Technical Specifications

	OceanObserver	AMAR G4
Primary purpose	On-board processing, data streaming (and recording)	Autonomous recording
Applications	Real-time detection of mammal calls and clicks Vessel, ambient noise quantification Non-acoustic sensor data collection Real-time data streaming	Acoustic and non-acoustic data recording
Typical implementations	Cabled observatory, Drifter, Profiling float, Buoy, Glider or other robotic vehicle	Underwater mooring, Bottom lander, Other recording platforms
Power draw	~2.5 W recording one channel Higher for processing, multiple channels, etc.	~560 mW (1 or 4 channels)
Power source options	Battery packs or 7–24 V_{DC} in cabled settings	Battery packs (alkaline or others) 7–24 V_{DC}
Duration	Weeks or months on battery Years if cabled	Months or years
Memory	1 microSD up to 256 GB 10 TB on twenty 512 GB SD cards (optional) Lossless data compression also available	10 TB on twenty 512 GB SD cards Lossless data compression also available
Acoustic channels	Up to 16 mid-speed (8–512 ksps) 1 high-speed (2048 ksps)	Up to 4 mid-speed (8–512 ksps)
Noise floor	<−150 dB/√Hz re full scale at 8–512 ksps <−145 dB/√Hz re full scale at 2048 ksps	<−150 dB/√Hz re full scale
Non-acoustic sensor channels	4 analog 3–6 digital (6 RS-232 or 3 RS-485)	4 analog 3 digital (3 RS-232 or 2 RS-485)
Built-in clock accuracy	0.7 ppm w/ 1 ppm aging in 1st year (TCXO)	5 ppm w/ 4.6 ppm aging over 20 yr (RTC)
Other clock options	TCXO: 0.7 ppm w/ 1 ppm aging in 1st year (with PPS sync) CSAC: 10 ppb/year (with PPS sync)	
Other interfaces	Gigabit Ethernet, USB/OTG	10/100BaseT Ethernet, USB/OTG, SATA
Data streaming	Yes (Gigabit Ethernet)	No
Wireless control	Wi-Fi, Bluetooth available Option: Cellular, VHF, Iridium, Acoustic modem	

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ISO 9001 Certified

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OceanObserver and AMAR G4

Selection Guide and Technical Descriptions

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Shared Features

- Excellent noise floor, stable across sample rates and bands
- Massive 10 TB memory on removable SD cards
- Multiple acoustic and non-acoustic sensors
- Multichannel applications such as linear and spatial arrays
- Clock options of increasing precision, including CSAC
- Logic and power interfaces to control and power peripherals
- Wi-Fi and Bluetooth available
- Telemetry via Wi-Fi, cellular, VHF, Iridium, or acoustic modem

OceanObserver

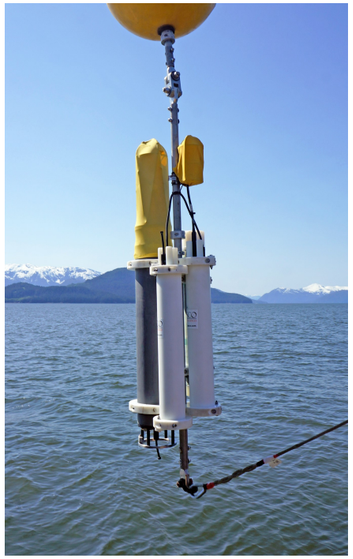
Real-time ocean observing

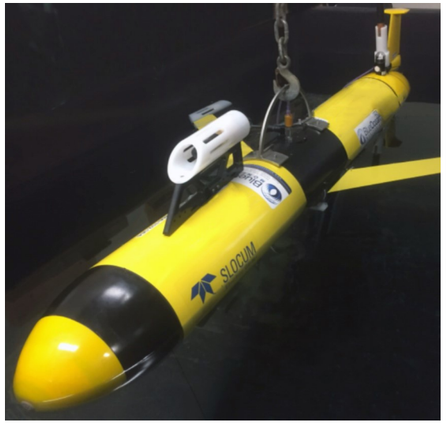
- Up to 16 acoustic channels
- Records and transmits raw or compressed data, or computed information
- In-situ processing (detections/classifications, bearing estimates, and environmental measurements)
- Extremely high bandwidths, number of channels, sample rates, and dynamic range

AMAR G4

Autonomous measurements

- Up to 4 acoustic channels
- Records acoustic and oceanographic data
- Efficient power use and many battery options for long duration missions
- Compact, lightweight housing options





1. Choose the main board for your application

OceanObserver

On-board processing and recording

Powerful in situ processing enables bandwidth-limited telemetry links to shore to transmit detections, pitch tracks, data snippets, or other derived information products of interest. It can also stream raw or compressed data at up to Gigabit Ethernet rates in cabled implementations. Supports up to 16 mid-speed acoustic channels up to 512 ksps and one high-speed channel at 2048 ksps.

Based on the Zynq XC7Z020 chip, it has a dual-core ARM processor and FPGA fabric. On-board signal processing can include detection and identification of marine mammal calls and clicks, and quantifying ambient noise and sounds from vessels and industrial noise sources.

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Autonomous recording

A long duration, low-power data recorder. An associated memory controller hosts up to twenty 512 GB SD memory cards for 10 TB of storage memory. Supports up to 4 mid-speed acoustic channels up to 512 ksps.

This board is based on the TI TMS320C6748 floating point digital signal processor. The board has Ethernet connectivity for configuring and downloading data.

Modular Architecture
The main board hosts daughterboards of your choice

2. Add daughterboards for your choice of features

Mid-speed ADC: High-performance acoustic sampling

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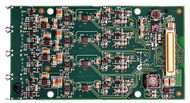

- 4 channels per board
  - Observer can host 4 boards (16 channels)
  - AMAR G4 can host 1 board (4 channels)
- Sample rates: 8–512 ksps
- Resolution: 24 bits
- Noise floor: <−150 dB re FS at all sample rates
- Synchronously sampled channels (ideal for arrays and beamforming)
- Easily optimized for your chosen hydrophone or sensor
- 4 variants to interface with:
  - Single-ended voltage hydrophones
  - Differential voltage hydrophones
  - Single-ended current-driven hydrophones
  - IEPE sensors
- Channels only powered when active

High-speed ADC: Very high frequency sampling

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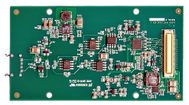

- 1 channel per board (1 board max)
- Sample rate: 2048 ksps
- Resolution: 24 bits
- Noise floor: −148 dB/√Hz relative full scale
- 4th order anti-alias filter at 900 kHz
- Only powered when active

Low-speed ADC: Analog sensors

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- 4 channels:
  - 2 at 0 to 5 V input
  - 2 at 4–20 mA input
- Sample rate: 10 sps (decimated by up to 2^{20})
- Resolution: 18 bits

Power

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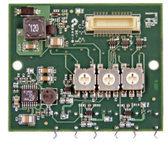

- Powers non-acoustic sensors and other external devices
- 3 separately switchable power channels (each can output 5 V_{DC}, 13 V_{DC}, or the raw input power of 7–28 V_{DC})
- Select output settings with DIP switches

GPIO

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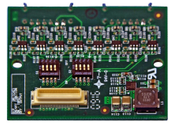

- Monitors and controls non-acoustic sensors and other external devices
- 8 GPIO lines with a high voltage level of 5 V (each configurable as input or output)
- Each connector can provide 5 V_{DC} power and ground to external devices
- 4 lines are read/written from Observer Zynq ARM component

Serial I/O

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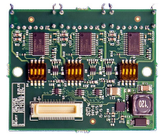

- Integrates digital non-acoustic sensors
- 3 peripheral chips (each configurable for 2 RS-232 channels or 1 RS-422/RS-485 channel)
- Switched 5 V for powering off-board sensors
- Each channel can be enabled/disabled by the main board

TCXO clock

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- Better clock drift than the AMAR's built-in RTC: 0.7 ppm vs. 5 ppm
- RS-232 line and PPS input to connect to GPS or other time sync devices
- Back-up battery for RTC support

CSAC

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- Ultimate in timing accuracy: < 10 ppb/year
- RS-232 line and PPS input to connect to GPS or other time sync devices
- No back-up battery: must be set at each power-on

Wireless controller

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- Remotely controls instrumentation and supports telemetry
- Built-in Wi-Fi and Bluetooth
- Telemetry via 3/4GL cellular, VHF, Iridium, or acoustic modem
- Interfaces DIO logic to control peripherals