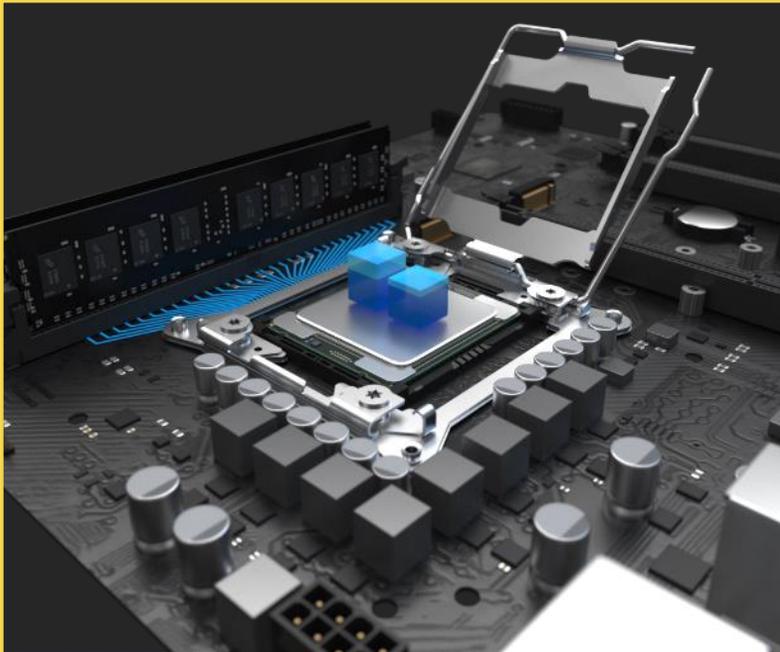


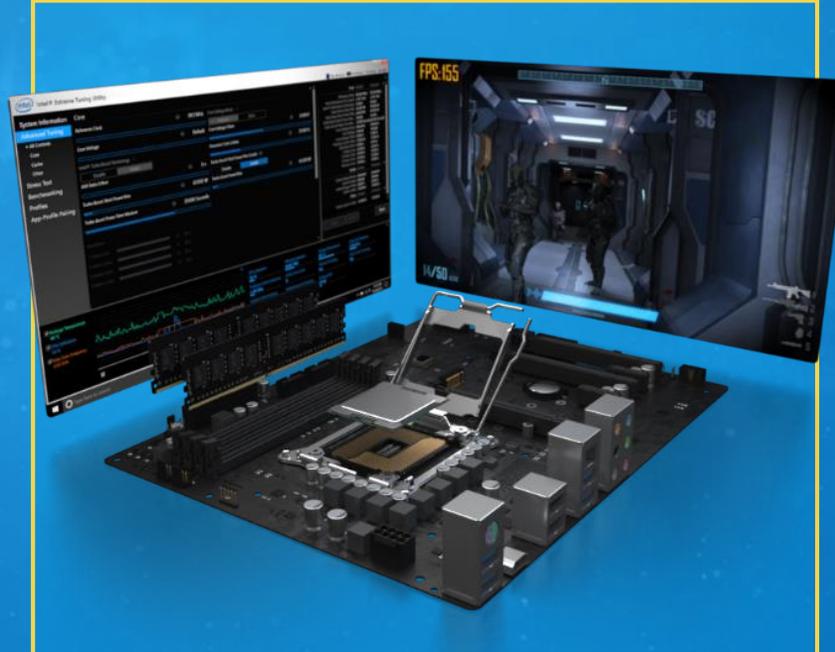
BASICS OF OVERCLOCKING¹



WHAT IS OVERCLOCKING?¹

Push the tuning of your boxed processor to a new level

Overclocking¹ is the process and techniques used to increase the processor's frequencies above or below the processor specification.



OVERCLOCKING¹ UNLOCKED

Now, overclocking¹ isn't only for the professionals.

Everyday overclockers are looking for stability: they want to be able to use the overclocked¹ system on a daily basis without worrying about stability and/or failures.



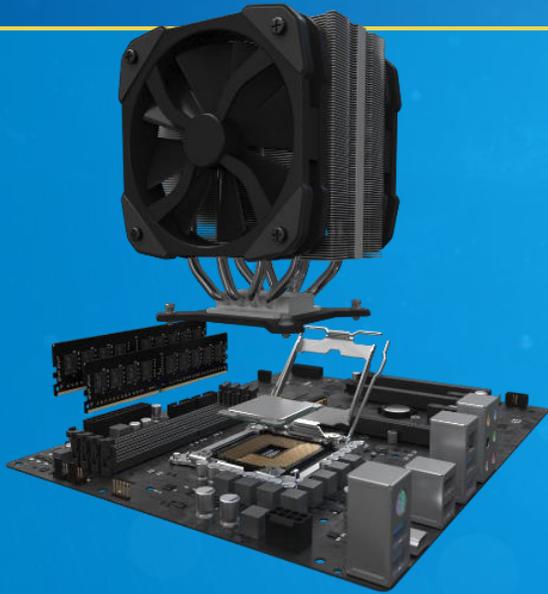
WHY OVERCLOCK?¹

Increased performance for compute intensive tasks.

- Can decrease time for compute workloads like rendering and transcoding media.
- Can increase general system performance including gaming and applications

¹ Altering clock frequency or voltage may damage or reduce the useful life of the processor and other system components, and may reduce system stability and performance. Product warranties may not apply if the processor is operated beyond its specifications. Check with the manufacturers of system and components for additional details.

HOW TO OVERCLOCK¹



WHAT DO YOU NEED?

The right thermal solution², processor and chipset combination is required.



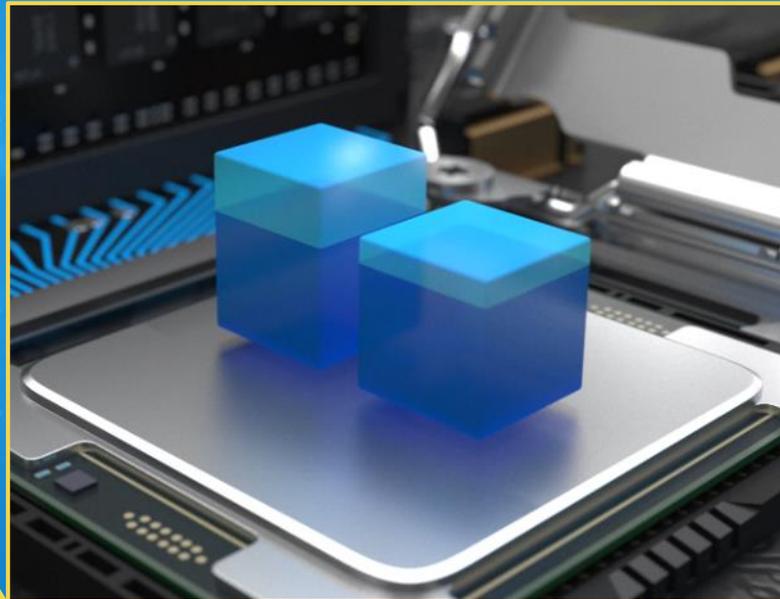
Unlocked Intel® Core™ Processor



Appropriate thermal solution²



Motherboard with Intel® "Z/X" chipset



WHAT ARE YOU CHANGING?

There are a few basic "knobs" that you can use to adjust the system:

- **Base Clock (BCLK) Frequency:** Base frequency clock that the motherboard functions at.
- **CPU Core Multiplier:** Uses the BCLK frequency and "multiplies" it to achieve CPU base frequency.
- **Turbo Multiplier.**

Multipliers		
1 Active Core		35 x
2 Active Cores		34 x
3 Active Cores		33 x
4 Active Cores		33 x

BCLK: 100 MHz Turbo Multiplier: 24 Turbo Frequency: 4.2 GHz

BCLK: 100 MHz Turbo Multiplier: 50 Turbo Frequency: 5.0 GHz

HOW DO YOU DO IT?

Overclock¹, monitor, and stress a system with Intel® Extreme Tuning Utility (Intel® XTU), a simple Windows performance tuning application.

Using Intel® XTU's Modifying Core Multiplier, you can allow the system to run at stock speed with all power states for normal loads but increase the max frequency that Turbo mode will use when needed.

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² There are multiple 3rd party solutions in the market that support overclocking requirements.

OVERCLOCKING¹ REQUIREMENTS

UNLOCKED INTEL® CORE™ PROCESSOR



Intel® Core™ i9 Extreme Edition

Up to 18 Cores/36-way Multitasking.
Ultimate content creation and most immersive VR
Extreme performance and mega-tasking



Unlocked Intel® Core™ i7 Processor

Up to 6 Cores/12-way Multitasking
Amazing VR, gaming and content creation
Seamless multitasking and streaming



Unlocked Intel® Core™ i5 Processor

6 Cores/6-way Multitasking
Great for VR and gaming



Unlocked Intel® Core™ i3 Processor

4 Cores/4-way Multitasking
Entry overclocking and casual gaming processor

THERMAL SOLUTION²

Increased cooling capabilities are critical for overclocking: High-end Air Heat sinks, All in one liquid coolers; Custom liquid coolers



MOTHERBOARD

Motherboard with Intel® “Z/X” chipset



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² There are multiple 3rd party solutions in the market that support overclocking requirements.



RISKS AND PROTECTION

UNDERSTANDING THE RISKS OF OVERCLOCKING¹

- Altering PC clock or memory frequency and/or voltage may:
- Reduce system stability and use life of the system, memory and processor
 - Cause the processor and other system components to fail
 - Cause reductions in system performance
 - Cause additional heat or other damage
 - Affect system data integrity

PERFORMANCE TUNING PROTECTION PLAN

Overlocking¹ is not covered under the Standard Intel Warranty. With the Performance Tuning Protection Plan, Intel allows a single replacement for a qualified processor, in addition to the standard 3 year warranty

Covers processor failure due to running outside of Intel[®] specifications, hassle-free. Plans may be purchased for all unlocked boxed processors
Learn more: <http://click.intel.com/tuningplan>



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CHOOSING A MOTHERBOARD FOR OVERCLOCKING¹



FEATURE	POTENTIAL Z/X CONFIGURATION	POTENTIAL B/H CONFIGURATION
Intel® Enabled for Overclocking	Yes	No
Overclock Auto-Tuning	Yes	No
Power Delivery	Multi-Phase / Digital	Analog / Single Phase
Multi-GPU Enabled	SLI* / Crossfire*	No
I/O Enablement	Additional Ports / 3 rd Party Controllers	Basic Chipset
Cooling Feature	Enhanced Chipset Cooling / Extra Fan Headers	Basic Chipset Cooling / Minimal Fan Headers
PCIe Configuration	Maximum PCIe lane usage / Flexible Physical Slots	Basic PCIe usage / Minimal Physical Slots

Intel recommends enthusiasts select motherboards with Z or X chipsets that are designed to support tunability features of Intel K and X/E SKUs

INTEL® EXTREME TUNING UTILITY

XTU or Intel® Extreme Tuning Utility is available directly from Intel:
<http://www.intel.com/content/www/us/en/motherboards/desktop-motherboards/desktop-boards-software-extreme-tuning-utility.html>

ODMs who build motherboards that overclock and can make settings available through BIOS.

OVERCLOCKING¹ USING CORE MULTIPLIER IN INTEL® XTU

Modifying Core Multiplier, you allow the system to run at stock speed with all power states for normal loads but increase the max frequency that Turbo mode will use when needed.



BCLK: 100 MHz

Turbo Multiplier: 24

Turbo Frequency: 4.2 GHz

BCLK: 100 MHz

Turbo Multiplier: 50

Turbo Frequency: 5.0 GHz

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