NEW INTEL® CORE™ X-SERIES PROCESSOR FAMILY

June 2017
MARKET GROWTH

UP TO 20% YEAR OVER YEAR*

*2015 to 2016 year-over-year change based on Intel® desktop unlocked processor revenue units
Introducing Intel’s®
MOST POWERFUL, MOST SCALABLE
DESKTOP PROCESSOR

CORE i5 X-SERIES
CORE i7 X-SERIES
CORE i9 X-SERIES
CORE i9 EXTREME
The new Intel® Core™ X-series processor family is the ultimate desktop platform, delivering extreme mega-tasking power for today’s demanding enthusiasts and creatives.
NEW INTEL® CORE™ X-SERIES PROCESSOR FAMILY
(Codename: Basin Falls)

NEW and improved Intel® Core™ X-series processors for extreme enthusiasts
• Introducing the first Intel® Core™ Extreme Edition processor with 18 cores
• Most scalable high-end desktop platform ever with options for 18, 16, 14, 12, 10, 8, 6, and 4 cores
• Updated Intel® Turbo Boost Max Technology 3.0
• Rebalanced smart cache hierarchy
• Intel Core® X-series™ processor on new LGA 2066 socket
• Intel® X299 chipset with improved I/O capabilities

EXTREME performance for single-thread and multithread computing
• Up to 14 percent faster multithread performance\(^1\) than previous generation
• Up to 15 percent faster single-thread performance\(^2\) than previous generation
• Massive 36-thread performance and quad-channel memory for content creation and extreme megatasking

ULTIMATE platform for gaming, VR, content creation and overclocking
• Up to 44 lanes of PCIe 3.0 directly connected to the CPU, so systems can be expanded with fast SSDs, multiple discrete graphics cards, and ultrafast Thunderbolt™ 3 technology
• Additional system performance and amazing responsiveness with Intel® Optane™ memory and Intel® Optane™ SSDs
• Fully unlocked processors deliver tuning flexibility for additional performance headroom

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1 Based on SPECint_rate_base2006 (n copy) comparing Intel® Core™ i9-7900X X-series processor (10C20T) vs. Intel® Core™ i7-6950X Processor (10C/20T)
2 Based on SPECint_rate_base2006 (1 copy) comparing Intel® Core™ i9-7900X X-series processor (10C20T) vs. Intel® Core™ i7-6950X Processor (10C/20T)

Note: Performance estimates are preliminary based on pre-silicon projections and are subject to +/- 5% error. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit [http://www.intel.com/benchmarks](http://www.intel.com/benchmarks).
NEW INTEL® CORE™ I9 EXTREME EDITION PROCESSOR

Intel's first 18-core desktop processor
Intel’s highest-performance processor for advanced gaming, VR and content creation

• New! 18 cores, 36 threads
• New! Teraflop CPU
• New! Support for Intel® AVX-512
• Improved Intel® Turbo Boost Max Technology 3.0
• Support for LGA 2066 socket
• 44 PCIe® 3.0 lanes
• Four-channel DDR4-2666 memory support
• Fully unlocked for performance tuning
• Rebalanced Intel® Smart Cache hierarchy
• Intel® Optane™ memory
• Intel® Hyper-Threading Technology (Intel® HT Technology)

For more complete information about performance and benchmark results, visit http://www.intel.com/benchmarks.
**IMPROVED INTEL® TURBO BOOST MAX TECHNOLOGY 3.0**

Updated Intel® Turbo Boost Max Technology 3.0 improves single- and dual-core performance in the new Intel® Core™ X-series processors.

1. Only available on SKUs 7820X, 7900X, 7920X, 7940X, 7960X, 7980XE
NEW INTEL® CORE™ X-SERIES PROCESSOR FAMILY

Intel’s most powerful desktop processors for a new world of gaming and creation

CREATIVITY WITHOUT COMPROMISE

UNRIVALED PC GAMING EXPERIENCES

FREEDOM TO PUSH THE LIMIT
THE ULTIMATE PLATFORM FOR CONTENT CREATION
New Intel® Core™ X-series processor family

EXTREME MEGA-TASKING
- Spend more time creating and less time waiting
- Edit, animate, render, transcode and more – simultaneously

UNLEASH YOUR CREATIVITY
- The ideal platform for editing and rendering high-resolution 4K and VR video and effects
- Fast video transcode, image stabilization, 3D effects rendering and animation

A FULL STUDIO IN YOUR PC
- Create and design on a bank of 4K monitors
- Enjoy multiple options for capture and input
- Output options include 3D and large-format printers
MONSTER PLATFORM FOR PC GAMING

BOOST PERFORMANCE
• Intel's best 4K gaming performance
• Support for two, three or four graphics cards
• Amazing single-threaded game play with the updated Intel® Turbo Boost Max Technology 3.0

EXTREME MEGA-TASKING
• Game, stream, record and encode simultaneously
• Play your favorite game in 4K while broadcasting HD live streams around the world on Twitch* and YouTube*
• Record with the highest quality 4K encode and post highlights in stunning 4K resolution

IMMERSE YOURSELF
• Surround yourself with a cockpit of monitors, with support for up to four discrete GFX cards
• Power up to experience highly demanding virtual reality games

For more complete information about performance and benchmark results, visit http://www.intel.com/benchmarks.
*Other names and brands may be claimed as the property of others
OVERCLOCKING

New Intel® Core™ X-series processor family

UNLEASH THE BEAST
New overclocking features:
• Intel® Advanced Vector Extension-512 (AVX-512) ratio offset
• Memory controller trim voltage control
• PEG/DMI overclocking

Continued support for:
• Per-core overclocking
• Per-core voltage
• Enhanced memory overclocking

EXTREME TUNING
Overclocking simplicity:
• Intel® Extreme Tuning Utility (Intel® XTU)
• Intel® Extreme Memory Profile 2.0 (Intel® XMP) technology

PEACE OF MIND
Upgrade option for overclockers:
• Performance tuning protection plan
Intel® Technologies Work Together for Optimal Performance

More protocols

More speed

40 Gbps – fastest connection

More pixels

Dual 4K displays
60 Hz

More power

100W charging
15W device

Other names and brands may be claimed as the property of others

1 As compared to any other connection to the PC
Separate boxed SKU available from distribution and at retail

## INTEL® LIQUID COOLING TS13X

**HIGH-PERFORMANCE THERMAL SOLUTION FOR ENTHUSIASTS**

Compatible with socket 2011/1366/115X
Estimated retail pricing $85–$100

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Fan speed</td>
<td>800–2,200 RPM (four-wire PWM)</td>
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<tr>
<td>Fan dimensions</td>
<td>120 mm x 120 mm x 25 mm</td>
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<tr>
<td>Fan CFM</td>
<td>73.84 CFM</td>
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<tr>
<td>Unit noise level</td>
<td>21 dBA @ 800 RPM</td>
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<td></td>
<td>35 dBA @ 2,200 RPM</td>
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<tr>
<td>Radiator dimensions</td>
<td>150 mm x 118 mm x 37 mm</td>
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<tr>
<td>Pump Z height</td>
<td>31 mm</td>
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<tr>
<td>Total thermal solution weight</td>
<td>820 grams</td>
</tr>
<tr>
<td>Cooling liquid</td>
<td>Propylene glycol</td>
</tr>
<tr>
<td>Thermal interface material</td>
<td>Dow Corning® TC-1996</td>
</tr>
</tbody>
</table>
NEW DIE MAP FOR INTEL® CORE™ X-SERIES PLATFORM

INTEL® CORE™ I9-7980XE
PROCESSOR DIE MAP
14 nm tri-gate 3D transistors
NEW INTEL® CORE™ X-SERIES PROCESSOR

More core options: 18, 16, 14, 12, 10, 8, 6, and 4

Rebalanced Intel® Smart Cache hierarchy¹

Intel® Turbo Boost Technology

Intel® Hyper-Threading Technology (Intel® HT Technology)

Skylake-X and Kaby Lake-X processors

Support for up to four-channel DDR4

Discrete graphics

Intel® X299 Chipset

DMI

Update: Intel® Turbo Boost Max Technology 3.0²

Support for overclocking with extreme edition and “X” SKUs

Integrated memory controller: Up to four channels DDR4 2666²

Up to 44 lanes PCIe* 3.0

Power = 140W³
Socket: LGA 2066

See product specifications for features supported on the SKUs
1. Rebalanced cache hierarchy. See next slide for details
2. Only available on SKUs 7820X, 7900X, 7920X, 7940X, 7960X, 7980XE
3. On SKUs 7800X, 7820X and 7900X. 7640X and 7740X SKUs have 112W TDP
Shift cache balance from shared-distributed to private-local by enlarging MLC

Shared LLC retained to benefit shared data and to enable capacity balancing

High hit rate on low-latency MLC increases performance
INTEL® X299 CHIPSET
Redefines the enthusiast desktop experience

INCREASED SYSTEM RESPONSIVENESS
Intel® Optane™ memory ready
Faster throughput times with DMI 3.0

IMPROVED I/O CAPABILITIES
30 total high-speed I/O lanes with increased port flexibility:
- Up to 24 PCIe* 3.0 lanes
- Up to eight SATA* 3.0 ports
- Up to 10 USB 3.0 ports
Up to three Intel® Rapid Storage Technology PCIe 3.0 x4 storage support
Supports Intel® Ethernet Connection I219 (Jacksonville LAN PHY)

ULTIMATE SCALABILITY
New Socket R4 (LGA 2066)—compatible with all new Intel® Core™ X-series processors (4C–18C)

1. Compared to HDD alone.
2. Compared to Intel® X99 Chipset.
Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.
INTEL® CORE™ X-SERIES PROCESSOR PARTNERS

Other names and brands may be claimed as the property of others.
## UNLOCKED INTEL® CORE™ X-SERIES PROCESSOR FAMILY

<table>
<thead>
<tr>
<th>Processor number1</th>
<th>Base clock speed (GHz)</th>
<th>Intel® Turbo Boost Technology 2.0 frequency2 (GHz)</th>
<th>Intel® Turbo Boost Max Technology 3.0 frequency3 (GHz)</th>
<th>Cores/threads</th>
<th>L3 cache</th>
<th>PCI Express* 3.0 lanes</th>
<th>Memory support</th>
<th>TDP</th>
<th>Socket (LGA)</th>
<th>RCP pricing (USD 1K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW Intel® Core™ i9-7980XE</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>18/36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2066</td>
<td>$1,999</td>
</tr>
<tr>
<td>NEW Intel® Core™ i9-7960X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16/32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2066</td>
<td>$1,699</td>
</tr>
<tr>
<td>NEW Intel® Core™ i9-7940X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14/28</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2066</td>
<td>$1,399</td>
</tr>
<tr>
<td>NEW Intel® Core™ i9-7920X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12/24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2066</td>
<td>$1,199</td>
</tr>
<tr>
<td>NEW Intel® Core™ i9-7900X</td>
<td>3.3</td>
<td>4.3</td>
<td>4.5</td>
<td>10/20</td>
<td>13.75 MB</td>
<td>44</td>
<td>Four channels DDR4-2666</td>
<td>140W</td>
<td>2066</td>
<td>$999</td>
</tr>
<tr>
<td>NEW Intel® Core™ i7-7820X</td>
<td>3.6</td>
<td>4.3</td>
<td>4.5</td>
<td>8/16</td>
<td>11 MB</td>
<td>28</td>
<td>Four channels DDR4-2666</td>
<td>140W</td>
<td>2066</td>
<td>$599</td>
</tr>
<tr>
<td>NEW Intel® Core™ i7-7800X</td>
<td>3.5</td>
<td>4.0</td>
<td>NA</td>
<td>6/12</td>
<td>8.25 MB</td>
<td>28</td>
<td>Four channels DDR4-2400</td>
<td>140W</td>
<td>2066</td>
<td>$389</td>
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<tr>
<td>NEW Intel® Core™ i7-7740X</td>
<td>4.3</td>
<td>4.5</td>
<td>NA</td>
<td>4/8</td>
<td>8 MB</td>
<td>16</td>
<td>Two channels DDR4-2666</td>
<td>112W</td>
<td>2066</td>
<td>$339</td>
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<tr>
<td>NEW Intel® Core™ i5-7640X</td>
<td>4.0</td>
<td>4.2</td>
<td>NA</td>
<td>4/4</td>
<td>6 MB</td>
<td>16</td>
<td>Two channels DDR4-2666</td>
<td>112W</td>
<td>2066</td>
<td>$242</td>
</tr>
</tbody>
</table>

1. Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See intel.com/products/processor_number for details.
2. Refers to the maximum dual-core frequency that can be achieved with Intel® Turbo Boost Technology 2.0.
3. Refers to the maximum dual-core frequency that can be achieved with Intel® Turbo Boost Max Technology 3.0.
# Intel® Core™ X-Series Generational Platform Comparison

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU cores</td>
<td>18, 16, 14, 12, 10, 8, and 6</td>
<td>4</td>
<td>10, 8, and 6</td>
<td>8 and 6</td>
</tr>
<tr>
<td>Intel® Turbo Boost Max technology 3.0</td>
<td>Yes¹</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Shared cache</td>
<td>Up to 16.5 MB²</td>
<td>Up to 8 MB</td>
<td>Up to 25 MB</td>
<td>Up to 20 MB</td>
</tr>
<tr>
<td>PCIe lanes off of processor</td>
<td>Up to 44 (7800X &amp; 7820X have 28)³</td>
<td>16</td>
<td>Up to 40 (6800K has 28)³</td>
<td>Up to 40 (6800K has 28)³</td>
</tr>
<tr>
<td>Discrete GFX configurations</td>
<td>2x16/4x8⁴ of gen. 3 on processor</td>
<td>1x16/2x8 of gen. 3 on processor</td>
<td>2x16/4x8⁴ of gen. 3 on processor</td>
<td>2x16/4x8⁴ of gen. 3 on processor</td>
</tr>
<tr>
<td>Memory</td>
<td>Four-channel DDR4 2666¹</td>
<td>Two-channel DDR4 2666</td>
<td>Four-channel DDR4 2400</td>
<td>Four-channel DDR4 2133</td>
</tr>
<tr>
<td>TDP</td>
<td>140W</td>
<td>112W</td>
<td>140W</td>
<td>140W</td>
</tr>
<tr>
<td>Socket</td>
<td>LGA 2066</td>
<td>LGA 2066</td>
<td>LGA 2011-v3</td>
<td>LGA 2011-v3</td>
</tr>
<tr>
<td>Unlocked</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

¹ Not available on all SKUs.
² See rebalancing cache hierarchy slide for details.
³ Motherboards must be Thunderbolt™ technology ready.
⁴ Requires additional system clocks to be provided by third-party components.

## Notes:
- The table compares the specifications of Intel® Core™ X-series processors across different generations.
- SKL-X represents the 7th generation, KBL-X represents the 8th generation, BDW-E represents the 6th generation, and HSW-E represents the 4th generation.
- The columns indicate the processor family, year, CPU cores, Intel® Turbo Boost Max technology, shared cache, PCIe lanes off of processor, Discrete GFX configurations, memory, TDP, socket, and unlocked status.

## Additional Information:
- SKL-X: The 7th generation features 18, 16, 14, 12, 10, 8, and 6 quad-core processors.
- KBL-X: The 8th generation features 10, 8, and 6 core processors.
- BDW-E: The 6th generation features 10, 8, and 6 core processors.
- HSW-E: The 4th generation features 8 and 6 core processors.

## Key Features:
- **Turbo Boost Max Technology 3.0**: Available in SKL-X and KBL-X, not in BDW-E or HSW-E.
- **Shared Cache**: SKL-X has up to 16.5 MB, KBL-X has up to 8 MB, BDW-E has up to 25 MB, and HSW-E has up to 20 MB.
- **PCIe Lanes**: SKL-X has up to 44 (7800X & 7820X have 28), KBL-X has 16, BDW-E has up to 40 (6800K has 28), and HSW-E has up to 40 (6800K has 28).
- **Discrete GFX Configurations**: SKL-X has 2x16/4x8⁴ of gen. 3 on processor, KBL-X has 1x16/2x8 of gen. 3 on processor, BDW-E has 2x16/4x8⁴ of gen. 3 on processor, and HSW-E has 2x16/4x8⁴ of gen. 3 on processor.
- **Memory**: SKL-X has four-channel DDR4 2666, KBL-X has two-channel DDR4 2666, BDW-E has four-channel DDR4 2400, and HSW-E has four-channel DDR4 2133.
- **TDP**: SKL-X has 140W, KBL-X has 112W, BDW-E has 140W, and HSW-E has 140W.
- **Socket**: SKL-X has LGA 2066, KBL-X has LGA 2066, BDW-E has LGA 2011-v3, and HSW-E has LGA 2011-v3.
- **Unlocked**: SKL-X and KBL-X are unlocked, BDW-E and HSW-E are unlocked.

## Conclusion:
- The Intel® Core™ X-series processors offer a range of performance options across different generations, with the latest SKL-X and KBL-X generations providing the most advanced features such as Turbo Boost Max Technology 3.0 and increased memory support.
## Desktop Family for Enthusiast Experiences

### Mainstream Performance
- 77xx/76xx/75xx
- Four cores
- Up to 24 PCIe lanes
- Two memory channels
- Premium UHD/4K content
- Intel® Optane™ memory ready and support for Intel® Optane™ SSDs

### Unlocked Performance
- 7700K/7600K
- Four cores
- Up to 24 PCIe lanes
- Two memory channels
- Premium UHD/4K content unlocked
- Intel® Optane™ memory ready and support for Intel Optane SSDs

### Extreme Performance
- 7980XE/7960X/7940X/7920X/7900X/7820X/7800X/7740X/7640X
- Core options: 18, 16, 14, 12, 10, 8, 6, and 4
- Up to 44 PCIe lanes
- Up to four memory channels unlocked
- Updated Intel® Turbo Boost Max Technology 3.0
- Intel® Optane™ memory ready and support for Intel Optane SSDs
## SOLUTIONS FOR A RANGE OF USAGES

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>GAMING</strong></td>
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<td></td>
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<tr>
<td>1080P gaming</td>
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<tr>
<td>QHD gaming</td>
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<tr>
<td>4K gaming or VR gaming</td>
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<td>12K gaming</td>
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<tr>
<td>4K/12K gaming and live streaming</td>
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<td></td>
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<tr>
<td>4K/12K VR gaming and live streaming</td>
<td></td>
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<td><strong>CONTENT CREATION</strong></td>
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<td>Photo editing</td>
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<td>1080P video editing</td>
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<td>360-degree video editing (VR content)</td>
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<td>4K video editing</td>
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<tr>
<td>360-degree 4K video editing (VR content)</td>
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<td><strong>MUSIC CREATION</strong></td>
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<tr>
<td>16 tracks</td>
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<td>Up to 32 GB memory</td>
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<td>&gt; 16 tracks</td>
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<td>Beyond 32 GB</td>
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<td><strong>3D MODELING AND ANIMATION</strong></td>
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<td>3D SFX</td>
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<tr>
<td>CAD design</td>
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</tr>
</tbody>
</table>

1. On select SKUs only: 6 cores to 18 cores.
NEW INTEL® CORE™ X-SERIES PROCESSOR FAMILY

What's new ...
UNLOCKED INTEL® CORE™ X-SERIES PROCESSOR FAMILY

RETAIL PACKAGING

Intel® Core™ i9 Extreme Edition processor

Intel® Core™ i9 X-series processor
Intel® Core™ i7 X-series processor
Intel® Core™ i5 X-series processor
LEGAL DISCLAIMERS

• Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to intel.com/performance.

• All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and road maps.

• Intel processors of the same SKU may vary in frequency or power as a result of natural variability in the production process.

• Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

• Warning: Altering PC clock or memory frequency and/or voltage may (i) reduce system stability and use life of the system, memory and processor; (ii) cause the processor and other system components to fail; (iii) cause reductions in system performance; (iv) cause additional heat or other damage; and (v) affect system data integrity. Intel assumes no responsibility that the memory, included if used with altered clock frequencies and/or voltages, will be fit for any particular purpose. Check with memory manufacturer for warranty and additional details.

• Tests measure performance of components on a particular test, in specific systems. Differences in hardware, software or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit intel.com/benchmarks.

• Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.

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All data measured on version: v1.0.0.1025 driver software and subject to change.

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