Technical white paper

HP Z230 Workstation Architecture

Table of contents

Introduction

The HP Z230 Tower and SFF Workstations are the follow-on generation to the HP Z220 Workstations and introduce new functionalities and technologies to the entry workstation class. They feature the Intel® Xeon® processor E3-1200 v3 family and 4th generation Intel® Core™ processors[1], based on the new Intel micro-architecture code-named Haswell. New processor technologies like Integrated Voltage Regulator and high efficiency Power Supplies increase energy efficiency. Upgraded ME9 manageability and integrated USB 3.0 features deliver improved productivity and stability. This paper will describe the architecture features common to both platforms, while explicitly calling out differences.

New Technologies

New Intel Processor micro-architecture

The HP Z230 supports Intel's next generation processors, featuring a new micro-architecture and a new instruction set including AVX2 (Advanced Vector Extensions 2.0) and FMA (Floating-point fused Multiply Add instructions) that help deliver faster compute performance, with low energy consumption. Both the latest Quad Core Intel® Xeon® processor E3-1200 v3 Product Family and the 4th generation Intel® Core™ processors (dual-core Intel® Core™ i3 and Intel® Core™ i5/i7 processors) are supported. The Intel® C226 PCH (platform controller hub) chipset complements the HP Z230's core architecture.

New technologies supported on HP Z230 processors

Intel® Advanced Vector Extensions 2.0 (Intel® AVX2)

The new Intel Advanced Vector Extensions 2.0 (Intel AVX2) extends the Intel Advanced Vector Extensions (Intel AVX) with 256-bit integer instructions, floating-point fused multiply add (FMA) instructions, and gather operations. The 256-bit integer vectors benefit math, codec, image, and digital signal processing software. FMA can improve performance in face detection, professional imaging, and high performance computing. Gather operations increase vectorization opportunities for many applications. In addition to the vector extensions, this generation of Intel processors adds new bit manipulation instructions useful in compression, encryption, and general purpose software.

Intel® Data Protection Technology with AES-NI (Intel® AES-NI)

Enabling Advanced Encryption Standard AES-NI requires a computer system with an AESNI-enabled processor and third party encryption software to execute the instructions in the correct sequence. AES-NI requires Intel Core i7-600 or Intel Core i5-500 Mobile Processor series and is not available in all countries. http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-aes-instructions-set/. Tracking and recovery is supported by an embedded BIOS agent on HP business notebooks, which is shipped turned off, and must be activated by the purchase of a subscription for terms ranging from one to five years via LoJack Pro. Service is limited, check with Absolute for availability outside the United States, certain conditions apply. Full details are available at absolute.com/products/lojackforlaptops.

Integrated Voltage Regulator

Intel® Xeon® processor E3-1200 v3 series, and the 4th generation Intel® Core™ processors integrate the Voltage Regulator (VR) into the processor to improve power efficiency and lower switching latencies. The HP Z230 further optimizes VR switching to avoid interference with wireless radio devices.

Legacy PCI support (Tower only)

Although the Intel C226 chipset does not natively support PCI, HP recognizes that many customers have a continued need for legacy PCI cards. HP has addressed this need in the Z230 Tower by adding a PCI slot.

Next generation Intel Active Management Technology

New features for Intel AMT 9.0 include:

- Keyboard Video Mouse (KVM) Enhancements under Remote access
  - KVM support for high resolution displays up to 2560x1600 with 16bppKVM
  - During a KVM session, Microsoft Aero effects could otherwise cause a serious performance decrease. When the system is running a KVM session, Aero effects will be disabled and automatically restarted by the software agent when the KVM session ends
- Graceful restart support
  - ME8 only supported hard power operations, which can cause unpredictable system behavior. ME9 adds support for graceful power operations that include shutdown / Reset / Sleep / Hibernate to improve system stability.

Intel® HD Graphics P4600

The new integrated Intel® HD Graphics P4600 graphics engine provides professional entry graphics performance. Available on Intel® Xeon® processor E3-12x5v3 models, it comes certified for selected popular workstation applications. The graphics core integrated in Intel® Xeon® processors featuring Intel® HD Graphics P4600 has 20 Execution Units and offers higher performance, compared to the previous generation Intel® HD Graphics P4000, which has 16 Execution Units. It supports Microsoft DirectX11.1 and OpenCL 1.2 and OpenGL 4.0, and expanded media acceleration features like full hardware decode and encode acceleration as well as advanced video processing features.

Integrated USB 3.0

Two front and two rear integrated USB 3.0 ports are available on the HP Z230 Tower and SFF. Integrated USB 3.0 provides cost-effective support for greater I/O bandwidth for new, faster peripherals and external storage devices, and a 10 times higher bit rate over USB 2.0. More information on the USB 3.0 Technology and Performance measurements can be found in the “Resources, contacts, or additional links” section below.

USB Charging Ability (Tower Only)

HP Z230 Tower equips one of the front USB 2.0 ports to support power charging ability. The port is able to provide fast charge to a portable device not only in System On but also in System Sleep, System Hibernate and System Off. The port supports USB Battery Charging Specification 1.2.

Intel® SRT²

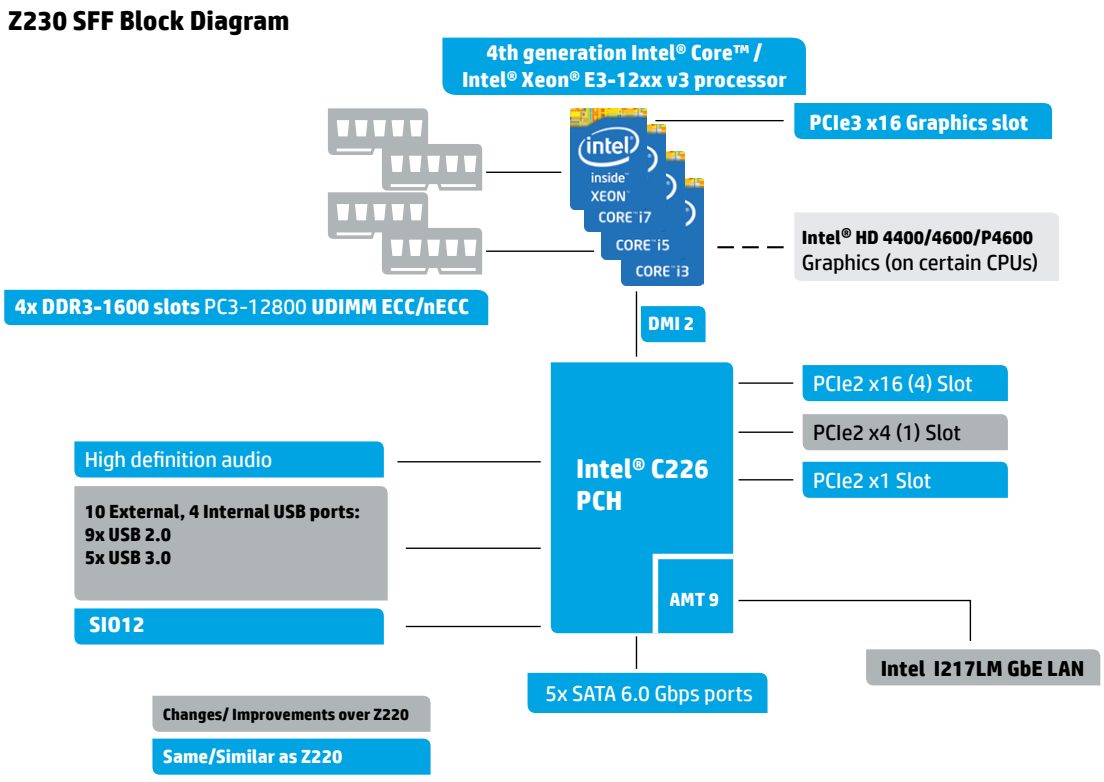
Intel® Smart Response Technology (SRT) is a cost effective disk caching option that enables faster boot and application responsiveness. A cost-effective 64GB SATA solid-state drive (SSD) functions as cache for a conventional, larger capacity magnetic hard disk drive, or RAIDed volumes of HDDs. It is available for Windows 7 and Windows 8 32/64 bit only. For an expanded overview of SRT’s technology, benefits and installation, please refer to the “Resources, contacts, or additional links” section below.

HP Z230 vs HP Z220 feature comparison

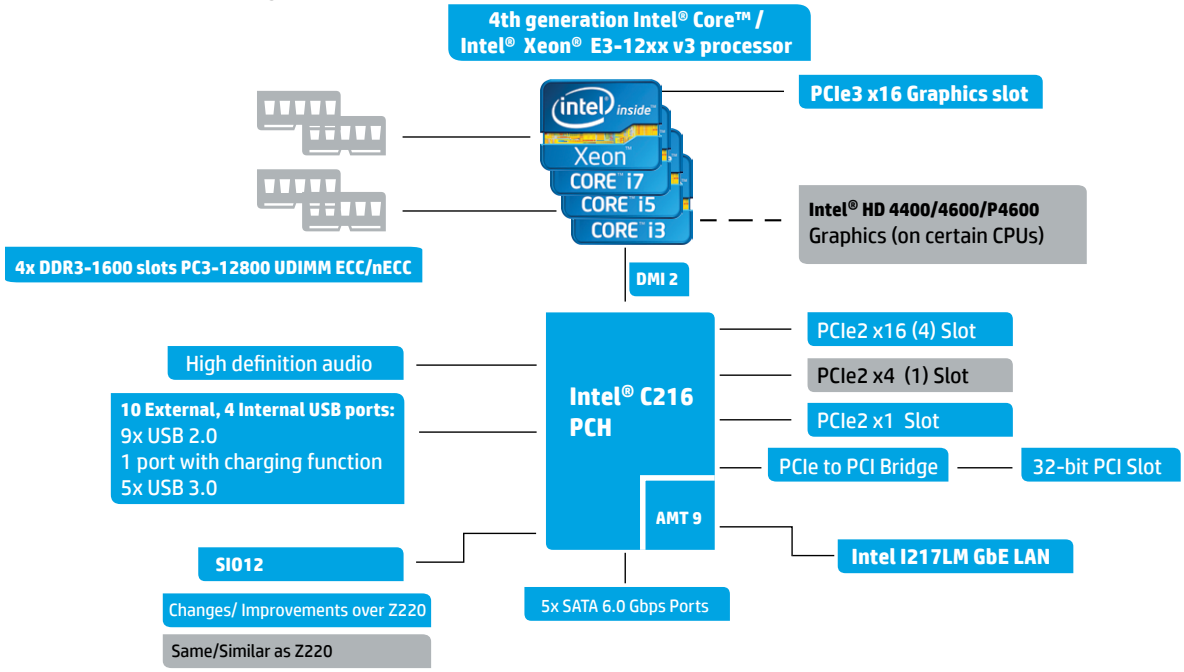
Figure 1. Z230 vs Z220 feature comparison

	HP Z230	HP Z220
Operating system	Windows 8 Professional 64-bit and other editions available[3]	Windows 7 Professional 64-bit and other editions available[4]
Processors[1]	Intel® Xeon® E3-1200v3 and 4th generation Intel® Core™ i7/i5/i3 Processors	Intel® Xeon® E3-1200v2 and 3rd generation Intel® Core™ i7/i5/i3 Processors
New instruction set	AVX2 AES-NI	AVX AES
Integrated graphics	Intel® HD Graphics P4600 Intel® HD Graphics 4600 Intel® HD Graphics 4400 Intel® HD Graphics	Intel® HD Graphics P4000 Intel® HD Graphics 4000 Intel® HD Graphics 2500 Intel® HD Graphics
Display ability		
Tower	1x Single-Link DVI-I 2x DisplayPort 1.2 (Dual mode)	1x DVI-I 1x DisplayPort 1.1a
SFF	3x DisplayPort 1.2 (Dual mode)	1x VGA 1x DisplayPort 1.1a
USB enhancement		
Tower	USB charging port on front panel	N/A
SFF	2 USB 3.0 port on front panel	N/A
PSU efficiency	92%	90%
Manageability	Intel ME9/AMT9, Intel vPro*	Intel ME8/AMT8, Intel vPro*

*if supported by the selected processor some functionality of this technology, such as Intel® Active management technology and Intel Virtualization technology, requires additional 3rd party software in order to run. Availability of future "virtual appliances" applications for Intel vPro technology is dependent on 3rd party software providers. Microsoft Windows required."



Z230 Tower Block Diagram

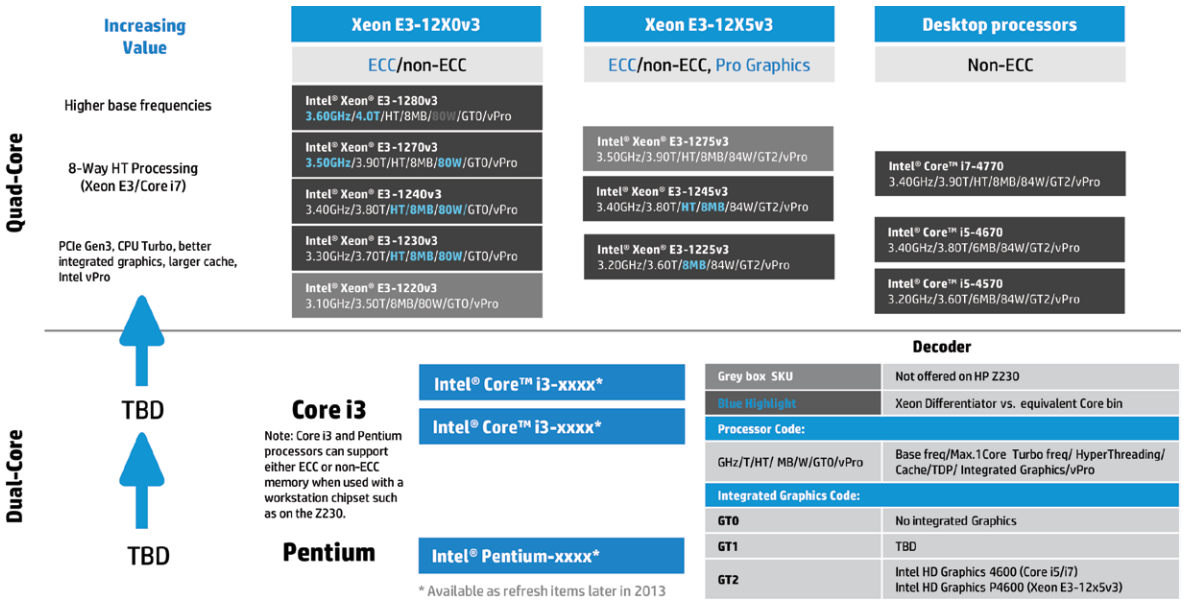


Workstation advantages over HP Desktop PCs

Higher CPU Performance

The workstation Quad Core Intel® Xeon® processor E3-1200 v3[1] series includes models up to a 3.6GHz base frequency, while the 4rd generation Intel® Core™ i7 processors[1] for desktop PC reach up to 3.4GHz. The Intel® Xeon® E3 processors[1] also offer several models with Hyper-Threading[6] and larger 8MB cache compared to their Intel® Core™ i5 counterparts.

Z230: Processor roadmap[1,5,6,7,8]



ECC

Error Correcting Code (ECC) memory is supported on workstation Intel® Xeon® SKUs, thereby improving data integrity. If ECC memory is used in conjunction with a non-ECC processor sku, ECC protection is not available and the DIMMs will appear to the system as Non-ECC memory. Desktop PCs do not typically support ECC.

3 displays support

The HP Z230 equipped with Xeon® processor E3-12x5v3 SKUs supports 3 digital display outputs. Each is capable of driving resolutions up to 3840x2160 at 60 Hz through DisplayPort out and symmetric independent display. Z230 support DisplayPort 1.2 with Multi Stream Transport (MST) transports multiple A/V streams over a single connector.

400W Power Supply

The high efficiency power supply on HP Z230 Tower Workstation supports higher-end 3D graphic cards with an additional power dongle, thereby providing greater expandability and higher performance options. The 400W power supply also enables the support of the 84W Xeon workstation SKU that boasts the highest base frequency (3.6GHz) and performance available. Business desktops typically have smaller power supplies and do not cater to high-end 3D graphics cards.

Resources, contacts or additional links

hp.com/go/whitepapers, includes white papers on USB 3.0 technology and an SRT overview

hp.com/support/Z230SFF_manuals

hp.com/support/Z230Tower_manuals

[1] Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing on Intel® architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel® 64 architecture. Processors will not operate (including 32-bit operation) without an Intel® 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
[2] Requires a compatible Intel® Core processor, enabled chipset, Intel® Rapid Storage technology software and non-SED HDD + optional 2.5" SSD flash cache module. Intel® Smart Response Technology is only available on select HP systems. Read performance levels assume that the data to be read is in the cache. Depending on system configuration, results may vary.
[3] Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See microsoft.com
[4] Not all features are available in all editions of Windows 7. Systems may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See microsoft.com/windows/windows-7/ for details.
[5] Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software, and overall system configuration. See intel.com/technology/turboboost for more information.
[6] The hyper-threading feature is designed to improve performance of multi-threaded software products; please contact your software provider to determine software compatibility. Not all customers or software applications will benefit from the use of hyper-threading. Go to intel.com/info/hyperthreading/ for more information including which processors support HT Technology.
[7] Each processor supports up to 2 channels (HP Z230 Tower/SFF) of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel. Actual memory speeds dependent on processor capability.
[8] Intel® Xeon® E3 and Intel Pentium processors can support either ECC or non-ECC memory. Intel Core i5/i7 processors only support non-ECC memory.

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