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#### USA Seagrahexampsagn In Intel® C

ER Core i5-4402E Processor You can search our catalog of processors, chipsets, kits, SSDs, server products and more in several ways.

# 3M Calhandi Name: 70 604 12/ Peage to Scanches

Product Number: i7-7500U

- Sign Insto-accessionstricted content. Ordering Code: SC3120AKIT

  - SPEC <u>Code:</u> SR2PA Supplemental Information
  - Code Name: Kapy Lake
  - Graphics Specifications
    - 0 **Expansion Options**
    - Package Specifications
    - <u>Advanced Technologies</u>
  - Security & Reliability
  - Ordering and Compliance
    - Ordering and spec information
    - Trade compliance information
    - PCN/MDDS Information

### **Specifications**

#### Export specifications

#### **Essentials**

- Product Collection <u>4th Generation Intel® Core™ i5 Processors</u>
- Code Name Products formerly Haswell
- Vertical Segment Embedded
- Processor Number i5-4402E
- Status Launched
- Launch Date Q3'13
- Lithography 22 nm •
- Recommended Customer Price

#### Performance

- # of Cores 2
- # of Threads 4
- Processor Base Frequency 1.60 GHz
- Max Turbo Frequency 2.70 GHz
- Cache 3 MB SmartCache
- Bus Speed 5 GT/s DMI2
- TDP 25 W

# **Supplemental Information**

- Embedded Options Available Yes
- Conflict Free Yes .
- Datasheet View now
- Additional Information URL View now

Learn how Intel is pursuing conflict-free technology.

# **Memory Specifications**

- Max Memory Size (dependent on memory type) 16 GB
- Memory Types DDR3L 1333/1600 •
- Max # of Memory Channels 2
- Downloaded from Arrow.com.

# **Graphics Specifications**

- Processor Graphics <sup>‡</sup> Intel® HD Graphics 4600
- Graphics Base Frequency 400 MHz
- Graphics Max Dynamic Frequency 900 MHz
- Graphics Video Max Memory 1.7 GB
- Graphics Output eDP/DP/HDMI/VGA
- Intel® Quick Sync Video Yes
- Intel® InTru<sup>TM</sup> 3D Technology Yes
- Intel® Flexible Display Interface (Intel® FDI) Yes
- Intel® Clear Video HD Technology Yes
- # of Displays Supported <sup>‡</sup> 3

### **Expansion Options**

- Scalability 1S Only
- PCI Express Revision 3.0
- PCI Express Configurations <sup>‡</sup> Up to 1x16, 2x8, 1x8 2x4
- Max # of PCI Express Lanes 16

#### **Package Specifications**

- Sockets Supported FCBGA1364
- Max CPU Configuration 1
- T<sub>JUNCTION</sub> 100°C
- Package Size 37.5mm x 32mm x 1.6mm
- Low Halogen Options Available See MDDS

# **Advanced Technologies**

- Intel® Turbo Boost Technology ‡ 2.0
- Intel® vPro<sup>™</sup> Technology <sup>‡</sup> Yes
- Intel® Hyper-Threading Technology <sup>‡</sup> Yes
- Intel® Virtualization Technology (VT-x) <sup>‡</sup> Yes
- Intel® Virtualization Technology for Directed I/O (VT-d) <sup>‡</sup> Yes
- Intel® VT-x with Extended Page Tables (EPT) <sup>‡</sup> Yes
- Intel® TSX-NI No
- Intel® 64 <sup>‡</sup> Yes
- Instruction Set 64-bit
- Instruction Set Extensions SSE4.1/4.2, AVX 2.0
- Idle States Yes
- Enhanced Intel SpeedStep® Technology Yes
- Thermal Monitoring Technologies Yes
- Intel® Stable Image Platform Program (SIPP) No

# Security & Reliability

- Intel® AES New Instructions Yes
- Secure Key Yes
- Intel® Trusted Execution Technology <sup>‡</sup> Yes
- Execute Disable Bit <sup>‡</sup> Yes
- Anti-Theft Technology Yes

# **Ordering and Compliance**

#### Ordering and spec information

#### Intel® Core<sup>™</sup> i5-4402E Processor (3M Cache, up to 2.70 GHz) FC-BGA12F, Tray

- Spec Code SR17Q
- Ordering Code CL8064701528501
- Step C0
- RCP

# Trade compliance information

- CCATSG077159
- US HTS8542310001

# **PCN/MDDS Information**

# SR17Q

• 929209 <u>PCN</u> | <u>MDDS</u>

# Launch Date

The date the product was first introduced.

# Lithography

Lithography refers to the semiconductor technology used to manufacture an integrated circuit, and is reported in nanometer (nm), indicative of the size of features built on the semiconductor.

# **Recommended** Customer

-unit purchase

quantities, and are subject to change without notice. Prices may vary for other package types and shipment quantities. If sold in bulk, price represents individual unit. Listing of RCP does not constitute a formal pricing offer from Intel.

# # of Cores

Cores is a hardware term that describes the number of independent central processing units in a single computing component (die or chip).

# # of Threads

A Thread, or thread of execution, is a software term for the basic ordered sequence of instructions that can be passed through or processed by a single CPU core.

# **Processor Base Frequency**

Processor Base Frequency describes the rate at which the processor's transistors open and close. The processor base frequency is the operating point where TDP is defined. Frequency is measured in gigahertz (GHz), or billion cycles per second.

# **Max Turbo Frequency**

Max turbo frequency is the maximum single core frequency at which the processor is capable of operating using Intel® Turbo Boost Technology. Frequency is measured in gigahertz (GHz), or billion cycles per second.

#### Cache

CPU Cache is an area of fast memory located on the processor. Intel® Smart Cache refers to the architecture that allows all cores to dynamically share access to the last level cache.

# **Bus Speed**

A bus is a subsystem that transfers data between computer components or between computers. Types include front-side bus (FSB), which carries data between the CPU and memory controller hub; direct media interface (DMI), which is a point-to-point interconnection between an Intel integrated memory controller and an Intel I/O controller hub on the computer's motherboard; and Quick Path Interconnect (QPI), which is a point-to-point interconnect between the CPU and the integrated memory controller.

# TDP

Thermal Design Power (TDP) represents the average power, in watts, the processor dissipates when operating at Base Frequency with all cores active under an Inteldefined, high-complexity workload. Refer to Datasheet for thermal solution requirements.

# **Embedded Options Available**

Embedded Options Available indicates products that offer extended purchase availability for intelligent systems and embedded solutions. Product certification and use condition applications can be found in the Production Release Qualification (PRQ) report. See your Intel representative for details.

Find products with Embedded Options Available

#### Conflict Free Downloaded from Arrow.com.

"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.

# Max Memory Size (dependent on memory type)

Max memory size refers to the maximum memory capacity supported by the processor.

#### **Memory Types**

Intel® processors come in four different types: a Single Channel, Dual Channel, Triple Channel, and Flex Mode.

#### Max # of Memory Channels

The number of memory channels refers to the bandwidth operation for real world application.

# ECC Memory Supported <sup>‡</sup>

ECC Memory Supported indicates processor support for Error-Correcting Code memory. ECC memory is a type of system memory that can detect and correct common kinds of internal data corruption. Note that ECC memory support requires both processor and chipset support.

Find products with ECC Memory Supported #

#### **Processor Graphics** <sup>‡</sup>

Processor Graphics indicates graphics processing circuitry integrated into the processor, providing the graphics, compute, media, and display capabilities. Intel® HD Graphics, Iris<sup>TM</sup> Graphics, Iris Plus Graphics, and Iris Pro Graphics deliver enhanced media conversion, fast frame rates, and 4K Ultra HD (UHD) video. See the Intel® Graphics Technology page for more information.

#### **Graphics Base Frequency**

Graphics Base frequency refers to the rated/guaranteed graphics render clock frequency in MHz.

### **Graphics Max Dynamic Frequency**

Graphics max dynamic frequency refers to the maximum opportunistic graphics render clock frequency (in MHz) that can be supported using Intel® HD Graphics with Dynamic Frequency feature.

#### **Graphics Video Max Memory**

The maximum amount of memory accessible to processor graphics. Processor graphics operates on the same physical memory as the CPU (subject to OS, driver, and other system limitations).

# **Graphics Output**

Graphics Output defines the interfaces available to communicate with display devices.

# Intel® Quick Sync Video

Intel® Quick Sync Video delivers fast conversion of video for portable media players, online sharing, and video editing and authoring.

Find products with Intel® Quick Sync Video

#### Intel® InTru<sup>TM</sup> 3D Technology

Intel® InTru<sup>TM</sup> 3D Technology provides stereoscopic 3-D Blu-ray\* playback in full 1080p resolution over HDMI\* 1.4 and premium audio.

# Intel® Flexible Display Interface (Intel® FDI)

The Intel® Flexible Display Interface is an innovative path for two independently controlled channels of integrated graphics to be displayed.

# Intel® Clear Video HD Technology

Intel® Clear Video HD Technology, like its predecessor, Intel® Clear Video Technology, is a suite of image decode and processing technologies built into the integrated processor graphics that improve video playback, delivering cleaner, sharper images, more natural, accurate, and vivid colors, and a clear and stable video picture. Intel® Clear Video HD Technology adds video quality enhancements for richer color and more realistic skin tones.

#### **PCI Express Revision**

PCI Express Revision is the version supported by the processor. Peripheral Component Interconnect Express (or PCIe) is a high-speed serial computer expansion bus standard for attaching hardware devices to a computer. The different PCI Express versions support different data rates.

# **PCI Express Configurations** <sup>‡</sup>

PCI Express (PCIe) Configurations describe the available PCIe lane configurations that can be used to link the PCH PCIe lanes to PCIe devices.

### Max # of PCI Express Lanes

A PCI Express (PCIe) lane consists of two differential signaling pairs, one for receiving data, one for transmitting data, and is the basic unit of the PCIe bus. # of PCI Express Lanes is the total number supported by the processor.

# **Sockets Supported**

The socket is the component that provides the mechanical and electrical connections between the processor and motherboard.

# **T**JUNCTION

Junction Temperature is the maximum temperature allowed at the processor die.

# Intel® Turbo Boost Technology <sup>‡</sup>

Intel® Turbo Boost Technology dynamically increases the processor's frequency as needed by taking advantage of thermal and power headroom to give you a burst of speed when you need it, and increased energy efficiency when you don't.

### Intel<sup>®</sup> vPro<sup>TM</sup> Technology <sup>‡</sup>

Intel® vPro<sup>TM</sup> Technology is a set of security and manageability capabilities built into the processor aimed at addressing four critical areas of IT security: 1) Threat management, including protection from rootkits, viruses, and malware 2) Identity and web site access point protection 3) Confidential personal and business data protection 4) Remote and local monitoring, remediation, and repair of PCs and workstations.

Find products with Intel® vPro<sup>TM</sup> Technology <sup>‡</sup>

# Intel® Hyper-Threading Technology <sup>‡</sup>

Intel® Hyper-Threading Technology (Intel® HT Technology) delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.

Find products with Intel® Hyper-Threading Technology

# Intel® Virtualization Technology (VT-x) <sup>‡</sup>

Intel® Virtualization Technology (VT-x) allows one hardware platform to function as multiple "virtual" platforms. It offers improved manageability by limiting downtime and maintaining productivity by isolating computing activities into separate partitions.

# Intel® Virtualization Technology for Directed I/O (VT-d) <sup>‡</sup>

Intel® Virtualization Technology for Directed I/O (VT-d) continues from the existing support for IA-32 (VT-x) and Itanium® processor (VT-i) virtualization adding new support for I/O-device virtualization. Intel VT-d can help end users improve security and reliability of the systems and also improve performance of I/O devices in virtualized environments.

Find products with Intel® Virtualization Technology for Directed I/O (VT-d) ±

# Intel® VT-x with Extended Page Tables (EPT) ‡

Intel® VT-x with Extended Page Tables (EPT), also known as Second Level Address Translation (SLAT), provides acceleration for memory intensive virtualized applications. Extended Page Tables in Intel® Virtualization Technology platforms reduces the memory and power overhead costs and increases battery life through hardware optimization of page table management.

Find products with Intel® VT-x with Extended Page Tables (EPT) #

# Intel® TSX-NI

Intel® Transactional Synchronization Extensions New Instructions (Intel® TSX-NI) are a set of instructions focused on multi-threaded performance scaling. This technology helps make parallel operations more efficient via improved control of locks in software.

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#### Intel® 64 <sup>‡</sup>

Intel® 64 architecture delivers 64-bit computing on server, workstation, desktop and mobile platforms when combined with supporting software.<sup>1</sup> Intel 64 architecture improves performance by allowing systems to address more than 4 GB of both virtual and physical memory.

Find products with Intel® 64<sup>±</sup>

# **Instruction Set**

An instruction set refers to the basic set of commands and instructions that a microprocessor understands and can carry out. The value shown represents which Intel's instruction set this processor is compatible with.

#### **Instruction Set Extensions**

Instruction Set Extensions are additional instructions which can increase performance when the same operations are performed on multiple data objects. These can include SSE (Streaming SIMD Extensions) and AVX (Advanced Vector Extensions).

#### **Idle States**

Idle States (C-states) are used to save power when the processor is idle. C0 is the operational state, meaning that the CPU is doing useful work. C1 is the first idle state, C2 the second, and so on, where more power saving actions are taken for numerically higher C-states.

#### Enhanced Intel SpeedStep® Technology

Enhanced Intel SpeedStep® Technology is an advanced means of enabling high performance while meeting the power-conservation needs of mobile systems. Conventional Intel SpeedStep® Technology switches both voltage and frequency in tandem between high and low levels in response to processor load. Enhanced Intel SpeedStep® Technology builds upon that architecture using design strategies such as Separation between Voltage and Frequency Changes, and Clock Partitioning and Recovery.

#### **Thermal Monitoring Technologies**

Thermal Monitoring Technologies protect the processor package and the system from thermal failure through several thermal management features. An on-die Digital Thermal Sensor (DTS) detects the core's temperature, and the thermal management features reduce package power consumption and thereby temperature when required in order to remain within normal operating limits.

# Intel® Stable Image Platform Program (SIPP)

Intel® Stable Image Platform Program (Intel® SIPP) can help your company identify and deploy standardized, stable image PC platforms for at least 15 months.

#### Intel<sup>®</sup> AES New Instructions

Intel® AES New Instructions (Intel® AES-NI) are a set of instructions that enable fast and secure data encryption and decryption. AES-NI are valuable for a wide range of cryptographic applications, for example: applications that perform bulk encryption/decryption, authentication, random number generation, and authenticated encryption.

Find products with Intel® AES New Instructions

#### Secure Key

Intel® Secure Key consists of a digital random number generator that creates truly random numbers to strengthen encryption algorithms.

#### Intel® Trusted Execution Technology <sup>‡</sup>

Intel® Trusted Execution Technology for safer computing is a versatile set of hardware extensions to Intel® processors and chipsets that enhance the digital office platform with security capabilities such as measured launch and protected execution. It enables an environment where applications can run within their own space, protected from all other software on the system.

Find products with Intel® Trusted Execution Technology

#### Execute Disable Bit <sup>‡</sup>

Execute Disable Bit is a hardware-based security feature that can reduce exposure to viruses and malicious-code attacks and prevent harmful software from executing and propagating on the server or network.

# Anti-Theft Technology

Intel® Anti-Theft Technology (Intel® AT) helps keep your laptop safe and secure in the event that it's ever lost or stolen. Intel® AT requires a service subscription from an Intel® AT–enabled service provider. Downloaded from Arrow.com.

# PA

Pre Active: Orders may be taken, but not scheduled, nor shipped.

# AC

Active: This specific part is active.

# EN

End of Life: Product End of Life notification has been published.

# NO

No Orders after Last Order Entry Date: Used for end of life products. Allows for delivery and returns.

# OB

Obsolete: Inventory available. No future supplies will be available.

# RP

Retired Price: This specific part is no longer being manufactured or purchased and no inventory is available.

# RT

Retired: This specific part is no longer being manufactured or purchased and no inventory is available.

# NI

Not Implemented: No Orders, Inquiries, Quotes, Deliveries Returns, or Shipments.

# QR

Quality/Reliability Hold.

# RS

Reschedule

More support options for Intel® Core™ i5-4402E Processor (3M Cache, up to 2.70 GHz)

Product Support Downloads and Software Support Community Warranty and Replacement

# Need more help?

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# **Give Feedback**

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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.

<sup>‡</sup> 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 <u>http://www.intel.com/content/www/us/en/architecture-and-technology/hyper-threading/hyper-threading-technology.html?wapkw=hyper+threading</u> 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 <a href="http://www.intel.com/technology/turboboost/">www.intel.com/technology/turboboost/</a> 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 <a href="http://www.intel.com/content/www/us/en/processors/processor-numbers.html">http://www.intel.com/content/www/us/en/processors/processor-numbers.html</a> for details.

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

#### **Give Feedback**

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