Box-PC System BPCWL02/03

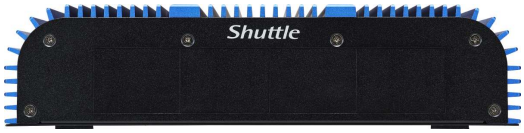
FANLESS SHUTTLE BOX-PC WITH INTEL CORE ULV PROCESSOR IN A ROBUST CHASSIS

Shuttle's new generation BPCWL02/03 IPC Series in a ruggedized box design for high durability consists of compact fanless IPC systems with modular expansion for wide-range industrial applications. The model BPCWL03 supports an extended operating temperature range of -20 to +60 °C.

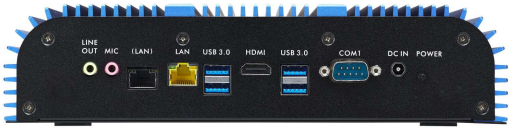
The Shuttle Box-PC series is offered as a complete system: either as a fixed configuration or as an customized BTO system (see page 2). Ask your Shuttle reseller for a quote.

Images for illustration only

Front View
(without optional I/O ports)



Rear View



Robust chassis | 2x 32 GB Support | NVMe SSD Support | Dual LAN (or more) | Serial Port (max. 4) | vPRO/AMT OPTIONAL | 75 x 75 mm VESA mount | Fanless | 24/7 Support

ROBUST CHASSIS

■ Fanless cooling system ■ Robust aluminium/steel chassis
■ Dimensions (LWH): 16.9 x 24.5 x 5.7 cm (2.7 L) ■ Net weight: 2.85 kg
■ IP Rating: IP30 ■ Mounting options: VESA 75x75 mm, Ear mount 256x100 mm and DIN Rail

OPERATING TEMPERATURE [1]

■ **Model BPCWL02**: 0 – +40 °C
■ **Model BPCWL03**: -20 – +60 °C
■ Operating humidity: 0 ~ 90% (non-condensing)

OPERATING SYSTEM

■ An operating system is not included.
■ Supports Windows 10/11 and Linux (64-bit)

PROCESSOR SELECTION

■ Intel Core Gen. 8 "Whiskey Lake" ULV processor, 15 W TDP

CPU Modell	Cores	Threads	Takt / GHz	Cache	AMT/vPro
Core i3-8145UE	2	4	2,2 – 3,9	4 MB	—
Core i5-8365UE	4	8	1,6 – 4,1	6 MB	Supported
Core i7-8665UE	4	8	1,7 – 4,4	8 MB	Supported

GRAPHICS

■ Integrated Intel UHD 620 graphics, 4K support
■ Optionally supports up to three independent displays

MEMORY SUPPORT

■ 2x 260-pin SO-DIMM slot
■ Supports Dual Channel, up to 2x 32 GB DDR4-2400

STORAGE

■ M.2-2280/2260 M slot supports one SSD card (supports PCIe X4 NVMe and SATA interface)

BACK PANEL CONNECTORS

■ HDMI 1.4 ■ 4x USB 3.2 Gen 1 ■ Dual Gigabit LAN (Intel i219LM/i211)
■ RS232 serial COM (D-Sub) ■ Mic-in and Line-out (Realtek ALC662 or ALC888S) ■ DC-input 19V (2.5/5.5 mm) ■ Power Button

OTHER FEATURES

■ Hardware TPM v2.0 Infineon SLB9670VQ2 onboard
■ AMI BIOS, 16/32 MB SPI ROM supports Intel vPro and ATM features
■ Embedded I/O controller: ITE IT8528E/FX

OPTIONAL FRONT PANEL CONNECTORS

■ Up to two additional graphics ports:
HDMI 2.0, DVI-I, DisplayPort 1.2 or D-Sub/VGA
■ Up to three additional COM ports
■ Up to 8 (16) additional USB 2.0 ports
■ Up to four additional 2.5 Gbps LAN ports
■ up to four Digital I/O expansion kits (each with 4x Input and 4x Output)
■ Input for car ignition lock enables delayed on/off switching of the BoxPC

LTE/WLAN-OPTIONEN

■ LTE/4G kit with 2 antennas (LTE card and Nano-SIM not included)
■ WLAN kit with 2 antennas – either Wi-Fi 5 (ac) or Wi-Fi 6 (ax)

POWER SUPPLY

■ DC-Input: 19V, optional wide range DC-input 9~36V
■ External 90W/19V power adapter (150W for wide -20...60 °C tempera-

[1] A special 150W power supply is included for the extended operating temperature range (-20 to +60°C) and industrial-grade RAM/SSD components with an operating temperature range of -40 ... +85 °C are required.

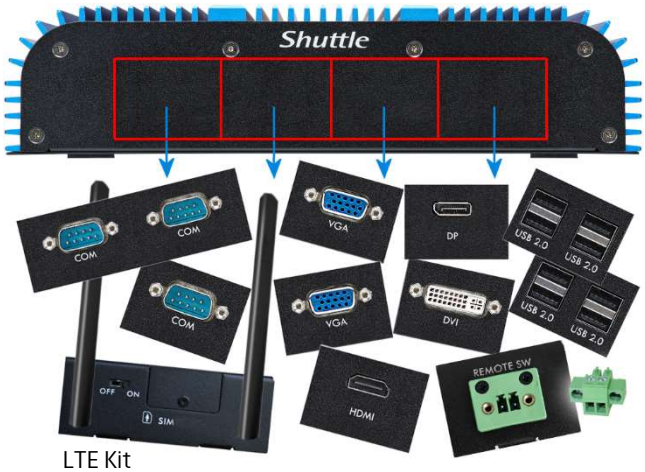
System Configuration

You have the choice between a proposed **fix configuration** and an individually assembled **Built-To-Order (BTO) system**.		System		
		Fix Conf.		BTO
		BPCWL02-i3XA EAN: 4046047103652	**BPCWL02-i5WA** EAN: 4046047103669	**Customized Configuration**
Category	***Choice Options***			
Intel ULV Processor	Intel Core i3-8145UE 2 Cores, 4 Threads, 4 MB Cache	☑	—	?
	Intel Core i5-8365UE (vPro) 4 Cores, 8 Threads, 6 MB Cache	—	☑	
	Intel Core i7-8665UE (vPro) 4 Cores, 8 Threads, 8 MB Cache	—	—	
Operation-temperature	**BPCWL02: 0 ... +40 °C** Standard power adapter (90W)	☑	☑	?
	BPCWL03: -20 ... +60 °C Power Adap. (150W): -20 ... +60 °C RAM: -40 ... +85 °C (industrial) SSD: -40 ... +85 °C (industrial)	—	—	
DC-Input	19V ± 5% (Standard)	—	—	?
	9...36V (Extended Range)	☑	☑	
RAM DDR4, SO-DIMM	4 GB	☑	—	?
	8 GB	—	☑	
	16 GB, 32 GB or 64 GB	—	—	
SSD M.2 card	120 GB	☑	—	?
	250 GB	—	☑	
	512 GB, 1 TB or 2 TB	—	—	
Operating System (Win10/11 or Linux)	Without operating system	☑	—	?
	Windows 10 IoT Enterprise	—	☑	
	Windows 10 Pro (as Windows 11 Downgrade)	—	—	
	Windows 11 Home	—	—	
	Windows 11 Pro	—	—	
	Linux Ubuntu	—	—	
WLAN Kit with 2 antennas	Wi-Fi 5 (WLAN-ac, BT 4.2)	—	—	?
	Wi-Fi 6 (WLAN-ax, BT 5.2)	—	—	
LTE/4G Kit with 2 antennas	LTE-Kit without M.2 LTE card and Nano-SIM card	—	—	?
Standard I/O Connectors always included	1x HDMI 1.4 4x USB 3.2 Gen1 2x Gigabit LAN 1x COM (RS232) 2x Audio (mic+head phones)	☑	☑	☑
Optional Graphics Ports	HDMI 2.0 (One Choice)	—	—	?
	DiplayPort (DP 1.2) (One Choice)	—	—	
	DVI-I (One Choice)	—	—	
	VGA (One Choice)	☑	☑	
	VGA (second)	—	—	?
Other optional Ports	4x USB 2.0 (first)	☑	☑	?
	4x USB 2.0 (second)	—	—	?
	COM (RS232)	—	—	?
	2x COM (RS232/422/485)	☑	☑	?
	4x LAN (RJ45) 2.5 Gbps	—	—	?
	Dig. I/O (4x Input / 4x Output)	—	—	?
	Input for car ignition lock enables delayed on/off switching of the BoxPC	—	—	?
	Screw terminals for an external power button	—	—	?
Mounting	2x Ear-Mount assembly plates	—	—	?
	DIN-Rail clip	—	—	?

A special 150W power supply is included for the **extended operating temperature range (-20 to +60°C)** and industrial-grade RAM/SSD components with an operating temperature range of -40 ... +85 °C are required.

Back Panel – here with WLAN antennas

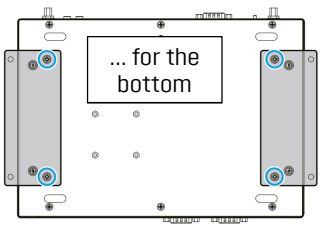
Front Panel – four areas for optional connectors



LTE Kit

Ear Mount

... for the bottom



Front and Back Panel

Front panel

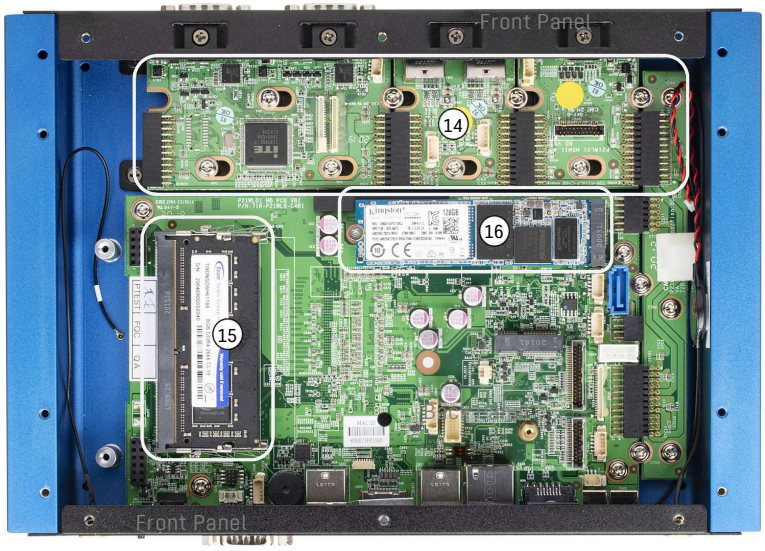
To illustrate with example connections
(individual configuration of the front panel is possible)

1. Optional: Dual COM ports support RS232/RS422/RS485
2. Optional: 4x USB 2.0 port
3. Optional: HDMI 1.4/2.0

Back panel

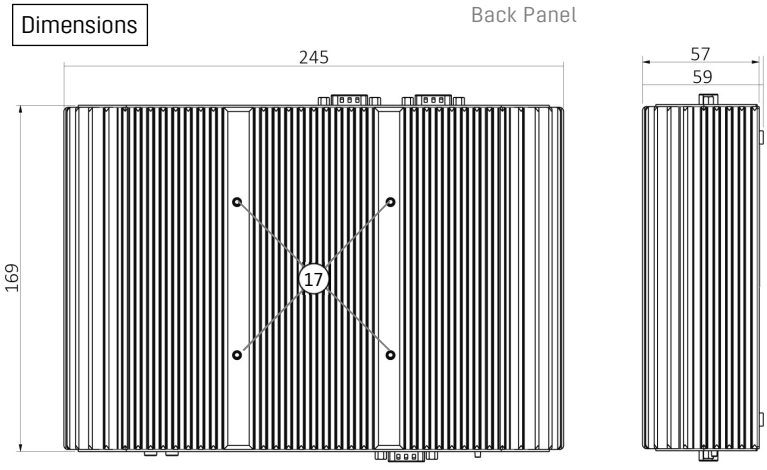
4. Audio Line Out (Headphones output)
5. Microphone input
6. Gigabit LAN port (Intel i211)
7. Gigabit LAN port (Intel i219LM)
8. 4x USB 3.2 Gen 1 Type A port
9. HDMI 1.4 port
10. COM port (RS232)
11. DC-in connector for power adapter
12. Power button
13. 2x WLAN antenna (optional)

Inside View



14. Area for optional daughter boards
15. 2x SO-DIMM slot supports DDR4-2400
16. M.2-2280/2260 M slot for SSD card (NVMe/SATA)
17. Screw threads for VESA mount (75x75 mm)

Dimensions

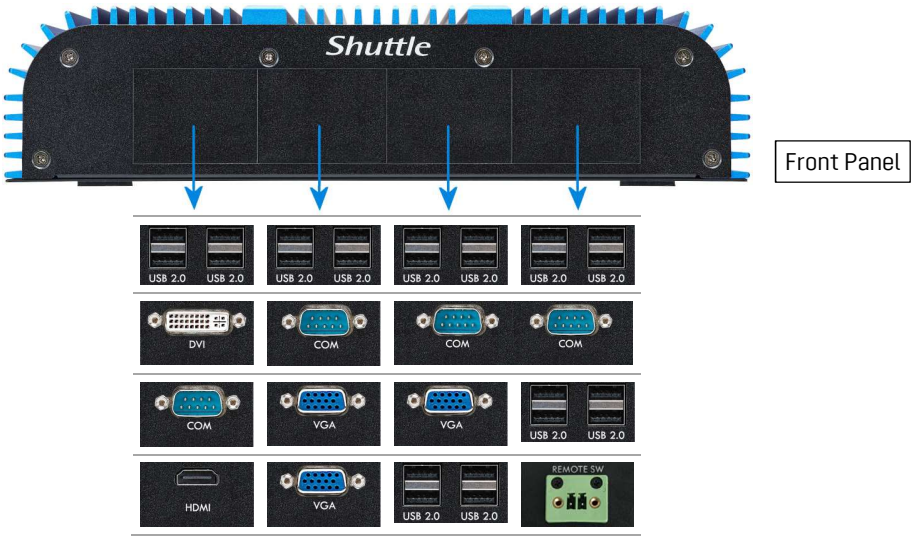


<u>Dimensions:</u>
Width: 245 mm (without optional ear mount)
Depth: 169 mm
Height: 57 mm (59 mm including feet)

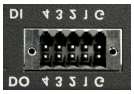
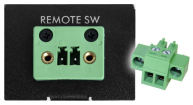
Optional Features

Expansion concept with optional daughter boards

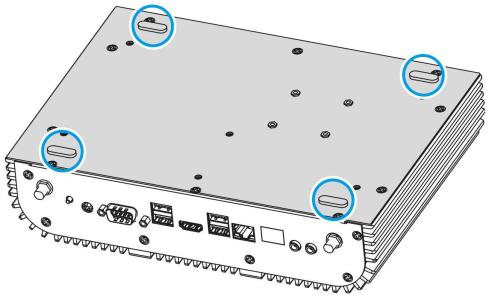
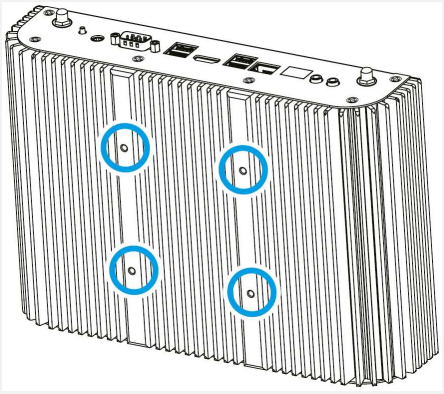
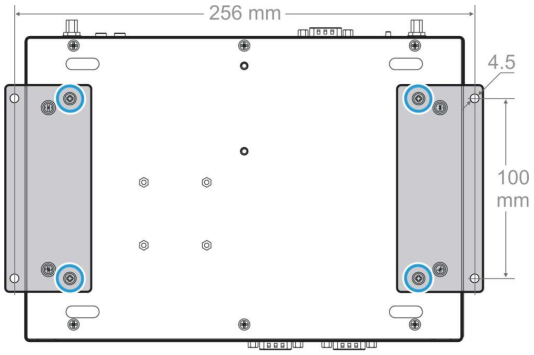
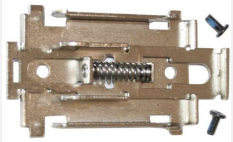
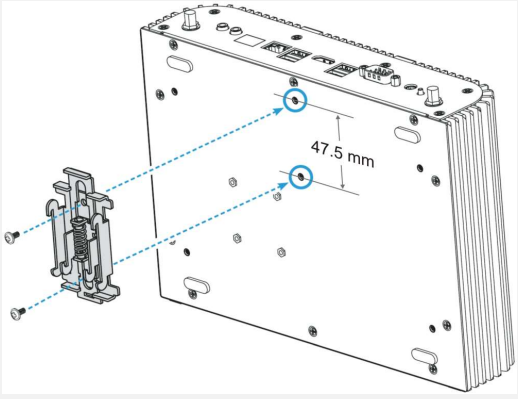
The front panel is subdivided into four sections to support optional expansion kits with daughter boards in order to add I/O ports.



Expansion options:

PORT	IMAGE	OCCUPIED SECTIONS	MAXIMUM KITS	NOTE
HDMI 2.0 DisplayPort 1.2 DVI-I or VGA		1	1	HDMI 2.0 and DisplayPort 1.2 support UHD resolution (4K) at 60 Hz
Second VGA		1	2	A second VGA port is possible if no HDMI/DP/DVI port has otherwise been installed. The second VGA port is not Plug&Play capable.
4x USB 2.0		1	2 (4)	USB hub device (USB 2.0 ports allow up to 500mA/2.5W power output, but if only low power devices like mouse/keyboard are connected, then up to 4 USB kits can be used)
Single COM		1	1	Supports RS232 only (passive cable adapter)
Dual COM		2	1	Supports RS232/RS422/RS485 (with additional I/O controller chip)
LTE Kit with 2 antennas		2	1	Compatible with e.g. Huawei ME906S, Sierra EM7455, Quectel EM06E etc. (supports Single-SIM)
1x LAN port 2.5G Upgrade		–	1	The yellow LAN port (1G) on the back panel can be replaced by a 2.5G LAN port
4x LAN ports with 2.5 Gbps		2	1	In addition to the existing 2x 1G LAN ports you can add four LAN ports with 2.5G speed
Dig. I/O-Kit 4x In / 4x Out		1	4	up to four Digital I/O expansion kits (each with 4x Input and 4x Output)
Input for car ignition lock		1	1	Input for car ignition lock enables delayed on/off switching of the BoxPC
Port for external Power Button		1	1	Screw terminals for a cable for an external power button
WLAN + BT		–	1	1) Wi-Fi 5 (Realtek WLAN-ac and BT 4.2) 2) Wi-Fi 6 (Intel WLAN-ax and BT 5.2)

Operating Positions and Mounting

	NOTE	IMAGE
Placed horizontally	The Shuttle Box-PC BPCWL0x can be operated in horizontal position like a desktop PC standing on its rubber feet.	
VESA-mounted	The Shuttle Box-PC BPCWL0x features four threaded M4 holes on the upper side for a standard 75 x 75 mm VESA mount, which allows for installation on to walls or large displays. The VESA mount is not included.	
Ear-mounted	The Shuttle Box-PC BPCWL0x features four threaded M3 holes on the bottom, which allows for it to be attached to two Ear Mount brackets (optional feature). The Box-PC can then be affixed to a surface with four M4 screws (mounting dimension: 256 mm x 100 mm). 	
DIN-Rail-mounted	The Shuttle Box-PC BPCWL0x features two threaded M3 holes on the bottom, which allows for installation on a standard 35 mm DIN-Rail, e.g. inside equipment racks. The matching DIN-Rail clip is an optional accessory. 	

SHUTTLE Box-PC BPCWL02 and BPCWL03 — SPECIFICATIONS

FANLESS AND SILENT	Equipped with passive cooling, no fan noise at all Perfect to be used in noise-sensitive environments Fanless, dust-free and thus virtually maintenance-free
24/7 NONSTOP OPERATION	This device is approved for 24/7 permanent operation. Requirement: Free circulation of air amongst the PC must be guaranteed.
CHASSIS	Durable and rugged chassis made of aluminium and steel. Passive cooling system with specially designed fins to maximize heat dissipation. Dimensions: 16,9 x 24,5 x 5,7 cm (LWH) = approx. 2,7 litres Weight: 2.85 kg net (Barebone without RAM/SSD and optional expansions) IP-rating: IP30
OPERATING POSITIONS AND MOUNTING	1) The unit can be placed horizontally to stand on its feet. 2) The unit can be affixed to a 75 mm x 75 mm VESA bracket. For this purpose, four M4x6L screws are required to be screwed into the chassis from the top. 3) The unit can be mounted using two optional 256 mm x 100 mm ear-mount brackets. For this purpose, four M3x6L screws are required to be screwed into the chassis from the bottom. 4) Mounted on a standard 35 mm DIN-Rail, e.g. inside equipment racks Notes: VESA bracket, Ear-Mount and DIN-Rail clip are not included. Vertical mounting is permitted in any orientation.
OPERATING SYSTEM	This system is compatible with Windows 10/11 (64-bit) and Linux (64-bit).
PROCESSOR	<table><tr><th>Available Processors</th><th>Cores/ Threads</th><th>Cache</th><th>Clock frequency (Turbo)</th><th>vPro Support</th><th>Intel UHD Graphics</th></tr><tr><td>**Intel Core i3-8145UE**</td><td>2 / 4</td><td>4 MB</td><td>2.2–3.9 GHz</td><td>-</td><td>UHD 620, 300-1000 MHz</td></tr><tr><td>**Intel Core i5-8365UE**</td><td>4 / 8</td><td>6 MB</td><td>1.6–4.1 GHz</td><td>Yes</td><td>UHD 620, 300-1050 MHz</td></tr><tr><td>**Intel Core i7-8665UE**</td><td>4 / 8</td><td>8 MB</td><td>1.7–4.4 GHz</td><td>Yes</td><td>UHD 620, 300-1150 MHz</td></tr></table> System-on-a-chip architecture (SoC) with integrated memory and graphics controller FCBGA1528 package - directly soldered onto the mainboard Code name: Whiskey Lake-U (8th Generation Intel Core), Manufacturing process: 3rd-generation enhanced 14nm++ TDP wattage: 15 W maximum
INTEGRATED GRAPHICS	Intel UHD Graphics 620 GPU clock frequency: 300~1050 MHz Execution Units (EUs): 24 Supports up to three independent screens: 1) HDMI 1.4 on the backpanel 2) optional HDMI 1.4/2.0, DisplayPort 1.2, DVI-I or D-Sub/VGA (DDI interface) 3) optional D-Sub/VGA (eDP interface, limitations: no PnP support)
UEFI BIOS	Supports resume after power failure Supports Wake on LAN (WOL) Supports Power on by RTC Alarm Supports boot from M.2 SSD cards and USB devices AMI BIOS in 16 or 32 MB EEPROM with SPI interface Supports hardware monitoring and Watchdog function Supports Unified Extensible Firmware Interface (UEFI)
INTEL vPRO/AMT	Supports Intel® vPro™ and AMT – only in connection with Intel Core i5-8365UE or Intel Core i7-8665UE processors Intel® vPro™ is a brand name for a specific set of management and security technologies. Intel® Active Management Technology (AMT) is a subset of Intel vPro. This technology allows remote management of PCs, even in power-off mode or with non-functional operating systems. You can audit, repair and restore AMT-based platforms in a LAN. These functions can increase the uptime of desktops with lower maintenance costs. Note: Intel vPro requires appropriate software. The Intel® MEBX configuration user interface can be accessed after pressing CTRL-P at the beginning of the boot process. Only the Intel i219 LAN port (yellow color) supports the Intel vPro® function.
TPM MODULE	Hardware Trusted Platform Module (Infineon SLB9670VQ2 TPM 2.0)

POWER ADAPTER [1]

Box-PC	Operating Temperature	Output Wattage	AC Input	DC Output	AC Cable
BPCWL02	0 to +40°C	Max. 90 W	100-240V, 50/60Hz	19V, max. 4.74A	Schuko to IEC 60320 C5
BPCWL03	-20 to +60°C	Max. 150 W (95W at 60°C)	90-260V, 50/60Hz	19V, max. 7.89A	Schuko to IEC 60320 C13

DC Connector: 5.5/2.5 mm (outer/inner diameter)
AC mains cable: 3 pins, ca. 1.8 m length, with C5/C6 coupler (called "Mickey Mouse" or "Clover-leaf") for the power adapter and CEE-7/7 plug with earth-contact (type E+F) for the power outlet
Note: The DC input voltage range can optionally be extended to support 9-36 V.

MEMORY SUPPORT [1]

2x SO-DIMM slot with 260 pins
Supports DDR4-2400 (PC4-19200) SDRAM at 1.2 V
Supports Dual Channel mode
Supports a maximum of 32 GB per DIMM,
maximum total size: 64 GB
Supports two unbuffered DIMM modules (no ECC or registered)

M.2 SLOT FOR SSDs [1]

The M.2 2280 M slot provides the following interfaces:
- PCI-Express Gen. 3.0 X4
- SATA v3.0 (max. 6 Gbps)
It supports M.2 cards with a width of 22 mm
and a length of 60 or 80 mm (type 2260, 2280).
Supports M.2 SATA SSDs (with B+M key) and M.2 PCIe NVMe SSDs (with M key) with auto detect

AUDIO

Audio Realtek® ALC662 or ALC888S High-Definition Audio
Two analog audio connectors (3.5 mm) on the back panel:
1) 2 channel line out (headphones)
2) microphone input
Digital multi-channel audio output: via HDMI and optional DisplayPort

DUAL GIGABIT LAN

Dual network with two RJ45 ports
Used network chips:
1) Intel i211 Ethernet Controller with MAC, PHY and PCIe interface **[3]**
2) Intel i219LM PHY connected to the MAC of the processor
Supports 10 / 100 / 1000 MBit/s operation
Supports WAKE ON LAN (WOL)
Supports network boot by Preboot eXecution Environment (PXE)
Supports Teaming mode

BACK PANEL CONNECTORS

Power Button
HDMI 1.4
4x USB 3.2 Gen 1 Type A (max. 5 Gbps)
2x Intel Gigabit LAN (RJ45, i211/i219LM) **[3]**
Serial COM port (RS232)
Microphone input (3.5 mm)
Audio Line-out / Headphones (3.5 mm)
DC-input connector for external power adapter

OPTIONAL FRONT PANEL CONNECTORS

The front panel is subdivided into four sections to support optional expansion kits with daughter boards in order to add I/O ports. The following accessory kits can be pre-installed by Shuttle upon request for an additional charge:
1) second graphics port: HDMI 2.0, DisplayPort 1.2 or D-Sub/VGA
2) third graphics port: D-Sub/VGA
3) one COM port RS232
4) two COM ports RS232/RS422/RS485 (occupies two sections)
5) 4x USB 2.0 - can be installed twice (Note: USB 2.0 ports allow up to 500mA/2.5W power output, but if only low power devices like mouse/keyboard are connected, then up to 4 USB kits can be used)
6) 2x or 4x LAN ports with 2.5 Gbps transfer speed
7) up to four Digital I/O expansion kits (each with 4x Input and 4x Output) **[2]**
8) Input for car ignition lock enables delayed on/off switching of the BoxPC
9) LTE kit with two external Antennas. Not included: LTE card in M.2-3042 format (e.g. Huawei ME906S, Sierra EM7455, Quectel EM06E) and Nano-SIM card.
10) Terminal screws to connect a cable for an external Power Button

FURTHER OPTIONAL ACCESSORIES

1) Wide range DC-input 9~36 V (instead of only 19 V)
2) Ear-mount brackets (mounting dimensions: 256 mm x 100 mm)
3) DIN-Rail clip (holes without thread)
4) WLAN module with two external antennas – either Wi-Fi 5 (WLAN-ac and BT 4.2) or Wi-Fi 6 (WLAN-ax and BT 5.2)

ENVIRONMENTAL SPECIFICATIONS

Box-PC	Operating temperature	Relative humidity
BPCWL02	0 to +40°C	0-90 %, non-condensing
BPCWL03	-20 to +60°C	0-90 %, non-condensing

Notice the footnote [1]

CONFORMITY AND CERTIFICATIONS

EMI: CE, FCC Class A, VCCI, RCM, BSMI
Safety: CB, cTUVus, BSMI
Other: RoHS, ErP, CEC
This device is classed as a technical information equipment (ITE) in Class A , Class A is for product used in commercial and industrial areas. The CE-mark approves the conformity by the EU directives:
(1) 2014/30/EU relating to electromagnetic compatibility (EMC),
(2) 2014/35/EU relating to Electrical Equipment designed for use within certain voltage limits (LVD),
(3) 2009/125/EC relating to eco design requirements for energy-related products (ErP)

[1] A special 150W power supply is included for the **extended operating temperature range (-20 to +60°C)** and industrial-grade RAM/SSD components with an operating temperature range of -40 ... +85 °C are required.
[2] The DIO expansion kit comes with the appropriate plug connector included. The digital inputs recognize "Low" at 0-3 Volt and "High" at 5-30 Volt (or open). The digital outputs can handle 0-30V (open collector) with up to 30 mA current.