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A NOTE ON RYZEN MASTER GENERAL USAGE

AMD Ryzen and Ryzen Threadripper processors are designed for outstanding performance out-of-the-box, on first use, with any Windows application, without AMD Ryzen Master.

AMD Ryzen Master is a tool for enthusiast users
- Who use the various controls to experiment with processor and system configurations
- Often outside of specified and warrantied range of operation
- Attempting to further optimize general performance or performance of a specific application or set of tasks
- Who accept the risk that some control settings may result in lower performance or instability and system crashes

The Ryzen Master Game Mode profile is offered as a preconfigured group of settings
- Intended only for Ryzen Threadripper processors when running games
- Not intended for Ryzen 3, Ryzen 5, and Ryzen 7 processors, as it will show no benefit on these models
- Only use Game Mode if the stock processor settings, also pre-configured as the ‘Creator Mode’ profile, produce less-than-expected game performance
- If so, try ‘Game Mode’ and use the settings that delivers the highest performance in the game.
RYZEN MASTER USAGE TIPS

AMD recommends the following Windows 10 Power Options settings when using Ryzen Master for any purpose
- High Performance power plan selected
- Uncheck “Turn on fast startup” under Power Options > Choose what the power buttons do > Shutdown Settings

For a Ryzen Master configuration change that requires a restart or shutdown
- Ryzen Master will always tell you if a restart requires you to push the system power button and restart Ryzen Master
- If Ryzen Master causes the system to power off, you must restart using the power button, and then restart Ryzen Master after booting to Windows.
- If Ryzen Master doesn’t prompt the user to power off the system, the system will restart without user intervention, and Ryzen Master will restart itself in time; wait for it.
  
  In this case, it may take on the order of 10 seconds for Ryzen Master to appear, depending on core and performance settings.
RYZEN MASTER INSTALLATION AND CONFIGURATION
The Ryzen Master application installer is available to download from AMD [here](#).

- Along with this Quick Reference Guide

Ryzen Master will only install on a Windows 10 PC running an AMD Ryzen desktop processor

If Ryzen Master will not install, it may not be enabled:

- In the case of a pre-built PC, the manufacturer has control over whether the PC is allowed to overclock. If the PC has been blocked from overclocking, Ryzen Master will advise of such and will not install.
- Windows 10 Virtualization-Based Security must be disabled for Ryzen Master to function.

During the installation process, a legal disclaimer and click-through license agreement must be accepted

- Ryzen Master allows the user to configure the processor beyond stock operating conditions which may result in system instability, loss of or corruption of data from open applications, processor failure and system damage
- The user must accept these risks to proceed with the installation

If Ryzen Master fails to uninstall or upgrade properly when a new version is being installed, use the Microsoft install/uninstall troubleshooter to clean up the Ryzen Master elements so that Ryzen Master can be cleanly installed

- See [Microsoft application installation troubleshooter](#)

On first use after installation, Ryzen Master uses the current processor parameters to establish default reset parameters

- If the processor is first configured in BIOS to other than default parameters, these changes will be reflected in the Ryzen Master default settings
- If the processor is changed after Ryzen Master installation, please uninstall then re-install Ryzen Master to associate the new processor
- If a new system BIOS is installed, please uninstall then re-install Ryzen Master to link supporting BIOS elements
- These steps will assure that Ryzen Master is accessing the correct information for the new processor and new BIOS

Ryzen Master checks for updates

- After installation, Ryzen Master checks for new updates every 15 days
- The user can check manually by starting the AMD AutoUpdate task through Windows Start > AMD AutoUpdate
RYZEN MASTER VERSION 1.5
NEW FEATURE REVIEW
Ryzen Master 1.5 adds support for AMD Ryzen™ Threadripper™ 2970WX and 2920X CPUs
- See the RM1.3 Quick Reference Guide for the basics

New Features in version 1.5:
- Profile export and import
- Dynamic Local Mode
  - Specifically for AMD Ryzen™ Threadripper™ WX Series processors
  - automatically improves performance in select applications
  - Toggle control for user experimentation
- All memory controls in one Group
- Keyboard entry of any field
- Auto-update configuration through Settings page
RYZEN MASTER FEATURE SUPPORT FOR RYZEN PROCESSORS

Ryzen Master 1.5 supports all Ryzen processors, but not all features are available for all processors:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ryzen and Ryzen Threadripper 2000-Series Processors</th>
<th>Ryzen with Radeon Vega Graphics Processors</th>
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<tr>
<td>Core speed overclocking</td>
<td>All cores same speed, cores speed per CCX, and per-core speeds</td>
<td>All cores at same speed</td>
<td>All cores at same speed</td>
</tr>
<tr>
<td>Precision Boost Overdrive</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Core performance indicators</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Core disabling</td>
<td>In user-defined pairs, and full CCX disable (core symmetry across die required for Ryzen Threadripper)</td>
<td>In pairs</td>
<td>Ryzen 3/5/7: In core pairs</td>
</tr>
<tr>
<td>Control Mode Auto/Manual switching</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Integrated GPU overclocking</td>
<td>No (no GPU)</td>
<td>Yes</td>
<td>No (no GPU)</td>
</tr>
<tr>
<td>Stability stress test</td>
<td>Yes (Cores &amp; Memory)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Power and current monitoring</td>
<td>Yes (EDC monitoring not available for Ryzen Threadripper 2000-Series)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic Local Mode service and Ryzen Master toggle control</td>
<td>Only for Ryzen Threadripper 2990WX and 2970WX</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
PROFILE EXPORT

- User’s may wish to save profiles to load later
- Each profile tab offers export of
  - Specific or all profiles
  - User-specified or all parameters
  - With a field for describing the profiles
- The exported file is encrypted to discourage tampering
- Use the Export button to complete the profile export
- Use the Done button to return to the profile
PROFILE IMPORT

- A profile file can be loaded for the user to Apply
- After selecting the profile file to load, the user can select which parameters to load
- Use the Import button to load the saved profile’s parameters and insert them into the current profile
- Use the Done button to return to the profile
- The user must still click ‘Apply’ for the imported profile to take effect
The Dynamic Local Mode (DLM) feature is a Windows service.

- Installed and activated with the installation of Ryzen Master 1.5 only to the Ryzen Threadripper 2990WX and 2970WX processors.
- This service can be turned on and off through Ryzen Master profile controls in the Additional Control group.
- Do NOT start or stop this service through the Task Manager/Services interface. If you do, reboot the system.

DLM dynamically associates the threads scheduled for an application with cores of die directly attached to memory to reduce memory latency, improving performance.

Recommended operation should be with DLM on. Ryzen Master allows the user to experiment with different settings to optimize performance for applications that have not yet been profiled.

Note that the DLM setting active in Ryzen Master will persist after both the Ryzen Master Current view Reset and a soft or hard reboot.
All Ryzen Master settings that control system memory performance are now in a single Memory Control group, including memory clock, memory timings, module voltage (MEM VDDIO) and processor memory controller voltage (VDDCR SOC).

When the Memory Control group is active, any change to any group parameter requires a reboot and all parameters are applied, not just the ones that have changed. This insures that the BIOS-level memory training uses all profile Memory Control parameters in the re-training attempt.
KEYBOARD ENTRY FOR CORE SPEEDS AND VOLTAGE

- Fields containing values can now be entered by keyboard.
- Note that voltage and frequency values are limited to increments that the processor will set to when applying a value entered.
- The Ryzen Master Current View will reflect the actual setting.
- To see the actual setting in a profile, use the Copy Current command of the profile.
The Legacy Compatibility Mode (LCM) feature has been restricted to processors of more than 8 cores
- where the feature may improve performance of some legacy applications
- subject to user experimentation per application

For processors of 8 cores or less, LCM is deactivated and displayed as “NA”
- The Game Mode profile remains useful even with LCM deactivated
- Use the profile to tune other parameters for your favorite game
- Hint: Overclocking memory is your best, first step to improving legacy and modern game performance for any processor
CHECKING FOR RYZEN MASTER UPDATES

These features have been added to check for updates manually and to set the update-check interval.
RYZEN MASTER VERSION 1.4

FEATURE REVIEW
SUPPORTING AMD RYZEN AND AMD RYZEN THREADRIPPER DESKTOP PROCESSORS

- Ryzen Master 1.4 adds new features to Ryzen Master 1.3
  - See the [Version 1.3 Quick Reference Guide](#) for the basics

- New to Ryzen Master 1.4 for Ryzen & Ryzen Threadripper 2000-Series
  - Precision Boost Overdrive feature (PBO)
    - Allows the CPU to use the full power headroom of the motherboard
    - Performance results scale with premium cooling and low ambient temperature
  - Real-time power monitoring
    - Motherboard power resources for PPT and TDC reported as a % of the current limit
    - Board maximum limit displayed for manual PBO optimization
  - Fastest and second-fastest cores identified
    - Expanded to cover each die of the Ryzen 3/5/7 and Threadripper processors
  - Improved user interface for per-CCX and per-core clock control
### Ryzen Master Feature Support for Ryzen Processors

Ryzen Master 1.4 supports all Ryzen desktop processors, but not all features are available for all processors:

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<td>Power and current monitoring</td>
<td>Yes (EDC monitoring not available for Ryzen Threadripper 2000-Series)</td>
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</table>
INTERFACE VIEWS

Current view
- The dashboard of the current configuration
- With performance monitoring
- *Not* for changing configuration – Use a profile

Profiles for user-defined configurations
- Editing parameters, running stress tests
- ‘Creator Mode‘ and ‘Game Mode’ partially pre-configured for those application types
- Profiles 1 & 2 fully configurable
- Click profile tab to change the name
PRECISION BOOST OVERDRIVE (PBO)

- Precision Boost Overdrive allows the processor to automatically use the full power headroom of the motherboard above warranted CPU limits, potentially increasing maximum and average core speed.
- This feature works best with premium cooling and a cool ambient environment.

- These manual PBO values are applied when PBO is selected, allowing the user to override the default values up to the board’s maximum limits.
PRECISION BOOST OVERDRIVE AT BOARD LIMITS

- PBO values set by user to board limits take effect using the 'Apply' button
CURRENT VIEW – POWER MONITORING

CPU consumption of socket power at stock or PBO setting limit. Turns yellow at 90%, red at 95%. PBO maximum limit displayed for reference.

CPU consumption of power supply thermally-constrained current delivery capacity at stock or PBO setting. Turns yellow at 90%, red at 95%. PBO maximum limit displayed for reference.

CPU consumption of power supply electrically-constrained current delivery capacity. PBO maximum limit displayed for reference. EDC reporting not supported on Ryzen Threadripper 2000-Series.
• Core performance indicators provided for each 8-core group
• The core with the potential for the highest overclocking speeds will be indicated.
  • Gold star is fastest overall
  • Gray and gold stars are fastest per CCX
  • Gray dots are second-fastest per CCX
**PER-CCX CONTROL OF CORE SPEEDS**

- All Cores button (green) enables all cores to match the speed changes as you adjust a single core.
- When off (red), each core is adjusted individually.

- The CCX button allows setting the speeds of the CCX’s cores together (green) or individually (red).
The ‘Game Mode’ profile (intended exclusively for Threadripper processors) pre-configures a limit of 8 active cores for legacy games that may run better under a limited-core resource.

The normal Control Modes remain accessible for the user, including Manual mode for manual core overclocking. Memory overclocking is also available.
Set the CPU core voltage
OVERVIEW AND OPERATION
CURRENT VIEW – PERFORMANCE MONITORING

- Die temperature
- Peak frequency of fastest core
- CPU consumption of socket power
- CPU consumption of power supply thermally-constrained current delivery capacity
- CPU consumption of power supply electrically-constrained current delivery capacity
- Platform Thermal Control temperature limit, above which the core speed will be greatly reduced until the die temperature falls below this limit
GETTING AROUND THE PROFILES INTERFACE

- **Overclocking controls**
- **Processor gauges**
- **Control Groups**
- **Actions**
- **Tabs for viewing and setting conditions**
- **Profile functions**
PROFILE USAGE DETAILS

- The left edge green buttons determine whether the control group is considered for changes when Applied
  - Selected (green): Apply group on Apply
  - De-selected (gray): Ignore group on Apply
  - This can be useful when you have multiple changes across groups but wish to apply them one group at a time to test for effect

- Changes to the following parameters require a restart:
  - Cores disabled, SMT, any Memory Voltage Control group value, any Memory Control value

- Ryzen Master presents the most commonly-applied and significant memory over-clocking parameters
  - Support of memory overclocking from Ryzen Master depends on motherboard BIOS enablement
  - Parameters that are not active indicate the BIOS does not support them at the application level
  - The BIOS also controls how many memory training attempts are made with the overclocked settings before a default is used

- Influence of Windows Power Options/Power Plans
  - In High Performance mode, cores will run at the top, overclocked power-state speed they are set for
    *This mode is key for the Copy Current function to capture the top speeds*
  - In Balanced mode, cores will modulate between the top, overclocked speed and the lower-speed power states.
    *Using Copy Current in this mode may result in sampling lower power-state speeds.*

After selecting Manual Control Mode and setting the speed of all or some CPU cores
  - always set or confirm the core voltage THEN Apply
  - A core voltage too low for the frequency requested will be instable

For Ryzen processors with graphics, the GFX Voltage is referenced to the SOC Voltage
  - The GFX Voltage can be raised above the SOC Voltage without reset
  - If the GFX Voltage is lowered below the SOC Voltage, the GFX Voltage will be automatically set to the SOC Voltage
  - If SOC Voltage is raised, a restart will then reset GFX Voltage to the new SOC Voltage
Four profiles provide user configurations to edit, save and apply now or later:
- Profiles 1 & 2 are general purpose.
- Creator Mode enables all cores and stock processor configuration.
- Game Mode reduces cores by half and constrains memory access such that some legacy games may perform better. This profile is typically useful only to AMD Ryzen Threadripper processors.

Saves the profile of focus. Does not Apply the profile. If you switch to another view without saving your profile work, the profile reverts to the last saved version when you return.

Copies the current conditions to the profile of focus. This is a very useful feature when starting with the settings of another profile that has been applied as a starting point to create the new profile. Does not Apply the profile.

The most important Action control: The ‘Apply’ button applies the profile’s settings to the processor and reports the status of the Apply below.

This button Applies the profile and initiates the stress tests as configured in the Settings.

Resets the profile to the processor’s condition when Ryzen Master was installed. This will include BIOS-level settings that were active at install that Ryzen Master also controls. Does not Apply the profile.

Opens the application Settings page.
Master toggle for Speed, Temperature and Histogram functions

Toggle for sampling core frequencies

Toggle for sampling die temperature

Toggle for displaying histogram on Current view. Enabling histogram display can present a small but noticeable load on the processor cores.

Parameter sample rate: higher

FOR EXTREME AND EXPERT USE ONLY: Disabling PROHOT causes the processor to ignore the temperature of the board’s voltage regulators and assumes the user is monitoring and cooling the regulators separately, typically for extreme overclocking record-setting only.

When off, parameter sampling continues but the histogram display is suspended. When enabled, the accumulated histogram history is presented. This limits the load Ryzen Master puts on the processors while still capturing processor information to view.
BASIC OVERCLOCKING
The CPU Voltage setting determines how far the CPU Cores frequency can be driven to a point of instability.

Ryzen Master now reports CPU-domain-sampled values for:
- CPU Power in Watts
- CPU Thermal Design Current (TDP) as a % of board capacity
- CPU Electrical Design Current (EDC) as a % of board capacity

The SOC Voltage setting drives the overclocking potential for the memory controller and, if an APU, for the Graphics (GFX).

- The APU GFX Voltage is derived from the SOC Voltage and determines how far the GFX frequency can be driven to the point of instability

Ryzen Master now reports SOC domain sampled values for:
- SOC Power in Watts
- SOC Thermal Design Current (TDP) as a % of board capacity
- SOC Electrical Design Current (EDC) as a % of board capacity
BASIC OVERCLOCKING FOR ALL RYZEN PROCESSORS

- Toggle cores to disable or enable them
- Drag sliders or use +/- to adjust core speeds
- Core voltage must be set with manually overclocked core speeds
- Select Manual mode to set speeds and voltage or return to stock Auto control
- Set memory module voltage
- Set processor memory controller voltage
- Set memory module speed and key memory overclocking parameters
These Ryzen Master configuration changes require this system change and user action.

- Control Mode to Manual
- Core speed, core voltage, per-core speed
  - No restart or shutdown required, activated on Apply

- From Manual to Auto mode
- Disabling any cores
- Disabling Simultaneous Multithreading
- Disabling or Enabling Memory Access Mode or Legacy Compatibility Mode
- Any Memory Voltage or Memory Control change
  - Ryzen Master-initiated restart, no user action required

- Enabling all cores
- Enabling Simultaneous Multithreading
  - Ryzen Master-initiated shutdown then User-initiated power-on and re-start Ryzen Master

Configuration & Overclocking Persistence Through ReStarts and ShutDowns

<table>
<thead>
<tr>
<th>Type of reboot</th>
<th>State after reboot to Windows</th>
<th>Control Mode &amp; OC frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen Master restart</td>
<td>Per profile Applied</td>
<td>Per profile Applied</td>
</tr>
<tr>
<td>Ryzen Master shutdown</td>
<td>Per profile Applied</td>
<td>Stock. Please re-apply the profile.</td>
</tr>
<tr>
<td>User-initiated Windows Restart Shutdown</td>
<td>At the configuration when Shutdown</td>
<td>Stock</td>
</tr>
<tr>
<td>Reload BIOS defaults &amp; restart</td>
<td>Stock</td>
<td>Stock</td>
</tr>
</tbody>
</table>
CONTROLS FOR RYZEN PROCESSORS WITH RADEON VEGA GRAPHICS

- Graphics Clock control
- GFX Voltage control
  - Referenced from SOC Voltage
CURRENT VIEW AT IDLE

- Stock configuration, no processor overclocking
- But with Memory overclocking to DDR4-2933
- At idle

AND WITH A HEAVY CPU LOAD

- Note higher CPU current, power, peak core speed, CPU Voltage, and temperature
- Note lower GFX Clock, not needed for a heavy core load
  - And thus lower SOC power and current
Current View of AMD Ryzen 5 2400G
- Stock configuration, no processor overclocking
- But with Memory overclocking to DDR4-2933
- At idle

Under heavy graphics load, some core load, still under stock automation control
- Note higher SOC current, power, and GFX clock
- Note lower CPU power, not needed for a heavy graphics load
OVERCLOCKING EXAMPLE

- With user Profile 1
  - CPU voltage and speed raised
  - SOC Voltage and GFX Voltage raised
  - GFX Clock speed raised and Memory Clock set for DDR4-2933 speed
  - Memory voltages and parameters set

- Applying Profile 1 requires a restart
  - Note update of all settings
ADVANCED OVERCLOCKING
**Available only on Ryzen 2000-Series processors**

- The core with the potential for the highest overclocking speeds will be indicated.
  - Gold star is fastest overall
  - Gray star is fastest per CCX
  - Gray dots are second-fastest per CCX
- When a user is optimizing maximum performance for a workload that uses fewer than all cores, the core speed indicator can be used for choosing which cores to set to higher speeds, and for choosing which cores to disable.
PER-CORE SPEED CONTROL FOR EACH CORE COMPLEX

• **Available only on Ryzen 2000-Series Processors**
  - The fastest core setting in the core complex sets the top speed reference.
  - Any combination of cores in the complex can be set to the fastest speed of the complex.
  - The top speeds can be different across the core complexes.
  - Use the All Cores control to easily set all cores to the same speed.

• Other cores can be set lower and will snap on Apply to a fractional relationship with the fastest core in the complex. Those fractions are 80%, 66%, 57%, 50%, and 44% with a range of 1 (fastest) : 1/2.25 (slowest).
  - After Apply, use the Copy Current function to reflect the actual speed relationship between cores.
  - If a different core is raised above the current top speed reference core, after Apply, the other cores will snap to the new fractional relationship set by the raised core.
  - If the current top speed reference core is lowered below the next fastest core, that next fastest core becomes the new reference. After Apply, the other cores will adjust to the new fractional relationship.
CORE DISABLE SELECTION WITHIN CORE COMPLEX

- Available only on Ryzen 2000-Series Processors
- Cores can now be individually and specifically disabled, with some constraints:
  - An equal number of cores must be disabled between active core complexes.
  - If all cores in a core complex are disabled, that core complex is no longer active, thus the remaining active core complex can have any number of cores disabled.
  - At least one active core and one active core complex must remain across the core resources.
- Attempting to disable and Apply an imbalanced configuration will display an error message restating the balanced requirement.
- Before a different core configuration can be created, all cores must first be enabled and Applied, then a new configuration can be set and Applied.
ISOLATING A SINGLE CORE

- One active core in one active complex.
- No active cores in inactive complex.
RYZEN MASTER INTERFACE VIEWS BY PREVIOUSLY RELEASED PROCESSORS FOR FEATURE REFERENCE

• RYZEN WITH RADEON VEGA GRAPHICS
• RYZEN 1000-SERIES PROCESSORS
• RYZEN THREADRIPPER 1000-SERIES PROCESSORS
RYZEN WITH RADEON VEGA GRAPHICS PROCESSORS

CURRENT VIEW
RYZEN WITH RADEON VEGA GRAPHICS PROCESSORS

PROFILES VIEW

![Image of AMD Ryzen Master interface showing profiles]

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RYZEN WITH RADEON VEGA GRAPHICS PROCESSORS

SETTINGS VIEW
Ryzen 1000-Series Processors

Current View
RYZEN 1000-SERIES PROCESSORS

PROFILES VIEW

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RYZEN 1000-SERIES PROCESSORS

SETTINGS VIEW
RYZEN THREADRIPPER 1000-SERIES PROCESSORS
CURRENT VIEW
RYZEN THREADRIPPER 1000-SERIES PROCESSORS

PROFILES VIEW
RYZEN THREADRIPPER 1000-SERIES PROCESSORS

SETTINGS VIEW