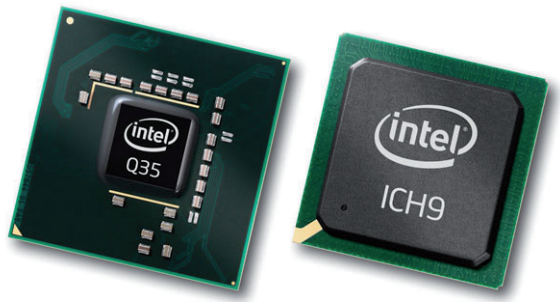
Product Brief

Intel® Q35 Express Chipset

Embedded Computing

Intel® Q35 Express Chipset for Embedded Computing

Product Overview



The Intel® Q35 Express chipset addresses key requirements of many embedded computing designs, including quality graphics, low-power consumption, noise reduction, manageability, data protection and security. When combined with the Intel® Core™ microarchitecture family of processors on 45nm and 65nm process technology, this platform helps embedded equipment manufacturers deploy exceptionally responsive, high-performance, low-power systems for interactive clients (i.e., point-of-sale terminals and interactive PCs), industrial control and automation, gaming, print imaging and network security applications.

The updated graphics memory controller hub features a low-power graphics core. With a total thermal design power (TDP) of 13 watts, and a lower idle of 5.5 watts, the Intel Q35 Express chipset provides a 50% power savings over the Intel® Q965 Express chipset (28 watts TDP). The I/O controller hub (ICH) is available in two SKUs: Intel® ICH9 and Intel® ICH9 DO (digital office). A 1333 MHz system bus supports Intel® processors on 45nm.

Twelve Hi-Speed USB 2.0 ports and external SATA (eSATA) port multiplier support on both ICH SKUs provide design flexibility, while Intel® Quiet System Technology regulates system and processor fan speeds for noise reduction. Additionally, the ICH9 DO supports Intel® Active Management Technology[1] (Intel® AMT) 3.0 for remote manageability, and Intel® Rapid Recover Technology for data protection.

When combined with an ADD2 or media expansion card, the Intel Q35 Express chipset enables dual-independent displays, while Intel® Virtualization Technology[2] for Directed I/O (Intel® VT-d) improves I/O virtualization, system reliability and security.

The chipset is ideal for designs using embedded operating systems like Microsoft Windows Embedded XP,* Microsoft Windows XP,* Windows Vista,* Microsoft WEPOS* and Linux.*

Intel® Active Management Technology 3.0

This hardware- and firmware-based solution (ICH9 DO only) is powered by the system's auxiliary power plane, providing around-the-clock availability to remotely monitor networked embedded systems. Enhanced hardware-based isolation and recovery through Zero Touch Configuration provide end-point access control, provisioning and configuring embedded systems via a remote, secure mechanism. Intel AMT stores hardware and software information in non-volatile memory. Built-in out-of-band management capabilities allow remote discovery and healing of systems after OS failures or when a system is powered down. Alerting and event logging features detect problems quickly to reduce downtime, proactively blocking incoming threats that contain infected clients before they impact the network, and notifying the user when critical software agents are removed.

Intel® Rapid Recover Technology

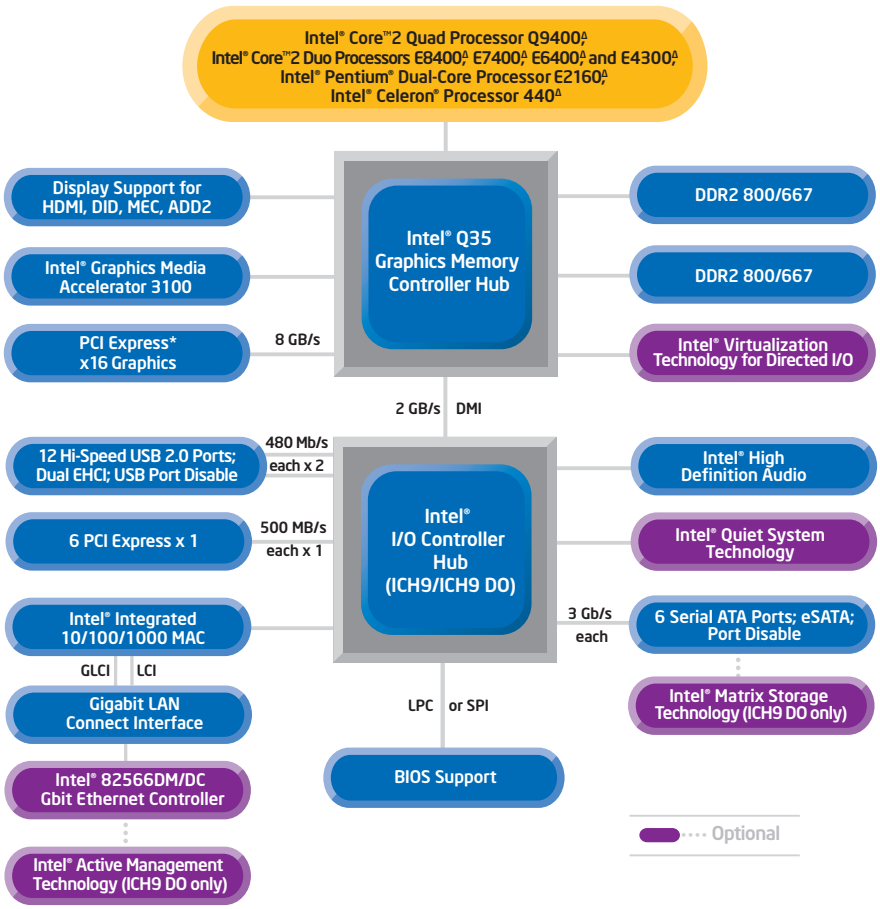
A feature of Intel® Matrix Storage Technology, this technology (ICH9 DO only) provides a recovery point that can be used to quickly and easily recover data and return a system to operational status should a hard drive fail or if there is massive data corruption. The clone can also be mounted as a read-only volume to allow recovery of individual files.

Intel® Trusted Execution Technology (Intel® TXT)

For safer computing, Intel® TXT[3,4] is a versatile set of hardware extensions to Intel® platforms (Intel® Core™2 Quad processor Q9400[Δ] and Intel® Core™2 Duo processor E8400[Δ] with Intel Q35 Express chipset), enabling security capabilities such as measured launch and protected execution. Hardware-based mechanisms help protect against software-based attacks to safeguard the confidentiality and integrity of data stored or created on the embedded system. This is accomplished by enabling a trusted environment where each application can run within a designated space, protected from all other software on the system.

Intel® Virtualization Technology for Directed I/O

Integrated into the chipset, Intel VT-d[2] increases manageability of I/O-sensitive applications and provides additional security for I/O systems by allowing customers to logically partition I/O devices and assign them to specific virtual machines. Key features help manage shared I/O resources and support protected access to resources from multiple sources.



Block Diagram for Intel® Q35 Express Chipset

Features	Benefits
1333/1066/800 MHz front-side bus	• Validated with a variety of processors to meet a wide range of performance needs, including the Intel® Core™2 Quad processor Q9400[Δ]; Intel® Core™2 Duo processors E8400,[Δ] E7400,[Δ] E6400,[Δ] and E4300[Δ]; Intel® Pentium® Dual-Core processors E5300[Δ] and E2160[Δ]; and Intel® Celeron® processor 440[Δ]
PCI Express* 1.1 interface	• 8 GB/s bandwidth for platform graphics.
Intel® Fast Memory Access	• Optimizes use of available memory bandwidth and reduces latency of memory access to improve system performance.
Dual-Channel DDR2 800/667 memory support	• Up to 12.8 GB/s (DDR2 800 MHz) bandwidth and 8 GB memory addressability for faster system responsiveness and support of 64-bit computing.
Intel® Flex Memory Technology	• Simplifies upgrades by allowing different memory sizes to be populated and remain in dual-channel mode.
Intel® Graphics Media Accelerator 3100	• 3-D enhancements enable greater flexibility and scalability. Improved realism with support for Microsoft DirectX* 9.0c Shader Model 2.0, OpenGL* 1.4.
PCI Express x16 ports	• Can be statically configured as PCI Express x8/x4/x1. Intel® Q35 GMCH contains one 16-lane (x16) PCI Express port (compliant with the PCI Express Base Specification revision 1.1), intended for an external PCI Express graphics card or PCI Express I/O card.
Intel® Embedded Graphics Drivers	• Drivers specifically target needs of embedded platform developers, while maximizing configuration flexibility. • Modular architecture enables similar functionality across all supported Intel® platforms and operating systems, reducing time-to-market through customer familiarity and ease of portability to future integrated graphics chipsets.
Intel® High Definition Audio[5]	• Integrated audio support enables premium digital sound and delivers advanced features such as multiple audio streams and jack re-tasking.
Intel® Matrix Storage Technology with Intel® Rapid Recover Technology (ICH9 DO only)	• Native support of eSATA ports and support for command-based port multipliers. • Flexibility to add external drives for increased data protection with up to six times faster performance than USB 2.0. • Addition of a second hard drive provides quicker access to digital photo, video and data files with RAID 0, 5, and 10; greater data protection against a hard disk drive failure with RAID 1, 5, and 10. • Advanced Host Controller Interface provides easier expandability with support for eSATA devices and native hot plug, while boosting boot and multitasking performance with native command queuing.
Serial ATA 3 Gb/s	• Faster transfer rate for improved data access. Full SATA interface speed outside the chassis, up to 3 Gb/s.
eSATA port multiplier	• SATA interface designed for use with eSATA devices. • 3 Gb/s data link eliminates bottlenecks found with current external storage solutions. Supports native port multipliers. • Combining port multipliers, eSATA, and Intel® Matrix Storage Technology provides great flexibility and expandability for external storage solutions.
SATA port disable	• Enables or disables individual SATA ports as needed. • Provides added protection by preventing malicious removal or insertion of data through SATA ports. • Targeted for eSATA ports, available on the outside of the system.
USB port disable	• Enables or disables individual USB ports as needed. • Provides added protection by preventing malicious removal or insertion of data through USB ports.
Intel® Quiet System Technology	• Intelligent system fan speed control algorithms use operating temperature ranges more efficiently to reduce system noise and heat by minimizing fan speed changes.
Ecosystem support	• Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Embedded and Communications Alliance (intel.com/go/eca), Intel helps developers cost-effectively meet design challenges and shorten time-to-market.
Embedded lifecycle support	• Protects system investment by enabling extended product availability for embedded customers.

Intel® Q35 Express Chipset for Embedded Computing

Product	Product Code	Package	Features
Intel® 82Q35 Graphics Memory Controller Hub	LE82Q35	34 mm 1226-pin FC-BGA	1333/1066/800 MHz system bus; DDR2 800/667; Intel® Graphics Media Accelerator 3100; high-bandwidth direct media interface chip interconnect
Intel® I/O Controller Hub 9 (Intel® ICH9)	FW82801IB	31 mm 652-pin PBGA	Four PCI masters and six PCI Express* x1 channels; four SATA ports; 12 Hi-Speed USB 2.0 ports; dual EHCI controllers; enhanced SPI interface; integrated 10/100/1000 MAC
Intel® I/O Controller Hub 9 DO (Intel® ICH9 DO)	FW82801IO	31 mm 652-pin PBGA	Same features as Intel ICH9 with six SATA ports. Also supports RAID 0, 1, 5 and 10, Intel® AMT and Intel® Matrix Storage Technology
Intel® 82566DM/DC Gigabit Ethernet Controller (optional)	RU82566DM RU82566DC	10x10 mm 81-pin FCMMAP (BGA)	Smaller footprint and lower power dissipation compared to multi-chip MAC and PHY solutions; 10/100/1000 Mb/s data transfer; footprint-compatible with Intel® 82562V 10/100 Network Connection; DM SKU supports Intel® AMT
Intel® 82562V 10/100 Network Connection (optional)	PC82562V	10x10 mm 81-pin mold cap package FCMMAP (BGA)	10/100 Mb/s data transfer; footprint-compatible with Intel® 82566DM/DC Gigabit Ethernet controller

Intel Access

Intel in Embedded and Communications:	intel.com/go/embedded
Developer's Site:	intel.com/design
General Information Hotline:	(800) 628-8686 or (916) 356-3104 5 a.m. to 5 p.m. PST
Intel® Literature Center:	(800) 548-4725 7 a.m. to 7 p.m. CST (U.S. and Canada)
	International locations please contact your local sales office.

[4]Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/products/processor_number for details.

[1]Intel® Active Management Technology requires the computer system to have an Intel® AMT-enabled chipset, network hardware and software, as well as connection with a power source and a corporate network connection. Setup required configuration by the purchaser and may require scripting with the management console or further integration into existing security frameworks to enable certain functionality. It may also require modifications of implementation of new business processes. With regard to notebooks, Intel AMT may not be available or certain capabilities may be limited over a host OS-based VPN or when connecting wirelessly, on battery power, sleeping, hibernating or powered off. For more information, see http://www.intel.com/technology/platform-technology/intel-amt/.

[2]Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

[3]No computer system can provide absolute security under all conditions. Intel® Trusted Execution Technology (Intel® TXT) requires a computer system with Intel® Virtualization Technology, an Intel TXT-enabled processor, chipset, BIOS, Authenticated Code Modules and an Intel TXT-compatible measured launched environment (MLE). The MLE could consist of a virtual machine monitor, an OS or an application. In addition, Intel TXT requires the system to contain a TPM v1.2, as defined by the Trusted Computing Group and specific software for some uses. For more information, see http://www.intel.com/technology/security.

[4]Not all specified units of this processor support Intel® VT or Intel® TXT. See the Processor Spec Finder at http://processorfinder.intel.com or contact your Intel representative for more information.

[5]Intel® High Definition Audio requires a system with an appropriate Intel chipset and a motherboard with an appropriate codec and the necessary drivers installed. System sound quality will vary depending on actual implementation, controller, codec, drivers and speakers. For more information about Intel® HD audio, refer to http://www.intel.com/.

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