



Intel® Core™ i5-650 Processor

4M Cache, 3.20 GHz

Specifications

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Essentials

Product Collection	Previous Generation Intel® Core™ i5 Processor
Code Name	Products formerly Clarkdale
Vertical Segment	Desktop
Processor Number	i5-650
Status	End of Interactive Support
Launch Date	Q1'10
Lithography	32 nm
Recommended Customer Price	\$177.00

Performance

# of Cores	2
# of Threads	4
Processor Base Frequency	3.20 GHz
Max Turbo Frequency	3.46 GHz
Cache	4 MB SmartCache
Bus Speed	2.5 GT/s DMI
TDP	73 W
VID Voltage Range	0.6500V-1.4000V

Supplemental Information

Embedded Options Available	No
Datasheet	View now

Memory Specifications

Max Memory Size (dependent on memory type)	16.38 GB
Memory Types	DDR3 1066/1333
Max # of Memory Channels	2
Max Memory Bandwidth	21 GB/s
Physical Address Extensions	36-bit

Graphics Specifications

Processor Graphics ‡	Intel® HD Graphics
Graphics Base Frequency	733.00 MHz
Intel® Flexible Display Interface (Intel® FDI)	Yes
Intel® Clear Video HD Technology	Yes
# of Displays Supported ‡	2

Expansion Options

PCI Express Revision	2.0
PCI Express Configurations ‡	1x16, 2x8
Max # of PCI Express Lanes	16

Package Specifications

Sockets Supported	FCLGA1156
Max CPU Configuration	1
T _{CASE}	72.6°C
Package Size	37.5mm x 37.5mm
Processing Die Size	81 mm ²
# of Processing Die Transistors	382 million
Low Halogen Options Available	See MDDS

Advanced Technologies

Intel® Turbo Boost Technology ‡	1.0
Intel® vPro™ Technology ‡	Yes
Intel® Hyper-Threading Technology ‡	Yes
Intel® Virtualization Technology (VT-x) ‡	Yes
Intel® Virtualization Technology for Directed I/O (VT-d) ‡	Yes
Intel® VT-x with Extended Page Tables (EPT) ‡	Yes

Intel® 64 ‡	Yes
Instruction Set	64-bit
Instruction Set Extensions	SSE4.2
Idle States	Yes
Enhanced Intel SpeedStep® Technology	Yes
Intel® Demand Based Switching	No
Thermal Monitoring Technologies	No

Intel® Data Protection Technology

Intel® AES New Instructions	Yes
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Intel® Platform Protection Technology

Trusted Execution Technology ‡	Yes
Execute Disable Bit ‡	Yes

Compatible Products

Benchmarks

Ordering and Compliance

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Refer to Datasheet for formal definitions of product properties and features.

"Announced" SKUs are not yet available. Please refer to the Launch Date for market availability.

Some products can support AES New Instructions with a Processor Configuration update, in particular, i7-2630QM/i7-2635QM, i7-2670QM/i7-2675QM, i5-2430M/i5-2435M, i5-2410M/i5-2415M. Please contact OEM for the BIOS that includes the latest Processor configuration update.

‡ This feature may not be available on all computing systems. Please check with the system vendor to determine if your system delivers this feature, or reference the system specifications (motherboard, processor, chipset, power supply, HDD, graphics controller, memory, BIOS, drivers, virtual machine monitor-VMM, platform software, and/or operating system) for feature compatibility. Functionality, performance, and other benefits of this feature may vary depending on system configuration.

"Conflict free" and "conflict-free" means "DRC conflict free", which is defined by the U.S. Securities and Exchange Commission rules to mean products that do not contain conflict minerals (tin, tantalum, tungsten and/or gold) that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo (DRC) or adjoining countries. Intel also uses the term "conflict-free" in a broader sense to refer to suppliers, supply chains, smelters and refiners whose sources of conflict minerals do not finance conflict in

the DRC or adjoining countries. Intel processors manufactured before January 1, 2013 are not confirmed conflict free. The conflict free designation refers only to product manufactured after that date. For Intel Boxed Processors, the conflict free designation refers to the processor only, not to any additional included accessories, such as heatsinks/coolers.

See <http://www.intel.com/content/www/us/en/architecture-and-technology/hyper-threading/hyper-threading-technology.html?wapkw=hyper+threading> for more information including details on which processors support Intel® HT Technology.

Max Turbo Frequency refers to the maximum single-core processor frequency that can be achieved with Intel® Turbo Boost Technology. See www.intel.com/technology/turboboost/ for more information.

The Recommended Customer Price ("RCP") is pricing guidance for Intel products. Prices are for direct Intel customers, typically represent 1,000-unit purchase quantities, and are subject to change without notice. Taxes and shipping, etc. not included. Prices may vary for other package types and shipment quantities, and special promotional arrangements may apply. If sold in bulk, price represents individual unit. Listing of these RCP does not constitute a formal pricing offer from Intel. Please work with your appropriate Intel representative to obtain a formal price quotation.

System and Maximum TDP is based on worst case scenarios. Actual TDP may be lower if not all I/Os for chipsets are used.

Low Halogen: Applies only to brominated and chlorinated flame retardants (BFRs/CFRs) and PVC in the final product. Intel components as well as purchased components on the finished assembly meet JS-709 requirements, and the PCB / substrate meet IEC 61249-2-21 requirements. The replacement of halogenated flame retardants and/or PVC may not be better for the environment.

For benchmarking data see <http://www.intel.com/performance>.

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/content/www/us/en/processors/processor-numbers.html> for details.

Processors that support 64-bit computing on Intel® architecture require an Intel 64 architecture-enabled BIOS.

