

# GEOsix

## Low Power Digitizer - Recorder

- High resolution digitizer
- Eight extra analog inputs
- Eight TTL command lines
- Low power consumption
- Dimensions 168x106x68mm
- GNSS time/Precision DPLL
- 0.1-4000 samples per second
- 6+1 seismic channels
- Ultra-low noise preamplifier
- Embedded open source OS
- Embedded SeedLink server
- Embedded earthworm server
- Continuous/trigger recording
- Advanced networking functionality
- Smart seismic network operation



## FEATURES

GEObit introduces GEOsix series high resolution 6+1 analog seismic channels telemetry digitizer/recorder. 32bits ADC converters provide effective resolution better than 23.7bits@100sps. The size of the instrument is only 168x106x68mm. The power consumption is only 1.2W for 7 channels. Available sampling rate is 1 to 2000sps/6ch, 1 to 4000sps/3ch and optional 0.1 sps is supported. Buld-in GNSS receiver combined with ultra accurate DPLL unit providing time drift 10e-9 sec ensures timing stability even in the absence of GPS signal. NTP timing is also available. The unit is very flexible and accepts several types of analog front end units so any type of seismic sensor can be connected. Additionally, it provides eight extra low resolution and rate analog inputs for seismometer mass position monitoring, or any other environmental parameter monitoring. Eight TTL command outputs are supported for seismometer control or for any other external device control. Typically, the digitizer supports differential variable gain preamplifier. Our force-balance sensor front end is also supported, providing a wide-band response (10sec-98Hz) and high sensitivity 1500V/m/s by connecting a C100 sensor. Acquisition parameters and operation modes can be set from the user-friendly web interface, up to 64 characters password protected .

The unit operates in continuous mode, triggered mode or both and data are streamed through different data ports. Local data storage is selectable as well as logfile information. The unit supports advanced functionality, imple-

mented from the combination of trusted open source software components. Because of it's open source architecture is able to run any custom application thus providing the next day solution to the user. The hardware is based over an embedded ARM9 400MHz ARM linux board, running 14.6 linux kernel. The data are stored in mini-SEED format into the microSD card or to a removable USB stick. The instrument supports 10/100 ethernet port and debug port. FTP, SFTP, SSH are also available. The state of health is transmitted over UDP packets upon request.



Monitoring the earth

## GEOsix

### Low Power Digitizer-Recorder

- System & Network
- Data Acquisition
- Credentials
- Stream Archive
- Trigger Archive
- Information

#### 1. Seismometer

CALIBRATE

Sensor: SENSOR 1

Calibration Signal: SNR

Calibration Signal Gain: 1

Calibration Time: 30 sec

Seisner 1: LOCK | UNLOCK | CENTER

Seisner 2: LOCK | UNLOCK | CENTER

#### Digitizer & SeedLink Stream Server

STATUS: STOP | SeedLink Server is running | CLEAR BUFFER

Sampling Rate: 100 sps

Filter Response: HANNING

Gain: 40

Seisner Control: ACTIVA HIGH

Remove DC:

Enable GPS:

GPS cycle: 60 min

Active Channels: 6

Digitizer Buffer: 1\_SEC

Mastered packet: 512 bytes

Network description: HP Geobit

Network ID: HP

Station Name: GSD

Station description: Geobit GEOsix

Channel 1: HHZ

Channel 2: HNN

Channel 3: HNE

Channel 4: HZZ

Channel 5: HLN

Channel 6: HLE

AZ Channels:

OC Channel:

User Location Code

Location: 00 TR

Archive:  DELETE ARCHIVE

Archive Disk: SD | 8GB

Archive Keep: 5 days

CONNECT | READ



# INSTRUMENT SPECIFICATIONS

## ULTRA LOW POWER, MINIATURE SIZE 32BIT ADC SEISMIC DIGITIZER/RECORDER

### DIGITIZER

<b>Analog channels</b>	6+1 high resolution seismic channels plus 8 auxiliary channels
<b>Calibration Channel</b>	One high resolution seismic channel internally connected to calib signal.
<b>A/D converter</b>	Fourth Generation, Delta-Sigma, 32bits data stream
<b>THD</b>	-125Db
<b>Modulator</b>	Fourth Generation, 4th order Delta-Sigma Modulator
<b>Filter</b>	Programmable SINC, FIR, IIR filtering, auto-calibration function
<b>Filter Response</b>	Selectable Minimum or Linear Phase Filter
<b>Input resistance</b>	1MOhm differential for variable gain input
<b>Sampling Rate</b>	6ch:1-2000sps, 3ch:1-4000sps, optional 0.1-1000sps
<b>Power</b>	9-36Vdc, 0.8W standalone, 1.1W standalone 1.3W telemetry
<b>RMS noise</b>	<138dB@100sps <129db@1000sps
<b>Analog Front-End</b>	Modular <b>Low noise preamplifier or wide-band sensor electronics</b>

### DATA RECORDING

<b>Storage Media</b>	MicroSD flash card, removable USB stick Ringbuffer RAM storing 10h+ data. Miniseed data files
<b>Information file</b>	System log file. SOH message over UDP
<b>Recording mode</b>	Continuous, Triggered STA/LTA based or both
<b>Operation</b>	Advanced functionality if connected to an Earthworm server
<b>Operating System</b>	Open Source based, ability for custom application run
<b>Memory</b>	Internal 256Mbyte RAM in ringbuffer mode and minimum 64Gbyte FLASH memory

### TIME BASE

<b>Type</b>	GNSS receiver(GPS, GLONASS, WAAS,EGNOS,BeiDou,QZSS) /DPLL, GPS port, up to 30m cable GPS antenna or 120m active GPS antenna
<b>Accuracy</b>	+/-1usec to UTC time pulse, +/-5 meters to position
<b>Timing Sources</b>	Ultra low drift DPLL unit using TCVCXO, RTC
<b>DPLL drift</b>	Less than 17usec between one hour GPS cycles

### COMMUNICATION

<b>Ports</b>	Ethernet port, serial port, WiFi (station, AP, router)
<b>Telemetry</b>	Seedlink server 128 & 512 byte data blocks, earthworm server, SeisNetWatch
<b>Protocols</b>	SSH, FTP, SFTP, Web Interface, TCP/IP, HTTP, HTTPS, PPP, MQTT, CoAP/CoAPS, NTP, PTP
<b>Security</b>	64 char password
<b>LCD</b>	Miniature LCD with altering information messages
<b>LED</b>	Two high brightness LEDs

### CONTROL - CALIBRATION

<b>Ccontrol Signals</b>	Seismometer Lock, Unlock, Center, Calib. Enable, active high/low user selectable
<b>Calibration</b>	Pulse, Sine waveform, variable amplitude and frequency, 16bit DAC

### DIFFERENTIAL INPUT FRONT END

<b>Input (standard gain)</b>	40Vpp, 20Vpp, 10Vpp
<b>Input (high gain)</b>	5Vpp, 2.5Vpp, 1.25Vpp, 0.625Vpp

### INTEGRATED WIDE - BAND SENSOR FRONT END

<b>Bandwidth</b>	10sec-98Hz(MK3 version)
<b>Sensitivity</b>	1500V/m/sec using force-balance electronics

### PHYSICAL (DIGITISER/RECORDER WITH INTEGRATED SENSOR ELECTRONICS)

<b>Size</b>	168mmx106mmx68mm
<b>Weight</b>	0.85kg

### PHYSICAL (10s SEISMIC SENSOR IF COMBINED WITH SENSOR ELECTRONICS)

<b>Type</b>	Borehole Type/Surface Type
<b>Dimensions</b>	50mm diameter x 180mm length
<b>Cable length</b>	20meters, up to 100 meters
<b>Weight</b>	1.2kg
<b>Humidity</b>	Up to 20 bar external water pressure
<b>Tilt</b>	+/-10 degrees

### ENVIRONMENT (DIGITIZER/RECORDER)

<b>Temperature range</b>	-20 to +70 °C
<b>Humidity</b>	100%, IP67 enclosure



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