## Shuttle Mini PC with heatpipe cooling for LGA1150 "Haswell" processors

The Shuttle XPC Barebone SH87R6 packs the 4th Generation of Intel Core desktop processors for LGA1150 socket into an elegant, fresh case design. The aluminium chassis with a black-brushed surface has a volume of 14 litre which is just one third of the volume of a standard Midi tower. Despite its small dimensions it is brimming with features. Set up a top-performer with the latest Intel Core i7 Quad Core processor, a dual-slot PCI Express graphics card, mSATA-SSD, two 4 TB hard disks in RAID mode and 32 GB DDR3-1600 memory plus Blu-ray drive. Contrary, also cost-effective configurations without dedicated graphics card are possible, since Intel's Haswell generation offers an amazing CPU and graphics performance with low energy consumption. Convince yourself of the versatility and stylish exterior of this Shuttle XPC!

XPC *Barebone*
SH87R6
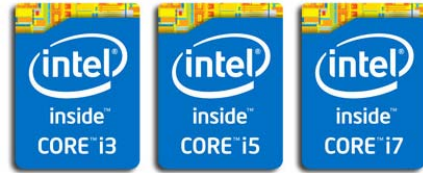
This product supports the
4th Generation of Intel Core Processors

Images for illustration purposes only.

Feature Highlights

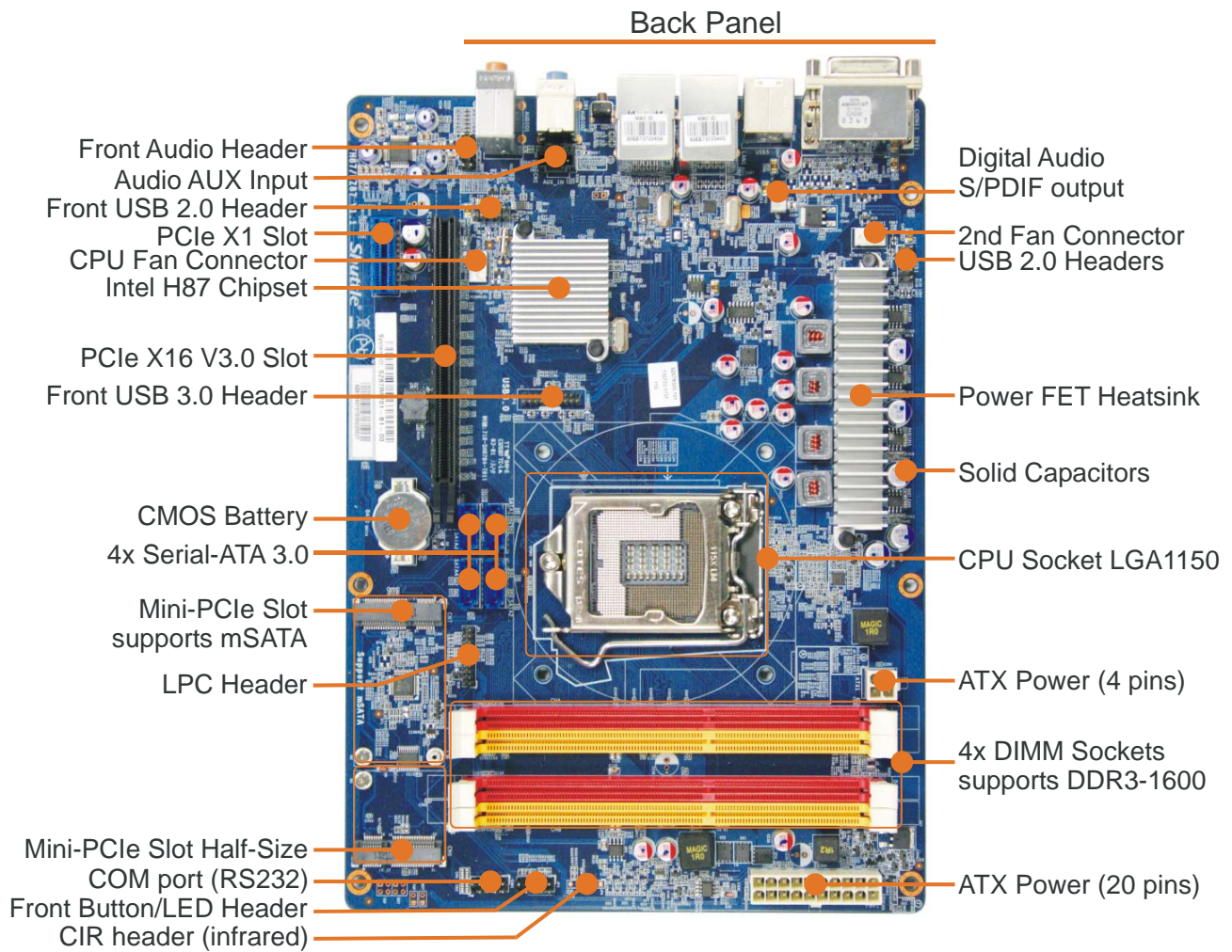|	
R6 chassis	• Black aluminium chassis (14.2 litre) • Bays: 1x 5.25", 2x 3.5" (1x external)
CPU	• Supports Socket LGA1150 Desktop CPUs • Supports Intel® Core i3, i5, i7, Pentium 22nm "Haswell" Processors up to 95W • Shuttle I.C.E. Heat-pipe cooling system
Slots	• 1x PCIe x16 (v3.0) supports dual-slot PCI-Express X16 graphics cards • 1x PCIe x1 (v2.0) • 1x Mini-PCIe Full Size, supports mSATA 6G • 1x Mini-PCIe Half Size, supports WLAN
Chipset	• Intel H87 PCH (C2 stepping or higher)
Integrated Graphics	• Intel HD graphics supports Full HD 1080p video with HDCP and Multi-Monitoring
Memory	• Supports 4x DDR3-1600, max. 32 GB
Drive connectors	• 4x SATA 3.0 (6Gb/s) supports RAID and RST • 1x eSATA (3 Gb/s), 1x mSATA (6 Gb/s)
Other connectors	• Video: HDMI and DVI-I • Audio: 7.1-ch Line-out, Line-in, Microphone • GigaBit LAN (RJ45) • 4x USB 3.0, 6x USB 2.0, 1x External SATA
Optional	• COM-Port (H-RS232), Wireless LAN (WLN-C)
PSU	• 300 Watt power supply (80 PLUS Bronze)

Shuttle XPC Barebone SH87R6 – Connectors

Front view

Rear view
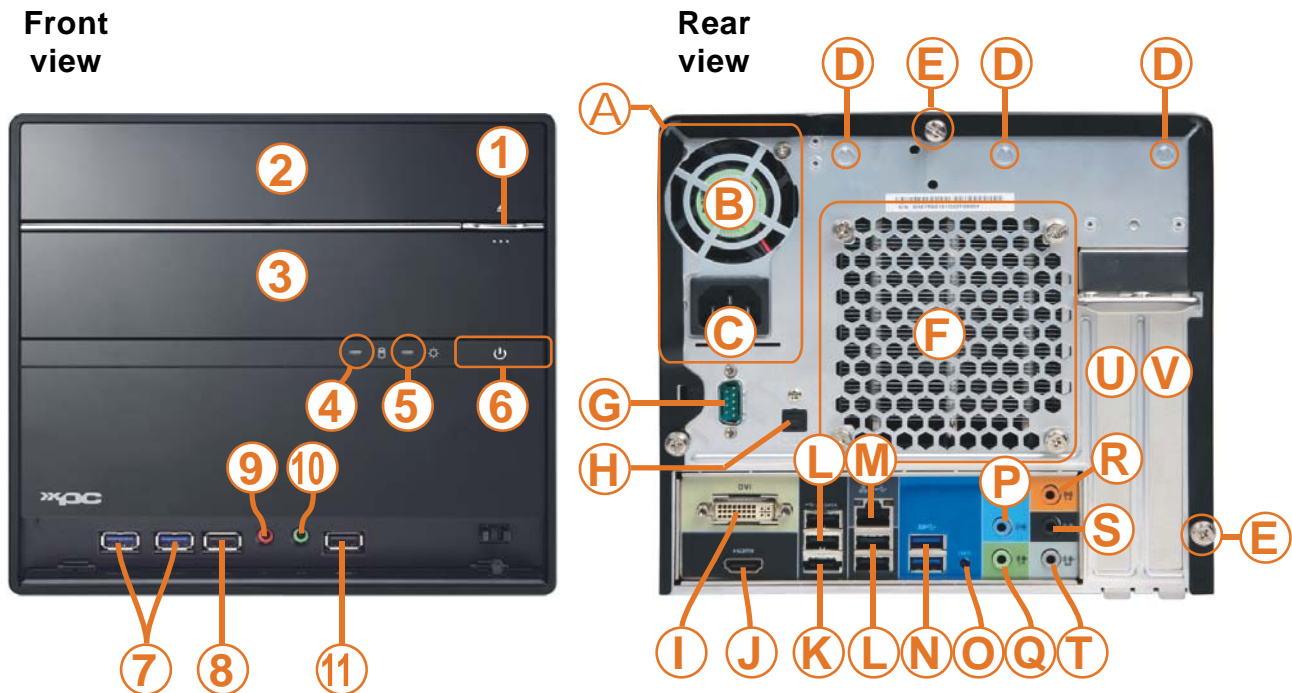
1	Eject button (optical drive)	A	Power supply	K	External Serial-ATA
2	5.25" bay (optical drive)	B	Power supply fan	L	4x USB 2.0
3	3.5" bay	C	AC power connecntor	M	Gigabit LAN (RJ45)
4	Hard disk LED indicator	D	Perforation for optional	N	2x USB 3.0
5	Power LED indicator		WLAN module	O	Clear-CMOS-Button
6	Power button	E	Three thumbscrews	P	Audio Line-in
7	2x USB 3.0 ports	F	Heat-pipe cooling system	Q	Audio Surround Front
8	USB 2.0 port	G	COM / RS232 (optional)	R	Audio Center/Bass
9	Microphone input	H	Dig. S/PDIF audio output	S	Audio Surround Rear
10	Headphone output	I	DVI-I video output *)	T	Audio Surround Side
11	USB 2.0 port with fast charger	J	HDMI video output *)	U	PCI-Express X16 slot
				V	PCI-Express X1 slot

*) Remark:: The integrated video outputs (HDMI and DVI-I) can only be used, if the processor provides an integrated graphics function.

Shuttle XPC Barebone SH87R6 – Mainboard

Back Panel

Front Audio Header
Audio AUX Input
Front USB 2.0 Header
PCIe X1 Slot
CPU Fan Connector
Intel H87 Chipset

PCIe X16 V3.0 Slot
Front USB 3.0 Header

CMOS Battery
4x Serial-ATA 3.0

Mini-PCIe Slot
supports mSATA

LPC Header

Mini-PCIe Slot Half-Size
COM port (RS232)
Front Button/LED Header
CIR header (infrared)

Digital Audio
S/PDIF output
2nd Fan Connector
USB 2.0 Headers

Power FET Heatsink

Solid Capacitors

CPU Socket LGA1150

ATX Power (4 pins)

4x DIMM Sockets
supports DDR3-1600

ATX Power (20 pins)

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Shuttle XPC Barebone SH87R6 – Special Product Features

The R6 chassis design: a clean and modern look

R6 is the new chassis design for the middle / high-end series XPCs in 2013. Shuttle has always placed great emphasis on the interior and exterior aesthetics of the XPC, with the belief that a good blend of style and form factor will enable the XPC to be attractive, versatile, and work well in almost any environment. The chassis and case cover are made of aluminium and come with a sleek brushed metal front fascia. The drives and front panel connectors are elegantly hidden by drive doors for superior style and visual appeal.

19.8 cm
14.2 L
21.6 cm   **33.2**

Small, but easy to install

Shuttle XPCs offer the performance of a desktop PC at a third of the size while using standard desktop components. Shuttle keeps the concept of being "futureproof" in mind when designing the new R6 chassis. The meticulously designed internal layout features pre-routed cables to reduce clutter, increase airflow and make the installation of components easy.

What is a Barebone?

The Shuttle XPC Barebone SH87R6 consists of a stylish case with pre-installed mainboard, power supply unit (PSU) and cables. Despite its small form factor, it offers outstanding connectivity, functionality and performance. For a full PC system, a processor, memory, hard disk and operating system need to be added. Shuttle XPC Barebones are completely customisable meaning users can pick certain components on their own to ideally match their individual needs.

Supports Intel 22nm Haswell Processors

Haswell is the codename for Intel's 4th Generation of Intel Core Processors introduced in June 2013 along with the 8-series chipsets. The Shuttle XPC Barebone SH87R6 supports Intel desktop processors for socket LGA1150, while the previous generation (LGA1155) isnot compatible. One monolithic die incorporates up to four CPU cores, the shared L3 cache, the memory controller, PCIe links, the graphics processor and now also the integrated voltage regulator (IVR). The 4th generation of Intel Core processors brings the highest performance currently available in mainstream computing with the additional benefit of superior graphics support. It provides a better branch prediction, a doubling of the bandwidth of both the L1 and the L2 caches, and integrates a new generation integrated HD graphics circuitry with a new level of performance for 3D games and HD media playback.

Integrated Cooling Engine (I.C.E.)

Shuttle XPCs offer the performance of a desktop PC at a third of the size. In order to ensure proper airflow inside such a small case, more advanced cooling technologies have been developed and implemented in the Shuttle XPC. Shuttle's industry-leading I.C.E. heatpipe technology delivers efficient cooling and is exceptionally quiet.
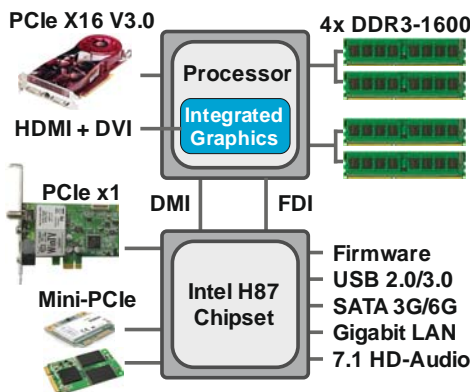
Single-Chip Chipset: Intel H87

The Shuttle XPC Barebone SH87R6 sports Intel's H87 Platform Controller Hub (PCH) which is a member of the 8-series "Lynx" chipset. The H87 chipset consists of a single chip and integrates the hard drive controller, network controller, firmware interface, PCIe links, USB and other input/output functionalities.

Supports up to 32 GB of memory

The Shuttle XPC Barebone SH87R6 supports up to 32 GB of DDR3-1600 memory which is ideal for workstations powered by 64-bit operating systems, enabling users to take full advantage of high-performance configurations.

Intel® Smart Response Technology ("SSD caching")

The Shuttle XPC Barebone SH87R6 supports Intel Smart Response Technology which allows a SATA solid-state drive to function as cache for a conventional hard disk drive (HDD). It uses intelligent block-based caching of frequently used applications to improve system performance and responsiveness. This allows users to experience system performance similar to SSD-only systems meaning an 60% performance improvement over HDD-only systems in PC Mark Vantage Suite. SRT is implemented in the device driver and firmware and can be enabled when the disk controller is configured in RAID mode (not AHCI or IDE).

2x expansion slots for Mini-PCI-Express cards

SH87R6 features two expansion slots for Mini-PCIe cards. One is a half size slot dedicated for Wireless LAN adapter cards (e.g. the accessory WLN-C). The second has full size format and not only features a PCIe interface, but also mSATA (Mini Serial ATA) supporting the new generation of Solid State Drives (SSD) in a compact Mini PCIe card form factor. The mSATA interface supports up to 6 Gb/s transfer rate for super high-speed storage.
Photos: full size mSATA SSD card (left) and half size WLAN card (right).

80 PLUS BRONZE certified 300W Power Supply

The Shuttle XPC Barebone SH87R6 is equipped with a rock-stable built in 300W power supply which was tested with the latest graphics cards and powerful Core i3/i5/i7 processors. Its 80 Plus Bronze logo indicates that it provides more than 82/85/82% of energy efficiency at 20/50/100% of rated load. This means a reduction of energy consumption while it increases the computer's reliability. In addition, the power supply uses a 50mm cooling fan providing the same airflow, but spins at a slower speed than previous 40mm models to make the system run even more quietly.

Energy efficiency

SH87R6 is an excellent choice when performance and energy efficiency matter. Simply opt for a power-optimized processor and do away with an additional graphics card. Here are some measured values of a sample configuration:

- Soft-Off mode (S5, BIOS: EUP=on): 0.3 W
- Standby mode (S3): 1.9 W
- Idle mode: 20.5 W
- Full load (CPU, CPU+graphics): 52.1 / 60.2 W

Configuration: SH87R6, CPU: Intel Core i5-4570T (2.9 / 3.6 GHz, 35W TDP), 4x 8GB DDR3-1600, SATA-6G SSD 60GB, Windows 8 Pro 64 bit.

4x USB 3.0

The Shuttle XPC Barebone SH87R6 sports four USB 3.0 ports (2x front, 2x rear) besides six USB 2.0 ports. USB 3.0 achieves a maximum data transfer rate of up to 5.0Gbps (640MBytes/sec) which is ten times faster than USB 2.0. USB 3.0 is fully compatible to USB 2.0.

Quick charge USB port for Apple iPhone/iPad

The USB port on the right side of the front panel (marked with a flash symbol) does not only serve as a normal USB port, it can also be used as a quick charge port for your Apple iPhone/iPad. Simply charge as quickly from your Shuttle XPC as from the wall socket. Moreover, it even charges your Apple device if your PC is turned off. By supporting a maximum current of 2A, it will cut the charging time compared to traditional USB ports.

SATA 3.0 with up to 6 Gbit/s speed

The Shuttle XPC Barebone SH87R6 sports four onboard Serial ATA ports Revision 3.0 delivering super-fast 6 Gbps link speeds for twice the data transfer rates of SATA Revision 2.0 (3 Gbps). A move from SATA 3 Gbit/s to SATA 6 Gbit/s allows the new generation of Solid-State Drives (SSDs) to work at their full speed. As for standard hard disks (HDDs), reading times from their built-in DRAM cache will be faster too..
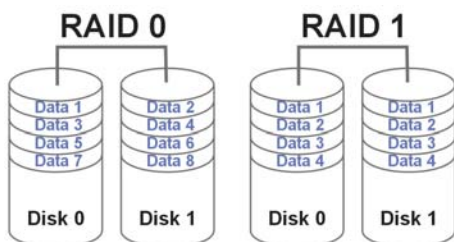
Intel Rapid Storage Technology – RAID support

Intel® Rapid Storage Technology offers new levels of protection, performance and expandability for desktop platforms. No matter if one or multiple hard drives are used, users can take advantage of enhanced performance and lower power consumption. Valuable digital memories are protected against a hard drive failure when the system is configured for any one of three fault-tolerant RAID levels: RAID 1, RAID 5, and RAID 10. By seamlessly storing copies of data on one or more additional hard drives, any hard drive may fail without loss of

data or system downtime. Once the defective drive is removed and a replacement hard drive is installed, data security is guaranteed again.

Supports one optical drive and two hard disks

Users can install one optical drive and up to two hard disks (or SSDs) into the SH87R6. But what about heat? The solution is right here - the drive rack built into the SH87R6 leaves space between the hard disks to improve air flow. Intelligently-engineered airflow mechanics channels cool air where it isneeded most - protecting components and providing optimum performance.

Two 2.5" drives in one 3.5" bay

The optional Shuttle XPC Accessory PHD3 allows for installation of up to two 63.5mm (2.5") hard drives or SSDs into a larger 89 mm (3.5") drive bay. This makes for a more flexible configuration in your drive rack.

External Serial ATA (eSATA)

Until the introduction of USB 3.0, the External Serial ATA port (eSATA) was the best choice for high data transfer rates for external hard disks. Its speed is up to six times faster than USB 2.0 and it allows for up to two meters of shielded data cables.

7.1 HD Audio capabilities

The Shuttle XPC Barebone SH87R6 supports 7.1 channel audio via four analog stereo audio ports or the digital optical S/PDIF out. In addition, HDMI combines high bandwidth video with digital audio in a single port.

Optional: Wireless LAN (Accessory WLN-C)

The Shuttle XPC Accessory WLN-C is a wireless LAN kit consisting of a Mini-PCIe card, two antennas and appropriate cables. Using this, the SH87R6 can be equipped with a wireless LAN module according to IEEE 802.11b/g/n standards. Data transfer speeds of up to 300 MBit/s can be reached and WPA2 with AES encryption is supported, too.

Optional: Serial RS-232 port (Accessory H-RS232)

Add one serial COM port (RS232) to the back panel. Not found on many of today's consumer PCs, as it has been superseded by USB, it is still commonly used for applications of industrial automation systems, scientific analysis, and POS systems.
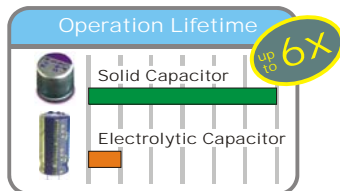
Solid Capacitors

By using all-solid capacitors (except the audio part) Shuttle mainboards are long-life and provide industry leading stability and reliability. The average lifespan of one solid capacitor is more than six times greater than the more common and less expensive electrolytic capacitors.

Mini-ITX Mainboard Support

Shuttle expands the capabilities of its R chassis, adding support for Mini-ITX mainboards (17 x 17cm or 6.7 x 6.7 inches). Thismakes upgrading or downgrading the mainboard easy without having to modify the chassis.

	SH87R6	SZ87R6
Intel-Chipset	H87	Z87
K-Series Overclocking	-	Yes
CPU Heat-pipe	3 pipes	4 pipes
Gigabit LAN	1	2
Power Supply	300W	500W
Graphics card power conn.	6 pins	6 + 8 pins
Front Panel	Glossy plastic	Brushed Aluminum

SH87R6 versus SZ87R6

Shuttle offers two high-performance XPC models for socket LGA1150 processors (Haswell). While the SH87R6 is already jam-packed with performance features, the SZ87R6 supports even extremely demanding graphics cards, the Intel K-series processors with open multiplier and an additional Gigabit LAN port.

Shuttle XPC Barebone SH87R6 – Graphics Features
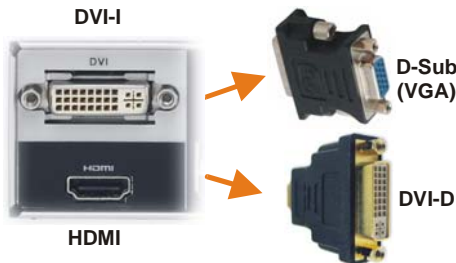
PCI-Express v3.0 for high-performance graphics cards

The Shuttle XPC Barebone SH87R6 supports the new PCI-Express x16 Version 3.0 specification in combination with the 22nm Intel Haswell processor slot delivering a bandwidth of up to 16GB/s which is twice the speed of PCI-E 1.0. So there is plenty of potential for the newest graphics cards. It is downward compatible, allowing for use of the most of present graphics cards as well.

PCI-Express 3.0 Expansion Slot
supports Dual-Slot Graphics Cards

Despite the small housing, the SH87R6 is capable of running dual-slot (double-height) PCI Express graphics cards. The system provides an additional 6-pin power connector for the demanding graphics cards. Please refer to the support list for detailed support information.

Built-in Intel® HD Graphics Engine *)

The integrated Intel graphics processor has been moved onto the same die as the CPU. It supports HDMI 1.4a/1.3 standards with 3D stereoscopic playback, hardware encoding for H.264 and MPEG-2 video, full 1080p high-definition video playback, including Blu-ray disc movies, DirectX 11.1 and Shader 5.0. Depending on the processor type, it has up to 20 execution units (similar to shader/stream processors). With all these features, this GPU is comparable to entry level discrete cards.

DVI-I

D-Sub (VGA)

DVI-D

HDMI

Video output options

With optional adapters (not included) DVI-D devices can be connected to the HDMI port or VGA devices to the DVI-I port, respectively.

DVI-D means the connector only outputs digital video signals.
DVI-I means digital and analog video signals are put out.
HDMI supports digital video plus multi-channel digital audio output.

Dual View Technology with HDMI and DVI

Dual View technology offers multiple display support on up to two separate monitors. This helps improve on productivity by allowing to spread multiple windows across two monitors while working with them simultaneously. SH87R6 features two video outputs: HDMI and DVI-I.

Supports 4 displays in combination with a graphics card

The Shuttle SH87R6 supports up to 4 displays in combination with a discrete PCI-Express graphics card, based on the Switchable Graphics feature. Extend your Windows desktop across up to 4 monitors in one line, but note it does not support a 2x2 configuration or clone mode to all connected monitors.

*) Note: The integrated graphics is located in the processor. Certain processor models may not include the integrated graphics.

Shuttle XPC Barebone SH87R6 Specifications

R6-Chassis	Black aluminium chassis Front panel: glossy plastic with horizontal line texture Storage bays: 1 x 5.25" (external), 2 x 3.5" (1x internal, 1x external) With the optional accessory PHD3 two 2.5" drives can be installed into one 3.5" bay. Front doors for I/O ports and storage drives Kensington Security Slot at the back panel (also called K-Slot or Kensington lock) as a part of an anti-theft system Dimensions: 33.2 x 21,6 x 19.8 cm (LWH), 14.2 litres Weight: 3.5 kg net / 5.0 kg gross
Mainboard and Chipset	Shuttle "FH87/FZ87", Shuttle form factor proprietary design for XPCs SH87R6/SZ87R6 Dimensions: 270 x 195 mm Chipset/Southbridge: Intel® H87 (codename: Lynx Point) Chipset stepping is C2 or higher. Platform Controller Hub (PCH) as Single-Chip-Solution Passive chipset cooling with heat sink The Northbridge is integrated into the processor. Solid Capacitors for sensitive areas provide excellent heat resistance for enhanced system durability
BIOS	AMI BIOS, SPI Interface, 32 MBit Flash-ROM with SPI interface Supports PnP, ACPI 3.0, Hardware Monitoring Supports Unified Extensible Firmware Interface (UEFI) [3] Supports boot up from external USB flash memory
Power Supply	Built in 300 Watt mini switching power supply AC input voltage: supports 100~240V, 50~60 Hz 80PLUS Bronze compliant: the PSU provides at least 82/85/82% of efficiency at 20/50/100% of load. Active PFC circuit (Power Factor Correction) ATX main power connectors: 2x10 and 2x2 pins Graphics power connector: 6 pins Other connectors: 4x SATA, 2x Molex, 1x Floppy
Operation System	This system comes without operating system. It is compatible with Windows 8, Windows 7 und Linux
Processor Support	Socket LGA 1150 (H3) supports the fourth generation of Intel Core i3 / i5 / i7 and Pentium processors Maximum supported processor power consumption (TDP) = 95W Codename "Haswell", 22nm process technology, up to 8 MB of L3 cache Supports "Haswell Refresh" processors since BIOS SH87R000.201 Not compatible with older Socket LGA 1155 processors. Does not support the unlock-function of Intel K-Series processors. The Processor integrates PCI-Express, memory controller and the graphics engine on the same die (depends on processor type) Please refer to the support list for detailed processor support information.

Processor Cooling	Shuttle I.C.E. (Integrated Cooling Engine) Advanced I.C.E. Heat-pipe technology with 3 pipes Temperature controlled 92 mm fan SilentX cooling and noise reduction technology with Active Airflow
Memory Support	4 x 240 pin slots Supports DDR3-1333/1600 SDRAM memory (PC3-10600/12800) Supports 2+2 Dual Channel mode Supports max. 8 GB per DIMM, maximum total size of 32 GB
Optional: Integrated graphics [2]	The features of the integrated Intel HD graphics function depends on the processor type used. Supports OpenCL 1.2, DirectX 11.1, OpenGL4.1 and DX extensions. Supports HDMI, max. resolution up to 1920x1200 Supports DVI, max. resolution up to 1920x1200 Supports D-Sub, max. resolution up to 2048x1536 (optional VGA-to-DVI-adapter required) Supports HDCP function through the DVI and HDMI ports Supports Full HD 1080p Blu-ray (BD) playback via DVI and HDMI ports Supports Dual-Independent-Display via HDMI and DVI-I port [2] Supports 4 displays in combination with a discrete graphics card [7] HDMI supports HD-video plus multi-channel digital audio on a single cable
PCIe-Expansion Slots	1x PCI-Express x16 v3.0 slot (PEG, for graphics cards only) 1x PCI-Express x1 v2.0 slot This XPC supports dual-slot (double-width) graphics cards - in this case the second PCI-Express slot will be occupied. Graphics power connector: 6 pins
Mini-PCIe Expansion Slots	This XPC features two Mini PCI Express expansion slots: 1) half size, supports PCIe 2.0 and USB 2.0, e.g. for WLAN cards [4] 2) full size, supports PCIe 2.0, SATA 3.0 (6 Gbps) and USB 2.0 e.g. for Mini SATA (mSATA) flash memory cards [5]
7.1-channel Audio	7.1 channel High Definition Audio with Realtek ALC888S codec Azalia standard support Analog: line-out (7.1-ch), line-in, microphone, AUX input (onboard) Digital: optical S/PDIF-out (Digital Audio also via HDMI output)
Gigabit-LAN Controller	Realtek RTL 8111E Ethernet network controller PCI Express interface IEEE 802.3u 1000Base-T compliant Supports 10 / 100 / 1.000 MBit/s operation Supports Wake-on-LAN (WOL)
Drive connectors	4x Serial ATA rev. 3.0, max. 6 Gbit/s (onboard) 1x External Serial ATA rev. 2.0, max. 3 Gbit/s (back panel) Supports Intel Rapid Storage Technology (RST 12, Raid 0/1/5/10, JBOD) Supports Smart Response Technology (SRT, "SSD Caching")

Front panel connectors and buttons	Microphone input Headphone output (line-out) 2x USB 3.0 2x USB 2.0 (1x Quick charge with up to 2A, see 8) Power button Power indicator (LED) Hard disk drive indicator (LED)
Back panel connectors	HDMI (supports digital audio) [2] DVI-I (supports analog VGA with optional adapter) [2] 4x USB 2.0 2x USB 3.0 GigaBit LAN (RJ45) 7.1-ch Audio line-out (2x rear/front, bass/center, surround/back) Audio Line-in External Serial ATA (eSATA 3Gb/s) Digital Audio: optical S/PDIF output Clear CMOS button optional: serial port RS-232 (Accessory: H-RS232) 3x perforations for optional WLAN antennas [4]
Other connectors (onboard)	4x USB 2.0 (two sets with 2x5 pins, one set is occupied) 1x RS232 (2x5 pins) for optional accessory H-RS232 2x fan connectors (4 pins), one connector is occupied Audio AUX input Low Pin Count header (LPC, 2x 10 pins, 2 mm pitch size) Other occupied connectors: S/PDIF, USB 3.0/2.0, audio, power buttons, LEDs
Included Accessories	Multilanguage XPC Installation Guide (EN, DE, FR, ES, JP, KR, SC, TC) 32/64 bit driver disk 2x Serial ATA cables Power Cord Screws Heatsink Compound Protector for CPU socket (do not use, if heat-pipe or fan is mounted)
Optional Accessories	3.5" to 2.5" adapter (PHD3) Backpanel COM port adapter for the RS232 serial interface (H-RS232) Wireless LAN 802.11n module with external antennas (WLN-C, see [4]) 500W power supply (PC63J)
Environmental Spec	Operating temperature range: 0~35°C Relative humidity range: 10~90% (non-condensing)
Certifications Compliance	EMI: FCC, CE, BSMI, C-Tick Safety: ETL, CB, BSMI, TÜV Other: RoHS, ErP 2013 Lot 6, Energy Star 5

	This device is classed as a technical information equipment (ITE) in class B and is intended for use in living room and office. The CE-mark approves the conformity by the EU-guidelines:
Conformity	- EMV-guideline 89/336/EWG electromagnetic tolerance - LVD-guideline 73/23/EWG use of electric devices within certain voltage-limits

Notes:

[1] Overclocking Warning
Please note there is a certain risk involved with overclocking, including adjusting the setting in the BIOS or using third-party overclocking tools. Overclocking may affect your system stability or even cause damage of the components and devices of your system. It is done at your own risk and expense. Shuttle cannot be held responsible for possible damage caused by overclocking.

[2] The integrated video outputs (HDMI and DVI-I) cannot be used, if the processor does not have integrated graphics. Please check the specification of the processor used.

[3] The Unified Extensible Firmware Interface (UEFI) is required when booting from hard disks larger than 2.2 TB.

[4] Optional Wireless LAN module: this XPC supports the optional Shuttle XPC Accessory WLN-C which consists of a half-size Mini-PCIe card with IEEE 802.11n functionality and and two external antennas with appropriate antenna cables.

[5] mini-SATA (mSATA)
Not to be confused with the "micro SATA" connector, is a newer industry standard which converts the electrical SATA interface to the pysical "Mini PCI Express" mini card form factor. Applications include mobile devices that require a smaller solid-state drive and mainboards that utilize Intel's Smart Response Technology (SRT).

[6] Intel Smart Response Technology (SRT, formerly "SSD caching")
The Shuttle XPC Barebone SH87R6 supports the Intel Smart Response Technology which allows a SATA solid-state drive (SSD) to work as cache for a conventional hard disk drive (HDD). This allows users to experience system performance similar to SSD-only systems. The maximum cache size is 64 GB.

[7] SH87R6 supports 4 displays in combination with a discrete graphics card
The Shuttle XPC Barebone SH87R6 supports up to 4 displays in combination with a discrete PCI-Express graphics card, if the initial display is connected to the integrated graphics. To enable this, please enter the BIOS Setup Utility by pressing the "Delete" key after powering on the PC. In the "Onboard Device Configuration" BIOS menu please set "Initiate Graphic Adapter" to "Switchable". The Windows Device Manager will show the integrated graphics and the external discrete graphics card as well. This function is based on the Switchable Graphics feature introduced since the 2nd Generation of Intel® Core™ processors.

[8] Right Front USB port with Quick Charge feature
Quick charge Apple iPhone/iPad devices with up to 2A under Windows XP,Windows 7 and 8 (not under Linux).

4th Generation Intel Core Processor Family

LGA1150 socket 22nm "Haswell" processor overview (Date: August 2014)

Name	Model	Cores	HT	Clock	Turbo	Cache	TDP	Graphics	GPU max.	DDR3
Core i7	4790	4	Yes	3.6 GHz	4.0 GHz	8 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4790S	4	Yes	3.2 GHz	4.0 GHz	8 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4790T	4	Yes	2.7 GHz	3.9 GHz	8 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4785T	4	Yes	2.2 GHz	3.2 GHz	8 MB	35 W	HD 4600	1.20 GHz	1333/1600
	4771	4	Yes	3.5 GHz	3.9 GHz	8 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4770K	4	Yes	3.5 GHz	3.9 GHz	8 MB	84 W	HD 4600	1.25 GHz	1333/1600
	4770	4	Yes	3.4 GHz	3.9 GHz	8 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4770S	4	Yes	3.1 GHz	3.9 GHz	8 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4770T	4	Yes	2.5 GHz	3.7 GHz	8 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4770TE	4	Yes	2.3 GHz	3.3 GHz	8 MB	45 W	HD 4600	1.00 GHz	1333/1600
	4765T	4	Yes	2.0 GHz	3.0 GHz	8 MB	35 W	HD 4600	1.20 GHz	1333/1600
Core i5	4690T	4	-	2.5 GHz	3.5 GHz	6 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4690S	4	-	3.2 GHz	3.9 GHz	6 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4690	4	-	3.5 GHz	3.9 GHz	6 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4670T	4	-	2.3 GHz	3.3 GHz	6 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4670S	4	-	3.1 GHz	3.8 GHz	6 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4670K	4	-	3.4 GHz	3.8 GHz	6 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4670	4	-	3.4 GHz	3.8 GHz	6 MB	84 W	HD 4600	1.20 GHz	1333/1600
	4590T	4	-	2.0 GHz	3.0 GHz	6 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4590S	4	-	3.0 GHz	3.7 GHz	6 MB	65 W	HD 4600	1.15 GHz	1333/1600
	4590	4	-	3.3 GHz	3.7 GHz	6 MB	84 W	HD 4600	1.15 GHz	1333/1600
	4570TE	2	Yes	2.7 GHz	3.3 GHz	4 MB	35 W	HD 4600	1.00 GHz	1333/1600
	4570T	2	Yes	2.9 GHz	3.6 GHz	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4570S	4	-	2.9 GHz	3.6 GHz	6 MB	65 W	HD 4600	1.15 GHz	1333/1600
	4570	4	-	3.2 GHz	3.6 GHz	6 MB	84 W	HD 4600	1.15 GHz	1333/1600
	4460T	4	-	1.9 GHz	2.7 GHz	6 MB	35 W	HD 4600	1.10 GHz	1333/1600
	4460S	4	-	2.9 GHz	3.4 GHz	6 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4460	4	-	3.2 GHz	3.4 GHz	6 MB	84 W	HD 4600	1.10 GHz	1333/1600
	4440S	4	-	2.8 GHz	3.3 GHz	6 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4440	4	-	3.1 GHz	3.3 GHz	6 MB	84 W	HD 4600	1.10 GHz	1333/1600
	4430S	4	-	2.7 GHz	3.2 GHz	4 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4430	4	-	3.0 GHz	3.2 GHz	6 MB	84 W	HD 4600	1.10 GHz	1333/1600
Core i3	4370	2	Yes	3.8 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4360T	2	Yes	3.2 GHz	-	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4360	2	Yes	3.7 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4350T	2	Yes	3.1 GHz	-	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4350	2	Yes	3.6 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4340	2	Yes	3.6 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4330TE	2	Yes	2.4 GHz	-	4 MB	35 W	HD 4600	1.00 GHz	1333/1600
	4330T	2	Yes	3.0 GHz	-	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4330	2	Yes	3.5 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4160T	2	Yes	3.1 GHz	-	3 MB	35 W	HD 4400	1.15 GHz	1333/1600
	4160	2	Yes	3.6 GHz	-	3 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4130T	2	Yes	2.9 GHz	-	3 MB	35 W	HD 4400	1.15 GHz	1333/1600
	4130	2	Yes	3.4 GHz	-	3 MB	54 W	HD 4400	1.15 GHz	1333/1600

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Name	Modell	Kerne	HT	Takt	Turbo	Cache	TDP	Grafik	GPU max.	DDR3
Pentium	G3460	2	-	3.5 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3450T	2	-	2.9 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3450	2	-	3.4 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3440T	2	-	2.8 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3440	2	-	3.3 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3430	2	-	3.3 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3420T	2	-	2.7 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3420	2	-	3.2 GHz	-	3 MB	53 W	HD	1.15 GHz	1333/1666
	G3320TE	2	-	2.3 GHz	-	3 MB	35 W	HD	1.00 GHz	1333/1666
	G3250T	2	-	2.8 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3250	2	-	3.2 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
	G3240T	2	-	2.7 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3240	2	-	3.1 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
	G3220T	2	-	2.6 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3220	2	-	3.0 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
Celeron	G1850	2		2.9 GHz	-	2 MB	53 W	HD	1.05 GHz	1333
	G1840T	2		2.5 GHz	-	2 MB	35 W	HD	1.05 GHz	1333
	G1840	2		2.8 GHz	-	2 MB	53 W	HD	1.05 GHz	1333
	G1830	2	-	2.8 GHz	-	2 MB	54 W	HD	1.05 GHz	1333
	G1820TE	2	-	2.2 GHz	-	2 MB	35 W	HD	1.00 GHz	1333
	G1820T	2	-	2.4 GHz	-	2 MB	35 W	HD	1.05 GHz	1333
	G1820	2	-	2.7 GHz	-	2 MB	54 W	HD	1.05 GHz	1333

K = unlocked, **S** = Performance optimized lifestyle, **T** = Power optimized lifestyle, **HT** = Hyper Threading (SMT).
Please refer to the support list for detailed processor support information at *global.shuttle.com*.

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