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AMD Ryzen 5 1600 overclocking guide.

This guide will be an overclocking guide for the setup listed below. Using a B350 chipset motherboard I have another guide listed below for an X370 motherboard. I will not go deep into explaining the basics and will only list volts and numbers. I am assuming you have done this before I am writing this to supplement AMD Reddit and other AMD overclocking sources.

My Ryzen 5 1600X guide is located in the links below as well as a guide for the 8086k/8700k, Z390 and X370 motherboards and some upgrades included as well.
Ryzen 5 OC'ing the 1600X.
Intel i7 OC'íng the 8086K on Z390.
Streaming and/or recording using OBS NDI Tutorial.

My Rig.

- Case: Phanteks Enthoo Luxe.
- Motherboard: ASUS Prime B350-Plus.
- CPU: Ryzen 5 1600 Retail.
- RAM: Corsair DDR4 LPX White 16 GB 3000.
- GPU: MSI GTX 960 4GB.
- PSU: Sharkoon 600 Watt semi-modular.
- OZC Agility 3 256GB C Drive, WD Green/Blue 1TB storage drives.
- Cooling: CoolerMaster 212 EVO and AMD Wraith Spire.
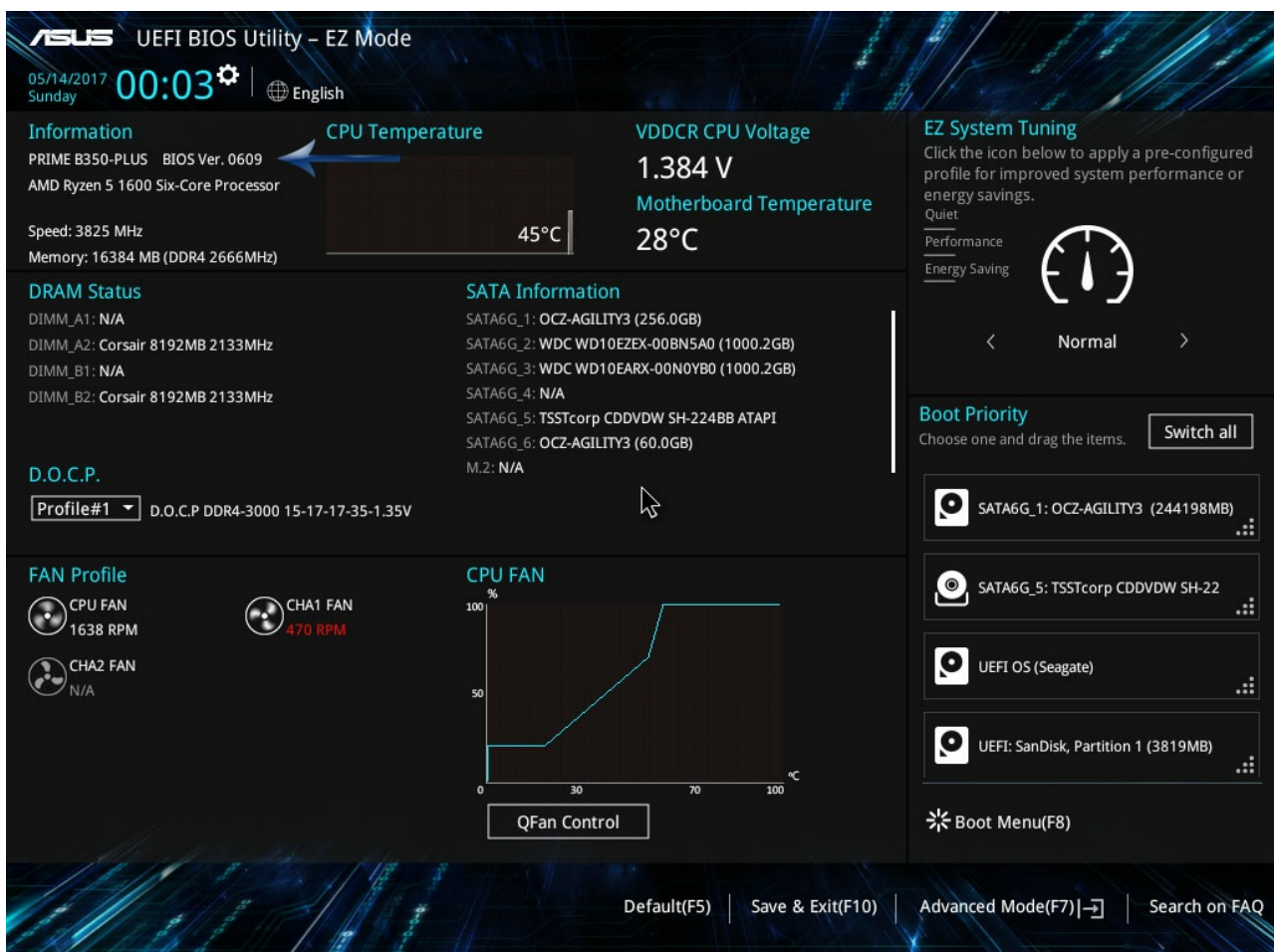- Case fans: 2 x 120mm and 1 x 140mm push fans, 1x 120mm and 3 x 140mm pull fans.

A medium-range setup, nothing really fancy for a workstation but it works like a charm.My Antec 650 Gold PSU went bust and I replaced it with a Sharkoon that was on hands, will either go back to Antec or a Corsair PSU ASAP.This rig will run programs like Photoshop, some recording with Nvidia shadowplay, gaming, some web page editing, music, browsing etc on a daily basis.While I could get away with not overclocking Ryzen shines when you push it and get the best results performance-wise.

Getting Started with the AMD Ryzen 5 1600.

Skipping the part of installing all the hardware in your case since that should be covered in the manuals. Do ensure that you apply the RIGHT amount of thermal paste so that your CPU cooler will work as it supposes to. When booting up the first time make sure to go right into your BIOS and update the BIOS to the latest drivers this will enhance stability from the get-go. Also, memory and other hardware support will be in the latest BIOS version if feeling brave use a Beta release BIOS but that might not be wise. The updating BIOS in the ASUS motherboards can be done inside the BIOS, in the worse case you need to use a flash drive. Boot up your system one time to see if you installed the components correctly and make a baseline performance test with Passmark or Cinebench. Restart and boot back into your BIOS, ensure that you have the latest drivers and updates for stability and support purposes!
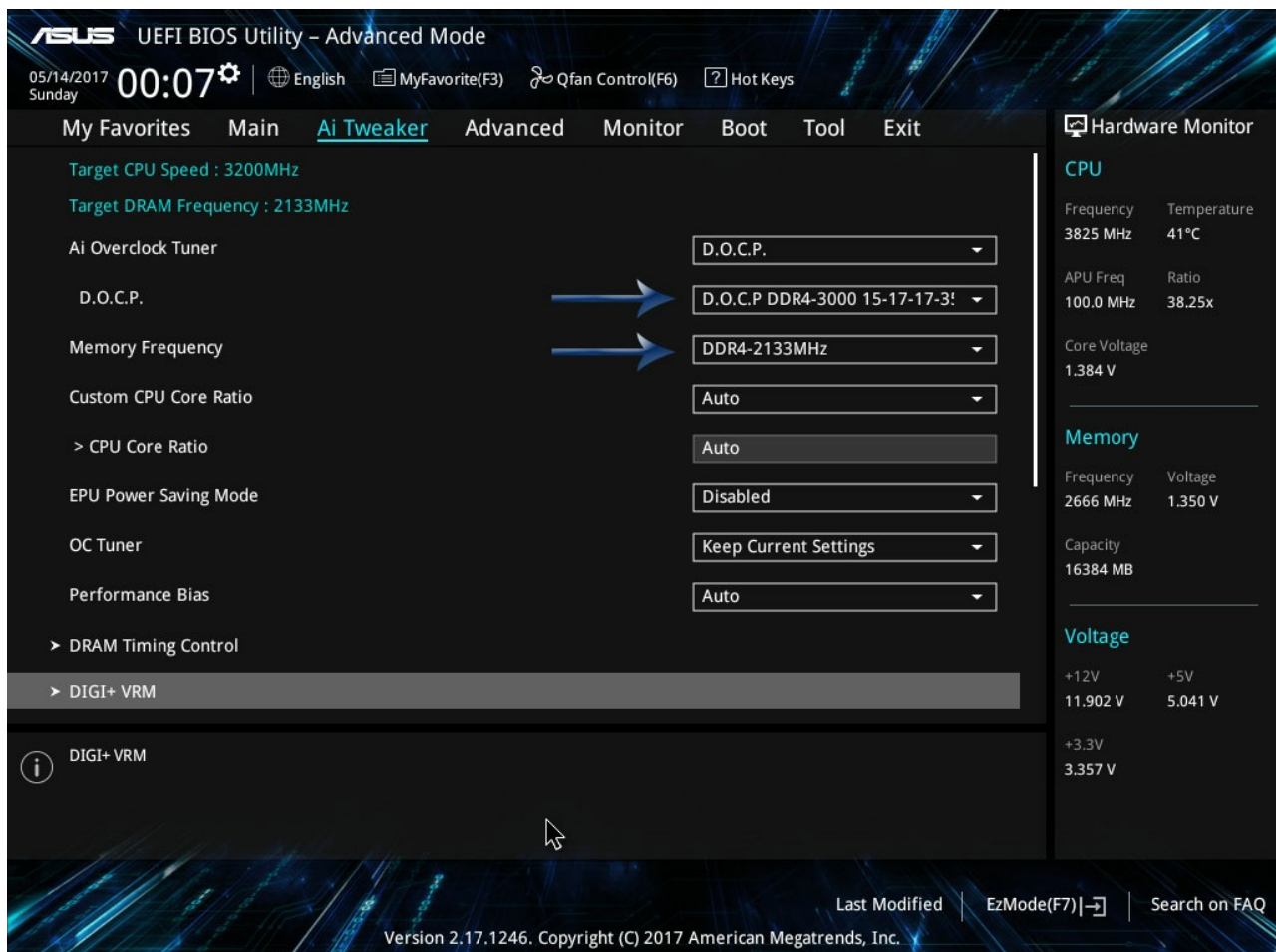
You also want to download the following programs for stress testing your overclock. These are a vital tool for stress testing and monitoring if you already have tools you can use those but these programs I highly recommend and were used while writing this overclocking guide.

- HWiNFO64: https://www.hwinfo.com/download/
- Prime 95: https://www.mersenne.org/download/

BIOS Settings.

Make sure your RAM profile is set to 2133mhz, not DOCP/XMP/A-XMP max 3000/3200mhz and up, just the basic 2133mhz all DDR4 runs on. Set the optimal RAM clocks speed after achieving a stable CPU overclock since Ryzen still has some compatibility issues. What RAM MHz you can pick also has to do with the die quality of the components, Samsung allows for the best results anything else will be lower. You can check your die quality with THAIPHOON BURNER and see for yourself, manufacturers have a list but this tool is far easier and quicker.
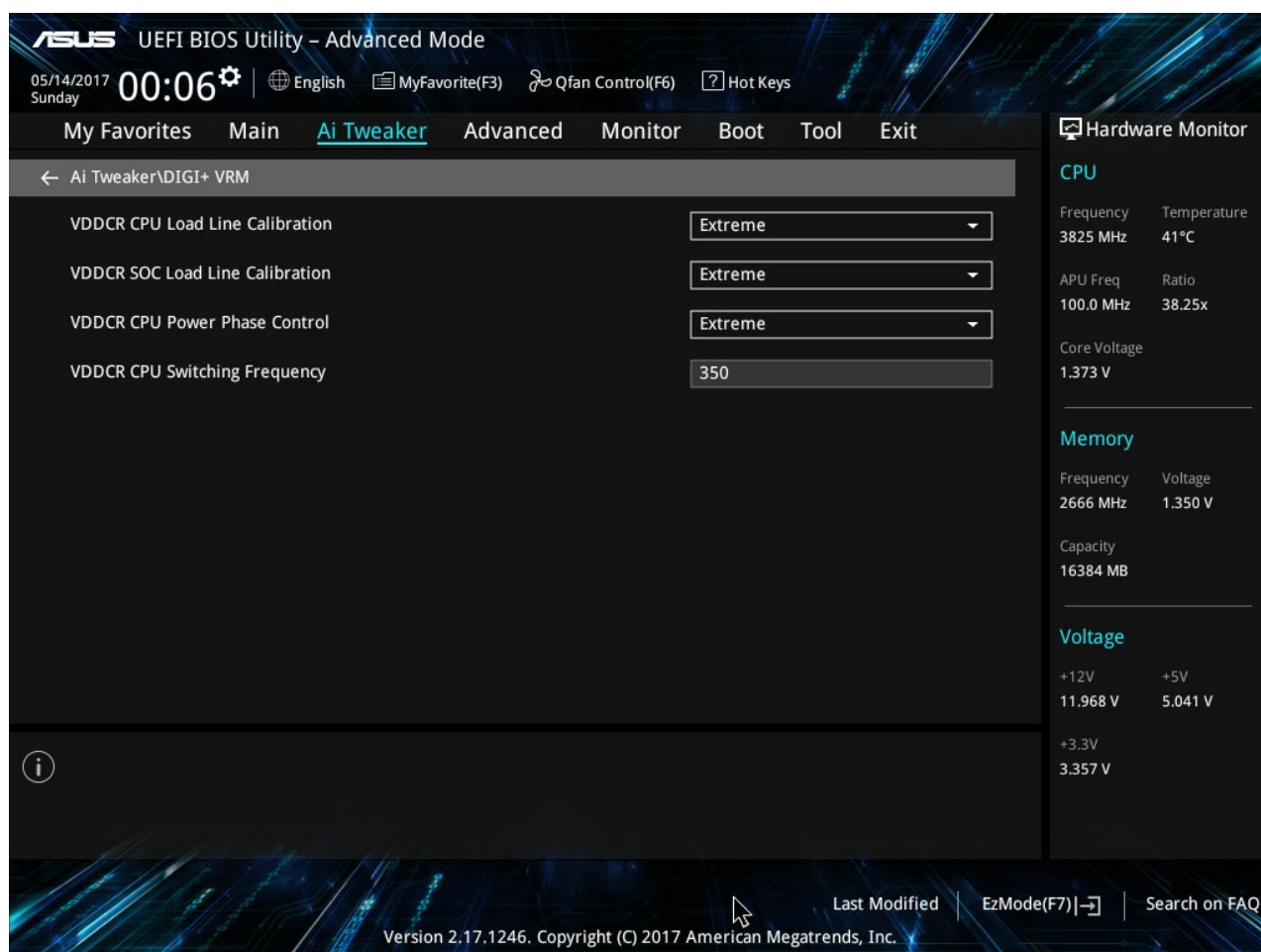

Now it is time to set the Ryzen 5 clock, in ASUS it is called CPU Core Ratio, MSI calls it CPU Frequency. Each chip Intel or AMD Ryzen will behave differently, the OC community phrase would be "silicone lottery" and it is winning or losing.
That said any Ryzen should be able to reach 3800mhz or I would recommend a refund and replacement with a better chip. They can go as high as 4000mhz or even higher but that is winning the silicon lottery or being blessed with an engineering sample.
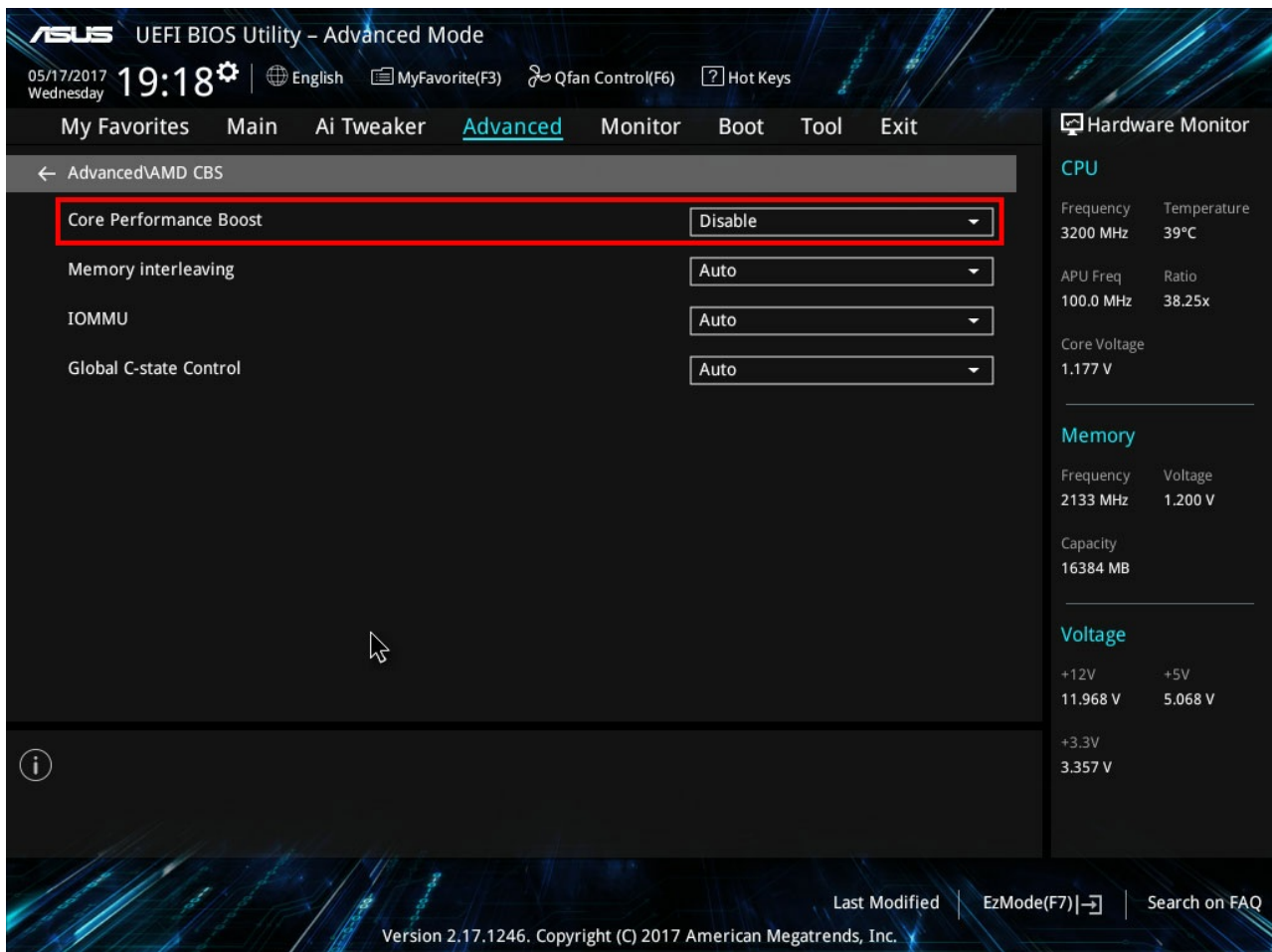
DIGI+ VRM Settings.

These settings help with achieving greater overclocks and stability of the overclocks, setting this in the BIOS over AI Suite is better since it might reset. Setting them to extreme will only affect power consumption do make sure to set the VDDCR CPU

Switching Frequency to 350 MHz and not higher. You can tinker with these settings once you have achieved a stable overclock, see if you can reduce power consumption, this is a starting point, not the end.

AMD CBS.

Here you can find some important settings, for now, leave everything on Auto but *Disable* Core Performance Boost and Global C-state Control, this will hamper stable overclocking if left on. Core Performance Boost to put it simply is the boost function of your CPU within set guidelines from AMD to increase core clocks and VDDCR CPU voltage. Global C-state Control does the opposite and will lower core clocks and VDDCR CPU voltage when the CPU idles.
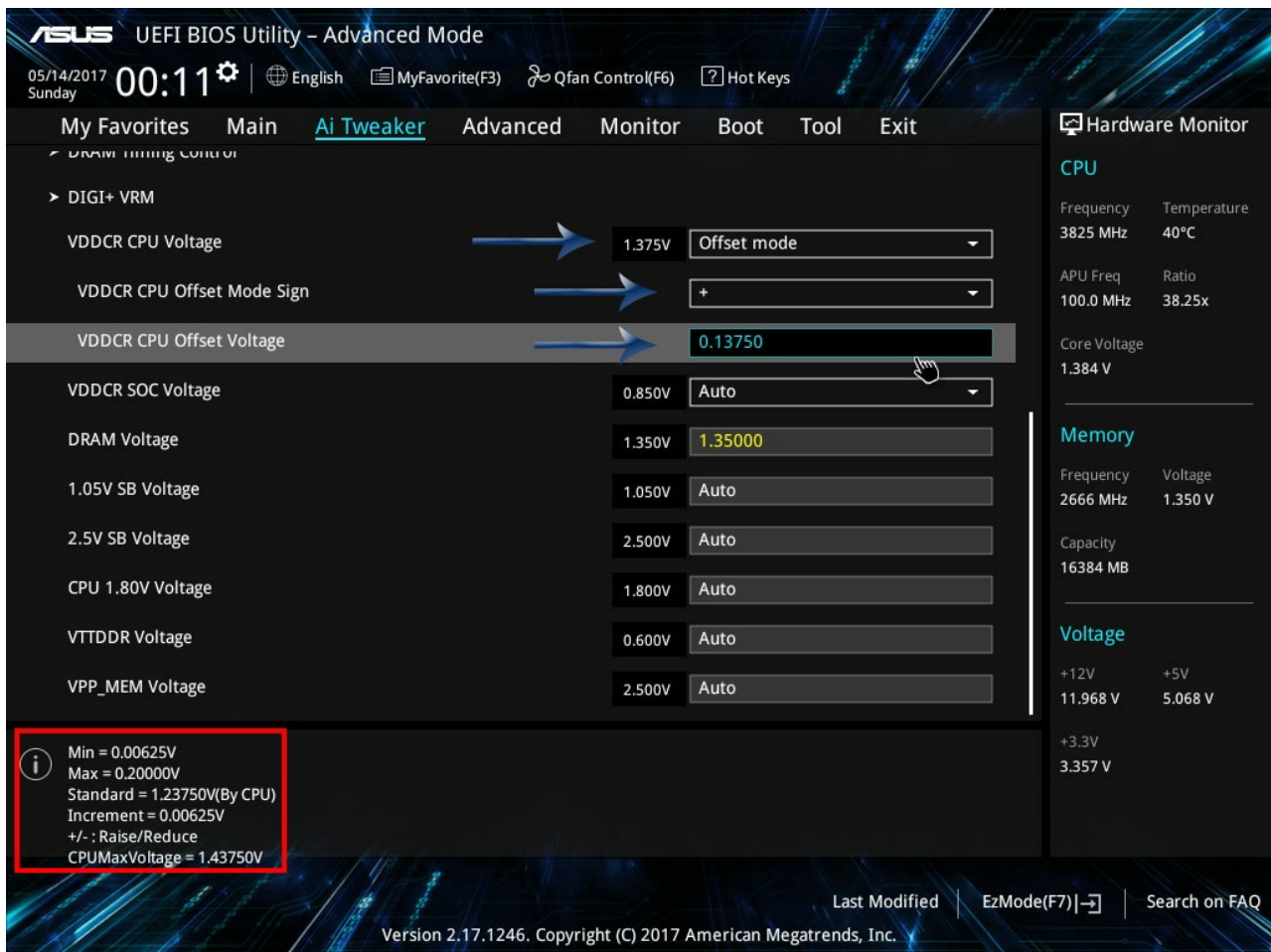
CPU Core Volts.

There are several volt ranges you need to consider, for those who are new to overclocking voltage and CPU core ratio/frequency will attribute to your overclock. The ratio of your clock should be seen as x multiplied by 100, mostly 99.9 and 99.8 what then translates into overclock speed, higher ratios need more volts. The voltage will result in more or less heat being produced there for you need cooling, the voltage can be different per chip due to the silicone lottery. Lower volts is always better but is not always possible, and will set a limit on how far you can overclock combined with the CPU core ratio/frequency.

- AMD Recommended Voltage: *1.350 and 1.375 volts.*
- Community Recommended Voltage: *1.400 and 1,450 volts.*
- Absolute max and not recommended: *1.500 and 1550 volts.*

Here we start with an overclock speed of 3800 MHz, set CPU Core Ratio to 38.00, disable EPU Power Saving mode and OC Tuner. Now it is time to adjust the CPU voltage, VDDCR CPU Voltage in this BIOS also to note this offers an offset and not a manual mode. Set the CPU Voltage to *Offset Mode*, *Offset Mode Sign to* + and *Offset Voltage to 0.13750*. Exit the BIOS and save these settings, you can also opt to save as a profile under the Tool section of this BIOS and reboot.

Stability and Tweaks.

Unless the silicone lottery hates you it should reboot and now you use Cinebench and Prime to run a quick stability test. If your settings are stable and they should be you can try to lower the CPU Offset Voltage to lower your temperatures.
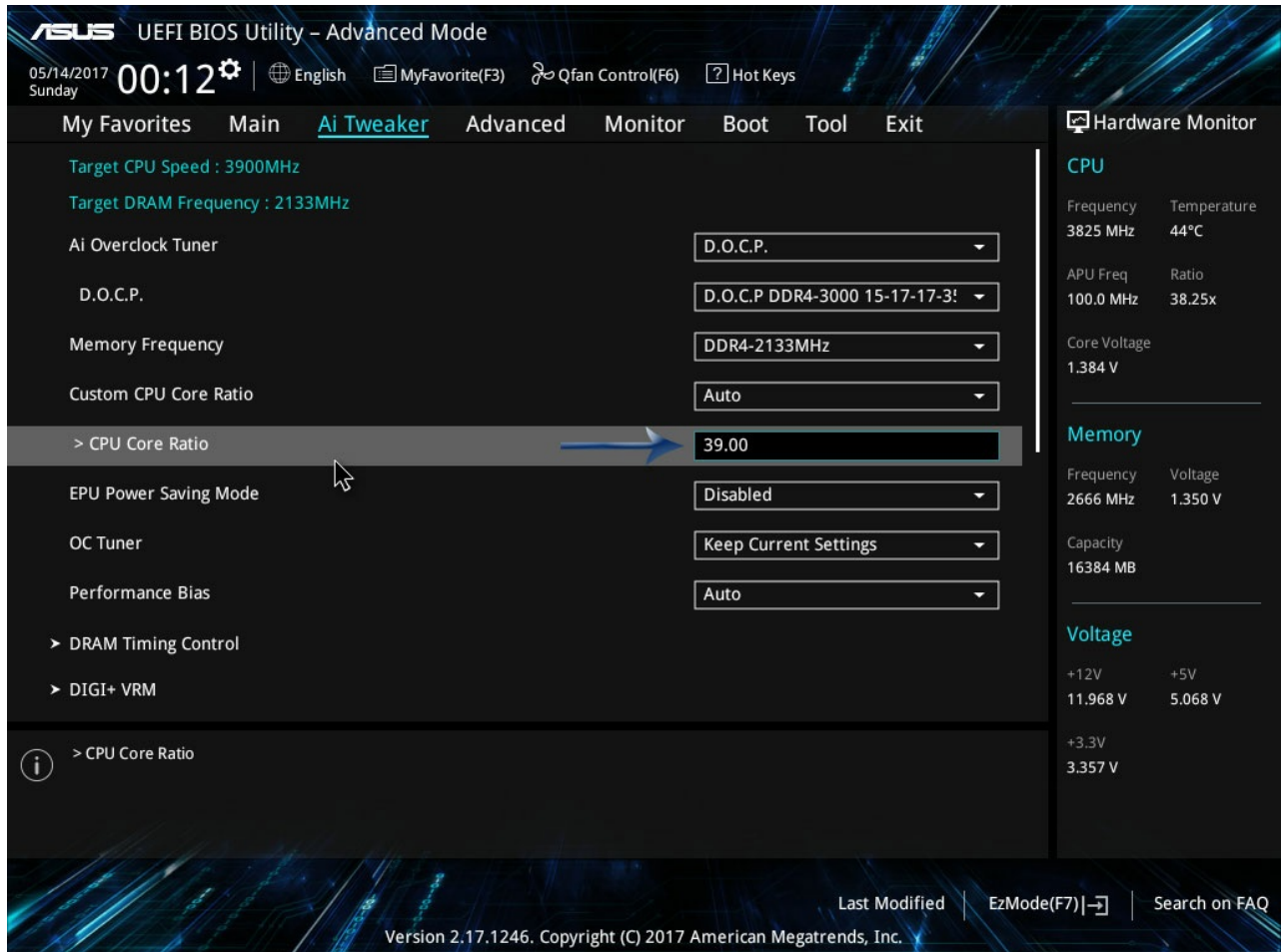As shown in the picture the increments are 0.00625 volts use that to lower the CPU Voltage while remaining stable in Prime95/Cinebench. Make sure to keep an eye on those temperatures for that I would recommend HWMonitor, no individual core temperature programs are updated yet. You can also set your XMP/A-XMP/DOCP profile above the basic 2133 MHz, I was not blessed with a Samsung B-die so mine, for now, is set at 2666 MHz.
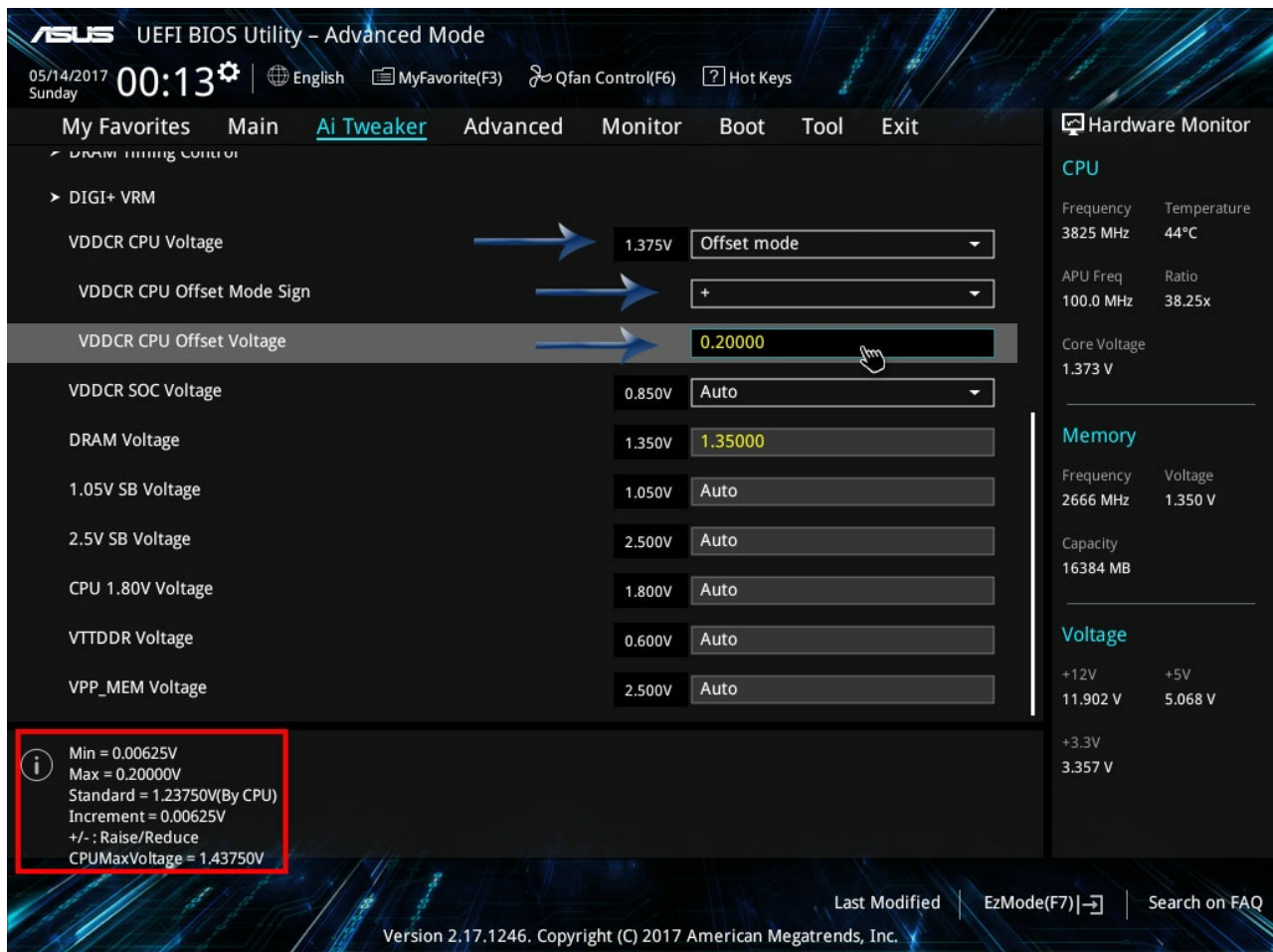
Here is my CPU-Z validation link for my 38.25: https://valid.x86.fr/z9ia69

My Absolute Max, 3900 MHz.

I spend days reading up on Ryzen and the overclocking potential I have not touched my

DDR4 RAM yet, waiting for some BIOS update. Temperatures even with the stock cooler are acceptable but the core voltage is above the AMD recommended value. Therefore I opted to go back to my 38.25 clocks what yielded me to best results, with BIOS updates I hope this will become more viable.

The new AMD Ryzen CPU chip is amazing especially considering the price, with a good overclock you can take on CPU's double in price. Happy I took the plunge and invested in a Ryzen 5 chip with my upgrade, Intel better steps up its game because this is stiff competition. With that I conclude my small guide, I hope this has helped the readers and saved them some time.

- Paul Ripmeester