MAXIMUS XII FORMULA

ROG Maximus XII series motherboards are designed to explore the upper echelons of gaming and overclocking. The Formula is plumbed for custom liquid cooling and includes other enhancements to punctuate premium systems. The CrossChill EK III VRM block, co-developed with EK Water Blocks, help cope with higher VRM loads associated with Intel Comet Lake CPUs. Aesthetically, Maximus XII Formula has a stealthy black finish with intricate patterns cut into its reflective armor. The latest-generation Formula is all set to make your showcase rig shine.

intel CHIPSET Z490

SUPPORTS intel CORE 10TH GEN

Intelligent Motherboard

Our ROG engineers developed and extensively-tested intelligent software solutions to ensure your system stays in optimal condition.

AI Overclocking

Tuning is now faster and smarter than ever before. AI Overclocking profiles the CPU and cooling to predict the optimal configuration for each system.

LEARN MORE

AI Cooling

AI Cooling automatically manages and controls motherboard-connected fans, ensuring the most efficient settings depending on the current system load and temperature.

LEARN MORE

AI Networking

GameFirst VI optimizes and organizes network bandwidth, effectively reducing jitter and eliminating spike lag to ensure smooth online gameplay.

LEARN MORE

SPEC OVERVIEW

Extreme Power & Performance

PROCOOL II POWER CONNECTOR

16 POWER STAGE

MULTI-GPU SLI®/ CFX SUPPORT
- 2 x PCIe 3.0 x16 Safeslots (x16, x8/x8)
- 1 x PCIe 3.0 x16 slot (x4)
- 1 x PCIe 3.0 x1 slot

INTEL® SOCKET LGA 1200
10th Gen Intel® Core™, Pentium® Gold and Celeron® processors

DDR4, 4 X DIMM
- ASUS OptiMem III
- Dual Channel

3 X M.2 SOCKET
- 1 x M.2 2242-22110 supports PCIe 3.0 x4 & SATA modes
- 2 x M.2 2242-2280 support PCIe 3.0 x4 mode (1 x at front / 1 x at rear)

Comprehensive Cooling

CROSSCHILL EK III

MULTIPLE 4-PIN PWM FAN HEADERS

M.2 HEATSINK

ROG WATER-COOLING ZONE

- W_FLOW tachometer
- W_IN/OUT T-sensor

Total Gaming Immersion

I/O & ARMOR ZONE AURA LIGHTING

SupremeFX S1220 CODEC
ESS® ES9023P High Definition DAC
120dB SNR stereo playback output
113dB SNR recording input
Gold-plated Audio Jacks
SONIC STUDIO III
Sonic Studio Virtual Mixer
SONIC RADAR III
DTS® SOUND UNBOUND

2 X 3-PIN ADDRESSABLE GEN 2 RGB HEADERS
2 X 4-PIN AURA RGB HEADERS

2" LIVEDASH OLED

PCH ZONE AURA LIGHTING

Full Connectivity

CLEAR CMOS button
BIOS FlashBack™ button

6 X USB3.2 Gen1

4 x USB 3.2 Gen 2
· 1 x USB Type-C®

Marvell® AQtion AQC107 10Gb
Intel® 2.5G Ethernet

Intel® Wi-Fi 6 AX201

Optical S/PDIF out

1 x USB 3.2 Gen2
Front Panel Connector

6 x SATA 6Gb/s

Thunderbolt header

DIY Friendly

ROG PATENTED PRE-MOUNTED I/O SHIELD

ESD GUARDS

Greater electrostatic protection than the industry standard. ESD Guards cover the USB, audio and LAN ports

TRUEVOLT USB

USB power supplies rock-steady 5V to all USB ports, minimizing power fluctuations for minimal data loss

2 x SAFESLOT

Provides stronger PCIe device retention and greater shearing resistance.

4 x Q-DIMM

One sided clips for super-simple, super-secure handling of memory modules

Q-CODE

The Q-Code LED design provides you with a 2-digit error code that displays the system status.

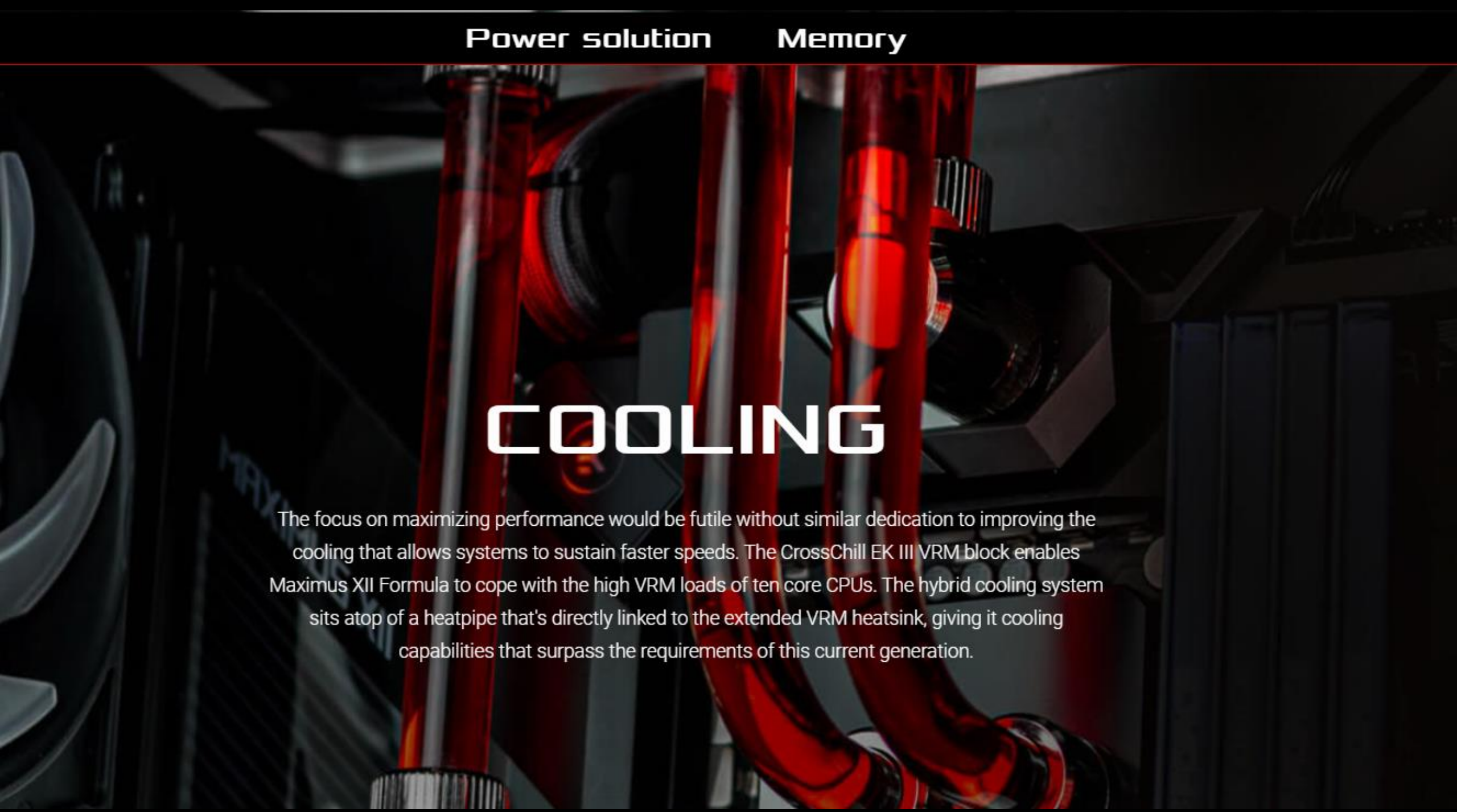
FLEXKEY

At its default, the FlexKey functions as a system reset button, but it can also be easily set to quickly turn Aura lighting on or off, activate Safe Boot or enter the BIOS.

Q-CONNECTOR

Sorts all front-panel cables.


PERFORMANCE
The Intel Comet Lake processor features 10 cores and a peak single-core Turbo speed that exceeds 5.3 GHz right out of the box. To cope with this increased demand on the system, Maximus XII Formula takes advantage of its intelligent VRM design and uses quality components to ensure the best gaming and daily productive computing experience.



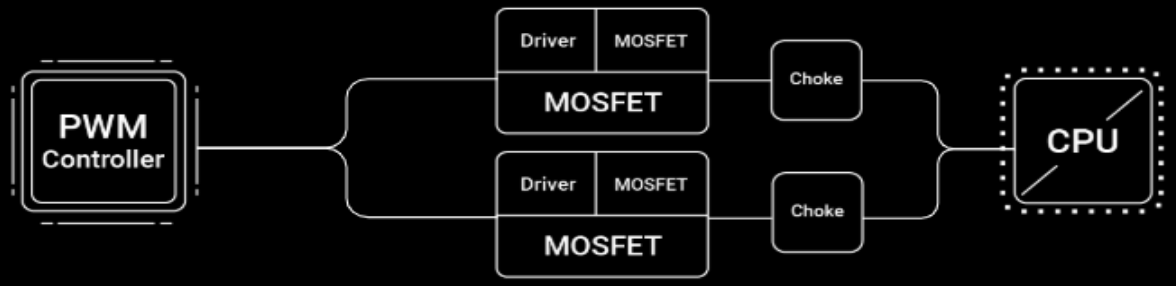
COOLING

The focus on maximizing performance would be futile without similar dedication to improving the cooling that allows systems to sustain faster speeds. The CrossChill EK III VRM block enables Maximus XII Formula to cope with the high VRM loads of ten core CPUs. The hybrid cooling system sits atop of a heatpipe that's directly linked to the extended VRM heatsink, giving it cooling capabilities that surpass the requirements of this current generation.

Teamed Power Architecture

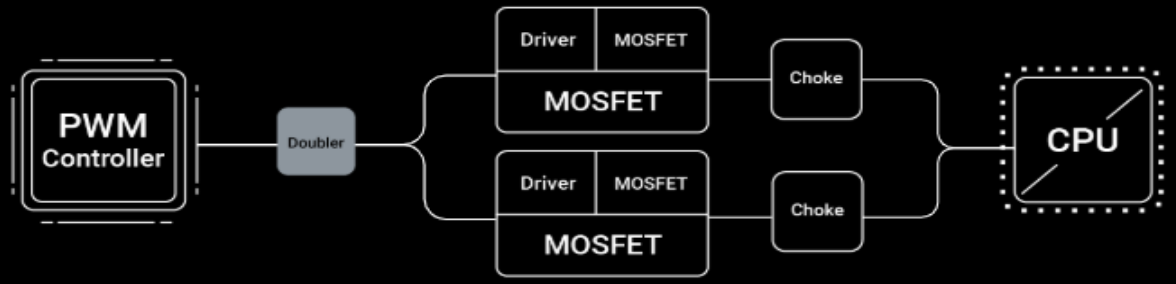
Today's CPU architectures place incredible demands on motherboard power design by transitioning from deep power saving modes , going from lower-power mode to full load in an instant. Our latest VRM architecture rises to the challenge by utilizing teamed power stages to rapidly swing current, while maintaining exemplary thermal performance.

Teamed
Power Stage Design

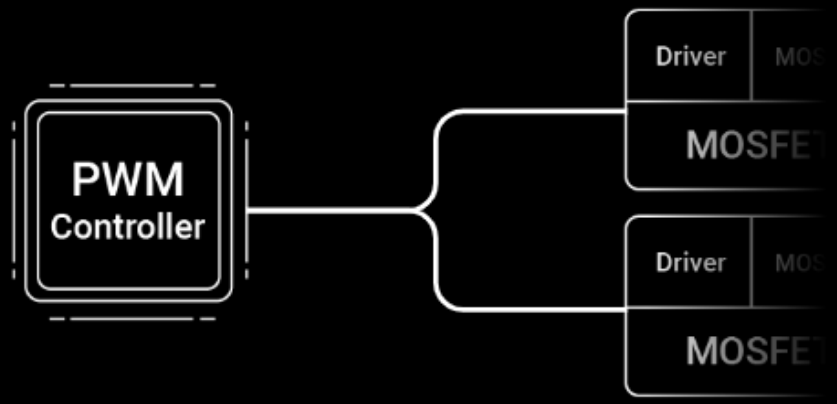


We became the first manufacturer to implement phase-doublers when we shipped our A8N32-SLI Deluxe motherboard, back in 2005. The board's VRM was lauded for elegantly overcoming the power handling capabilities of components that were available at the time and also reducing voltage ripple. Those benefits led to phase-doublers becoming universally accepted in the industry, and they are still used for similar purposes today.

Conventional
Phase-doubled Design

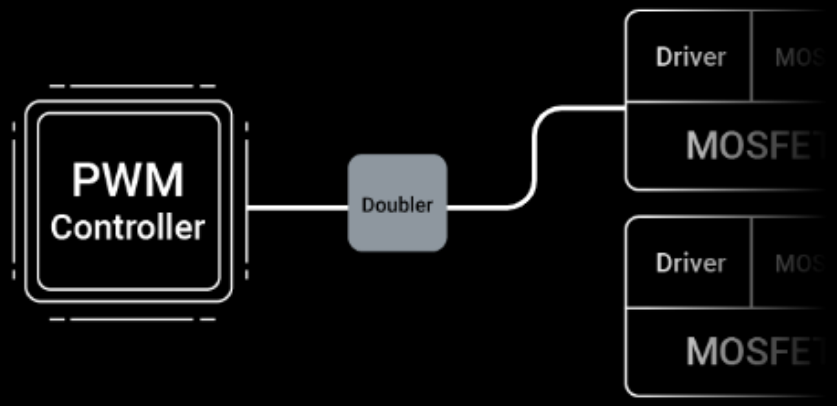


Teamed
Power Stage Design



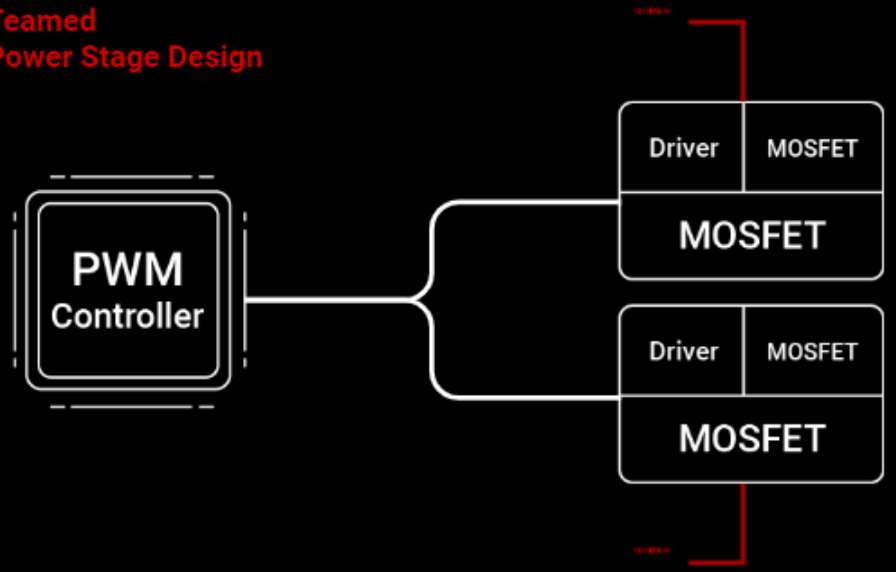
While doublers help extend the number of effective phases, they do so at the cost of a processing delay.

Conventional
Phase-doubled Design



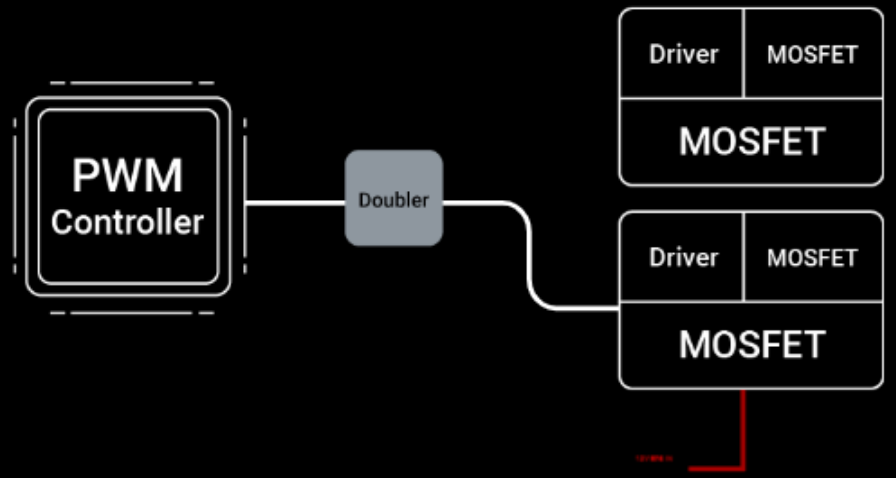
However, today's CPUs now pack more cores than their predecessors, and the latest instruction sets allow them to crunch computationally dense workloads at an incredible pace. In addition, they consume less power at idle and can transition between load states much more quickly. These improvements necessitate a re-evaluation of power-design priorities because phase-doublers add a propagation delay that hampers transient response.

Teamed
Power Stage Design



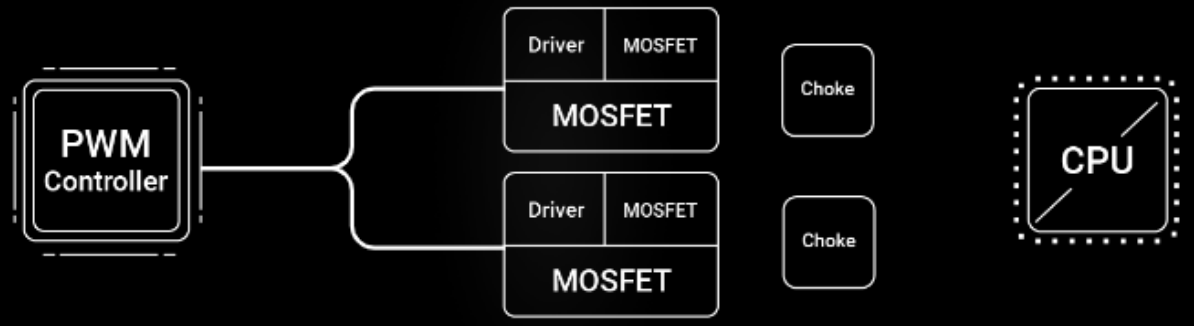
The teamed architecture allows two power stages to work in tandem to provide more power to the CPU.

Conventional
Phase-doubled Design



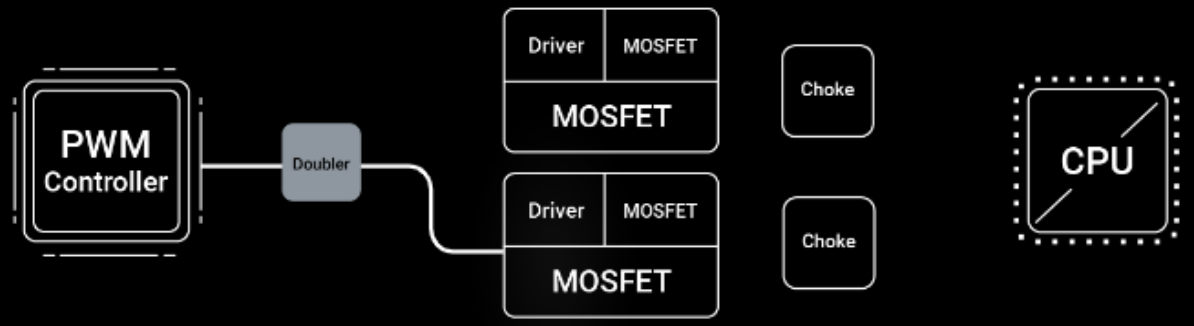
Fortunately, the latest integrated power components can handle higher currents than the devices of yesteryear, making it possible to implement a simple circuit topology that isn't hamstrung by the processing lag of phase-doublers. That's why ROG Maximus XII Formula utilizes teamed power stages to deliver higher burst current per phase, while maintaining the thermal performance of phase-doubled designs.

Teamed
Power Stage Design



The MOSFETs within the power stages generate the most heat as they are responsible for voltage conversion and delivery to the CPU from the 12V EPS connector.

Conventional
Phase-doubled Design



Each VRM component serves a specific purpose. PWM controllers and phase-doublers control the circuit, and the power stages do the heavy lifting from an electrical and thermal standpoint. That's why ROG Maximus XII Formula utilizes 16 power stages. The power stage sits at the top of Infineon's lineup and features a low RDSON to reduce switching and conduction losses, helping to improve overall thermal headroom.

8-pin ProCool II power connector

Ensures a snug and reliable connection to the EPS 12V power lines.

70 A power stage

The VRM has 16 power stages, each rated to handle 70 amps.

MicroFine alloy chokes

Each Power stage is accompanied by a high-permeability alloy-core choke rated to handle 45 amps.

10K Japanese-made black metallic capacitors

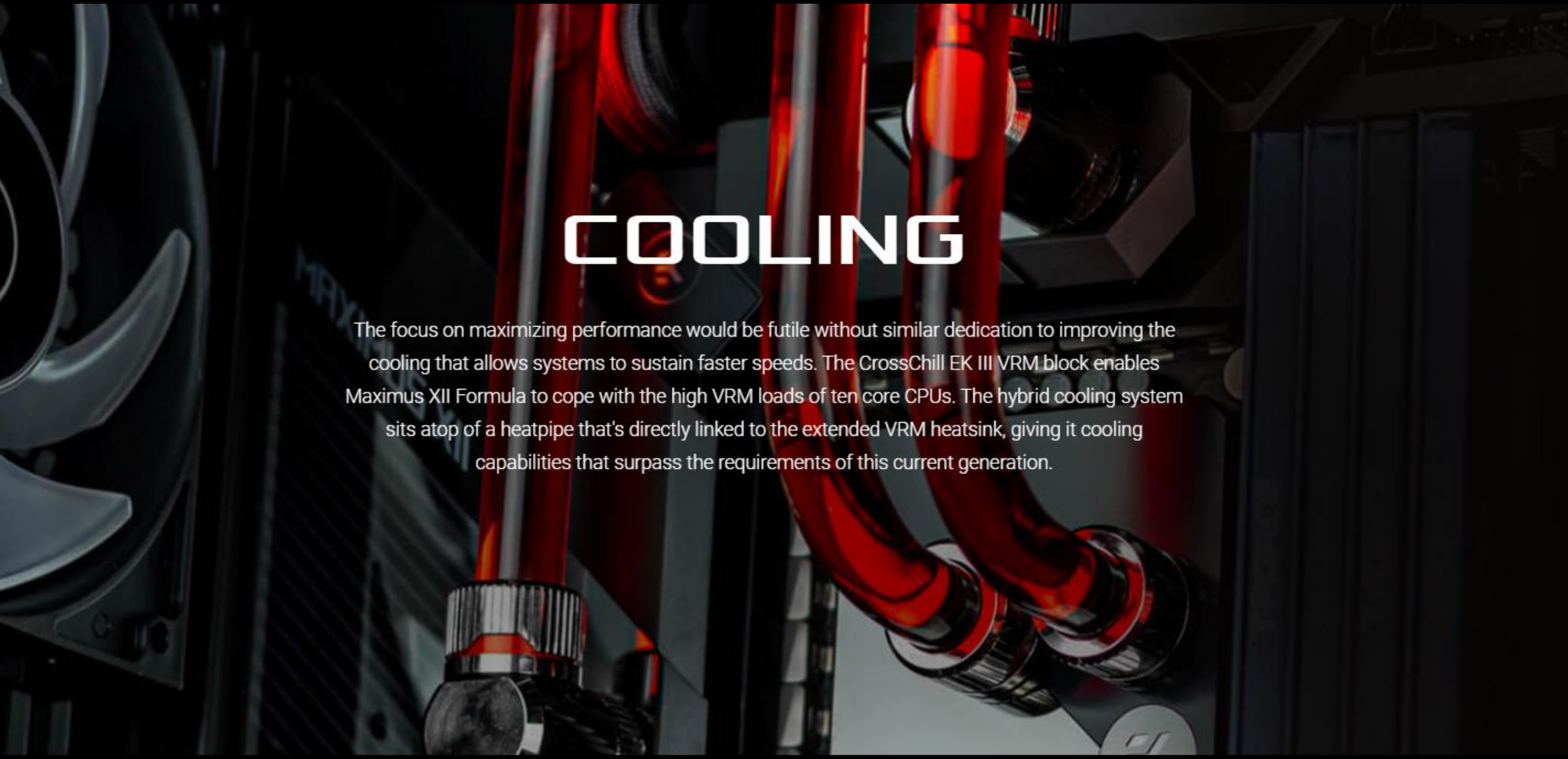
Input and output filtering is provided by solid-polymer capacitors rated to last thousands of hours at high operating temperatures.

ASUS OptiMem III

Boasting proprietary memory trace layout tweaks that improve signal integrity and mitigate noise, ASUS OptiMem III is more compatible with 3600 MHz+ memory kits, allowing them to run at higher frequencies. You can opt to optimize memory for high frequency settings, or low latency settings. With higher capacity memory kits, OptiMem III enables you to run at maximum frequency, whereas other motherboards will trade off frequency for capacity. Stack Maximus XII Formula with your favorite modules and maximize throughput of the new 10th Generation Intel® Core™ Comet Lake-S processor for applications that demand massive bandwidth.

Test Configuration: Intel 10th Gen Processor ES Sample | ROG Maximus XII Formula

High Frequency | Max Capacity without compromise



COOLING

The focus on maximizing performance would be futile without similar dedication to improving the cooling that allows systems to sustain faster speeds. The CrossChill EK III VRM block enables Maximus XII Formula to cope with the high VRM loads of ten core CPUs. The hybrid cooling system sits atop of a heatpipe that's directly linked to the extended VRM heatsink, giving it cooling capabilities that surpass the requirements of this current generation.

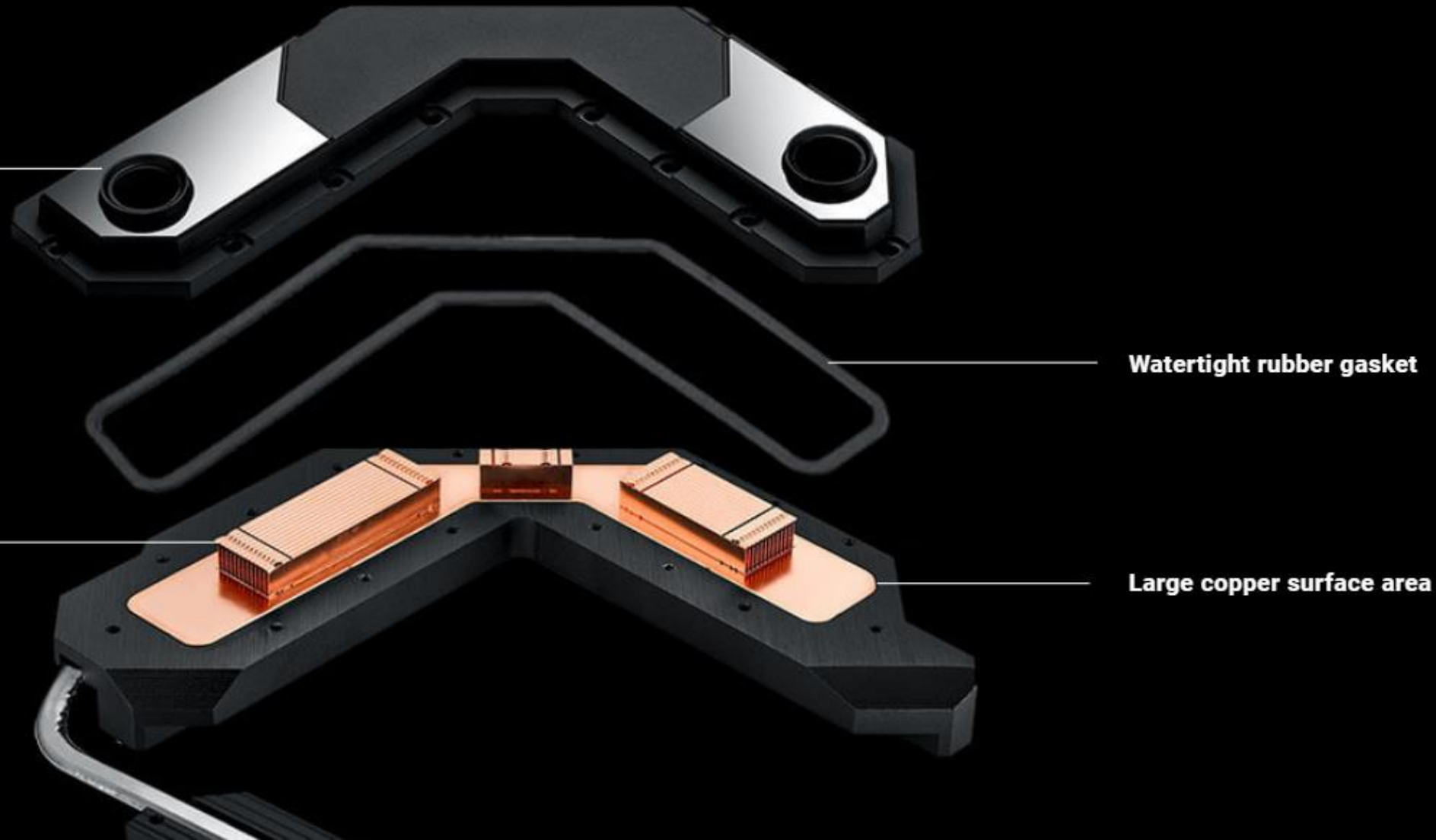
CrossChill EK III Heatsinks Headers

CrossChill EK III

CrossChill EK III lets you cool with air and water. The redesigned copper cooling channel is wider to provide up to 37.2°C-lower MOSFET temperatures on water, while the standard G1/4" threaded fittings allow it to fit existing setups for efficient, quiet cooling with minimum effort.

G1/4" threaded design

1/2" 3/8" 1/4"



Watertight rubber gasket

Copper water channel

Large copper surface area

Cooling Heatsinks

CrossChill hybrid thermal design

Engineered with a copper cooling channel that's incredibly effective at removing heat

Large-diameter heatpipe

The U-shaped design provides rapid and even heat transfer from the VRM to the extended VRM heatsink.

M.2 heatsink

A dedicated heatsink keeps the two M.2 SSDs at the optimum operating temperature for consistent performance and reliability.

High-conductivity thermal pad

The high-quality thermal pad improves overall heat transfer from the system by bridging the heat generated by the power stages to the heatsink.

Extended VRM heatsink

The extended heatsink at the end of heatpipe increases thermal mass to offset the additional heat generated by high power consumption.

Chipset heatsink

A dedicated chipset heatsink draws heat away to maintain optimum operating temperatures.

Solid steel backplate

An electro-galvanized, cold-rolled coil construction backplate resists bending, and helps draw heat away from the VRM.

Cooler by design

ROG Maximus XII Formula features the most comprehensive cooling options ever.

Multiple temperature sources

Each header can be set to monitor and react to three user-configurable thermal sensors for workload-based cooling. And all settings can be easily managed by Fan Xpert 4 or UEFI.

4-pin PWM/DC fan

Every onboard header supports auto-detection of PWM or DC fans.

AIO pump

A dedicated PWM/DC header for self-contained water-cooling setups.

ROG Water-Cooling Zone

Dual water-temperature headers and a flow-rate header feed information straight into the AI Suite utility, allowing you to track coolant temperatures and the flow rate of the entire loop.

Water pump+

A dedicated header can supply over 3 amps to high-performance PWM or DC water pumps.

Water in/out

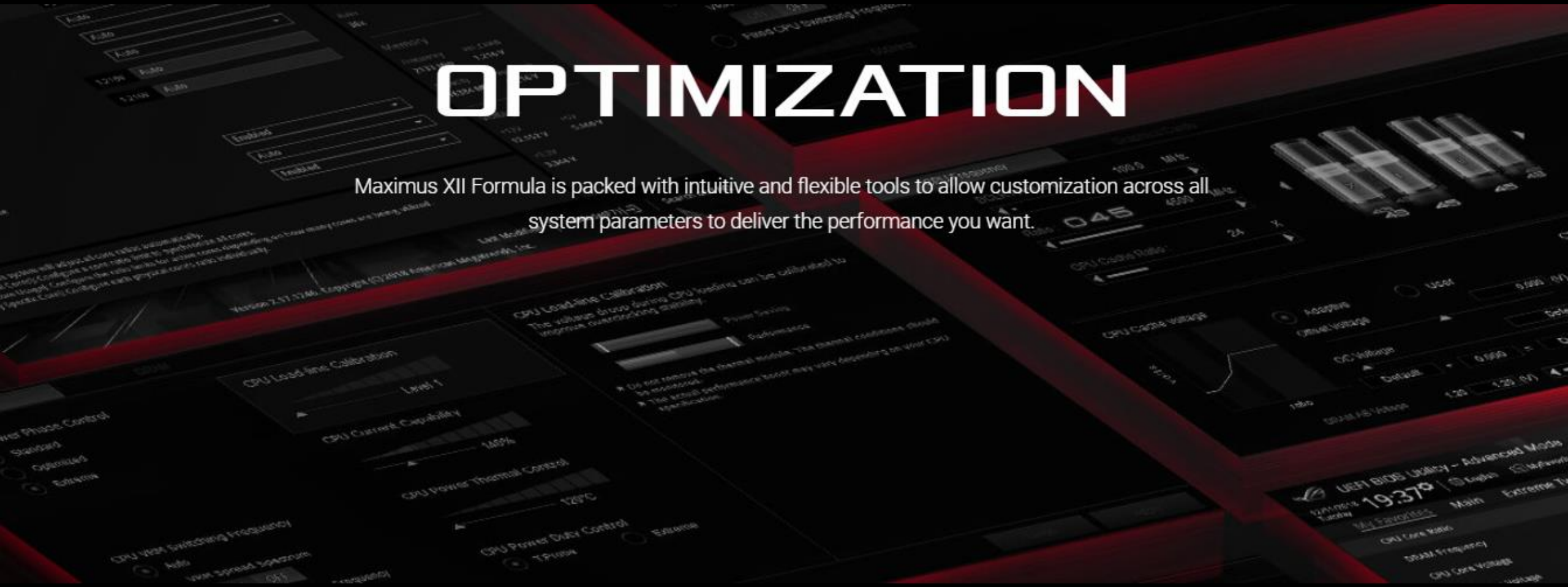
A dedicated header enables monitoring of temperatures at the input/output points of any component.

Water flow

A dedicated header enables constant monitoring of flow rate throughout the entire loop.

OPTIMIZATION

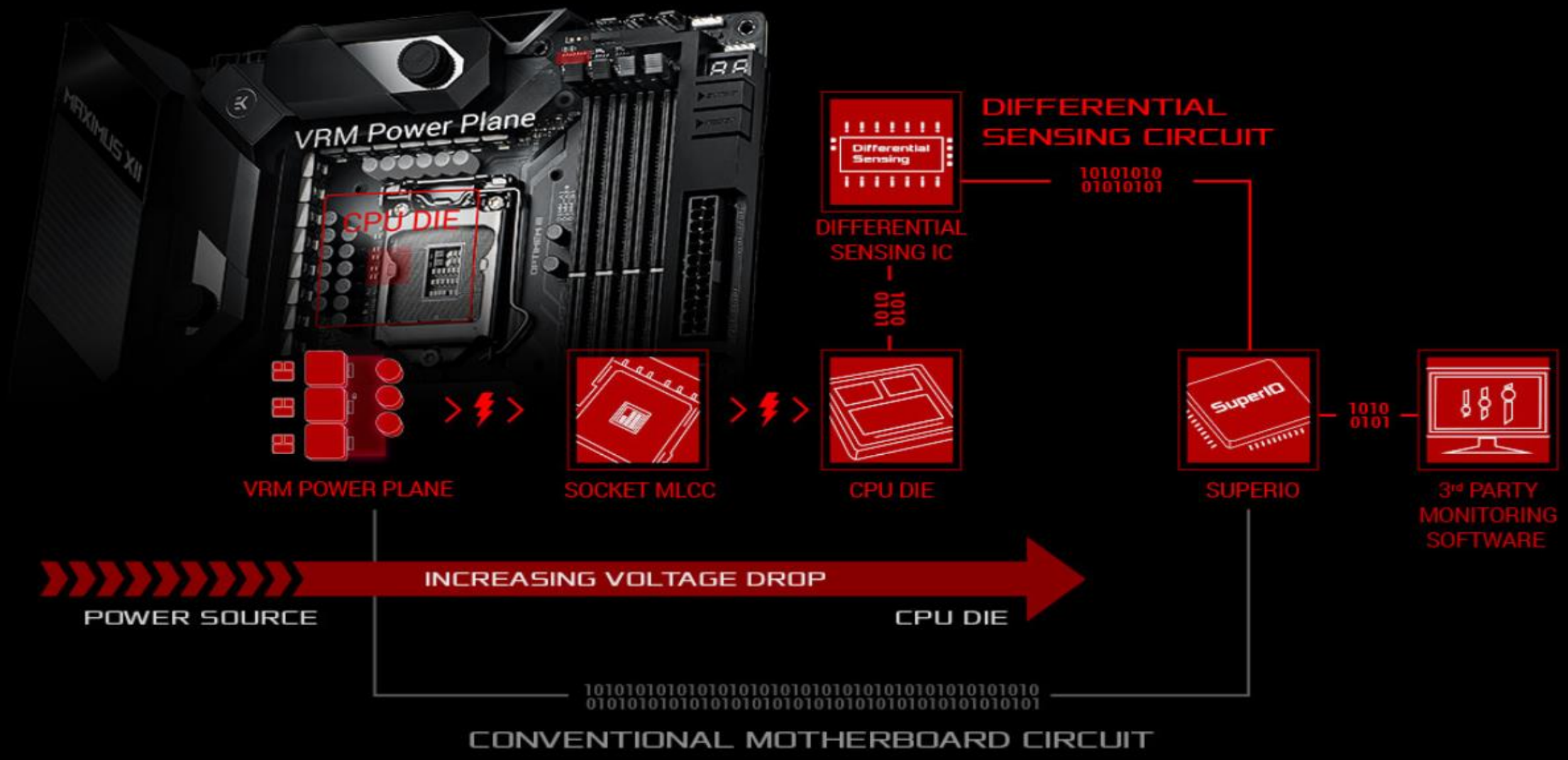
Maximus XII Formula is packed with intuitive and flexible tools to allow customization across all system parameters to deliver the performance you want.



Differential Sensing **BIOS** **5-way optimization**

Accurate Voltage Monitoring

Conventional motherboards use single-ended sensing tapped from a location that isn't ideal, leading to a large disparity between the actual voltage fed to the CPU and the value reported to software. Maximus XII Formula features a differential-sensing circuit and delicate IC that simplify overclocking and tuning by allowing you to track voltages more accurately.



UEFI BIOS

The renowned ROG UEFI (BIOS) provides everything you need to configure, tweak, and tune your rig. It offers intelligently simplified options for newcomers to PC DIY, as well as comprehensive features for seasoned veterans.

Advanced Mode EZ Mode

When you're ready for a deeper dive, delve into the UEFI's Advanced mode and take complete control. Advanced mode enables full control over every aspect of the motherboard, and a built-in search function helps you quickly find the setting you need.

Advanced Mode

My Favorites
Quickly find tuning options and add preferred tools to the list.

EZ Flash 3
Flash the latest BIOS via the internet from within the BIOS.

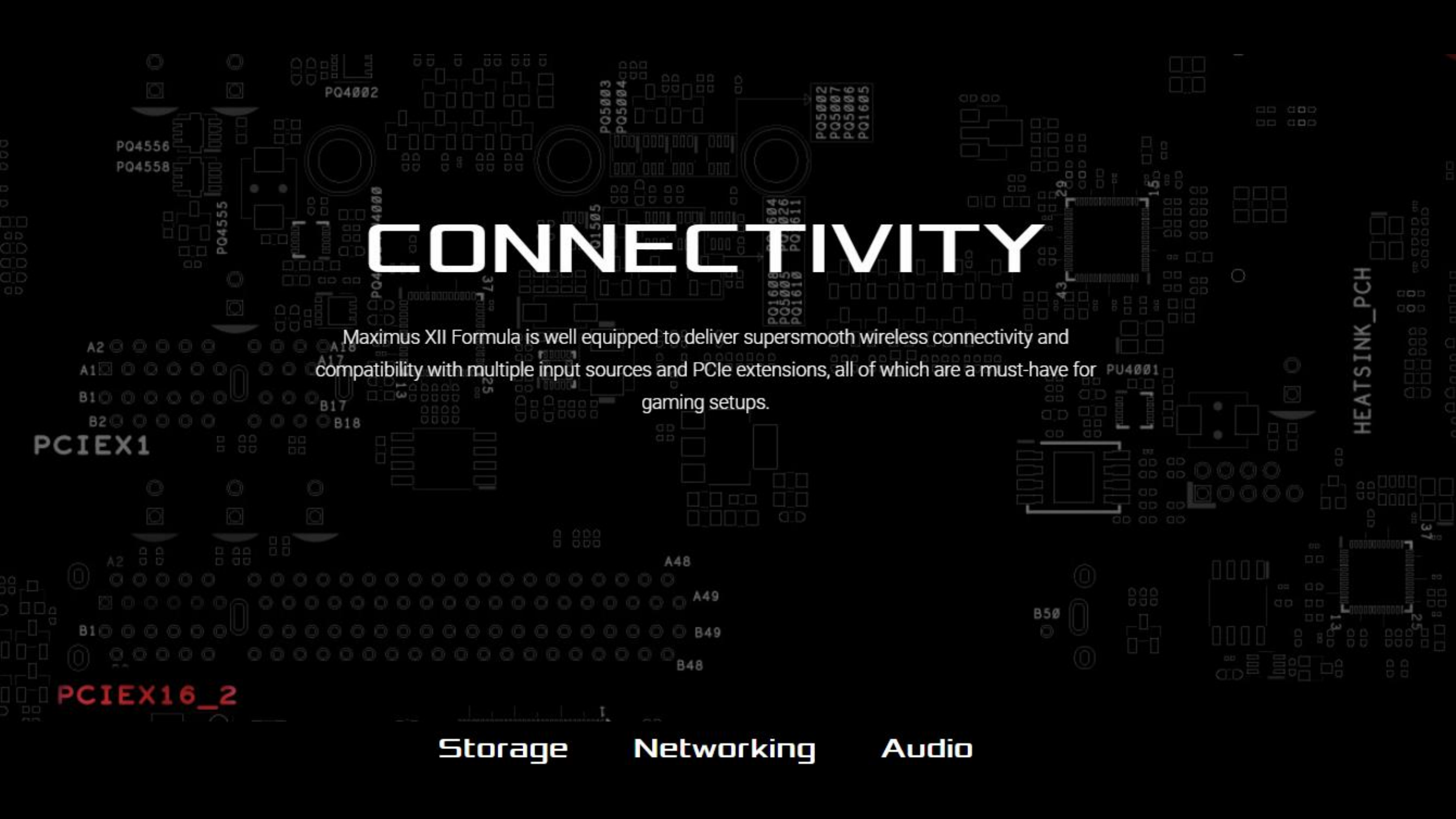
S.M.A.R.T.
Check your storage device Self-Monitoring, Analysis, and

Performance Level Up

The dashboard-style control panel of AI Suite 3 lets you fine-tune almost every aspect of your ROG Maximus XII Formula system with ease. Get the best balance between performance, cooling, stability, and efficiency via one simple and intuitive interface.

CPU-performance boost

The TurboV Processing Unit (TPU) is an intelligent onboard micro-controller that provides an array of system-tuning features, including the ability to fine-tune voltages, monitor system stats and adjust overclocking parameters.



CONNECTIVITY

Maximus XII Formula is well equipped to deliver supersmooth wireless connectivity and compatibility with multiple input sources and PCIe extensions, all of which are a must-have for gaming setups.

Storage Networking Audio

Three PCIe 3.0 M.2

Three M.2 slots are wired directly to the PCH. One slot supports both SATA and PCIe 3.0 x4 modes, while the other two supports PCIe 3.0 x4 for NVMe. Additional Intel® Optane™ memory recognizes, remembers, and speeds up access to most frequently used files, applications, and games for faster, more responsive performance.

WiFi 6 (AX201)

Onboard WiFi 6 (802.11ax) supports ultrafast wireless-networking speeds, improved capacity and better performance in dense WiFi environments, providing exceptional online gaming experiences. *

Pair your motherboard with ASUS WiFi 6 routers to fully experience the networking potential of WiFi 6. Find out more about ASUS WiFi 6 solutions:

https://www.asus.com/wifi6/

10 Gbps onboard Ethernet

Designed to meet the demanding requirements of power users and content creators, 10 Gbps onboard Ethernet provides a new level of home networking. With up to 10X the bandwidth of standard gigabit Ethernet, you'll enjoy streaming uncompressed 4K UHD videos, and backups and file transfers that are faster than ever before.

Intel 2.5G Ethernet

Onboard Intel 2.5G Ethernet gives your wired connection a boost, with up to a 2.5X improvement over standard Ethernet connections for faster file transfers, smoother lag-free gaming and high-res video streaming.

SupremeFX

ROG SupremeFX audio technology has levelled up, delivering an exceptional 113 dB signal-to-noise ratio on the line-in connection to provide best-ever recording quality. There's also a low-dropout regulator for cleaner power delivery to the SupremeFX S1220 codec, an ESS® ES9023P digital-to-analog converter for superior front-panel output, and a Texas Instruments® RC4580 op amp for high gain with low distortion — all to deliver audio that envelops you as never before.

Audio Line Shielding | ESS®ES9023P | S1220 codec | Switching MOSFETS | Nichicon® CAPS

Blocks electromagnetic interference from the motherboard or add-ons to provide cleaner audio.

Audio Line Shielding | **ESS®ES9023P** | S1220 codec | Switching MOSFETS | Nichicon® CAPS

The ESS® ES9023P digital-to-analog converter creates a perfect balance for top-tier audio clarity capable of 112db DNR /-94dB THD+N for superior front-panel output.

Audio Line Shielding | ESS®ES9023P | **S1220 codec** | Switching MOSFETS | Nichicon® CAPS

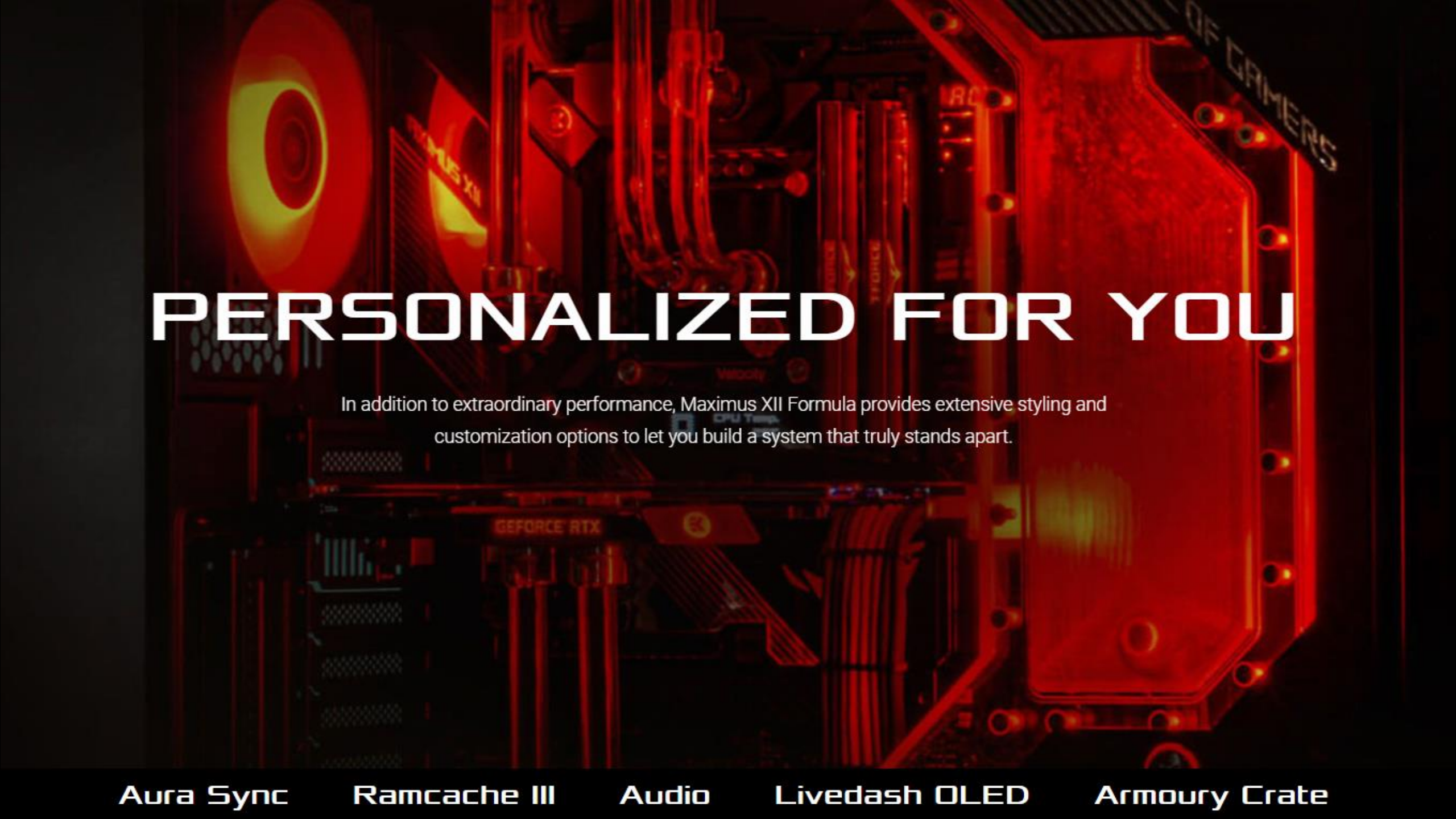
10 DAC channels provide simultaneous 7.1-channel playback, independent 2.0-channel, multiple-stream stereo to front-panel outputs

Audio Line Shielding | ESS® ES9023P | S1220 codec | **Switching MOSFETS** | Nichicon® CAPS

Unique design allows the codec's impedance-sensing function to be ported with either the front or rear headphone outputs

Audio Line Shielding | ESS® ES9023P | S1220 codec | Switching MOSFETS | **Nichicon® CAPS**

Fine-quality Japanese-made components that produce a warmer, natural sound with exceptional clarity and fidelity



PERSONALIZED FOR YOU

In addition to extraordinary performance, Maximus XII Formula provides extensive styling and customization options to let you build a system that truly stands apart.

Aura Sync Ramcache III Audio Livedash OLED Armoury Crate

Aura Sync RGB Header

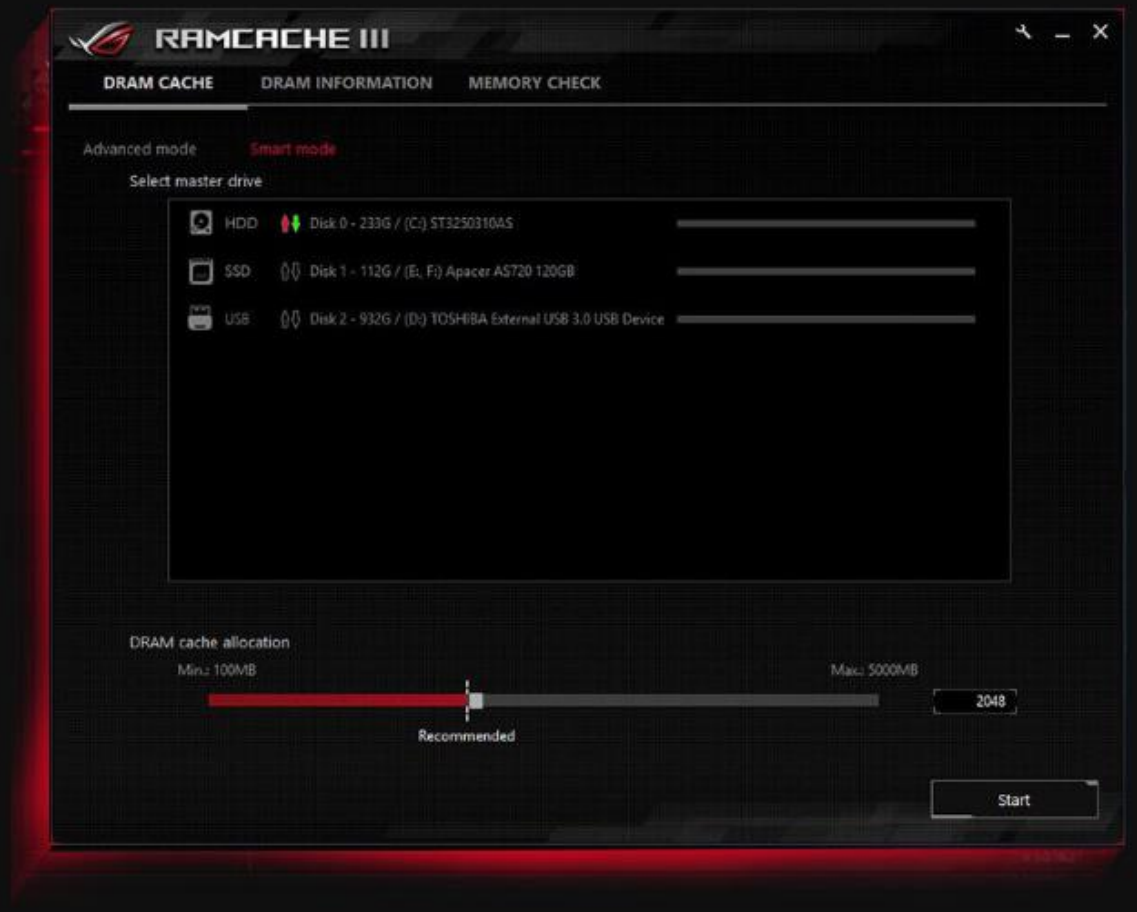
Grow your gaming world

Gear up with ROG components, from graphics and monitors to mice and keyboards. And up your game with complementary aesthetics, control and compatibility. The ROG ecosystem is more extensive than any competing brand, so enjoy greater choice as your system expands.

Aura Sync Ramcache III Audio Livedash OLED Armoury Crate

RAMCache III software utility turns milliseconds into microseconds to boost game-load times. Fully compatible with the latest NVM Express® storage options, RAMCache III utilizes uniquely intelligent technology to effectively cache any storage device, so favorite games and apps launch at breakneck speeds.

Smart mode | Real-time information | Health check



Automatically cache all your storage devices to maximize your system's resources.

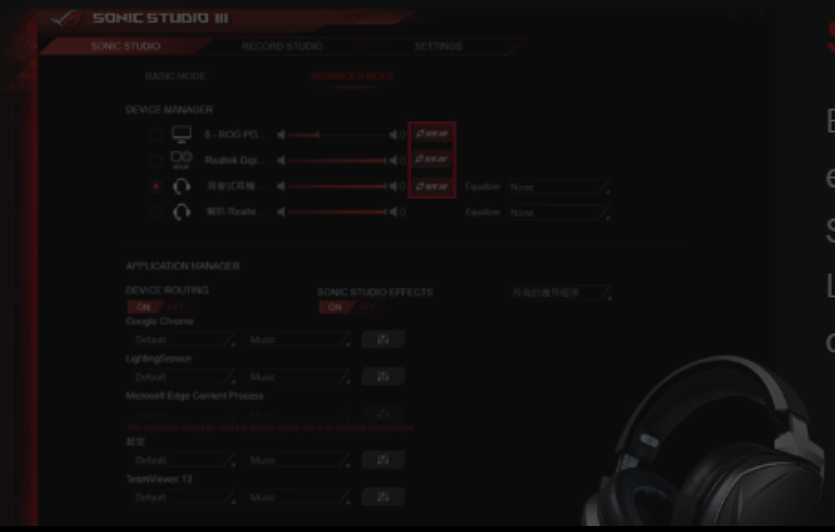
Sonic Studio III

Sonic Studio supports HRTF-based (head-related transfer function*) virtual surround for headsets, casting an immersive aural landscape that draws you deeper into the action. The intuitive Sonic Studio interface also offers a range of EQ options and one-click presets, allowing you to tailor acoustics to suit personal preferences or the characteristics of your headset.

⊕ Head-related transfer function

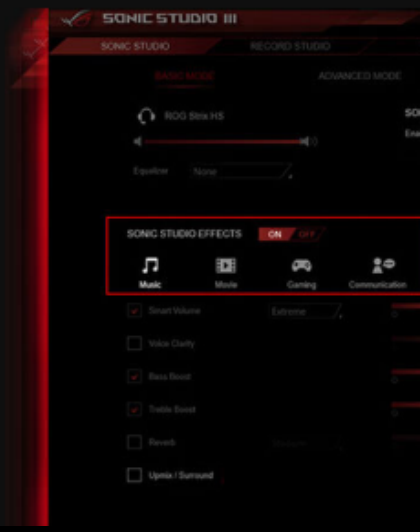
Learn more

Sonic Studio Link | App-specific profiles | Sonic Studio virtual mixer



Sonic Studio Link

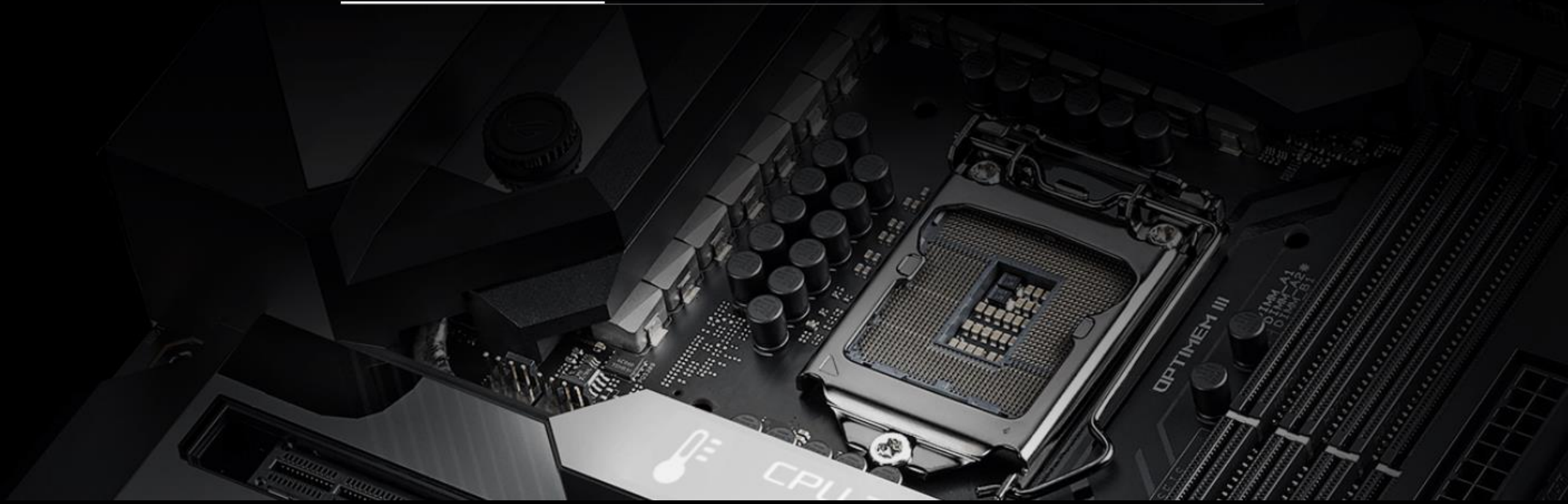
Easily apply Sonic Studio effects on all playback devices. Simply press the Sonic Studio Link button to enjoy the effect on any playback device.



OLED

ROG Maximus XII Formula motherboards is equipped with LiveDash, a built-in 2" OLED panel that displays useful information and customizable graphics. During the power-on, self-test (POST) phase, OLED shows key progress stats in simple language, using traditional POST codes. Then, during normal operation, the panel shows a choice of CPU frequency, device temperatures, fan speeds or information from the Water-Cooling Zone. You're also able to customize the default OLED GIF, so it'll display your own image or animation.

Hardware Monitoring | ROG Exclusive | BIOS update | Customization Content

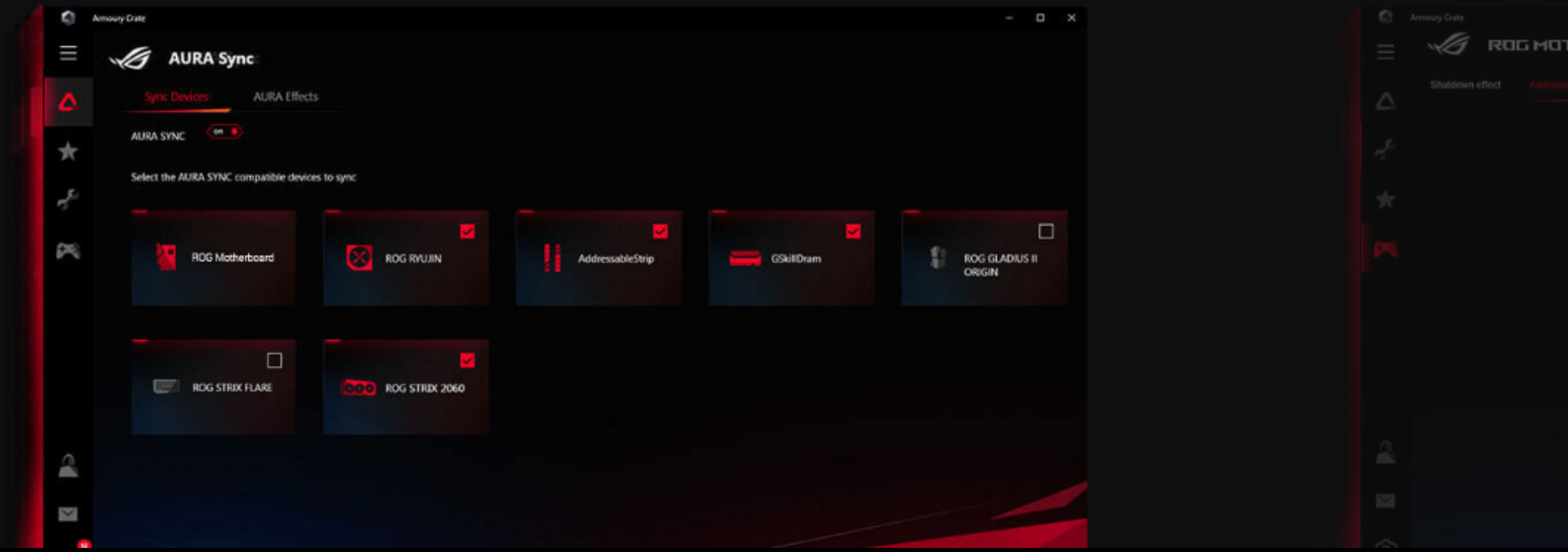


Armoury Crate

Armoury Crate is a software utility designed to provide centralized control of supported ROG gaming products. From a single intuitive interface, Armoury Crate puts command of all your Aura gear at your fingertips with the new Aura Creator suite ready. The software also provides control of settings for a growing number of ROG products, making it easier to tune the look and feel of your system. Armoury Crate even offers dedicated product registration and ROG news feeds to help you stay in touch with the ROG gaming community.

Download Link>

AURA SYNC | Device Configuration | Driver & Manual Download | Gaming Highlight | Account Management



- Los colores y las especificaciones técnicas del producto varían de país en país; por favor contacte con un vendedor autorizado ASUS para confirmar las configuraciones del producto y/o las opciones de crecimiento (RAM, Disco Duro etc.) disponibles en su país.
- La información de los productos está sujeta a cambios sin previo aviso.
- El color de la PCB y las versiones del software incluido están sujetas a cambio sin previo aviso.
- La marca y los nombres de los productos mencionados son marcas registradas por sus respectivas compañías.

El producto (equipos eléctricos, electrónicos, pilas de botón con mercurio) no debe depositarse en la basura municipal. Consulte las regulaciones locales para la eliminación de productos electrónicos.

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