

HQ-BOX 3X

Embedded Industrial Server External Design Specification (EDS)

Revision 1.0

June 2018

1. Introduction

The HQ-BOX is a series of rugged compact embedded fanless servers, based on Intel® Xeon® D-1500 server CPU's embedding up to 16 Cores, 128GB DDR4 ECC, 2x 10Gb SFP+, and more features for embedded systems with support high performance computing with multiple IO peripherals under extended temperature range.

Typical HQ-BOX applications include Multi-Access Edge Computing (MEC), Edge Servers, FOG Servers, Radio access networks (RAN), Industrial automation and control, IoT Gateway, Private Cloud, Microserver and more.

The HQ-BOX 3X embedded server benefits customers with up to 3x PCIe Gen3 full height half length (FHHL) standard PCIe extensions with total available power up to 70W.



2. Highlights

The HQ-BOX 3X supports up to 3 PCIE Gen3 (FHHL) customer extensions with total power up to 70W.

- Intel® Xeon®-D1500 CPU, 4-16 Core, 35-65W ,Fanless
- 4x DDR4 2133/2400 MHz DIMM288 with ECC, up to 128GB
- 2x PCIe 3.0, x4 lanes FHHL Add-on card slots
- 1x PCIe 3.0, x8 lanes FHHL Add-on card slot
- 1x M.2 NVMe SSD, 22110/2280 socket , PCIE 3.0 x4
- 1x M.2 SATA SSD, 2280 socket
- 2x 10G SFP+ Ethernet ports
- 2x 1GbE I210 Ethernet ports
- 4x USB 3.0 + internal secure USB 2.0 connector
- mini PCIE with SIM socket
- M.2-E socket for WIFI
- M.2-B for LTE/3G modem + SIM socket
- TPM 2.0
- 2x RS232 Serial port
- AST2400 BMC with IPMI 2.0 and 1G LAN
- VGA (AST2400 based)
- Audio IN/OUT
- 154x195x200 mm enclosure
- Wide voltage range 13.6V-24V
- Wide temperature range (-30°C to +72°C) on selected SKUs

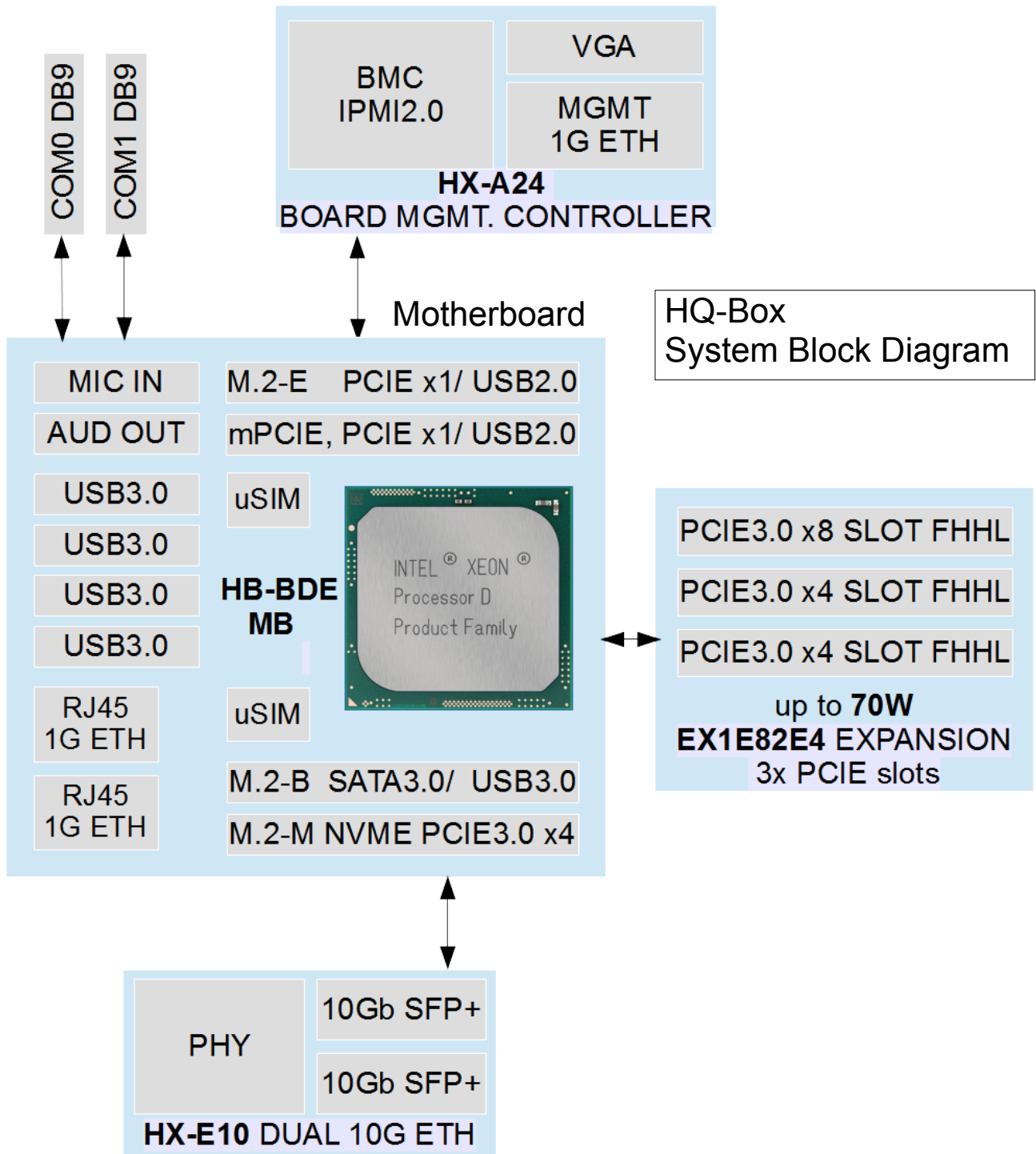
Optional extension PX-1M

- 1x M.2 NVMe SSD, 22110/2280 socket , PCIE 3.0 x4 or
- 1x M.2 SATA SSD, 2260/2280/22110 socket
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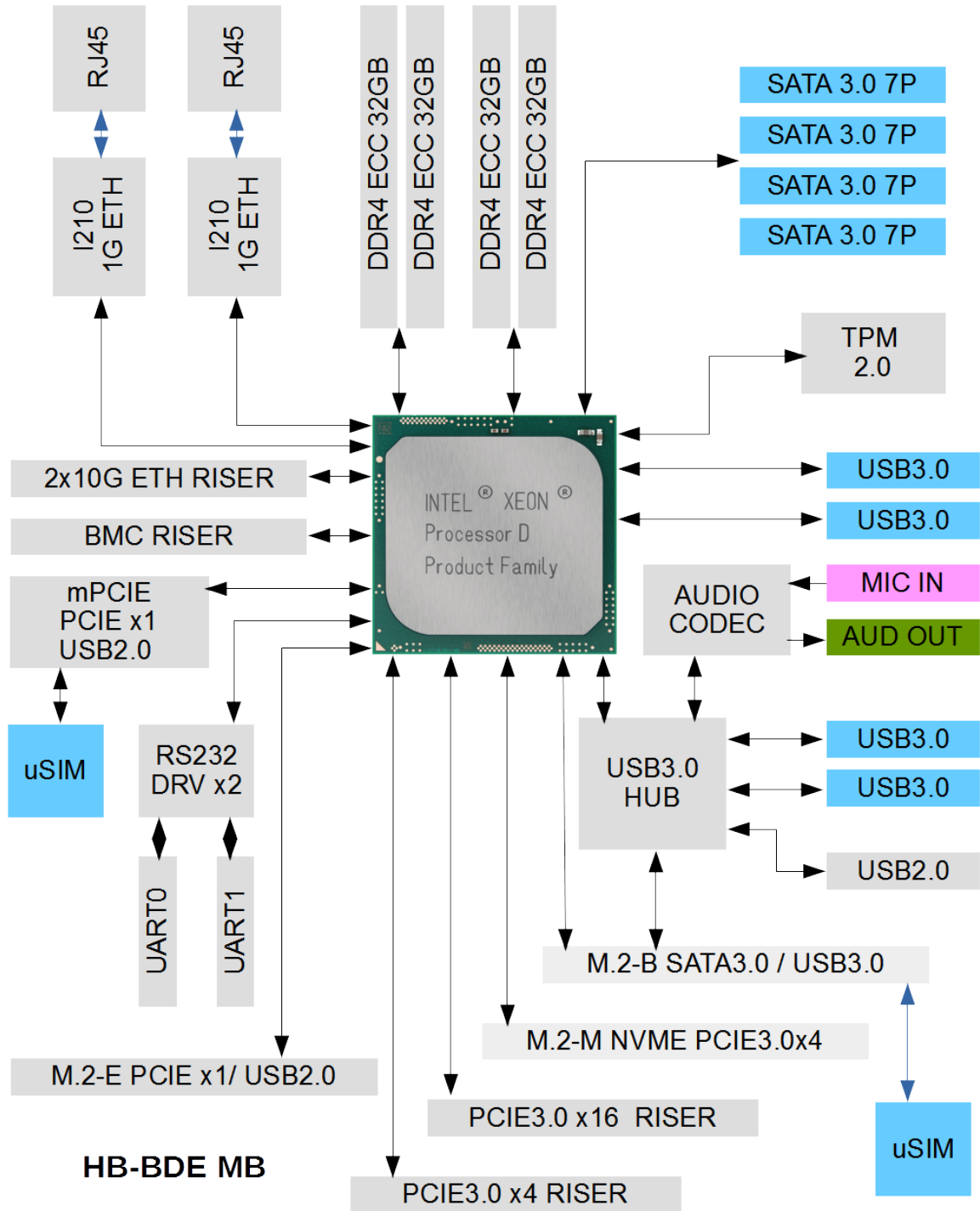
Optional extension HX-DIO

- 8 IN + 8 OUT, optically isolated digital I/O pins
- Digital IO cable

3. Block Diagram



HQ-Box - Motherboard Block Diagram



4. Specifications

CPU

CPU number	# of Cores	Max. Turbo Freq.	Base Freq.	Cache	Embedded option / Longevity	Extended Temper.	TDP
16-Cores							
D-1587	16	2.3GHz	1.7GHz	24MB	Yes/ 7Year	-	65W
D-1577	16	2.1GHz	1.3GHz	24MB	Yes/ 7Year	-	45W
12-Cores							
D-1567	12	2.7GHz	2.1GHz	18MB	Yes/ 7Year	-	65W
D-1559	12	2.1GHz	1.5GHz	18MB	Yes/ 7Year	Yes	45W
8-Cores							
D-1548	8	2.6GHz	2.0GHz	12MB	Yes/ 7Year		45W
D-1541	8	2.7GHz	2.1GHz	12MB	-	-	45W
D-1539	8	2.2GHz	1.6GHz	12MB	Yes/ 7Year	Yes	35W
D-1537	8	2.2GHz	1.6GHz	12MB	Yes/ 7Year	-	35W
4-Cores							
D-1527	4	2.7GHz	2.2GHz	6MB	Yes/ 7Year	-	35W
D-1521	4	2.7GHz	2.4GHz	6MB	-	-	45W

Memory

Memory	Type	Data width	Frequency.	Max. Slots	Max. Capacity
DDR4	UDIMM	ECC/ n-ECC	2400/2133MHz	4	128GB
	RDIMM	ECC	2400/2133MHz		

Storage

Form factor	Interface Type	Supported form factor size	Max. speed R/W	Always present interface	Max. current available capacity
M.2-M	NVMe, PCIE3.0 x4	22110 2280	Up to 3900MB/s	Yes	4 TB
M.2-B	SATA3.0	2280	Up to 600MB/s	Yes	2TB
PX-1M accessory (optionally, one of the two below)					
M.2-M	NVMe, PCIE3.0 x4	22110 2280	Up to 3900MB/s	No	4 TB
M.2-M	SATA3.0	22110 2280, 2260	Up to 600MB/s	No	2 TB

Connectivity

Speed	MAC/PHY	Connection type	Connection	# of ports
10 GbE	X552/Inphi	Optical	SFP+ SR, LR, DAC	2
1 GbE	I210-AT	Wired	1000Base-T	2

Video

Feature	Specification
VGA	VGA, 1920x 1200, through ASTG2400

PCIe slots

Slot	Interface(s)	Link width	Form Factor	# of ports	Total max. power
PCIe x8	PCIe 3.0 x8	x8	FHHL	1	Up to 70W
PCIe x4	PCIe 3.0 x4	x4	FHHL	2	

NGFF / mPCIE slots

Feature	Specification	Functions
M.2-B	USB3.0, USB2.0 ,uSIM ,3042 ,3.3V cards only	LTE/4G/3G/2G
M.2-E	PCIe2.0 x1, USB2.0, 3042, 3030	WiFi/WiGi/BT
mPCIE	PCIe2.0 x1, USB2.0, uSIM, half mPCIE	WiFi/BT/CAN/ 3G/2G/RAID

Connectors I/O

Feature	Specification	# of ports
SATA3.0	SATA3.0, 7P, internal	4
USB3.0	USB3.0, USB2.0 ,Type-A connector	4
USB2.0	USB2.0 ,Type-A connector, internal, security	1
AUDIO	Audio IN, Audio OUT	2
SERIAL	RS232, RX/TX	2
HX-DIO expansion (optionally)		
DIO	Optically isolated digital I/O 8 IN, 8 OUT	16

Security

Feature	Specification
TPM2.0	AES, HMAC, SHA-1, SHA-256, RSA1024, RSA2048, ECDH, ECC256, ECC-NIST P-256, ECC BN-256, ECC
BIOS	UEFI 2.4.1, Secure Boot, Secure Flash
CPU	Intel® Trusted Execution Technology, Intel® VT-dx for server security Execute Disable Bit Intel® AES New Instructions, Security Key

Management

Feature	Specification
HW	BMC AST2400, VGA, 1Gb Management LAN
SW	IPMI 2.x, DCMI, iKVM, Virtual Storage

Power

Feature	Specification
INPUT	13.6V-24V DC
PROTECTION	Reverse polarity , OV, UV, OC

Controls

Feature	Specification
POWER	Power button with Auto-On
LED1	Power – GREEN, Memory Init -blink RED
LED2	SATA activity ,GREEN
LED3	UID,RED
LED4	BMC boot and heartbeat -GREEN ,UID-RED

Software Support

Feature	Specification
WINDOWS	Win7, Win10 ,2008R2, Server 2012R2, Server 2016
LINUX	All major distributions
OTHER	VMware ESXi 6.5

Environment and Mechanical

Feature	Specification
Mechanical	
DIMENSIONS	154 x 195 x 200 mm
WEIGHT	4.5kg + add-ons
COOLING	Fanless
MOUNTING	Shelf mount, Wall mount (back, left, right)

Feature	Specification	
Environment		
OPERATING TEMPERATURE	Standard	0°C to +50°C
	Extended (on selected SKU)	-20°C to +60°C
	industrial (on selected SKU)	-30°C to +72°C
STORAGE TEMPERATURE	-40°C to +85°C	
HUMIDITY	95%@40°C(non-condensing)	
EMC	CE, FCC, AS/NZS	
SAFETY	EN-60950-1, AS/NZS	

Product links and contacts

Product links
Heptagon Systems Website
HQ-Box 3X Product page
User Manual
HQ-BOX Quick Selection Guide (QSG)
HX-DIO EDS
Mechanical dimensions

Contacts	
Sales	sales@heptagonsystems.com
Information	info@heptagonsystems.com

5. Revision notes

Revision	Date	Revision notes
0.5	18-Mar-2018	Preliminary release
1.0	11-Jun-2018	Update all links to https.

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