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Intel® Embedded Digital Signage Media Player Reference Design

Versatile Intel® processor-based platform reduces development and manufacturing costs and accelerates time to market

Developing a Family of Signage Products

The expanding digital signage market is driving equipment manufacturers to find ways to increase their product line breadth while reducing development and manufacturing costs. This can be accomplished with a single, flexible board that supports a wide range of price, performance and energy-efficiency targets and cuts cost through software reuse and manufacturing economies of scale. Meeting these objectives, the Intel® Embedded Digital Signage Media Player reference design can help equipment manufacturers quickly develop a family of signage products at lower overall cost.

Benefiting from a Manufacturing-Ready Design

Based on a standards-based platform, the Intel Embedded Digital Signage Media Player reference design enables equipment manufacturers to deploy a wide variety of systems with advanced performance, manageability and connectivity features, as described in Table 1. Delivering leading-edge performance, the platform supports multiple displays, rich media blending, multiple zones and large LCDs through the use of power-efficient Intel® multi-core processors. Lowering total cost of ownership (TCO), Intel® Core™2 Duo processor-based systems save power through advanced power management features and reduce the number of expensive on-site repairs with Intel® Active Management Technology[1] (Intel® AMT). Supporting many connectivity options via PCI Express* and USB, the platform interfaces to a large variety of peripherals such as wireless adapters and TV tuner modules.

Satisfying Market Requirements

Many advertisers and businesses are using digital signage solutions to create multimedia customer experiences with compelling advertising and targeted messaging. The computing horsepower supplied by Intel® processors allows businesses to gauge the impact of advertising with solutions offering "anonymous video analytics." This is done by measuring the number of viewers, viewing duration and audience demographics and correlating this data to actual purchases by cross-checking sales receipts with audience analytics reports.

Supporting a Family of Products

Figure 1. Chassis for Compact, Fanless Version

The reference design has four versions, listed below, which all use the same board. The features of each version are listed in Table 2 on page 3.

- Compact, low-profile: Fanless
- Compact, low-profile: Performance
- 1U: I/O superset, fanless
- 1U: Graphics card, I/O superset, performance

Features	Benefits
Low-power Intel® processors	Enables fanless and small form factor solutions.
Remote manageability	Reduces operating costs with Intel® Active Management Technology (Intel® AMT).
Rich connectivity options	Integrates a broad range of components such as Intel® WiMAX/WiFi Link wireless network adapters and 3G, Bluetooth* and TV tuner modules.

Table 1. Intel® Embedded Digital Signage Media Player Reference Design Features and Benefits

Furthermore, digital signage systems with anonymous video analytics capabilities can determine whether consumers are paying attention to the display, just glancing or ignoring it. Equipped with inexpensive USB cameras and facial detection software, these systems help advertisers determine content effectiveness and target consumers by adapting advertising and messaging in real-time, based on the gender and demographic composition of the audience. To implement video analytics, systems require a high level of compute performance to display state-of-the-art graphics and video, and to process the images taken by the camera. This reference design supplies the necessary compute performance in a power-efficient manner, while lowering TCO with advanced remote management capabilities.

Computing performance and energy-efficiency

The Intel digital signage media player reference design meets the needs of a large assortment of performance-intensive, small form factor systems that require low power. Equipment manufacturers can design a single board that supports two levels of computing performance and energy consumption, based on Intel Core 2 Duo processors P8400 and T9400Δ (25W and 35W thermal design power, respectively). Intel Core 2 Duo processors are members of Intel's growing product line of multi-core processors based on Intel® Core™ microarchitecture manufactured on 45nm process technology, which delivers even greater energy-efficient performance. Intel Core 2 Duo processor technology makes it possible to integrate two complete execution cores in one physical package, thereby increasing the performance of multi-threaded and multitasking applications.

The reference design, illustrated in Figure 2, includes the Intel® GM45 Chipset Graphics Memory Controller Hub (GMCH), which provides excellent graphics and saves cost over integrating a separate graphics card. The graphics capability improves graphics and 3D rendering performance and enables high-definition video playback by using the following technologies:

- Mobile Intel® Graphics Media Accelerator 4500MHD
- Intel® Clear Video Technology
- Graphics core speeds up to 533 MHz

The chipset supports dual independent displays, which allows for flexible display configurations as well as numerous display types and video output options including:

- VGA
- LVDS
- DVI
- High Definition Multimedia Interface* (HDMI*)
- DisplayPort* with integrated High-bandwidth Digital Copy Protection (HDCP) technology

Lowering TCO with Remote Management

Today, almost every digital signage system is connected to a network in order to access video streams and information from back office systems. The same network can also be used to remotely perform IT support tasks, such as updating software, repairing systems and collecting inventory information.
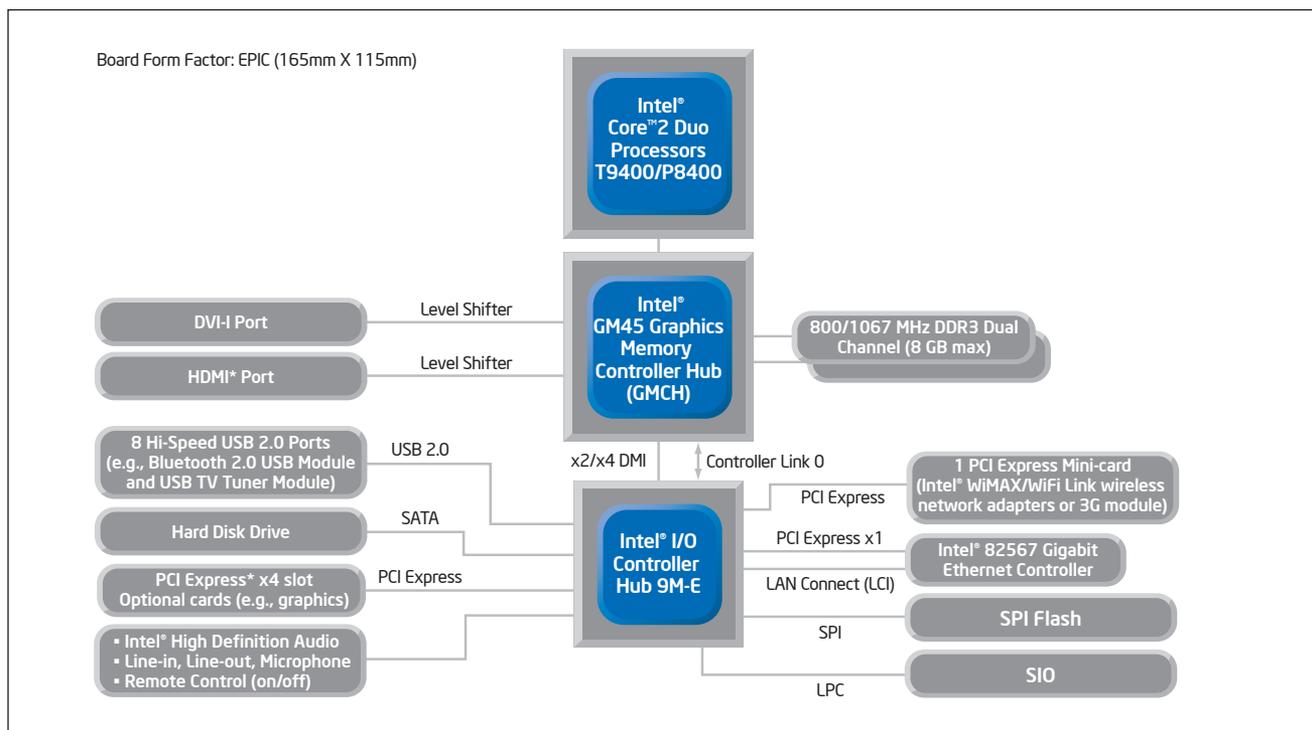
Figure 2. Block Diagram of Intel® Core™2 Duo Processor-Based System

Reference Design Versions

The standards-based Intel® reference design supports a number of industry-standard interfaces, commercially available modules and two different Intel® processors, as indicated in Table 2. This flexibility enables equipment manufacturers to create four versions with one board, ranging from a challenging low-profile fanless design to a high-performance 4-display system. The 1U graphics card, performance version has a PCI Express* x4 slot for a discrete graphics card, which supplies increased I/O and video-processing capabilities. All four versions of the reference design are supported by a third-party chassis vendor (Figure 3), and contact information is available through Intel. Using the reference design, equipment manufacturers differentiate themselves by offering industry-leading content display capabilities and video analytics.

	Compact: Fanless	Compact: Performance	1U: I/O Superset, Fanless	1U: Graphics Card, Performance
Intel® Processor	Intel® Core™2 Duo Processor P8400	Intel® Core™2 Duo Processor T9400	Intel Core 2 Duo Processor P8400	Intel Core 2 Duo Processor T9400
Independent Display Support	1-2	1-2	1-2	1-4
Board Dimensions	EPIC (165x115mm)			
Chassis Dimensions	185x125x30mm		265x165x50mm	265x175x60mm
Memory: Dual SODIMM	Up to 8 GB DDR			
I/O Ports	4 x USB		6 x USB	
	2 x SATA 1 x DVI-I 1 x HDMI 1 x RJ45 Line-in/Line-out/Mic-in PCI Express* x4 slot 1 x Mini PCI Express slot			
			2 x COM Compact Flash slot	
WiMAX and WiFi connectivity	Intel® WiMAX/WiFi Link wireless network adapters			
Modules	IR Remote Control Bluetooth Board			
Optional Modules			3G module—Mini card 12V DC Out	
			TV Tuner (Plugs into PCI Express slot)	S3 Graphic Card with 1 x DVI, 1 x HDMI (Plugs into PCI Express slot) 8~32V Power Module

Table 2. Overview of Four Reference Design Versions

The Intel digital signage media player reference design goes one step further by implementing Intel AMT, which has a unique capability (i.e., circuit) for accessing and controlling the system, even if it's powered off or the software is corrupted. This circuit establishes an "out-of-band" link that allows the system to communicate with a management console without relying on the system's standard networking functionality.

Without Intel AMT, digital signage systems would use the same networking functionality (e.g., Ethernet NICs, CPU, operating system, protocol stacks) for both standard LAN and remote management communications. When equipment fails, this "in-band" approach has the drawback of relying on the continued operation of many equipment components: CPU, operating system, hard disk drive and system memory. What happens if the target system isn't switched on or a malicious virus corrupts the operating system? Dispatching a technician may be the only option, resulting in incremental maintenance cost.

End-users can reduce downtime and lower TCO by performing the following functions remotely using Intel AMT:

- Fix hung systems
  – Restore systems by cycling power, reloading software or booting from a "gold" hard drive on the network.
  – Reduce the number of expensive on-site repairs with innovative remote management capabilities.

- Run inventory reports
  – Remotely read system configuration data from non-volatile memory, even if the system is switched off.

- Reduce power consumption
  – Save power by powering down systems during off hours using the remote on/off switching option or scheduling option for routine on/off operation.

| Compact, fanless (front and back) | Compact, performance (front and back) |
| 1U, fanless (front and back) | 1U, performance (front and back) |

Figure 3. Compact and 1U Performance Chassis

Reaching a Larger Market

Users of digital signage, such as retailers, medical offices and airports, have different requirements, which can not be cost-effectively met with a one-size-fits-all solution. Instead, it's possible to address most of these segments with a family of products based on a single platform using Intel's silicon products. Equipment manufacturers can meet different performance and power consumption objectives while leveraging a common code base and decreasing software development, testing and management effort. The scalability of this platform can also reduce hardware engineering and validation effort as well as lower manufacturing costs through economies of scale.

Accessing the Reference Design

Intel is enabling its ecosystem partners to develop and build the reference design, which will be available as a commercial off the shelf (COTs) product for system manufacturers. This design, which realizes four configurable versions, is the hardware basis for a family of products capable of servicing a large portion of the digital signage market. The reference design uses Intel Core 2 Duo processors to provide the computing horsepower needed for advanced functions like video analytics, and implements Intel AMT, which advances remote system management to further lower TCO. By supporting the right features in a configurable platform, the Intel digital signage media player reference design can reduce development and manufacturing costs and accelerate time to market for equipment manufacturers.

To learn more about Intel's solutions for digital signage, please visit www.intel.com/go/digitalsignage.

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