Hive-1U

The **AIONYX Hive 1U** is a compact, highly modular 1U device designed for 10" or 19" rack-mounts, and it comes with flexible mounting adapters. Its advanced architecture, combining FPGA technology with 4 x ARM Cortex-A53 processors and field-proven NetTimeLogic IP Cores, offers exceptional modularity to meet a wide range of customer requirements. This makes it an ideal solution for laboratory environments, testing, measurement, and high-performance networking applications.

Designed with customizable configurations, the AIONYX Hive-1U delivers maximum flexibility and adaptability. It includes up to two performance slots for AIONYX ZM Modules and four extension slots for AIONYX PM Modules, which support a large range of functionalities, including GNSS Receivers, Clock/RTC Modules, and a variety of Input/Output Modules.

Key Features

- **10/100/1000 BASE-T RJ45 Ethernet Management Port**
- **USB-C connector:** Admin access to the CPU and FPGA
- **Modular Design with Flexible Configurations:** Easily adaptable to various needs
- **Two Performance Slots:** Compatible with AIONYX ZM Modules
- **Four Extension Slots:** Supports AIONYX PM Modules for added flexibility
- **FPGA Fabric with Quad-Core ARM Cortex-A53:** High performance and versatility for demanding tasks
- **Integrated Power-Supply (100–240 VAC): Wide AC input for standard environments.**
- **Web Interface for Configuration and Monitoring:** Configure via UVM with an intuitive dashboard

Example Configuration

Grandmaster Device:

- PTP Slave/Master, NTP Client/Server, PPS Slave/Master, IRIG Slave/Master. etc.
- Parallel Redundancy Protocol (PRP) or the High-availability Seamless Redundancy Protocol (HSR) fully in hardware
- 1x GNSS Reference
- High-stability oscillator and low-power RTC with 10 MHz and PPS output

Specification

General

Dimension	167 x 221 x 44.45 mm (L x W x H)
Rackmount	1U for 10" or 19" Rack
Weight	1300 g
Housing	Anodized Aluminum
Operating Temperature	0–50 °C
Cooling	Passive Cooling via Case
Humidity	10%-90% (no condensation)
Status/Alarms	3x RGB Status/Alarm LEDs, 1x Power Good indication

Power

Power Connector	100 - 240 VAC (C14 inlet with power switch)
Power Consumption	Typically 14W

Management/Configuration

USB/UART	FPGA: UCM (NetTimeLogic's Universal Configuration Manager) CPU: Terminal
UART	Command Line via UCM Protocol (ASCII based, allows to use a standard Terminal)
Ethernet	UVM (NetTimeLogic's Universal Web Manager) is a powerful web interface that features user management, statistics and a customizable dashboard. SSH

Network Interface(s)

Default/Management	1x 10/100/1000 BASE-T RJ45
PTP Option	PTP Master or Slave (Multi-Port)
NTP Option	NTP Server or Client (Multi-Port)
Redundancy Option	HSR and PRP redundancy protocol according to IEC 62439-3 rev 3 Frame Replication & Elimination for Reliability (FRER) according to IEEE 802.1 CB Optional Redbox or Quadbox support
TSN Option	3 Port (2 redundant ports and 1 uplink) Switched End-Node or 1 Port End-Node Frame scheduling according to IEEE 802.1 Qbv Cyclic forwarding according to IEEE 802.1 Qch Credit based shaper according to IEEE 802.1 Qav Frame preemption according to IEEE 802.1 Qbu and IEEE 802.3 br Synchronization with sub-microsecond accuracy according to IEEE 802.1 AS Frame Replication & Elimination for Reliability (FRER) according to IEEE 802.1 CB

Reference Input Options

GNSS	L1/(L5), Multi-Constellation (GPS, GLONASS, Beidou, Galileo)
PTP	Slave Device for following Profiles/Modes: Default Profile: Layer 2 (Ethernet) and Layer 3 (Ipv4, Ipv6) support Power Profile: C37.238-2011 and C37.238-2017 including VLAN support Utility Profile: including HSR and PRP tag handling IEEE802.1AS: including IEEE802.1CB tag handling ITU: G8275.1, G8275.1 and G8275.2: 4096 Nodes at 128 frames/s One Step and Two Step support Peer to Peer (P2P) and End to End (E2E) delay measurement
NTP	SNTP Client according to RFC 4330/5905 IPv4 and IPv6 Support for Unicast or Multicast NTP mode
IRIG	IRIG-B006/IRIG-G006 format (compatible with B004, B005, B006 and B007 IRIG-B Masters)
PPS	PPS Slave with Accuracy Encoding or embedded PPS
CLK	Reference Clock Input (100Hz – 10MHz)
DCF	DCF-77 Slave

Reference Output Options

GNSS	Generating NMEA Messages including NMEA UTC
PTP	Master Device for following Profiles/Modes: Default Profile: Layer 2 (Ethernet) and Layer 3 (Ipv4, Ipv6) support Power Profile: C37.238-2011 and C37.238-2017 including VLAN support Utility Profile: including HSR and PRP tag handling IEEE802.1AS: including IEEE802.1CB tag handling ITU: G8275.1, G8275.1 and G8275.2: One Step and Two Step support Peer to Peer (P2P) and End to End (E2E) delay measurement
NTP	Server according to RFC 4330/5905 (NTPv4)

	IPv4 and IPv6 Support for Unicast, Multicast or Broadcast NTP mode
IRIG	IRIG-B007 and IRIG-G006 format (compatible with B004, B005, B006 and B007 IRIG-B Slaves)
PPS	PPS Master with Accuracy Encoding or embedded PPS
CLK	Reference Clock Output (100Hz – 10MHz)
DCF	DCF-77 Master
Network Performance	
PTP ITU	4096 Nodes at 128 frames/s
CSPTP	~1'000'000 requests/s
NTP	~1'000'000 requests/s
Typical Synchronization Accuracy	
GNSS	+/- 50 ns
PTP	+/- 25 ns
NTP	+/- 500 ns
IRIG	+/- 50 ns
PPS	+/- 10 ns
CLK	+/- 10 ns
DCF	+/- 100 us
Typical Signal Accuracy	
Timestamping	Signal Timestamping Resolution: 1 ns
Signal-/Frequency Generation	Signal-/Frequency Generation resolution: 1 ns Frequencies up to 10 MHz
Holdover	
Holdover after 10h locked	< 10 us within 24h (with Clock/RTC module)
Holdover after 7d locked	< 1 us within 24h (with Clock/RTC module)
Performance Slot Options (2x)	
RJ45 Ethernet	2x 10/100/1000 PHY with RJ45 connection and SyncE support
SFP Ethernet	2x 100/1000 PHY with SFP connection and SyncE support
Extension Slot Options (4x)	
GNSS Receiver	Furuno GT88/GT100, ComNav K801 or u-blox M9N
Clock/RTC	SiT5356 (100 ppb precision MEMS Super-TCXO)/ SiT5811 (1 ppb 12-Hour Holdover OCXO) and RV-3028-C7 (extremely low-power (45nA) RTC)
Input/Outputs	Per slot following configurations are possible: 8x 3.3V IOs (PMOD Connector) 6x 1.65V-5.5V IOs with external Voltage (3.3V with internal Voltage) 2x 1.65V-5.5V SMA IOs with external Voltage (3.3V with internal Voltage) 1x Fiber Optical Input from DC up to 50MBd 1x Fiber Optical Output from DC up to 50MBd
Ethernet	10/100BASE-T RJ45 with PM ETH
DPLL	AD9544 with two SMA Outputs

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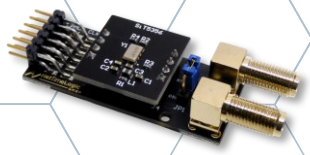
AIONYX Extension Slot Module Options

PM Furuno GT100

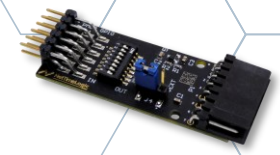
PM Furuno GT88

PM ComNav K801

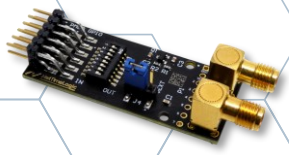
PM u-blox M9N



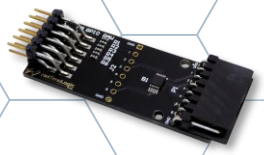
PM CLK RTC



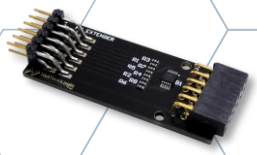
PM GPIO



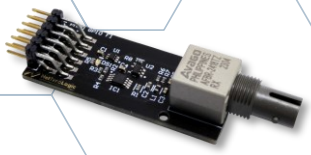
PM GPIO SMA



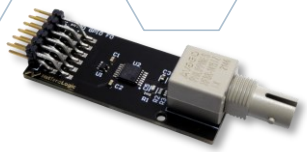
PM GPIO RAW



PM Extender



PM GPIO FI



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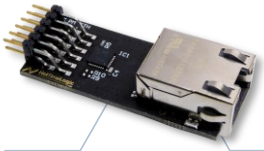
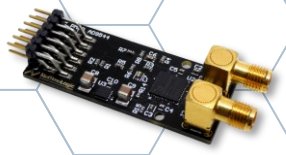
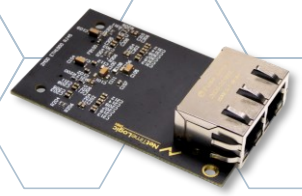


PM ETH



PM AD9544

AIONYX Performance Slot Module Options



ZM ETH 1000 RJ45

ZM ETH 1000 SFP

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