



HP Z1 Workstation

Chassis and System Highlights

Existing All-In-One Market Landscape

Many computer users need the capabilities of a workstation to do their job. Additionally, the simplicity and space efficiency of an All-In-One (AiO) computer can be a real advantage in a professional setting. Unfortunately, workstation capabilities are hard to find in existing AiO products; workstation users often want : Intel® Xeon® processors, professional graphics, ECC memory, easy serviceability and configurability. The HP Z1 meets these requirements, and more, to offer customers the great experience they've come to expect in HP Z Workstations while also meeting ergonomic and adjustability expectations for professional displays.

This paper will discuss the attributes of the HP Z1 Workstation, including chassis and system highlights, as well as the challenges that were faced in building an AiO with the capabilities of a HP Workstation.

HP Workstation Solution

The Workstation group's goal was to combine all the important attributes of a workstation, an AiO, and a large professional display into one elegant package—and in this we accepted no compromises. Some of the primary HP Z1 features are:



Professional display

The HP Z1 Workstation has a brilliant 27" diagonal 2540 x 1440 In-Plane Switching (IPS) - professional display.



Industrial design

The HP Z1 has industrial design elements showing its HP Z Workstation heritage: true materials (e.g. brushed aluminum, cast aluminum, unpainted plastic), vertical vents, rear panel contours like the HP Z820, and adds a flush-glass touch of a premium AiO.



Innovative stand

The foundation of the HP Z1 is its innovative stand. This stand combines professional display adjustability with an innovative position lock.

- 100mm max height adjustment
- 30° rearward and 5° forward tilt adjustments
- A latched reclined shipping/service mode
- Industry-standard VESA mount, allowing the stand to be easily removed and replaced with an appropriate monitor arm



Access panel

The HP Z1 has an innovative access panel; in effect, the LCD is the access panel. The access panel unlatches at the bottom and hinges open from the top in much the same way a car hood or briefcase does.



Tool-less chassis

Similar to other HP Z Workstations, the HP Z1's internal components are easily serviceable, and most of them require no tools to remove and replace. The following components are all tool-less:

- 1 Power Supply
- 2 MXM Graphics
- 3 Hard Drive(s)
- 4 System Blower
- 5 Optical Drive
- 6 Memory



Professional Graphics

The HP Z1 Workstation's graphics assembly is different than most MXM graphics applications where configurability is limited and service is difficult. The HP Z1's solution is capable of cooling full power 100W MXM v3.0 cards, and can be installed, serviced, or upgraded without tools.

Cool and quiet

The system layout was designed for quiet acoustics in the same way all HP Z workstations are. Cool air enters the bottom of the system and is directed upward through the four independent thermal zones. The zones are:

- 1 Power Supply Zone
- 2 MXM Graphics Zone
- 3 Processor & Hard Drive Zone
- 4 Memory & Backlight Power Zone.



This strategy allows the system to support high-performance CPUs and professional 3D graphics cards while remaining whisper quiet in most operational modes.

Hard drives

Hard drives are secured in the HP Z1 with easy to use hard disk drive carriers that have tool-less installation of 1 Å~3.5" disk or 2 Å~ 2.5" disks. These options use different carriers, but both allow the same degree of serviceability and ease of use. Elastomeric dampers are integrated into these carriers to prevent the drives from transmitting noises into the system, and the system from transferring vibrations into the drives reducing their performance.





Additional features

- Windows® 7 Professional 64-bit
- 95 Watt Xeon® processors with Intel® vPro™ support
- SRS premium sound processing with front facing stereo speakers
- An internal 400W, 90% efficient power supply with tool-free latching mechanism and built-in self-test
- Optional Blu-ray writer¹
- Standard sized 1600MHz ECC DIMMs
- Environmentally conscious BFR/PVC-free design²
- FCC Class B EMC qualification
- Security slot for cable lock on access panel latch

Thermal Challenges

The compactness of the AiO form factor presented some particularly tough challenges. In tower workstations, the cooling solutions for the CPUs, power supplies, memory modules and other accessories rarely have severe height limitations. However, there were many physical space limitations that the design of the HP Z1 needed to address. We have designed the HP Z1 to be competitively thin, and thus designed the cooling elements for the HP Z1 with heat pipes and low-profile, high quality blowers for increased longevity and reliability. Additionally, power supply components for the system and display use high efficiency electric components to reduce the amount of heat they normally need to dissipate in other types of systems.

The HP Z1 is divided into four main thermal zones to optimize the effectiveness of its individual cooling components. The main power supply, MXM graphics, CPU/hard drives, and memory/display power zones are all individually monitored and cooled. There are a total of nine different thermal sensors monitoring components and helping control up to six fans and blowers throughout the system. The strategy is so effective that we've been able to keep acoustic emission levels very low. Lightly configured systems will be all but totally silent in some operating conditions.

Conclusion

The HP Z1 Workstation has all the attributes of a HP Workstation in a sleek, simple and functional AiO design. The HP Z1 easily opens to allow access, and most service operations can be performed without any tools. An AiO computer design presents certain challenges, specifically thermal. With four independent thermal zones, the HP Z1 cooling strategy not only keeps components cool but boasts whisper-quiet acoustics. Continuing the line of the HP Workstation family, the HP Z1 meets the demands of professionals while continuing to carry innovative industrial design elements.

Additional resources

hp.com/go/whitepapers

hp.com/support/Z1_manuals

Screen images courtesy of Autodesk and Local Motors, Inc.

¹ As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. This Blu-ray drive does not support writing to ultra-high speed CDRW media (16X to 32X advertised performance). HD-DVD movies cannot be played on this PC.

² Meeting the industry definition of 'BFR/PVC-free' per the iNEMI Position Statement on "Low Halogen" Electronics. Plastic parts incorporated into the chassis generally contain < 1000 ppm (0.1%) of bromine or chlorine. Printed circuit board and substrate laminates generally contain < 1500 ppm (0.15%) of total bromine and chlorine. Service parts after purchase may not be BFR/PVC-free. External accessories, including power supplies, power cords, and peripherals are not BFR/PVC-free.

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4AA4-1071ENW, August 2012

