trigger	LVC MOS25

DETAILED SPECIFICATIONS, (CONTINUED)

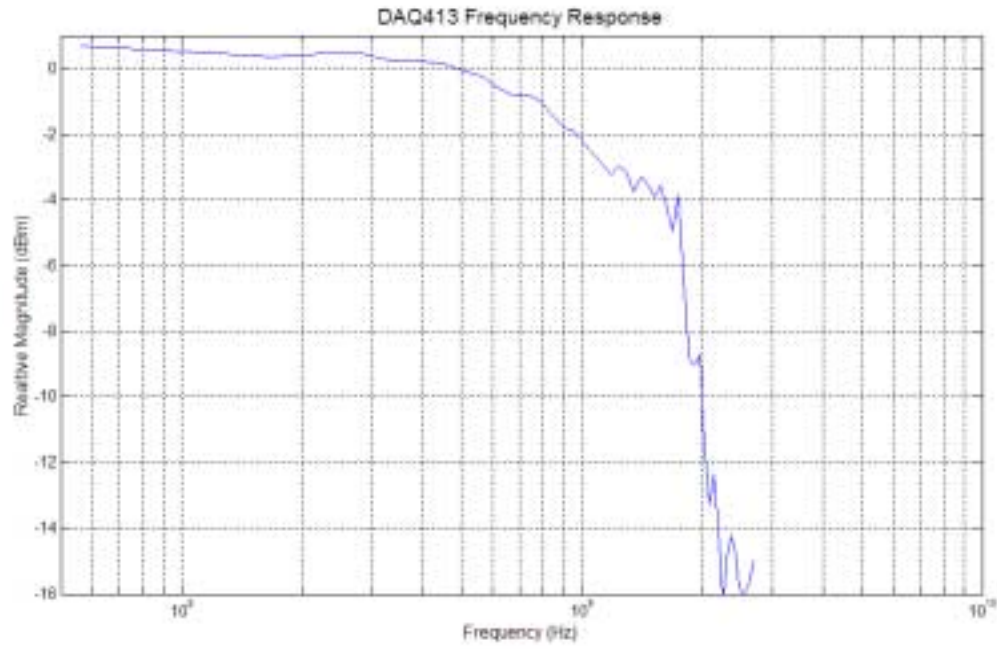
Capture Data	
Maximum Capture Length	536,870,912 samples
Minimum Capture Length	8,192 samples
Capture Length Incremental Step	32 samples
API	
CLR (Common Language Runtime) support languages targeting the runtime, such as C++/CLI, C#, Visual Basic, Jscript, and J#.	
GUI	
Available for Windows XP, Windows Vista and Windows 7	

SWITCHING CHARACTERISTICS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
TRIG: LVCMOS25 Logic					
V_{IH}	Input Voltage High	1.7		2.8	V
V_{IL}	Input Voltage Low	-0.3		0.7	V
t_{Setup}	Setup Time		2		ns
t_{Hold}	Hold Time		-0.25		ns
SYNCO: LVCMOS25 Logic					
V_{OH}	Output Voltage High	2.9		3.3	V
V_{OL}	Output Voltage Low	0		0.4	V

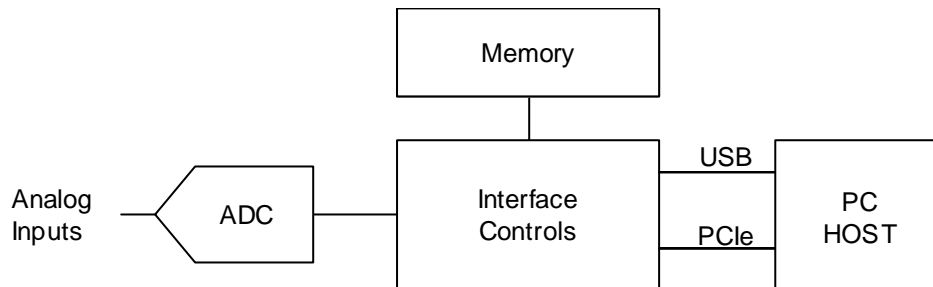
DYNAMIC PERFORMANCE

The figures above show the FFTs of four data captures of single-tone sinusoids of various frequencies. The sinusoids were generated with an Agilent E8267C PSG Vector Signal Generator and digitized with a Euvis DAQ413 at 3600 MSPS. 1024-point FFTs were used.



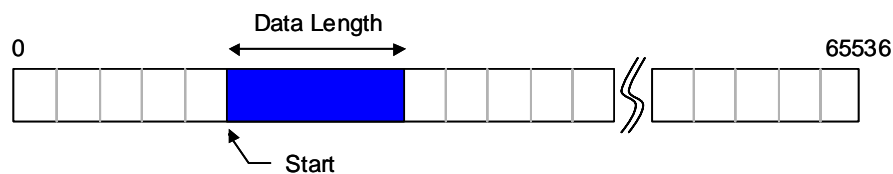
Bandwidth (-3dB)	1.2 GHz
1 dB Flatness	800 MHz

FUNCTIONAL OVERVIEW



The DAQ413 is composed of a high-speed ADC, an interface/controls unit, and a memory. The ADC digitizes and multiplexes the captured data to the interface/controls unit. The captured data is processed and stored in the memory unit according to the operation mode, data start position and length. The stored data in the memory can be transferred to a PC host via PCIe or USB.

The memory unit is capable of 1024 M x 12 bits storage. The 1,024M-point memory is divided into 65,536 equal-length segments. Each segment stores 16,384 data points. The captured data from the ADC can be stored in consecutive segments, which are defined by the start address and data length as shown in the following figure. Different captured data can be stored in different user pages.

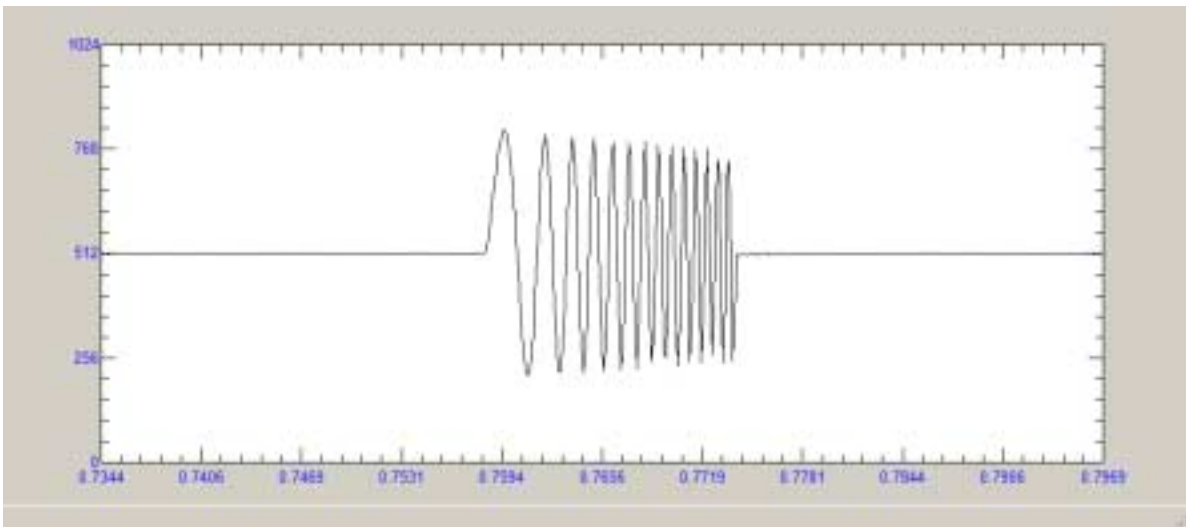


The stored data can be transferred to a PC host for display and FFT analysis via the module's standard USB 2.0 interface or the PCIe x1 DMA BMD interface.

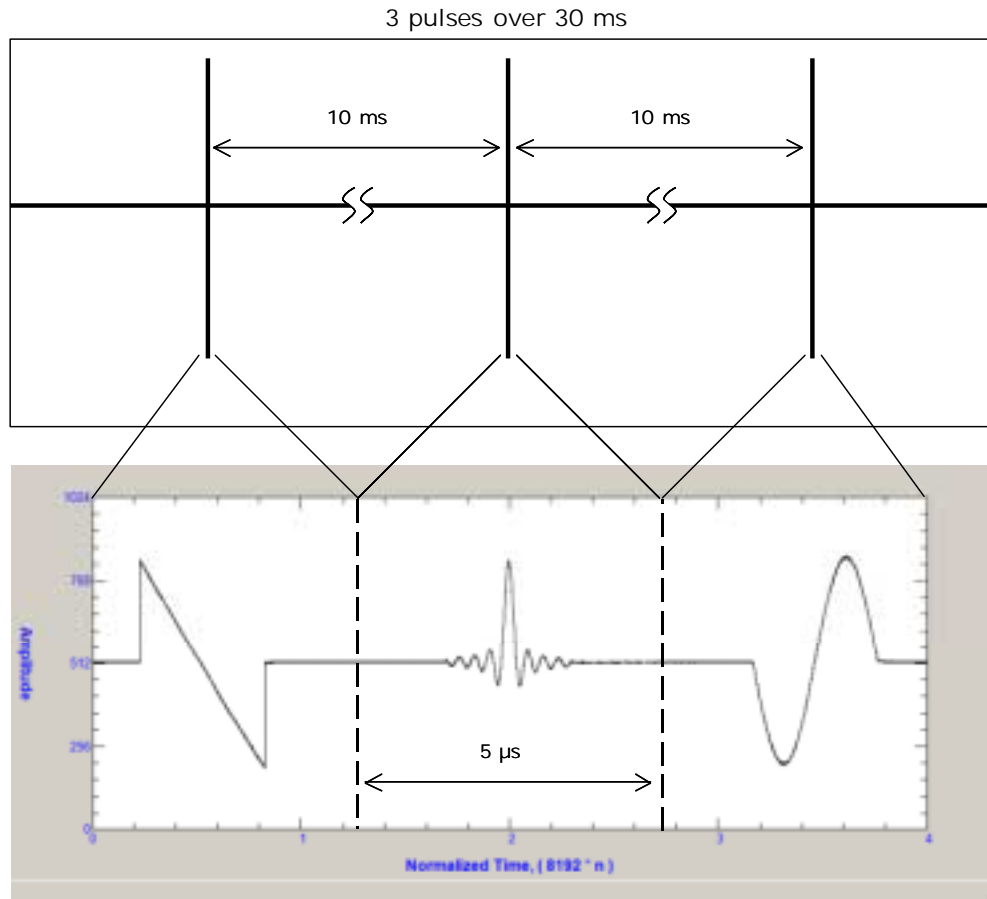
OPERATION MODES

The module can be operated in three modes: Continuous, Burst and Multiple-burst modes. In the continuous mode, right after snapshot is clicked, the module starts capturing the input data until the data length is met. Continuous mode is suitable for capturing repeating waveforms, where the starting time is not critical.

In Burst mode, the module starts recording on the rising edge of the trigger signal. The data is stored in the memory specified by the start position and length in the GUI. Once the module has collected enough data to satisfy the data length parameter, the module returns to an idle state. Alternatively, the module can be re-armed to record the next capture, which can be stored in different area of the memory.

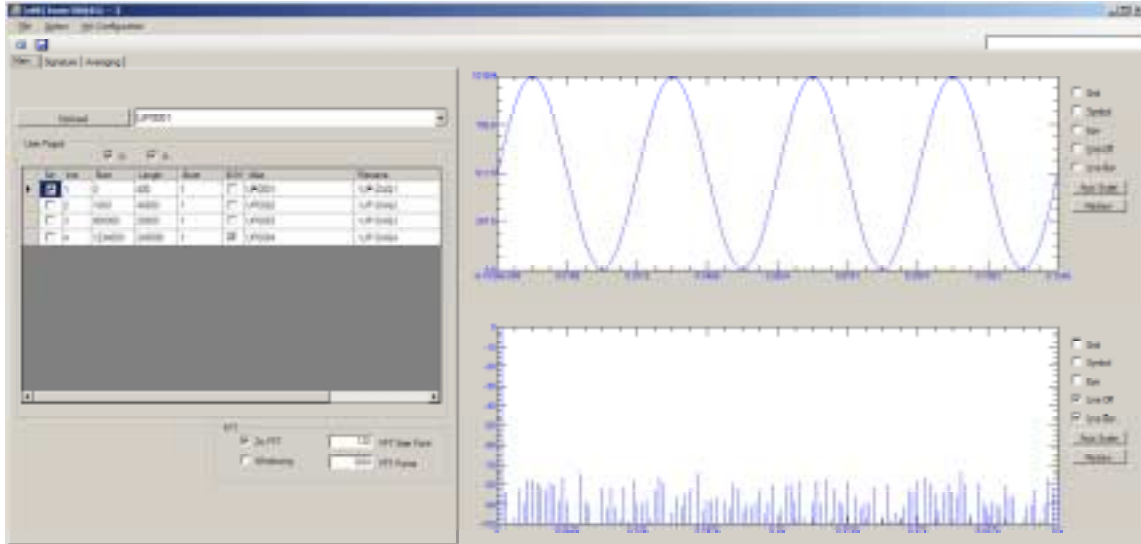


In the multiple-burst mode, the module records several captures with respect to the triggers. The burst number, the start position, and data length can be specified in the GUI. The total amount of memory used to store the captures is burst number times data length. This mode enables users to utilize a compact size of memory to capture long-term pulsed signals. The following figure shows three-burst captures with 15 us memory size for three widely spread pulses over 30 ms.

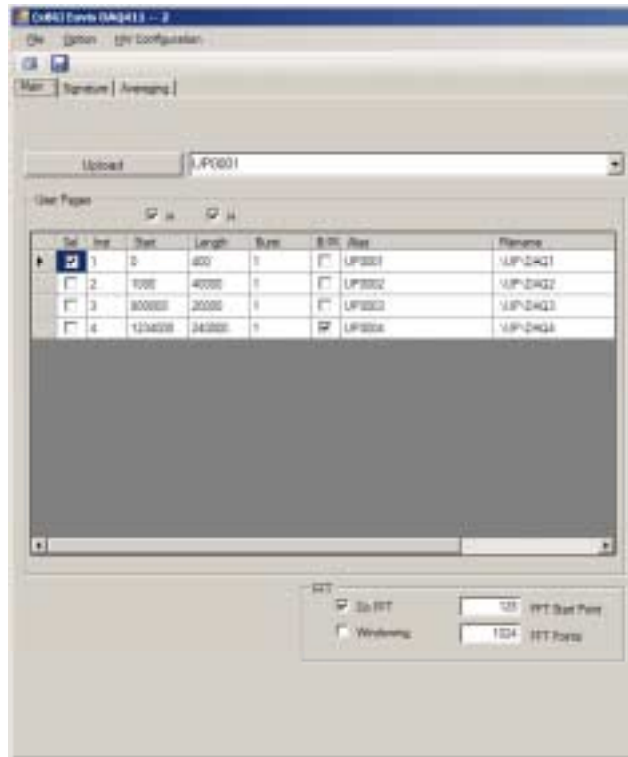


COMPANION GRAPHICAL USER INTERFACE

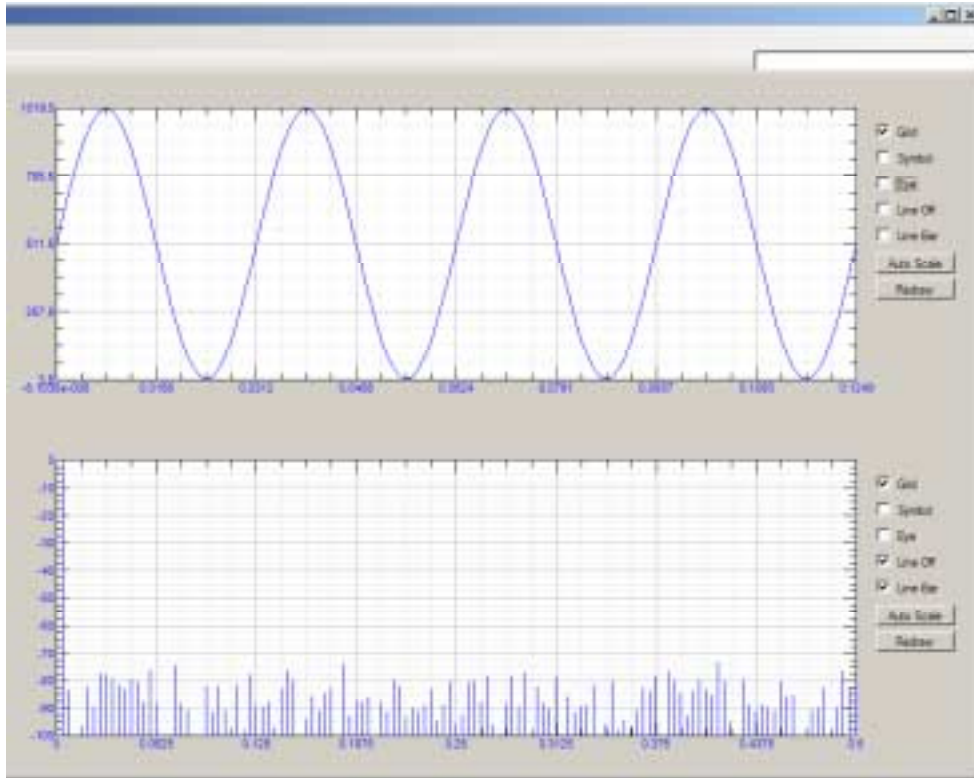
The GUI is composed of two sections: the Main control section and the Data display section.



In the Main control section, users can define user pages by specifying 1) the starting address and data length, 2) burst mode and burst count, 3) aliases of the user pages, and 4) file name to be saved to disk. Users can select a user page and perform acquisition and upload data for displaying. The captured data can be saved to a file and processed by other software such as Matlab.

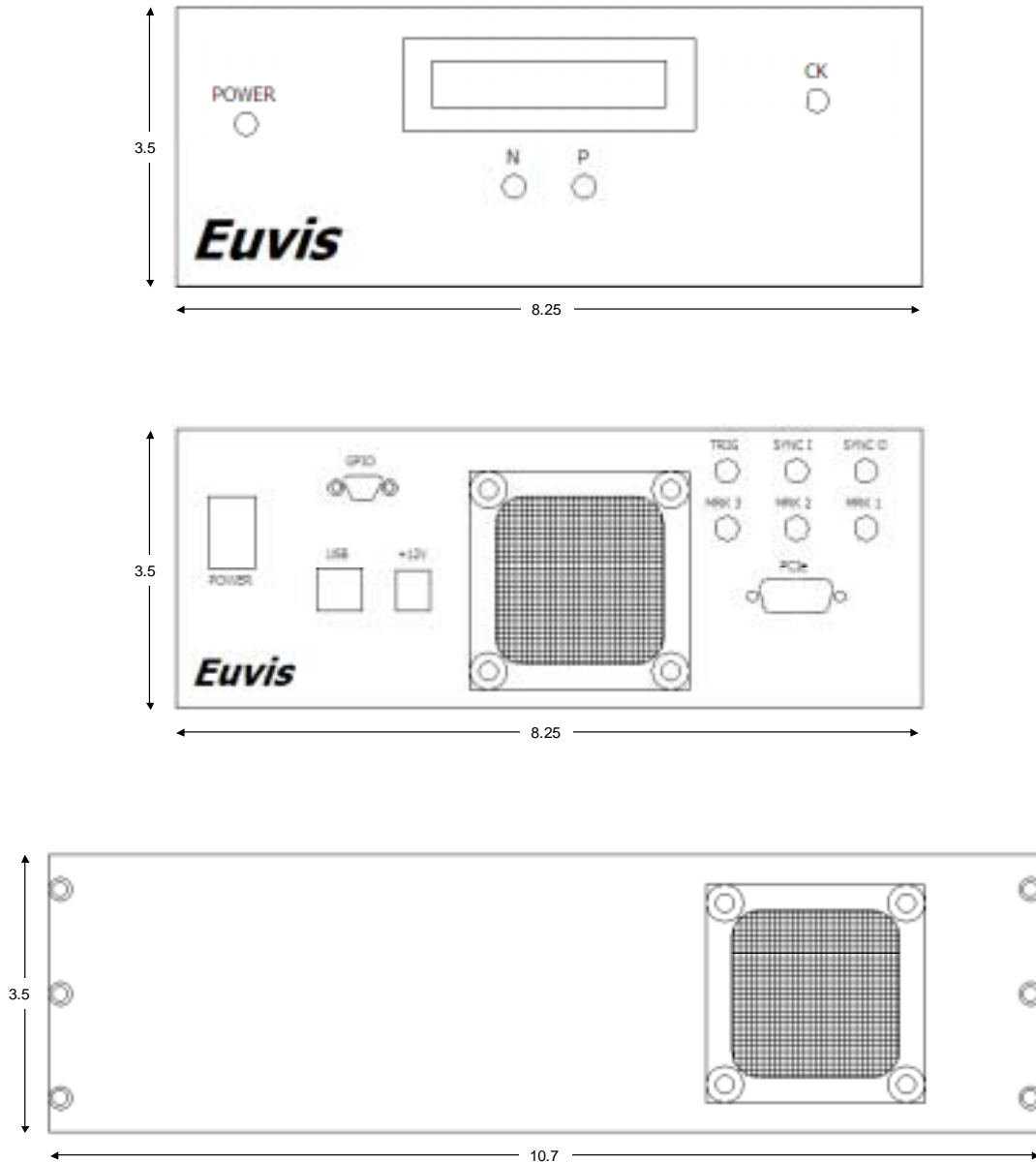


In the Data display section, users can view and analyze the captured data in the time-domain display (top axis) and the Fourier transform of the data (FFT) in the frequency-domain display (bottom axis), measure captured data with a high precision measurement tool, and toggle several data display settings for each set of axes



ENCLOSURE DIMENSIONS

The enclosure dimensions are 8.25" (W) x 3.5" (H) x 10.7" (D). The front, back, and side views are shown in the following figure:



ORDERING INFORMATION:

Email to: Sales@euvis.com

Or call: (805) 583-9888 x108 Sales Department

Or fax: (805) 583-9889

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