

Basic BIOS Guide for CTR 2.1 (beta 6)

ASUS
GIGABYTE™

ASRock
 **msi**

Whats new? V1.1


- Added the hint to disable PBO after checking CO values, on each of the summary slides (in the step by step guide it was already correctly described)
- Added a explanation for Asus Boards: Extreme Tweaker = AI Tweaker on some boards
- Some polishing

Basic BIOS Guide for CTR

The aim of this guide is to bring the basic BIOS setting for CTR closer to both the absolute beginner and the more experienced user.

Content

- **Step by step guide (for the absolute beginner)**

 page 3-11

 page 12-20

 page 21-28

 page 29-36

- **Summary of BIOS settings (more experienced user)**

 page 11

 page 20

 page 28

 page 36

Basic Bios Guide for CTR



UEFI BIOS Utility – Advanced Mode

02/21/2021 Sunday 19:40 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA(F4) ReSize BAR

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

Target FCLK Frequency : 1866MHz

AI Overclock Tuner

Memory Frequency

FCLK Frequency

Core Performance Boost

CPU Core Ratio

> CPU Core Ratio (Per CCX)

TPU

Performance Bias

> Precision Boost Overdrive

> DRAM Timing Control

> External Digi+ Power Control

1 Automatically overclocks the CPU and DRAM to enhance system performance.

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	48°C

BCLK	Core Voltage
100.00 MHz	1.473 V

Ratio 37x

Memory

Frequency	Voltage
3733 MHz	1.360 V

Capacity 32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V

+3.3V 3.328 V

Last Modified | EzMode(F7) | Hot Keys | Search on FAQ

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Go into “Extreme Tweaker” slide

On some Asus boards it is called “AI Tweaker”!

Set following settings to...

- Core Performance Boost -> Auto
- CPU Core Ratio -> Auto
- Performance Bias -> Auto

Scroll down

UEFI BIOS Utility – Advanced Mode

02/21/2021 Sunday 19:41 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA(F4) ReSize BAR

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

> DRAM Timing Control

> External Digi+ Power Control

> Tweaker's Paradise

CPU Core Voltage

CPU SOC Voltage

- VDDSOC Voltage Override

DRAM Voltage

VDDG CCD Voltage Control

VDDG IOD Voltage Control

CLDO VDDP voltage

1.00V SB Voltage

1.8V PLL Voltage

1 Increase to help CPU Core Frequency overclock.

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	50°C

BCLK	Core Voltage
100.00 MHz	1.473 V

Ratio 37x

Memory

Frequency	Voltage
3733 MHz	1.360 V

Capacity 32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V

+3.3V 3.328 V

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Set following settings to...

- CPU Core Voltage -> Auto
- CPU SOC Voltage -> Manual
 - Set VDDSOC Voltage Override to 1.15 - 1.20 V
- VDDG CCD Voltage Control -> 0,95 - 0,975 V

Scroll up

Basic Bios Guide for CTR



UEFI BIOS Utility – Advanced Mode
02/21/2021 Sunday 19:42 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA(F4) ReSize BAR

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

← Extreme Tweaker/Precision Boost Overdrive

PBO Fmax Enhancer

Precision Boost Overdrive

Precision Boost Overdrive Scalar

Max CPU Boost Clock Override

Platform Thermal Throttle Limit

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	49°C
BCLK	Core Voltage
100.00 MHz	1.473 V
Ratio	37x

Memory

Frequency	Voltage
3733 MHz	1.360 V
Capacity	32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V
+3.3V	3.328 V

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Go into “Precision Boost Overdrive” menu

Set ALL options to Auto

Go back to “Extreme Tweaker” slide

UEFI BIOS Utility – Advanced Mode
02/21/2021 Sunday 19:40 English MyFavorite(F3) Qfan Control(F6) EZ Tuning Wizard(F11) Search(F9) AURA(F4) ReSize BAR

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

Target FCLK Frequency : 1866MHz

AI Overclock Tuner

Memory Frequency

FCLK Frequency

Core Performance Boost

CPU Core Ratio

> CPU Core Ratio (Per CCK)

TPU

Performance Bias

> Precision Boost Overdrive

> DRAM Timing Control

> External Digi+ Power Control

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	48°C
BCLK	Core Voltage
100.00 MHz	1.473 V
Ratio	37x

Memory

Frequency	Voltage
3733 MHz	1.360 V
Capacity	32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V
+3.3V	3.328 V

Automatically overclocks the CPU and DRAM to enhance system performance.

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Go into “External Digi+ Power Control”

Basic Bios Guide for CTR



UEFI BIOS Utility – Advanced Mode
02/23/2021 Tuesday 02:11

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

← Extreme Tweaker/External Digi+ Power Control

Voltage Monitor

CPU Load-line Calibration

CPU Current Capability

CPU VRM Switching Frequency

VRM Spread Spectrum

CPU Power Duty Control

CPU Power Phase Control

Manual Adjustment

CPU Power Thermal Control

VDDSOC Load-line Calibration

VDDSOC Switching Frequency

① CPU Load Line Calibration is defined by AMD VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher value could get higher voltage and good overlocking performance but increase the CPU and VRM thermal.

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	48°C

BCLK	Core Voltage
100.00 MHz	1.465 V

Ratio 37x

Memory

Frequency	Voltage
3800 MHz	1.384 V

Capacity 32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V

+3.3V	
3.328 V	

Last Modified | EzMode(F7) | Hot Keys | Search on FAQ
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Set following settings to...

- CPU Load-line Calibration -> Auto
- CPU Current Capability -> 130%
- CPU Power Duty Control -> T.Probe
- CPU Power Phase Control -> Power Phase Response
 - Manual Adjustment -> Ultra Fast

Go back to “Extreme Tweaker” slide

UEFI BIOS Utility – Advanced Mode
02/21/2021 Sunday 19:42

My Favorites Main **Extreme Tweaker** Advanced Monitor Boot Tool Exit

← Extreme Tweaker/Precision Boost Overdrive

PBO Fmax Enhancer

Precision Boost Overdrive

Precision Boost Overdrive Scalar

Max CPU Boost Clock Override

Platform Thermal Throttle Limit

Hardware Monitor

CPU

Frequency	Temperature
3700 MHz	49°C

BCLK	Core Voltage
100.00 MHz	1.473 V

Ratio 37x

Memory

Frequency	Voltage
3733 MHz	1.360 V

Capacity 32768 MB

Voltage

+12V	+5V
12.208 V	5.000 V

+3.3V	
3.328 V	

Last Modified | EzMode(F7) | Hot Keys | Search on FAQ
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Go into “Precision Boost Overdrive” menu

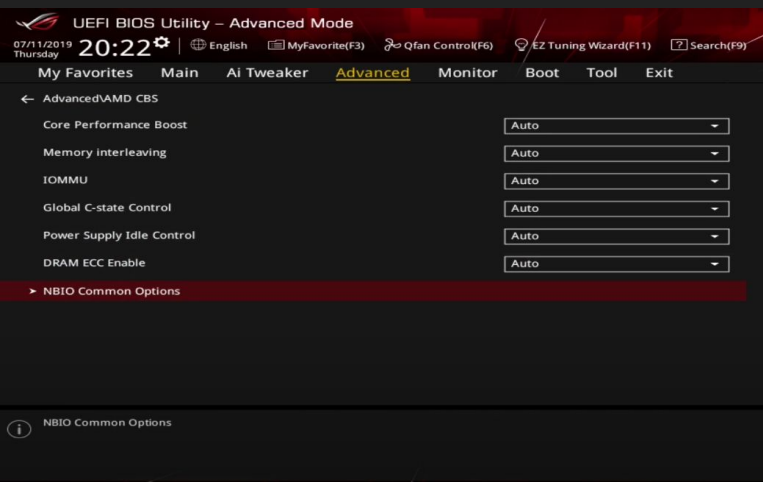
Set ALL options to Auto

Switch to “Advanced” slide

Basic Bios Guide for CTR



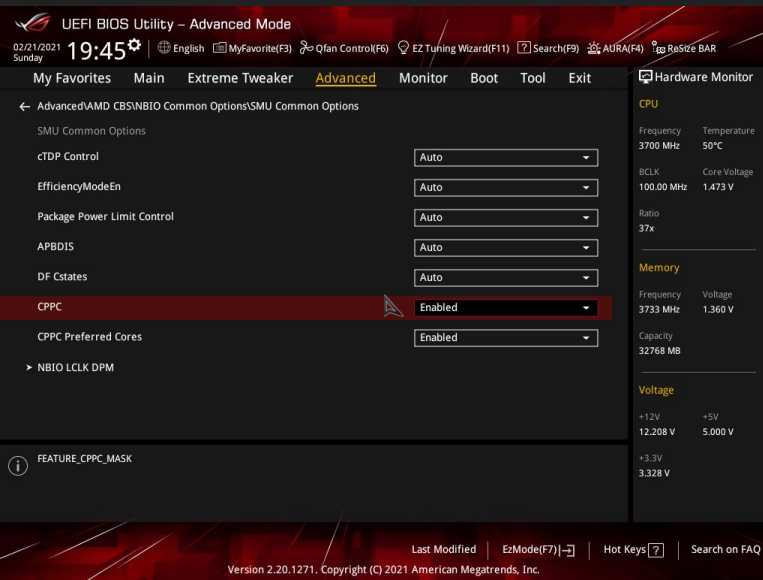
Go into “AMD CBS” menu



Set “Global C-state Control” to Enabled

Go into “NBIO Common Options”

Basic Bios Guide for CTR



Set following settings to...

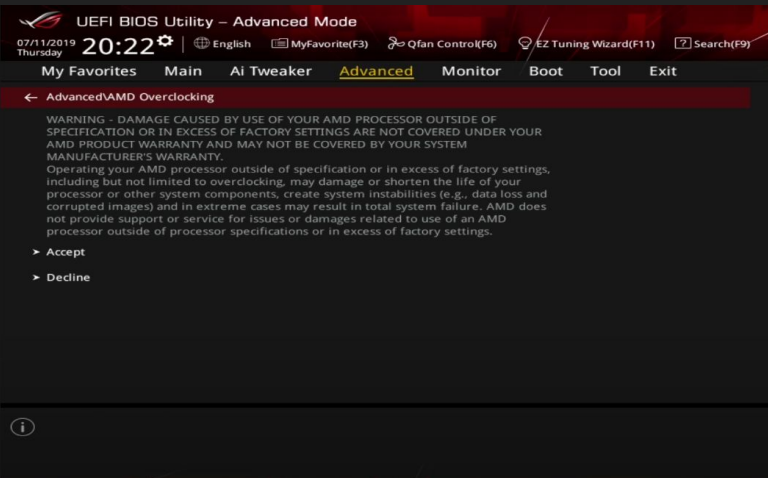
- CPPC -> Enabled
- CPPC Preferred Cores -> Enabled

Go back to “Advanced” slide

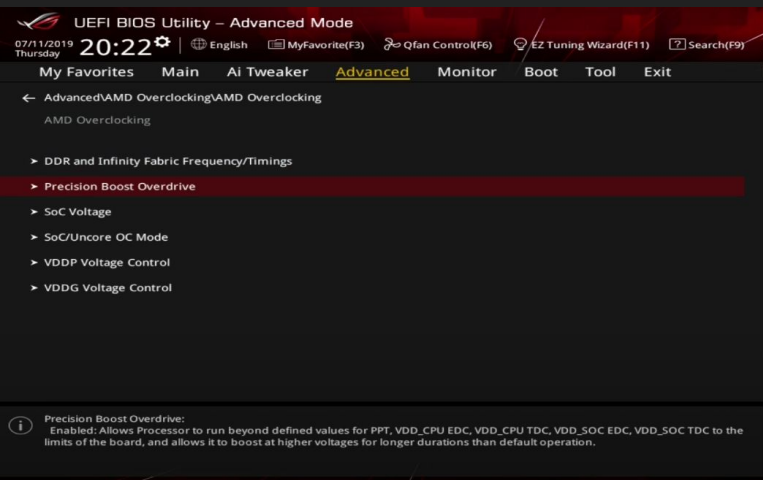


Go into “AMD Overclocking” menu

Basic Bios Guide for CTR

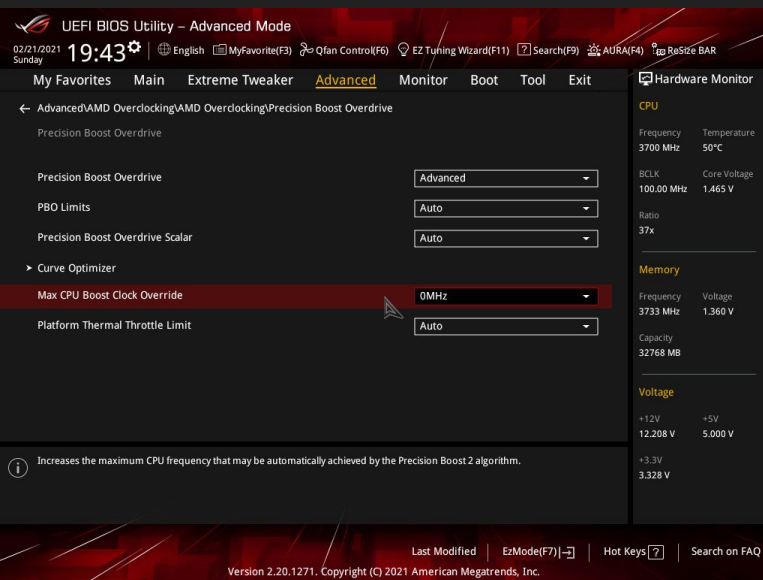


Accept the warning!



Go into “Precision Boost Overdrive” menu

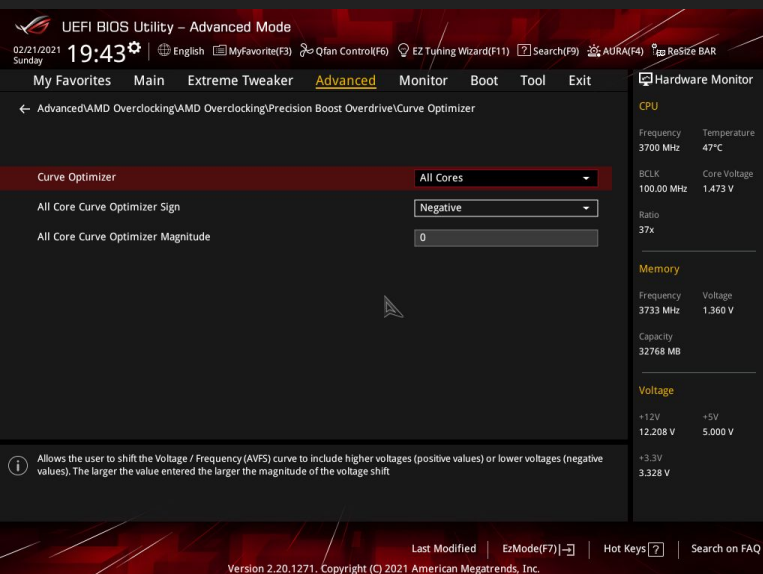
Basic Bios Guide for CTR



Set following settings to...

- Precision Boost Overdrive -> Advanced
- PBO Limits -> Auto
- Precision Boost Scalar -> Auto
- Max CPU Boost Override -> 0MHz
- Platform Thermal Throttle Limit -> Auto

Go into “Curve Optimizer” menu



Set “Curve Optimizer” to All Cores

Make sure the “All Core Curve Optimizer Magnitude” is 0

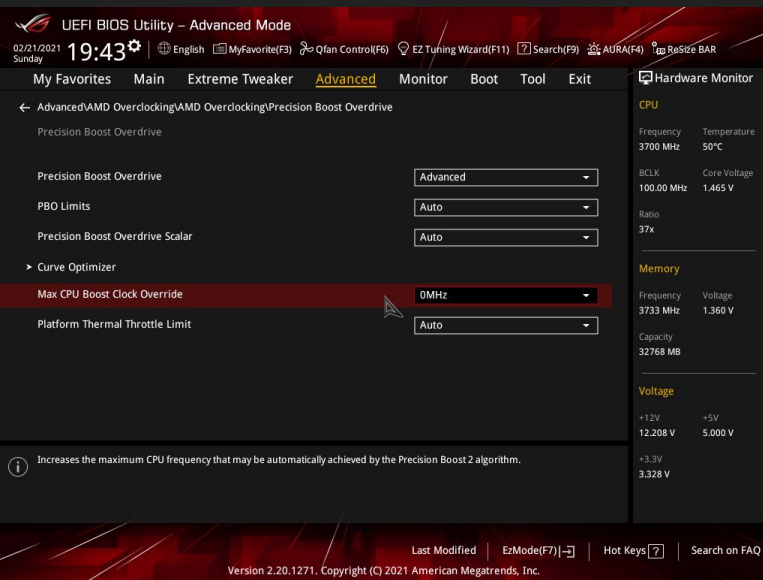
“All Core Curve Optimizer Sign” doesn’t matter!

Set “Curve Optimizer” to Per Core

Make sure all of the “Core Curve Optimizer Magnitude” are 0

Set “Curve Optimizer” to disabled

Basic Bios Guide for CTR



Go back to “Precision Boost Overdrive” menu

Set “Precision Boost Overdrive” to disabled

You are done!



Summary of BIOS settings for

Extreme Tweaker

- Core Performance Boost -> Auto
- CPU Core Ratio -> Auto
- Performance Bias -> Auto
- CPU Core Voltage -> Auto
- CPU SOC Voltage -> Manual
 - Set VDDSOC Voltage Override to 1.15 - 1.20 V
- VDDG CCD Voltage Control -> 0,95 - 0,975 V

External Digi+ Power Control menu

- CPU Load-line Calibration -> Auto
- CPU Current Capability -> 130%
- CPU Power Duty Control -> T.Probe
- CPU Power Phase Control -> Power Phase Response
 - Manual Adjustment -> Ultra Fast
- CPU Power Thermal Control -> 120

Curve Optimizer and PBO

- All options to Auto!
- Make sure all Curve Optimizer values are 0 in both menus (All Core and Per Core). Due to a bug it can be that these settings are still activated even though Curve Optimizer is set to disabled!
- After that, set PBO to disabled

AMD CBS menu

- Set Global C-state Control to Enabled
- Set CPPC to Enabled
- Set CPPC Preferred Cores to Enabled

Basic Bios Guide for CTR



Go into “OC Tweaker” slide

Set following settings to...

- CPU Frequency and Voltage (VID) -> Auto
- Soc/Uncore OC Voltage(VID) -> 1,15-1,20 V
- VDDG CCD Voltage Control -> Manual
 - Set voltage to 0,95-0,975 V

Go into “External Voltage Settings and Load-Line Calibration”



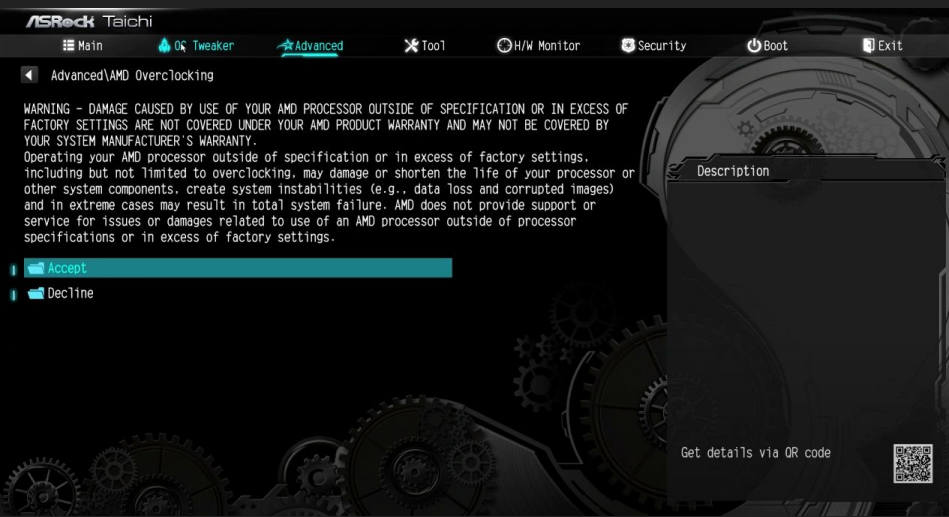
Set ALL settings to Auto

Go back and switch to the “Advanced” slide

Basic Bios Guide for CTR



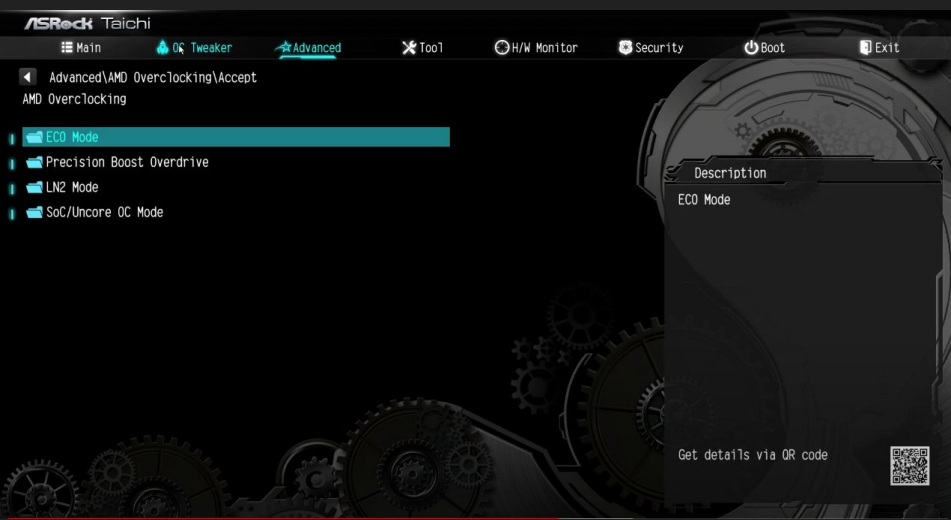
Go into “AMD Overclocking menu”



Accept the warning

Basic Bios Guide for CTR

Go into "Precision Boost Overdrive" menu



Switch "Precision Boost Overdrive" from Auto to Advanced



Basic Bios Guide for CTR



Set the following settings to...

- PBO Limits -> Auto
- Precision Boost Overdrive Scalar -> Auto
- Max CPU Boost Clock Override -> Auto / 0 Mhz
- Platform Thermal Throttle Limit -> Auto

Go into "Curve Optimizer" menu

Please ignore the values of the screenshot - it is only for demonstration!



Set "Curve Optimizer" to All Cores

Make sure the "All Core Curve Optimizer Magnitude" is 0

"All Core Curve Optimizer Sign" doesn't matter!

Set "Curve Optimizer" to Per Core

Basic Bios Guide for CTR



Make sure that all of the “Curve Optimizer Magnitude” are 0

“All Core Curve Optimizer Sign” doesn’t matter!

Set “Curve Optimizer” to disabled

Go back to “Precision Boost Overdrive”

Please ignore the values of the screenshot - it is only for demonstration!

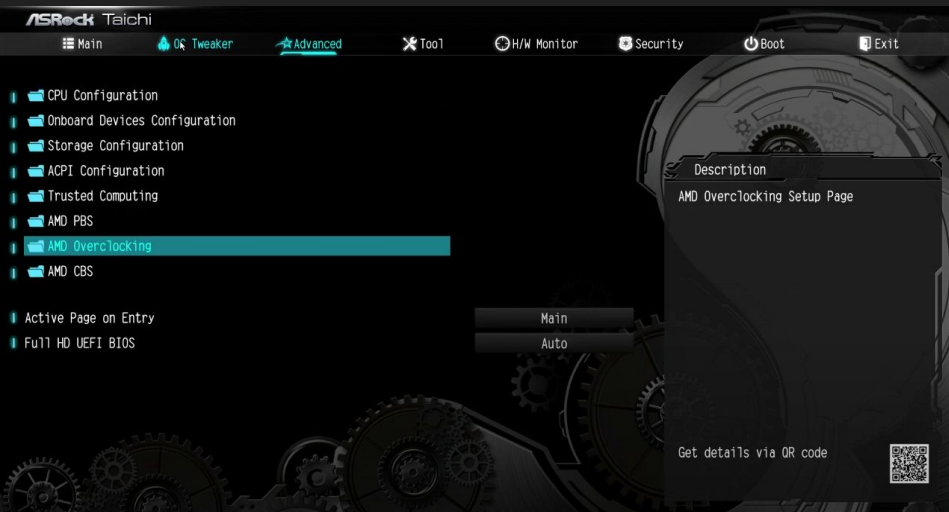


Set “Precision Boost Overdrive” to disabled

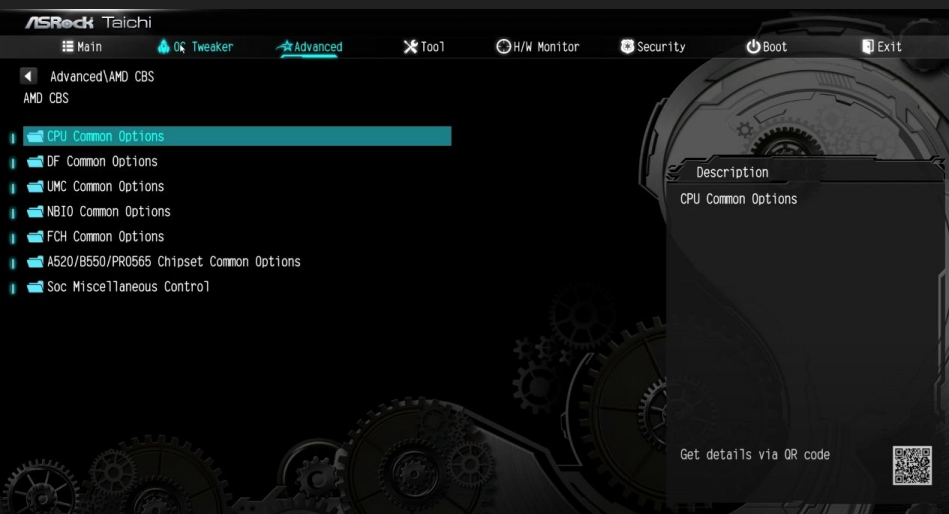
(If there is no disabled option, set it to Auto)

Go back twice to the Advanced slide

Basic Bios Guide for CTR



Go into “AMD CBS” menu



Go into “CPU Common Options”

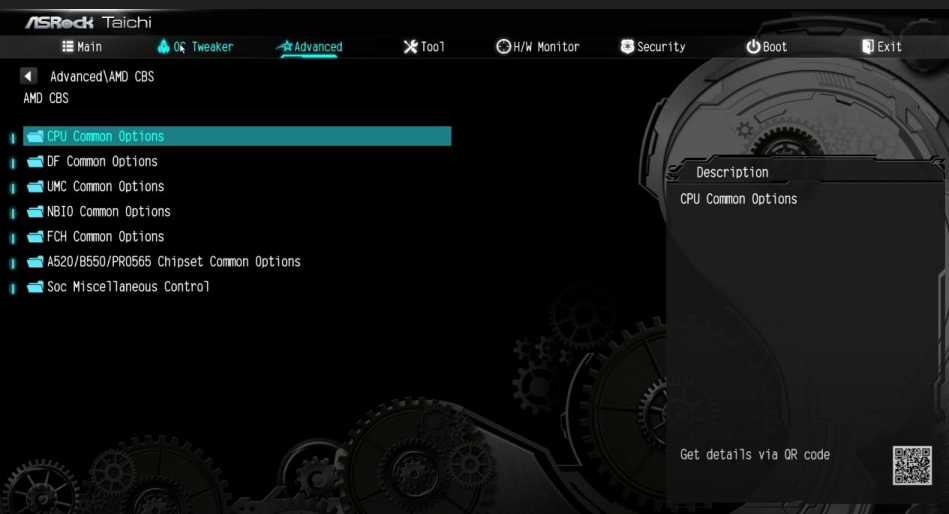
Basic Bios Guide for CTR



Set the following settings to...

- Core Performance Boost -> Auto
- Global C-state Control -> enabled

Go back to “AMD CBS” menu



Go into “NBIO Common Options”

Basic Bios Guide for CTR



Go into “SMU Common Options” menu



Set the following settings to...

- CPPC -> Enabled
- CPPC Preferred Cores -> Auto
- BoostFmaxEn -> disabled

You are done!

Summary of BIOS settings for

OC Tweaker menu

- CPU Frequency and Voltage (VID) -> Auto
- Soc/Uncore OC Voltage(VID) -> 1,15-1,20 V
- VDDG CCD Voltage Control -> Manual
 - Set voltage to 0,95-0,975 V
- Load-Line Calibration -> Auto

AMD CBS menu

- Core Performance Boost -> Auto
- Global C-state Control -> enabled

AMD CBS / NBIO / SMU Common Options

- CPPC -> Enabled
- CPPC Preferred Cores -> Auto
- BoostFmaxEn -> disabled

Curve Optimizer and PBO

- All options to Auto!
- Make sure all Curve Optimizer values are 0 in both menus (All Core and Per Core). Due to a bug it can be that these settings are still activated even though Curve Optimizer is set to disabled!
- After that, set PBO to disabled

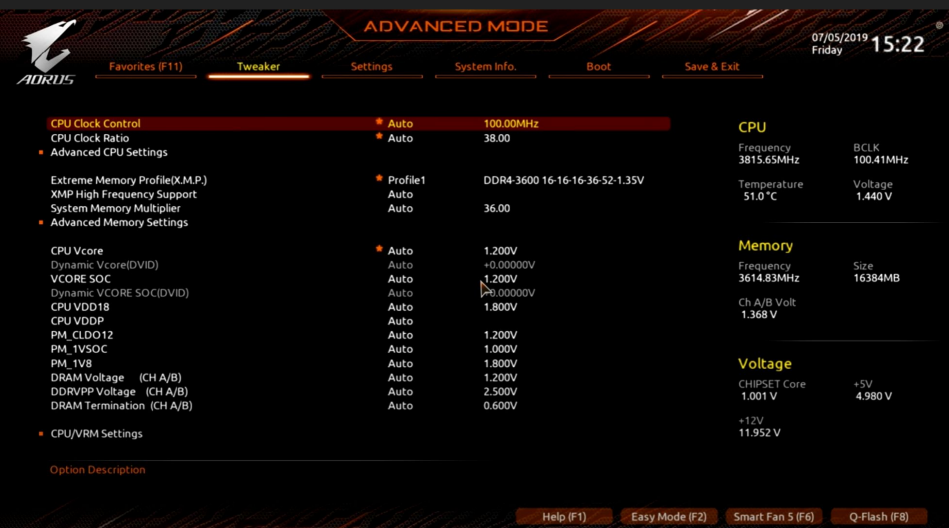
Basic Bios Guide for CTR

GIGABYTE™



If it doesn't look like this: press F7

Go into "Tweaker" menu



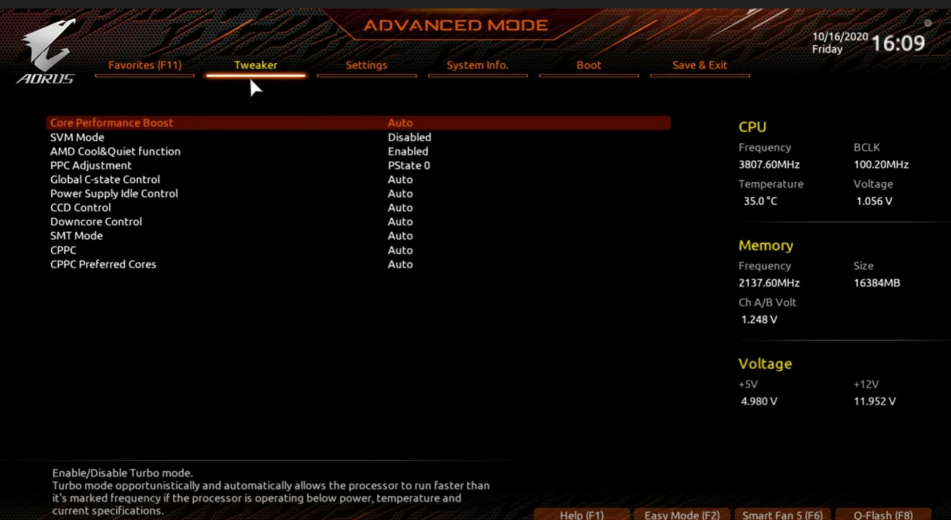
Set following settings to...

- CPU Clock Control -> Auto
- CPU Clock Ratio -> Auto
- CPU Vcore -> Auto
- Vcore SOC -> 1.15 V - 1.20 V

Go into "Advanced CPU Settings" menu

Basic Bios Guide for CTR

GIGABYTE™



Set following settings to...

- Core Performance Boost -> Auto
- AMD Cool&Quiet function -> Enabled
- Global C-State Control -> Enabled
- CPPC -> Enabled
- CPPC Preferred Cores -> Enabled



Go back and into “CPU / VRM Settings”

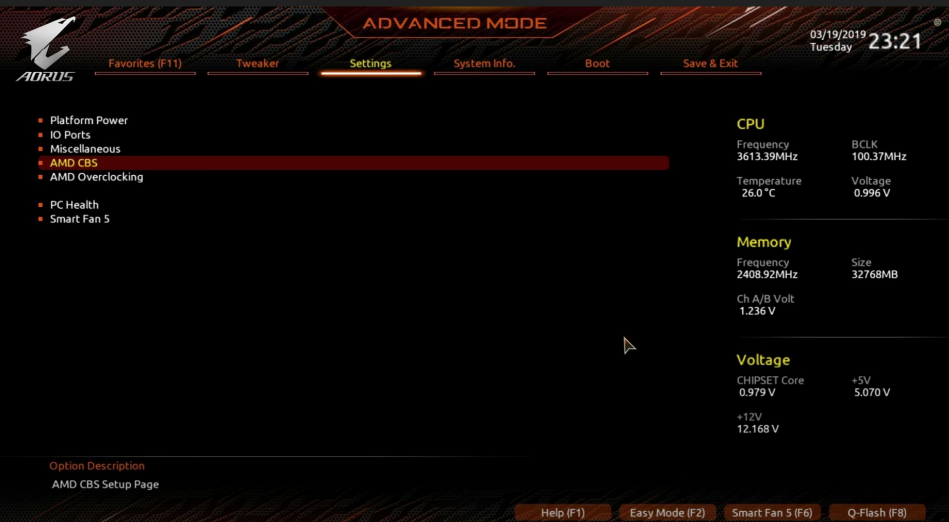
Set following settings to...

- CPU Vcore Loadline Calibration -> Auto

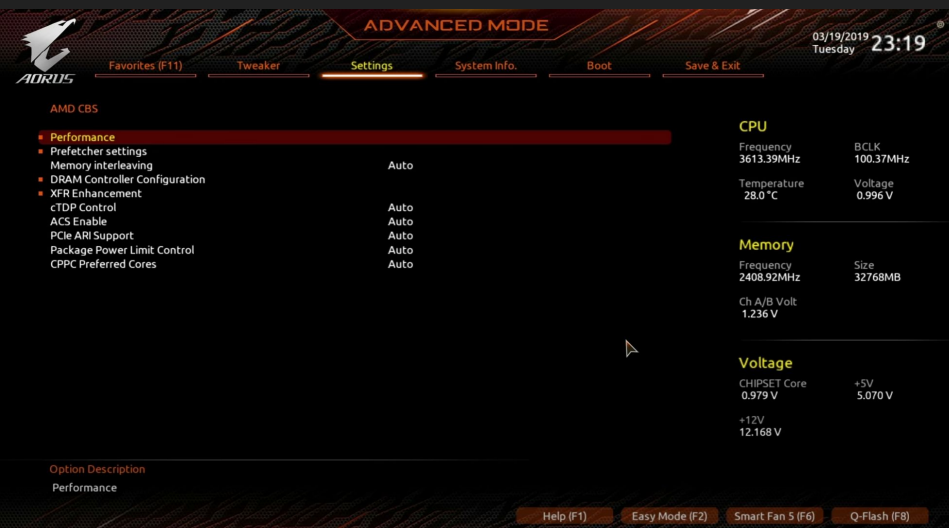
Go back and switch the tab to “Settings”

Basic Bios Guide for CTR

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Go into “AMD CBS”



Go into “XFR Enhancement”

Basic Bios Guide for CTR

GIGABYTE™

ADVANCED MODE 03/19/2019 Tuesday 23:15

ADORUS Favorites (F11) Tweaker **Settings** System Info. Boot Save & Exit

XFR Enhancement

WARNING - DAMAGE CAUSED BY USE OF YOUR AMD PROCESSOR OUTSIDE OF SPECIFICATION OR IN EXCESS OF FACTORY SETTINGS ARE NOT COVERED UNDER YOUR AMD PRODUCT WARRANTY AND MAY NOT BE COVERED BY YOUR SYSTEM MANUFACTURER'S WARRANTY.
Operating your AMD processor outside of specification or in excess of factory settings, including but not limited to overclocking, may damage or shorten the life of your processor or other system components, create system instabilities (e.g., data loss and corrupted images) and in extreme cases may result in total system failure. AMD does not provide support or service for issues or damages related to use of an AMD processor outside of processor specifications or in excess of factory settings.

- Declined
- Accepted
 - FCLK Frequency Auto
 - SOC OVERCLOCK VID 0
 - UCLK DM1 MODE Auto
 - VDDP Voltage Control Auto
 - VDDG Voltage Control **Manual**
 - VDDG Voltage 0
 - Soc/Uncore OC Mode Auto
 - LN2 Mode Auto

CPU
Frequency 3613.39MHz BCLK 100.37MHz
Temperature 26.0°C Voltage 0.984 V

Memory
Frequency 2408.92MHz Size 32768MB
Ch A/B Volt 1.236 V

Voltage
CHIPSET Core +5V 5.070 V
+12V 12.168 V

Option Description
VDDG represents voltage for the data portion of the Infinity Fabric. It is derived from the CPU SoC/Uncore Voltage (VDD_SOC). VDDG (input in mV) can approach but not exceed VDD_SOC.

Help (F1) Easy Mode (F2) Smart Fan 5 (F6) Q-Flash (F8)

Set the following settings to...

- VDDG Voltage Control -> Manual
- VDDG Voltage -> 0,95 - 0,975 V
 - Here you have to enter mV, so 0,95 V would be a value of 950

Go back to “Settings” tab

ADVANCED MODE 07/05/2019 Friday 15:25

ADORUS Favorites (F11) Tweaker **Settings** System Info. Boot Save & Exit

- Platform Power
- IO Ports
- Miscellaneous
- AMD CBS
- AMD Overclocking**
- PC Health
- Smart Fan 5

CPU
Frequency 3815.65MHz BCLK 100.41MHz
Temperature 48.0°C Voltage 1.452 V

Memory
Frequency 3614.83MHz Size 16384MB
Ch A/B Volt 1.368 V

Voltage
CHIPSET Core +5V 4.980 V
+12V 11.952 V

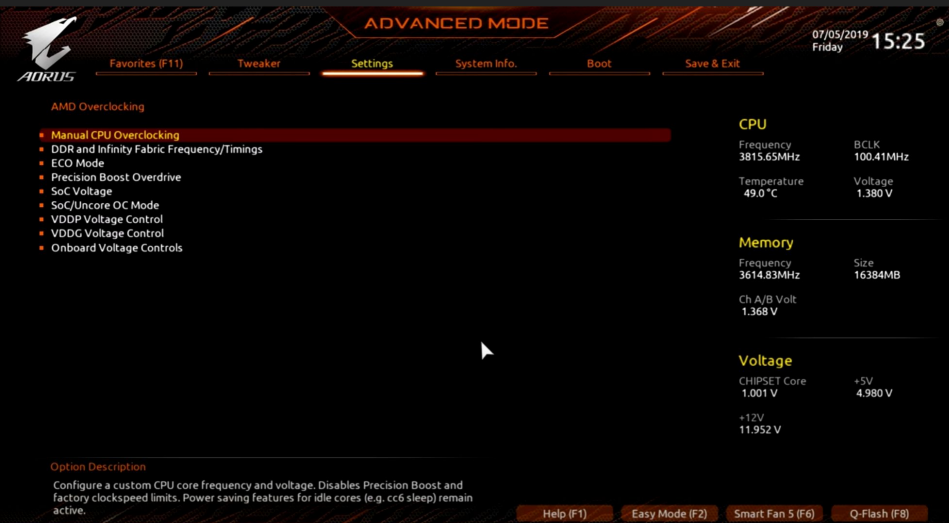
Option Description
AMD Overclocking Setup Page

Help (F1) Easy Mode (F2) Smart Fan 5 (F6) Q-Flash (F8)

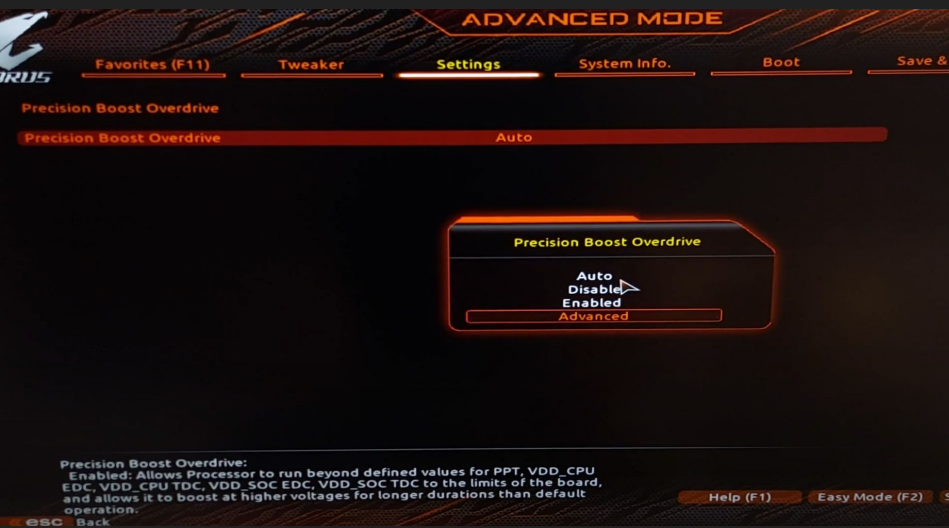
Go into “AMD Overclocking”

Basic Bios Guide for CTR

GIGABYTE™



Go into “Precision Boost Overdrive” menu



Select “Precision Boost Overdrive” and set it to “Advanced”

Basic Bios Guide for CTR

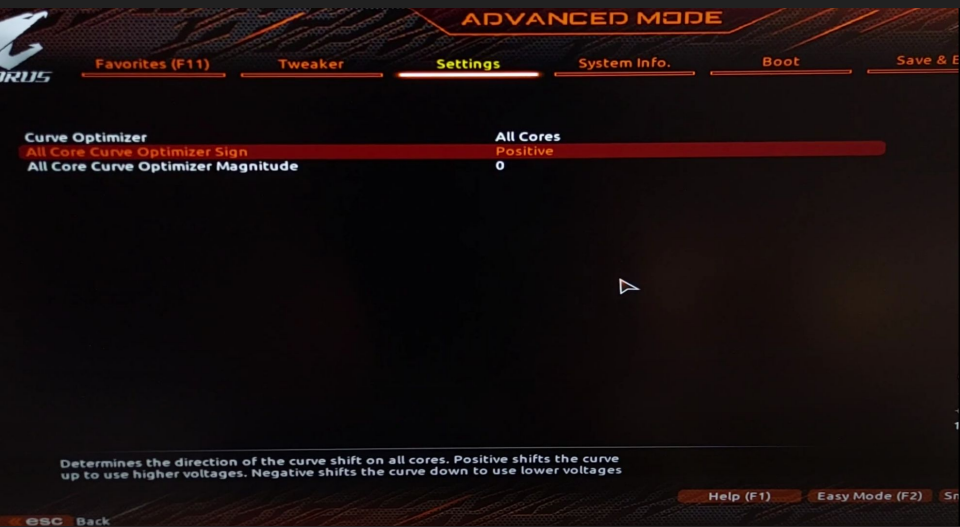
GIGABYTE™



Set following settings to...

- PBO Limits -> Disabled / Auto
- Precision Boost Overdrive Scalar -> Auto
- Max CPU Boost Clock Override -> 0MHz
- Platform Thermal Throttle Limit -> Auto

Then go into “Curve Optimizer” menu



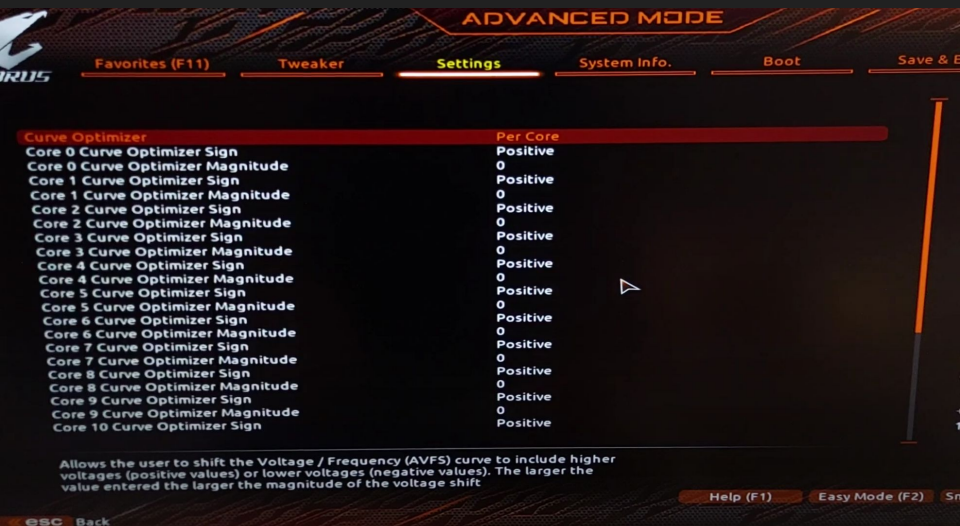
Set “Curve Optimizer” to “All Cores” and make sure that “All Core Curve Optimizer Magnitude” is set to 0.

“All Core Curve Optimizer Sign” doesn’t matter.

Switch “Curve Optimizer” from “All Cores” to “Per Core”

Basic Bios Guide for CTR

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Make sure that “All Core Curve Optimizer Magnitudes” are set to 0.

“All Core Curve Optimizer Sign” doesn’t matter.

Select “Curve Optimizer” again and set it to disabled

You are done!

Summary of BIOS settings for

GIGABYTE™

Tweaker menu

- CPU Clock Control -> Auto
- CPU Clock Ratio -> Auto
- CPU Vcore -> Auto
- Vcore SOC -> 1.15 V - 1.20 V
- Core Performance Boost -> Auto
- AMD Cool&Quiet function -> Enabled
- Global C-State Control -> Enabled
- CPPC -> Enabled
- CPPC Preferred Cores -> Enabled
- CPU Vcore Loadline Calibration -> Auto

Settings / AMD CBS / XFR Enhancement

- VDDG Voltage Control -> Manual
- VDDG Voltage -> 0,95 - 0,975 V

Curve Optimizer and PBO

- All options to Auto!
- Make sure all Curve Optimizer values are 0 in both menus (All Core and Per Core). Due to a bug it can be that these settings are still activated even though Curve Optimizer is set to disabled!
- After that, set PBO to disabled

Basic Bios Guide for CTR



If it doesn't look like this: press F7

Go into "OC" menu



Set following settings to...

- CPU Ratio Apply Mode -> All Core
- CPU Ratio -> Auto

Basic Bios Guide for CTR

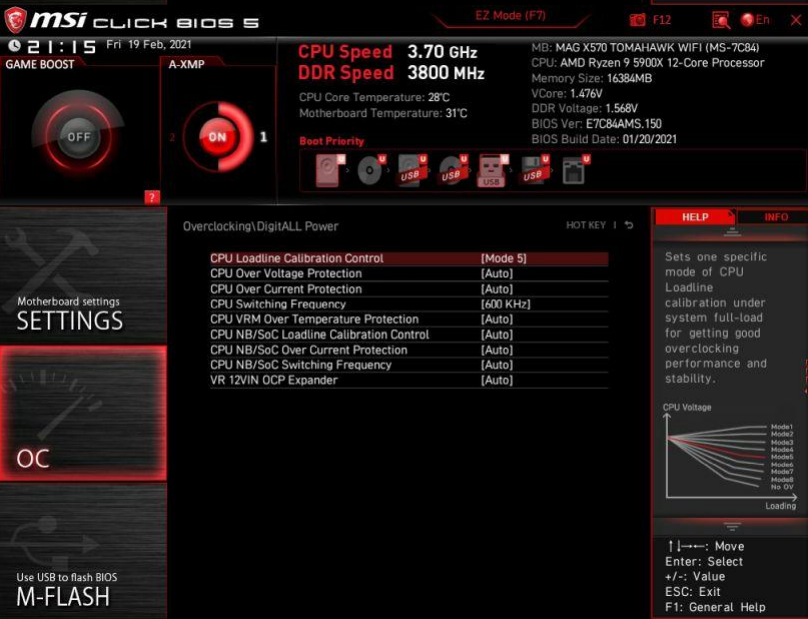


Scroll down

Set following settings to...

- CPU Core Voltage -> Auto
- CPU NB/SoC Voltage -> Override Mode
- Override CPU NB/Soc Voltage -> 1.15 V - 1.20 V
- VDDG IOD Voltage -> 0,95 V - 0,975 V

Go into “DigitALL Power” menu



Set following settings to...

- CPU Loadline Calibration Control -> Auto
- CPU Switching Frequency -> 600 KHz
- CPU NB/SoC Switching Frequency -> 600 KHz

Go back to “OC” menu

Basic Bios Guide for CTR



msi CLICK BIOS 5 EZ Mode (F7) F12 En

21:08 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.568V
BIOS Ver: E7C8AAMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking HOT KEY: |

OC Explore Mode [Expert]

CPU Setting

CPU Ratio Apply Mode	[All Core]
CPU Ratio	Auto
Adjusted CPU Frequency	3700MHz

Advanced CPU Configuration

FCH BCLK Setting
FCH Base Clock (MHz) Auto

DRAM Setting

A-XMP [Profile 1]

Profile1: DDR4 4000MHz 19-19-19-39
Profile2: DDR4 4000MHz 19-19-19-39

DRAM Frequency [DDR4-3800]

Adjusted DRAM Frequency	3800MHz
FCLK Frequency	[1900MHz]
UCLK DIV1 MODE	[UCLK==MEMCLK]
Load Memory Presets	[Disabled]
Memory Try It!	[Disabled]
Memory Failure Retry	[Enabled]
Memory Failure Retry Count	2

HELP INFO

Sets the detailed CPU features.

↑: Move
←→: Group Jump
Enter: Select
+/-: Value
F1: General Help

Go into “Advanced CPU Configuration” menu

msi CLICK BIOS 5 EZ Mode (F7) F12 En

21:08 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.568V
BIOS Ver: E7C8AAMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration HOT KEY: |

AMD Overclocking

AMD CBS	[Disabled]
SVM Mode	[Disabled]
NX Mode	[Enabled]
PSS Support	[Auto]
Performance Regulator	[Disabled]
Spread Spectrum	[Auto]
CPU VDD_SoC Current Optimization	[Auto]

AMD Overclocking Setup Page

HELP INFO

↑: Move
←→: Group Jump
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Go into “AMD Overclocking” menu

Basic Bios Guide for CTR



msi CLICK BIOS 5 EZ Mode (F7) F12 Er

21:08 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.572V
BIOS Ver: E7C8AAMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD Overclocking

Precision Boost Overdrive	[Auto]
CPU CCD Control	[Auto]
CPU Core Control	[Auto]
SMT Control	[Auto]
LN2 Mode 2	[Auto]
NUMA nodes per socket	[Auto]

HELP INFO

Precision Boost Overdrive:
Enabled: Allows Processor to run beyond defined values for PPT, VDD_CPU EDC, VDD_CPU TDC, VDD_SOC EDC, VDD_SOC TDC to the limits of the board, and allows it to boost at higher voltages for longer durations than default operation.

↑|---: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Motherboard settings SETTINGS

OC

Use USB to flash BIOS M-FLASH

Select “Precision Boost Overdrive” and set it to “Advanced”

msi CLICK BIOS 5 EZ Mode (F7) F12 Er

21:09 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

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BIOS Ver: E7C8AAMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD Overclocking

Precision Boost Overdrive	[Advanced]
PBO Limits	[Auto]
Precision Boost Overdrive Scalar	[Auto]
Max CPU Boost Clock Override	Auto
Platform Thermal Throttle Limit	Auto
Curve Optimizer	[Auto]
CPU CCD Control	[Auto]
CPU Core Control	[Auto]
SMT Control	[Auto]
LN2 Mode 2	[Auto]
NUMA nodes per socket	[Auto]

HELP INFO

Default: Loads AMD default socket power (PPT), electrically-limited VRM current (EDC), and thermally-limited VRM current (TDC) limits.
Motherboard: Allows the processor to run according to increased PPT, EDC, and TDC limits defined by your motherboard.
Manual: Allows the

↑|---: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Motherboard settings SETTINGS

OC

Use USB to flash BIOS M-FLASH

Make sure ALL options are set to Auto

Basic Bios Guide for CTR



msi CLICK BIOS 5 EZ Mode (F7) F12 Er

21:09 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.568V
BIOS Ver: E7C84AMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD Overclocking

Curve Optimizer

Curve Optimizer	[All Cores]
All Core Curve Optimizer Sign	[Negative]
All Core Curve Optimizer Magnitude	0

HELP INFO

Determines the direction of the curve shift on all cores. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.

↑ |----: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Change “Curve Optimizer” from “All Cores” to “Per Core” and make sure everything is set to 0

(Curve Optimizer Sign does not matter!)

msi CLICK BIOS 5 EZ Mode (F7) F12 Er

21:09 Fri 19 Feb, 2021

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.474V
DDR Voltage: 1.568V
BIOS Ver: E7C84AMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD Overclocking

Curve Optimizer

Curve Optimizer	[Per Core]
Core 0 Curve Optimizer Sign	[Negative]
Core 0 Curve Optimizer Magnitude	0
Core 1 Curve Optimizer Sign	[Negative]
Core 1 Curve Optimizer Magnitude	0
Core 2 Curve Optimizer Sign	[Negative]
Core 2 Curve Optimizer Magnitude	0
Core 3 Curve Optimizer Sign	[Negative]
Core 3 Curve Optimizer Magnitude	0
Core 4 Curve Optimizer Sign	[Negative]
Core 4 Curve Optimizer Magnitude	0
Core 5 Curve Optimizer Sign	[Negative]
Core 5 Curve Optimizer Magnitude	0
Core 6 Curve Optimizer Sign	[Negative]
Core 6 Curve Optimizer Magnitude	0
Core 7 Curve Optimizer Sign	[Negative]
Core 7 Curve Optimizer Magnitude	0
Core 8 Curve Optimizer Sign	[Negative]
Core 8 Curve Optimizer Magnitude	0
Core 9 Curve Optimizer Sign	[Negative]
Core 9 Curve Optimizer Magnitude	0
Core 10 Curve Optimizer Sign	[Negative]
Core 10 Curve Optimizer Magnitude	0

HELP INFO

Allows the user to shift the Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage shift.

↑ |----: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Go into “Curve Optimizer” menu and make sure that ALL “All Core Curve Optimizer Magnitude” are set to 0

(All Core Curve Optimizer Sign does not matter!)

Basic Bios Guide for CTR



msi CLICK BIOS 5

EZ Mode (F7)

F12 F10 F11 F12

21:09 Fri 19 Feb, 2021

GAME BOOST OFF ON 1

A-XMP

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.568V
BIOS Ver: E7C84AMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD Overclocking

Precision Boost Overdrive	[Advanced]
PBO Limits	[Auto]
Precision Boost Overdrive Scalar	[Auto]
Max CPU Boost Clock Override	Auto
Platform Thermal Throttle Limit	Auto
Curve Optimizer	
CPU CCD Control	[Auto]
CPU Core Control	[Auto]
SMT Control	[Auto]
LN2 Mode 2	[Auto]
NUMA nodes per socket	[Auto]

Default: Loads AMD default socket power (PPT), electrically-limited VRM current (EDC), and thermally-limited VRM current (TDC) limits.
Motherboard: Allows the processor to run according to increased PPT, EDC, and TDC limits defined by your motherboard.
Manual: Allows the

↑ |----: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Use USB to flash BIOS
M-FLASH

Go back to “AMD Overclocking” and change “Precision Boost Overdrive” back to Auto

(Auto = disabled)

msi CLICK BIOS 5

EZ Mode (F7)

F12 F10 F11 F12

21:08 Fri 19 Feb, 2021

GAME BOOST OFF ON 1

A-XMP

CPU Speed 3.70 GHz
DDR Speed 3800 MHz

CPU Core Temperature: 28°C
Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)
CPU: AMD Ryzen 9 5900X 12-Core Processor
Memory Size: 16384MB
VCore: 1.476V
DDR Voltage: 1.568V
BIOS Ver: E7C84AMS.150
BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration

AMD Overclocking	
AMD CBS	
SVM Mode	[Disabled]
NX Mode	[Enabled]
PSS Support	[Auto]
Performance Regulator	[Disabled]
Spread Spectrum	[Auto]
CPU VDD_SoC Current Optimization	[Auto]

AMD Overclocking Setup Page

↑ |----: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Use USB to flash BIOS
M-FLASH

Go back to “Advanced CPU Configuration” and go into “AMD CBS” menu

Basic Bios Guide for CTR



msi CLICK BIOS 5

EZ Mode (F7)

F12 Er

Fri 19 Feb, 2021

GAME BOOST OFF

A-XMP ON 1

CPU Speed 3.70 GHz

DDR Speed 3800 MHz

CPU Core Temperature: 28°C

Motherboard Temperature: 31°C

MB: MAG X570 TOMAHAWK WIFI (MS-7C84)

CPU: AMD Ryzen 9 5900X 12-Core Processor

Memory Size: 16384MB

VCore: 1.474V

DDR Voltage: 1.572V

BIOS Ver: E7C84AMS.150

BIOS Build Date: 01/20/2021

Boot Priority

Overclocking\Advanced CPU Configuration\AMD CBS

Motherboard settings SETTINGS

OC

Use USB to flash BIOS M-FLASH

AMD CBS - CPU Common Options	
Core Performance Boost	[Auto]
Global C-state Control	[Enabled]
Power Supply Idle Control	[Auto]

AMD CBS - DF Common Options	
NUMA nodes per socket	[Auto]

AMD CBS - NBIO Common Options	
IOMMU	[Auto]
LN2 Mode 1	[Auto]
Package Power Limit	Auto
CPPC	[Enabled]
CPPC Preferred Cores	[Enabled]

HELP INFO

Sets the Core Performance Boost.

↑ |----: Move
Enter: Select
+/-: Value
ESC: Exit
F1: General Help

Set the following settings to...

- Set Core Performance Boost to Auto
- Set Global C-state Control to Enabled
- Set CPPC to Enabled
- Set CPPC Preferred Cores to Enabled

You are done!

Summary of BIOS settings for



OC menu

- CPU Ratio Apply Mode -> All Core
- CPU Ratio -> Auto
- CPU Core Voltage -> Auto
- CPU NB/SoC Voltage -> Override Mode
- Override CPU NB/Soc Voltage -> 1.15 V - 1.20 V
- VDDG IOD Voltage -> 0,95 V - 0,975 V

Digit All Power menu

- CPU Loadline Calibration Control -> Auto
- CPU Switching Frequency -> 600 KHz
- CPU NB/SoC Switching Frequency -> 600 KHz

Curve Optimizer and PBO

- All options to Auto!
- Make sure all Curve Optimizer values are 0 in both menus (All Core and Per Core). Due to a bug it can be that these settings are still activated even though Curve Optimizer is set to disabled!
- After that, set PBO to disabled

AMD CBS menu

- Set Core Performance Boost to Auto
- Set Global C-state Control to Enabled
- Set CPPC to Enabled
- Set CPPC Preferred Cores to Enabled