



Noctua at Computex Taipei 2025

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As usual, we would like to give you a brief glimpse of what we are currently working on by displaying some exclusive prototypes and providing a first sneak preview of upcoming new products:

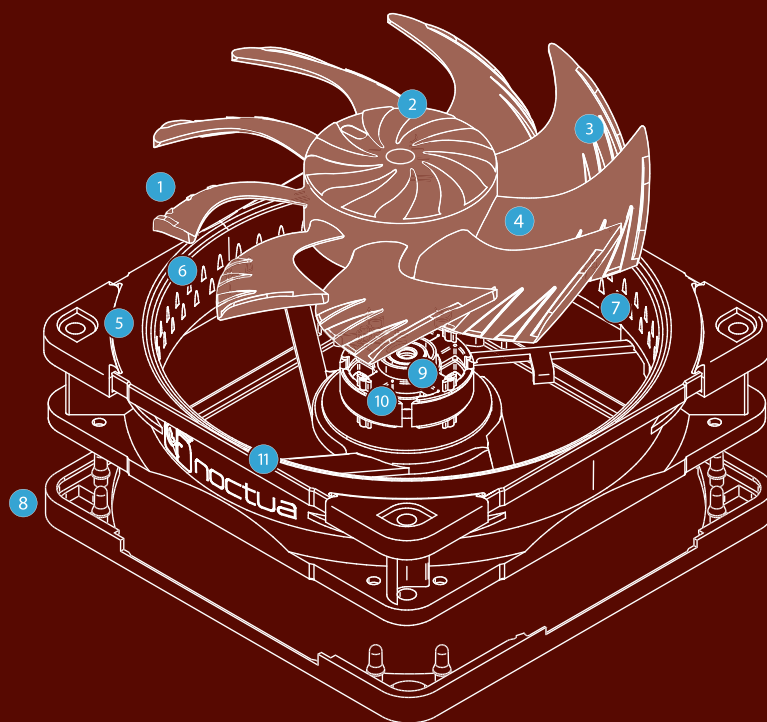
- **NF-A12x25 G2**
- **NF-A14x25(r) G2 chromax.black**
- **NH-D15 G2 chromax.black**
- **Next-gen workstation CPU coolers**
- **Thermosiphon development project**
- **All-in-one liquid coolers**
- **Antec Flux Pro Noctua Edition**
- **ASUS GeForce RTX 5080 Noctua Edition**
- **Seasonic PRIME PX HPD Noctua Edition power supplies**
- **Pulsar Feinman Noctua Edition**
- **140mm size desk fan**
- **USB inline fan controller**

NF-A12x25 G2



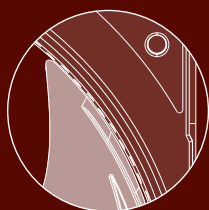
- Further improved performance-to-noise efficiency compared to the award-winning NF-A12x25
- Same aerodynamic design approach and feature set as the 140mm NF-A14x25 G2
- Progressive-Bend impeller, made from Sterrox® liquid-crystal polymer, pushes air out towards the highest efficiency blade areas
- Centrifugal Turbulator hub for better flow attachment and optimised fluid distribution across the impeller
- Winglets reduce tip vortices and thereby increase efficiency
- Ultra-tight tip clearance (0.5mm) for superior performance on heatsinks and radiators
- **Current ETA:** June 2025 (chromax.black version: Q1 2026)

NF-A12x25 G2 key features



- ① **Winglets** reduce tip vortices and thereby increase efficiency
- ② **Centrifugal Turbulator hub** for better flow attachment and optimised fluid distribution across the impeller
- ③ **Flow Acceleration Channels** reduce suction side flow separation and vortex noise
- ④ **Progressive-Bend impeller** made from Sterrox® liquid-crystal polymer pushes air out towards the highest efficiency blade areas
- ⑤ **AAO (Advanced Acoustic Optimisation) frame** with Stepped Inlet Design, Inner Surface Microstructures and anti-vibration pads
- ⑥ **Stepped Inlet Design** improves flow attachment and suction capacity
- ⑦ **Inner Surface Microstructures** improve efficiency by creating a boundary layer at the inside of the frame
- ⑧ **NA-AVG1** anti-vibration gasket for tighter seal on water cooling radiators
- ⑨ **SS02 bearing** with magnetic stabilisation and metal bearing shell
- ⑩ **Ultra-high efficiency etaPERF™ motor** with Smooth Commutation Drive 2 for superb running smoothness and SupraTorque™ for superior performance on heatsinks and radiators

⑪



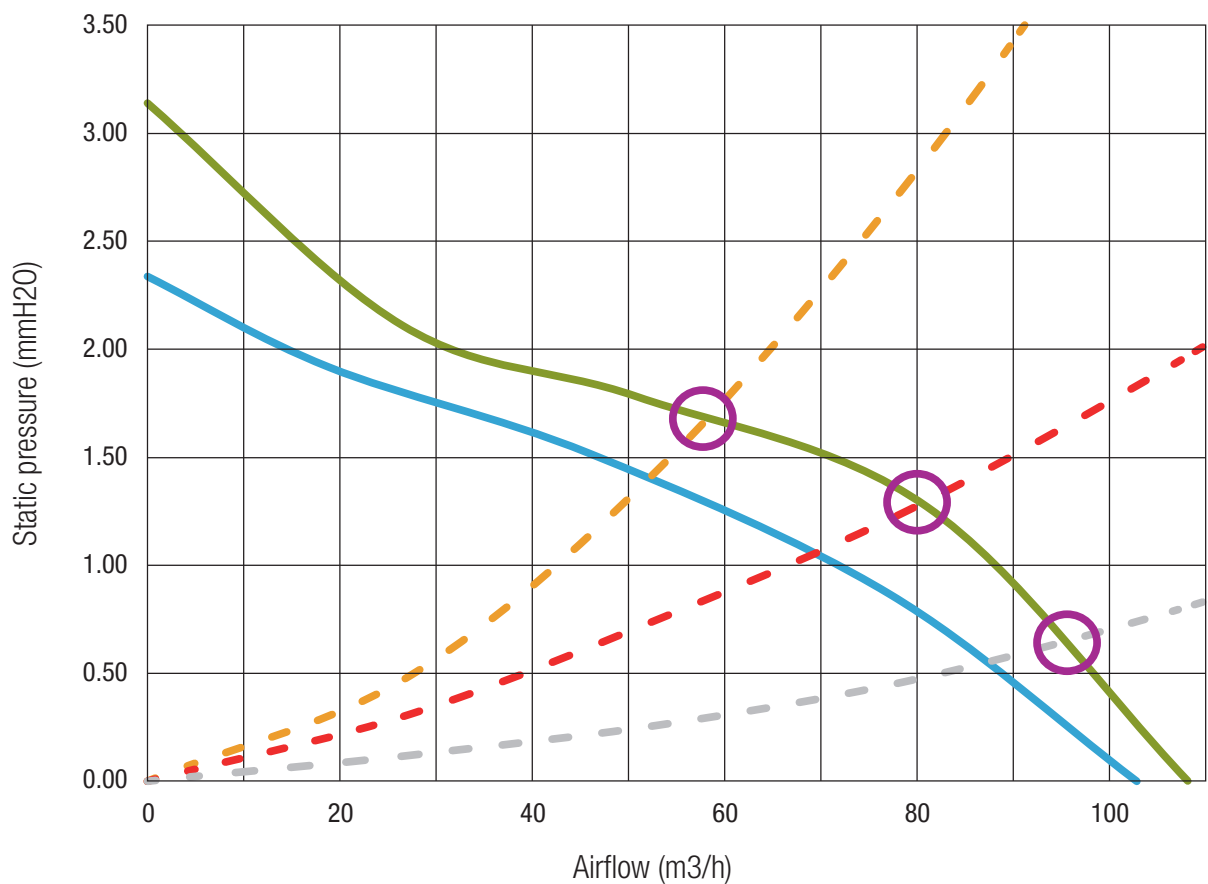
Ultra-tight tip clearance

Like its much-acclaimed predecessor, the NF-A12x25 G2 has an extremely tight tip clearance (distance between the blade tips and the inside of the frame) of only 0.5mm. This highly ambitious design helps the fan to work more efficiently against back pressure, such as on heatsinks or radiators, by reducing leak flows through the gap between the impeller and frame.

NF-A12x25 G2 performance

Highly optimised P/Q curve for all applications

The sophisticated aerodynamic design of our next-gen 120mm fan allows for a pressure-to-airflow (P/Q) curve that is extremely strong in the critical mid-section. This makes the fan a true jack-of-all-trades with excellent performance in both static pressure and airflow demanding applications.

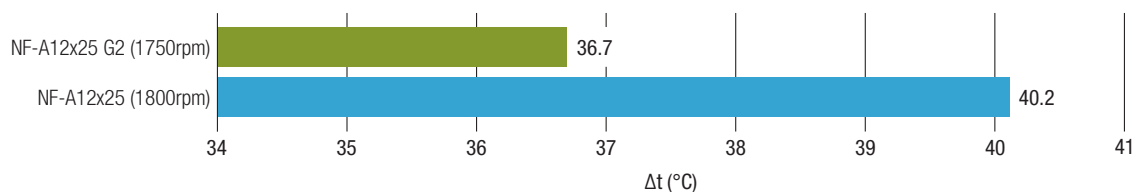


- NF-A12x25
- NF-A12x25 G2
- Impedance of typical water cooling radiator
- Impedance of typical air cooling heatsink
- Impedance of typical case fan application

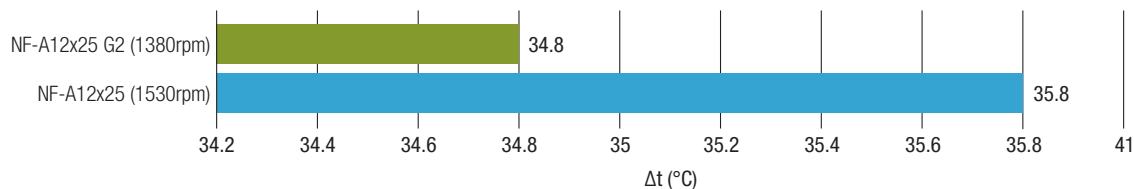
NF-A12x25 G2 performance

NF-A12x25 G2 vs. NF-A12x25

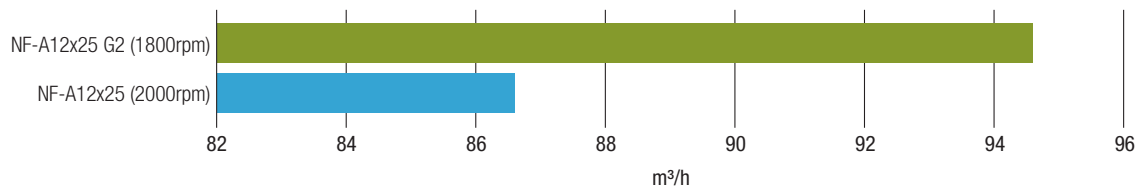
Cooling performance on 120x49mm water cooling radiator (200W heat-load, noise-normalised)



Cooling performance on NH-U12A (200W heat-load, noise-normalised)



Case cooling performance (airflow through typical resistance)

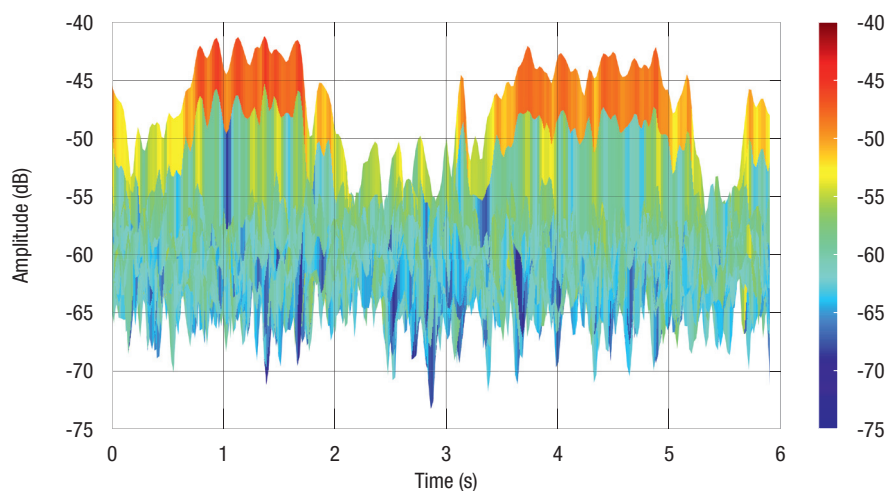


NF-A12x25 G2 performance

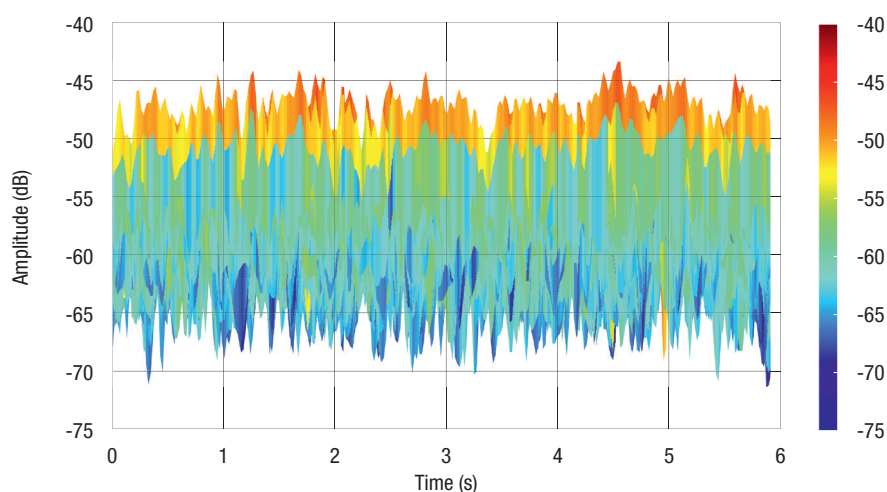
Dual fan set with speed offset

When two fans are running at almost the same, constant speed in a push-pull configuration or, albeit to a lesser extent, side by side, their acoustic interaction can lead to undesirable harmonic phenomena such as intermittent vibrations or periodic humming due to interference, which can be heard as beat frequencies. Therefore, the two NF-A12x25 G2 PWM fans contained in the Sx2-PP set are slightly offset in speed ($\pm \sim 50\text{rpm}$) in order to avoid such phenomena.

without speed offset



with speed offset



As the spectrograms show, the speed offset reduces the amplitude variations of the beat frequency significantly and makes them fast enough so that they are perceived as a tone of high roughness that is less distracting for most users.

NF-A14x25(r) G2 chromax.black



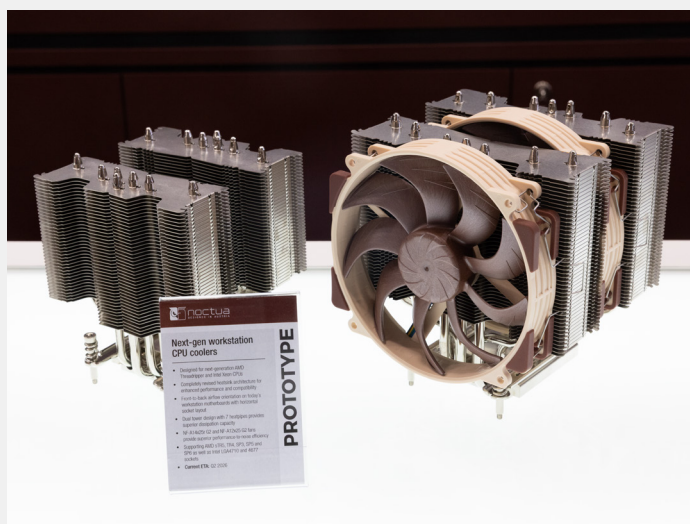
- All-black chromax-line version of the award-winning NF-A14x25 G2 (square frame) and NF-A14x25r G2 (round frame) 140mm fans
- Available as a single fan or in Sx2-PP dual fan sets with speed-offset for acoustic optimisation in push-pull and side-by-side applications
- Progressive-Bend impeller, made from Sterrox® liquid-crystal polymer, pushes air out towards the highest efficiency blade areas
- Centrifugal Turbulator hub for better flow attachment and optimised fluid distribution across the impeller
- Winglets reduce tip vortices and thereby increase efficiency
- Ultra-tight tip clearance (0.7mm) for superior performance on heatsinks and radiators
- Current ETA: September 2025

NH-D15 G2 chromax.black



- All-black chromax-line version of the award-winning NH-D15 G2 CPU cooler
- Medium base convexity for optimal performance on AMD AM5 (with included offset mounting) and Intel LGA1851
- NF-A14x25r G2 PWM chromax.black fans with speed-offset for acoustic optimisation
- High thermal-conductivity black coating ensures comparable thermal performance to the standard version
- Black SecuFirm2+™ multi-socket mounting parts
- Current ETA: September 2025

Next-gen workstation CPU coolers



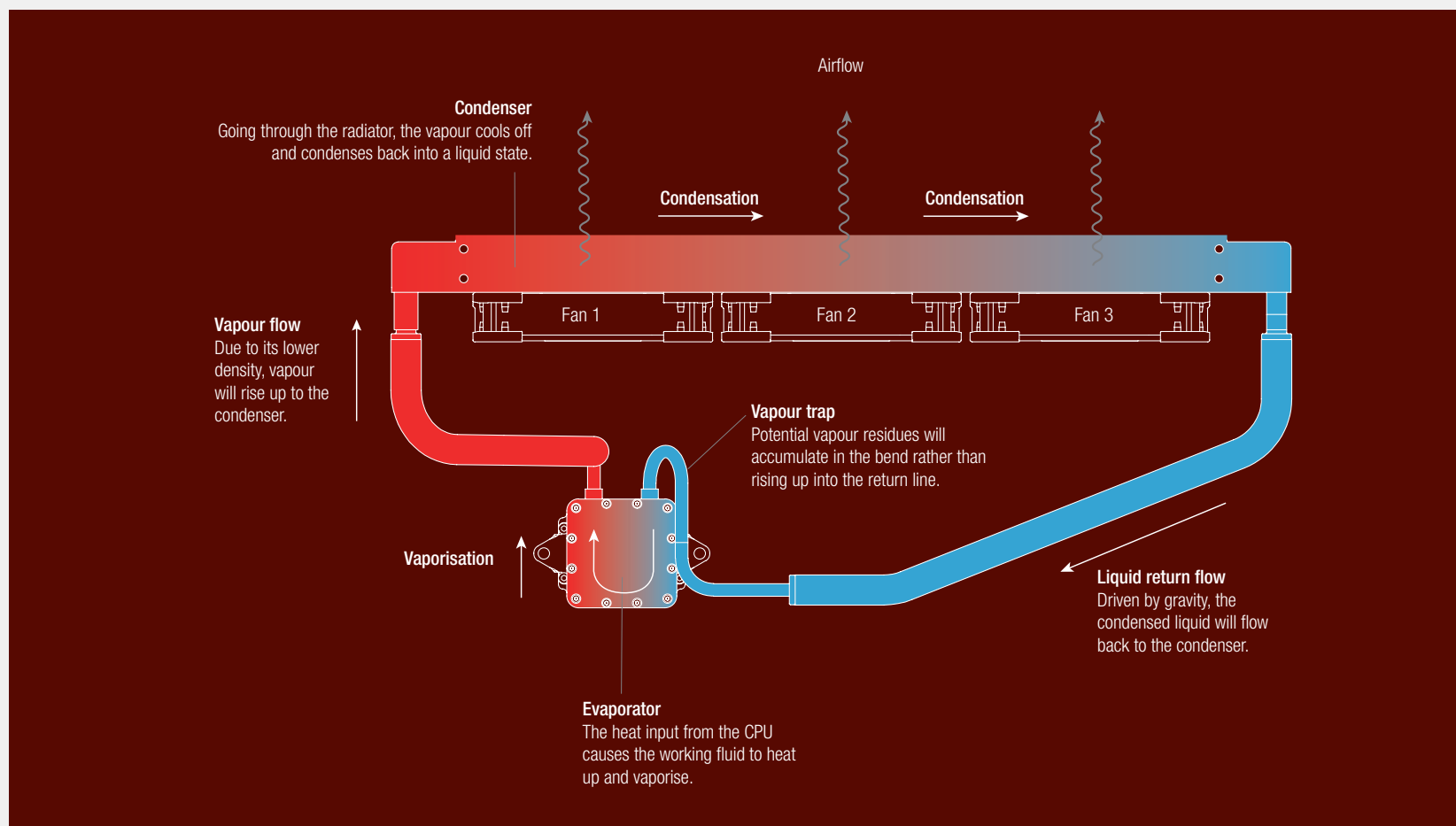
- Designed for next-generation AMD Threadripper and Intel Xeon CPUs
- Completely revised heatsink architecture for enhanced performance and compatibility
- Front-to-back airflow orientation on today's workstation motherboards with horizontal socket layout
- Dual tower design with 7 heatpipes provides superior dissipation capacity
- NF-A14x25r G2 and NF-A12x25 G2 fans provide superior performance-to-noise efficiency
- Supporting AMD sTR5, TR4, SP3, SP5 and SP6 as well as Intel LGA4710 and 4677 sockets

Thermosiphon development project



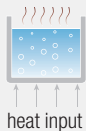
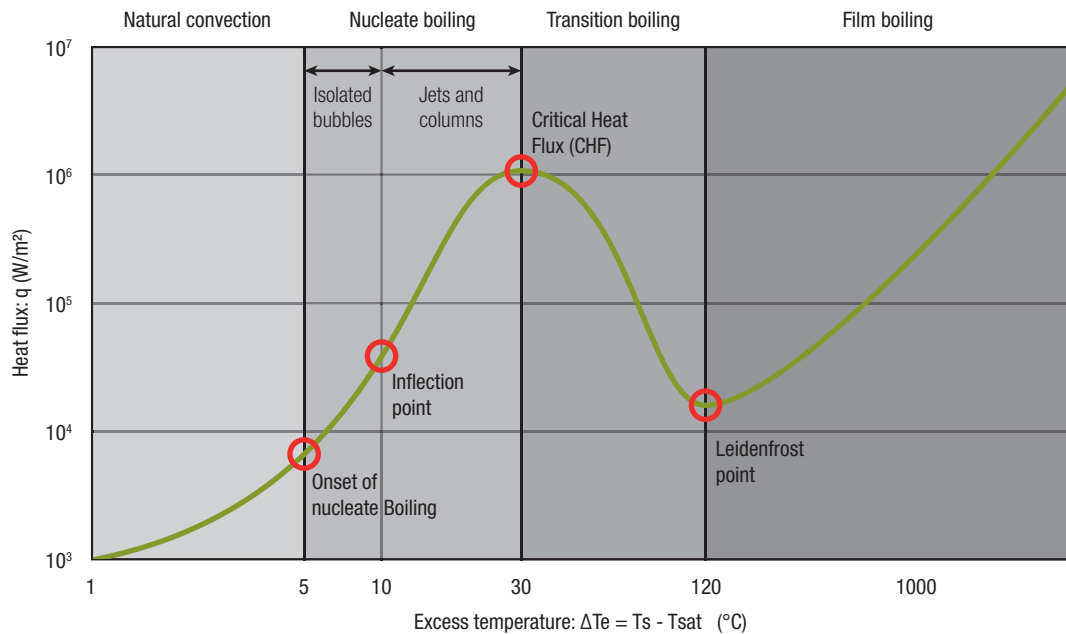
- Two-phase thermosiphon CPU cooler with flexible tubing
- Exclusive development partnership with Calyos, an expert in developing and supplying two-phase cooling solutions for aviation, renewable energy and automotive industries
- Development target: Providing the form factor, convenience and performance levels of all-in-one water cooling solutions without moving parts
- No pump noise or vibration, ultimate reliability!
- Flexible tubes for easy installation and broad compatibility
- 360mm form factor for top-exhaust position mounting (gravity-dependent operation)
- Long-term development project, no ETA or pricing projections

Two-phase thermosiphon cooler working principle



The hotspot challenge

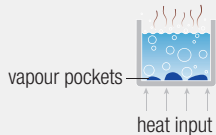
Thermodynamics background



Nucleate boiling (up to Critical Heat Flux)

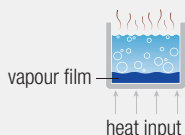
Nucleate boiling is the initial boiling regime at the onset of the boiling curve. It is the most desirable when engineering two-phase cooling solutions due to its high heat transfer rates at comparably low surface temperatures.

The nucleate boiling phase spans from the first formation of isolated bubbles that separate from the surface, all the way to vapour escaping in jets and columns as the temperature approaches the point of Critical Heat Flux (CHF). Whereas initially, heat transfer occurs mostly through direct transfer from the surface to the liquid, which causes the fluid to mix near the surface, increased bubble interaction and coalescence will lead to less liquid reaching the surface and more heat transfer occurring through the vapour bubbles. Since a fluid's liquid phase generally has much better heat transfer properties than the vapour phase, this causes the heat transfer curve to flatten towards CHF and after this point, the heat transfer properties start to degrade.



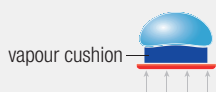
Transition boiling (post Critical Heat Flux)

Transition boiling describes the phase after the point of CHF has been passed. In this stage, the formation of vapour becomes so intense that less and less liquid can reach the surface, which causes an abrupt reduction in heat transfer. In thermal engineering, the rapid fall-off in heat transfer rate when passing CHF is a major challenge that can cause the surface temperature to rise quickly, which may push the system further towards the Leidenfrost point.



Film boiling (Leidenfrost effect and dryout)

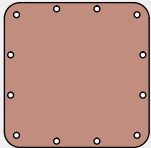
Film boiling, also known as the Leidenfrost effect, is a physical phenomenon that occurs when a liquid comes near a solid surface that is much hotter than its boiling point. In this situation, an insulating vapour layer forms, preventing the liquid from directly touching the surface and boiling rapidly. This effect where droplets hover above the hot surface rather than vapourising quickly is named after German scientist Johann Gottlob Leidenfrost.



On the boiling curve, the so-called Leidenfrost point is where heat flux reaches a low-point because the surface becomes entirely covered by a vapour blanket. Since this prevents liquid from reaching and wetting the surface, this condition is also referred to as dryout. At this stage, heat transfer from the surface to the liquid can only take place through conduction and radiation within the vapour.

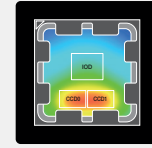
The hotspot challenge

Thermodynamics background

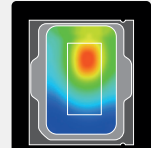


Most modern CPUs show a non-uniform heat distribution across their contact surfaces (Integrated Heat Spreaders) with distinct hotspots over certain chiplets or die areas, depending on the workload.

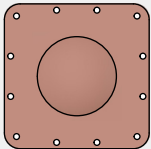
The high heat flux densities at these hotspots pose a major challenge when engineering two-phase cooling solutions. If the evaporator used a flat, untreated interface towards the working fluid, the surface temperature over the CPU's hotspots might exceed to point of CHF, which would result in a sudden drop in cooling efficiency.



Hotspot of an AMD
AM5 CPU

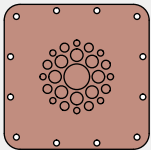


Hotspot of an Intel
LGA1851 CPU

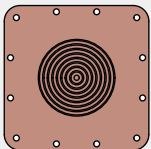


Spreading the heat-load

Our engineering response to this problem first focused on modifying the surface shape of the evaporator plate in order to achieve a more uniform heat-distribution and surface temperature. By reducing local heat flux density and encouraging better thermal spreading, we could reduce the risk of localised overheating that may push the working fluid beyond CHF.

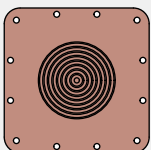


Examples of these approaches include bumped surfaces that reduce heat flux densities at the centre as well as surfaces with dent patterns that provide a more direct heat transfer paths in areas that would otherwise show less heat transfer.

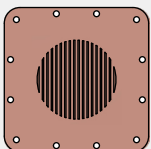


Improving surface interaction

Our second focus was to increase the surface area of the evaporator using shapes and structures that help to maximise the interaction between the working fluid and the heated surface, leading to more efficient phase-change dynamics.

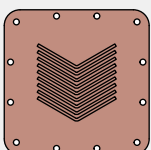


Unlike coldplates used in common single-phase liquid cooling, evaporator surfaces in two-phase cooling solutions must be designed in such a way that vapour bubbles can easily escape while liquid can reach and wet the surface. This rules out typical microfin geometries what would lead to localised vapour pockets in two-phase systems.



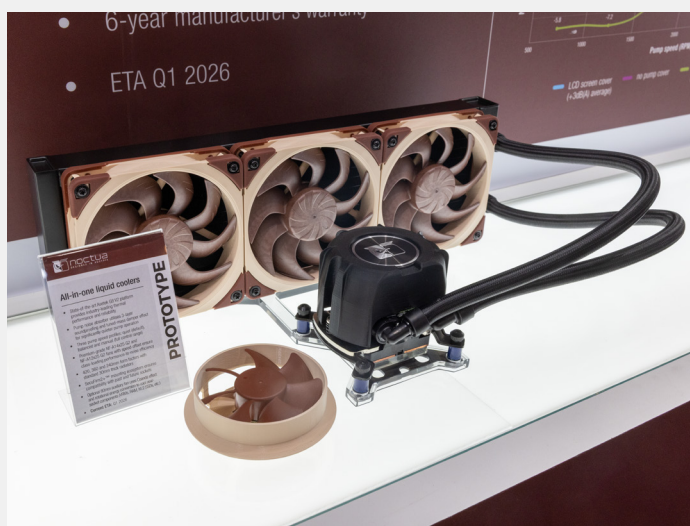
Enhancing liquid return

Assisting liquid return to the vaporisation hotspots and improving surface wetting was our third focus. Since thermosiphon coolers cannot rely on a pump and jet plate structures to direct and channel liquid flow on the coldplate, ensuring optimal liquid return and distribution is critical to achieving maximum efficiency and performance reliability.



To this end, we have developed and optimised different surface textures and channel structures that help to guide condensed liquid back to the hottest regions more efficiently. By refining the liquid return pathway, we can minimise dry-out conditions and maintain consistent thermal performance, ensuring a steady and reliable phase-change cycle.

All-in-one liquid coolers



- State-of-the-art Asetek G8 V2 platform provides industry-leading thermal performance and reliability
- Pump noise absorber utilises 3-layer soundproofing and tuned-mass damper effect for significantly quieter pump operation
- Three pump speed profiles: quiet (default), balanced and manual (full control range)
- Premium-grade NF-A14x25 G2 and NF-A12x25 G2 fans ensure class-leading performance-to-noise efficiency
- Fan speed offset helps to avoid periodic humming or vibrations due to beat frequencies
- 420, 360 and 240mm form factors with standard 30mm thick radiators
- SecuFirm2+™ mounting ecosystem ensures compatibility with past and future sockets
- Optional 80mm auxiliary fan uses Coandă effect and rotational energy conversion to cool near-socket components (VRMs, RAM, M.2 SSDs, etc.)
- 6-year manufacturer's warranty
- **Current ETA: Q1 2026**

All-in-one liquid coolers

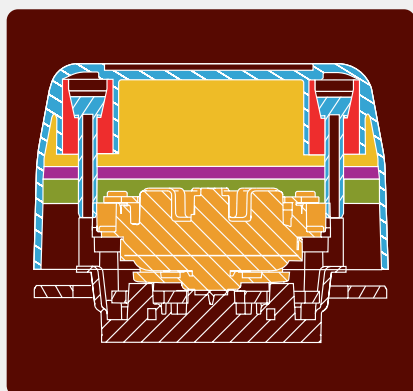
With pump-noise-absorbing tuned-mass damper

3-layer soundproofing

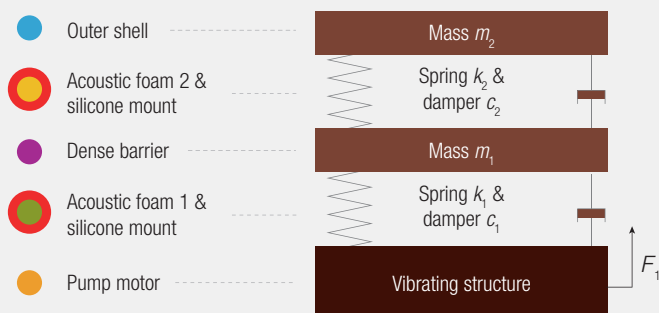


- ① **Layer 1: Acoustic foam**
Designed to absorb high-frequency sound waves, this soft, porous material acts as the initial barrier.
- ② **Layer 2: Dense sound barrier**
Serving as the core of our system, this high-density material acts as the mass component. It effectively blocks and reflects sound waves, particularly targeting the lower frequencies.
- ③ **Layer 3: Acoustic foam**
This layer complements the overall soundproofing by absorbing any residual sound that penetrates the first two layers. It also helps in isolating the dense middle barrier from the final substrate.
- ④ **Floating silicone mount**
Ensuring that vibration does not bypass the central 3-layer damping structure, the floating silicone mount plays a key role in ensuring the overall effectiveness.

Tuned-mass damper

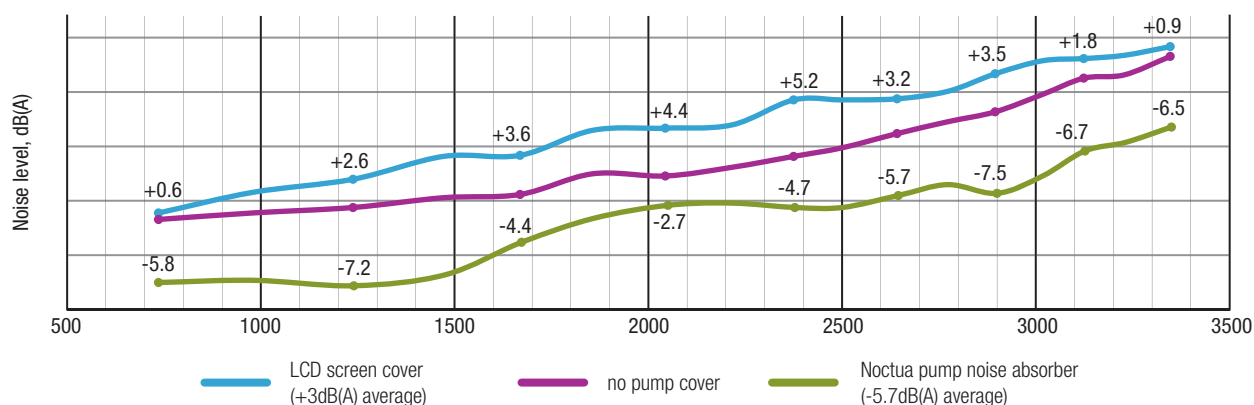


Working principle



Tuned-mass dampers (TMDs) utilise the mass-spring effect to reduce mechanical vibrations. Consisting of one or more mass nodes that are attached to each other as well as the vibrating structure through springs and dampers or damping materials, TMDs counteract the vibration by moving in the opposite direction. For a TMD to be effective, its mass, spring stiffness, damping coefficient and oscillation frequency must be tuned to the amplitude and frequency of the vibrating structure.

Acoustic performance preview



Antec Flux Pro Noctua Edition

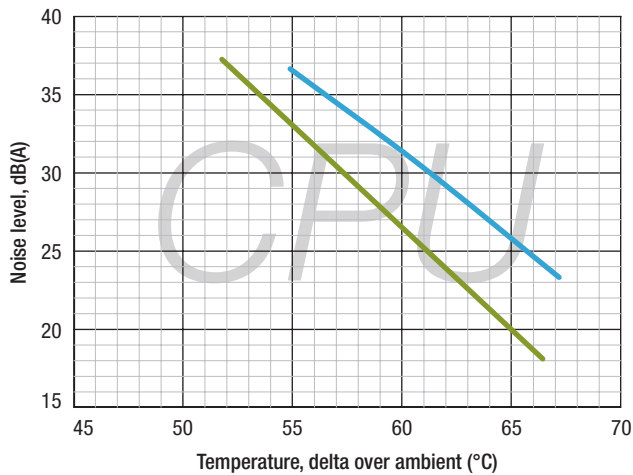


- Award-winning Antec Flux Pro chassis with very low airflow resistance for excellent cooling performance
- Pre-installed state-of-the-art Noctua NF-A14x25 G2 and NF-A12x25 G2 premium fans
- Substantially lower noise levels at equal cooling performance compared to the stock setup, ideal for building ultra-quiet high-performance systems
- Adjacent fans are offset in speed to avoid periodic humming or vibrations due to beat frequencies
- Fans are pre-installed using anti-vibration mounts to prevent the transmission of minute vibrations to the chassis
- Pre-wired high-quality NA-FH1 fan hub for synchronised fan control
- Unique styling in signature Noctua colourway
- ETA Q4 2025

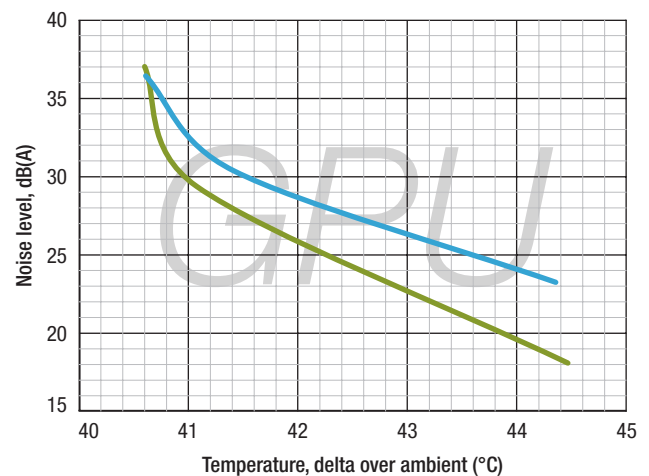
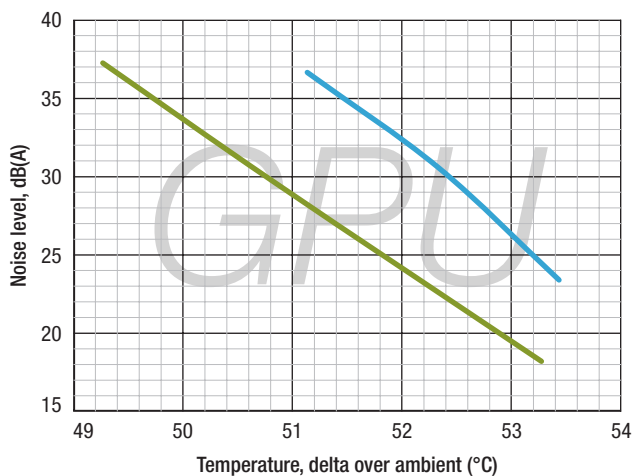
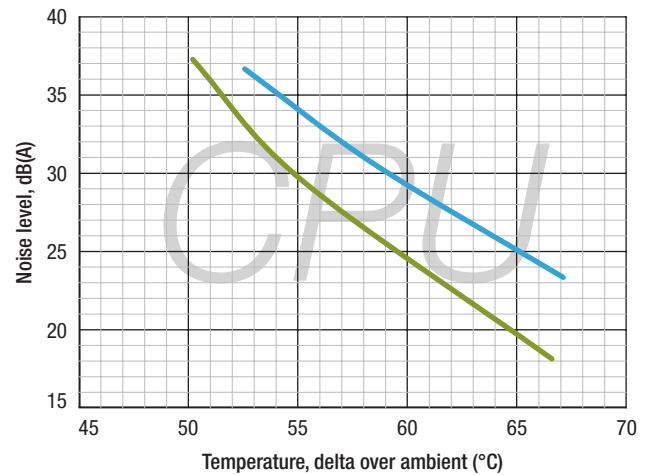
Antec Flux Pro Noctua Edition

Performance-to-noise improvements

High heat-load scenario



Regular scenario



— Noctua Edition — Stock

— Noctua Edition — Stock

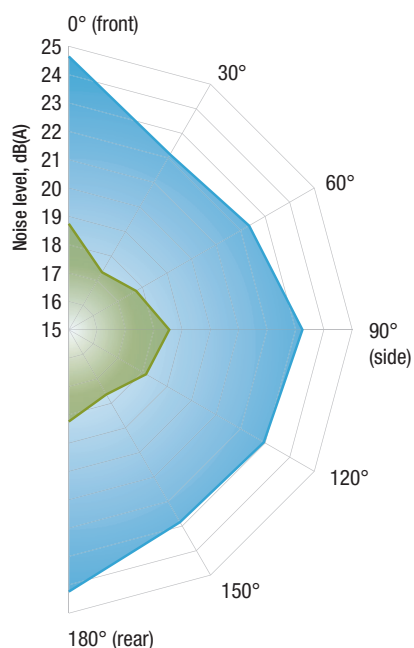
In our high heat-load test scenario using an AMD Ryzen 9 9950X that put out 200W and an overclocked GeForce RTX 4090 with 600W heat emission (equivalent to GeForce RTX 5090 cards), the Noctua Edition showed a significant performance boost over the standard Flux Pro fan setup across the entire RPM range. CPU temperatures were 2.5 to 4.5°C lower and GPU temperatures 1 to 2°C lower at the same noise levels. This thermal advantage can be translated into 3.5 to 6dB(A) lower noise levels at equal CPU temperatures or 6.5 to 8.5dB(A) lower noise levels at equal GPU temperatures.

In a less demanding scenario running the AMD Ryzen 9 9950X at 200W and limiting the GeForce RTX 4090 locked to its standard 450W heat-output, the advantage of the Noctua Edition remained massive at lower fan speeds with up to 6°C lower CPU temperatures and up to 1.5°C lower GPU temperatures at the same noise level. Again, this thermal advantage can be converted to around 5dB(A) lower noise levels at the same component temperatures. At maximum fan speeds, however, the stock fans already deliver more than sufficient cooling, so the benefit from the additional airflow provided by the Noctua fans is more limited with a 2°C or 3.5dB(A) improvement for the CPU and near identical results on the GPU.

Antec Flux Pro Noctua Edition

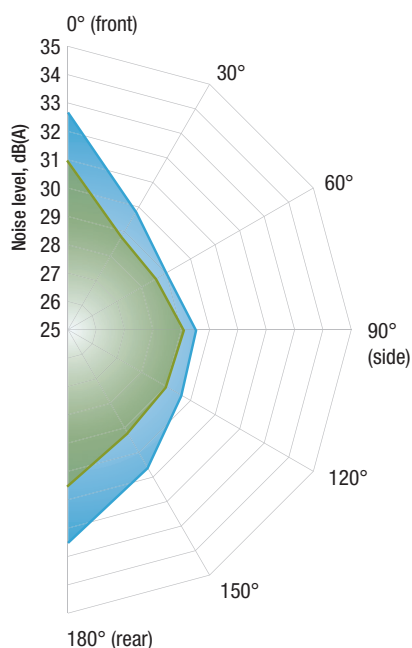
Acoustic directivity

50% fan speed



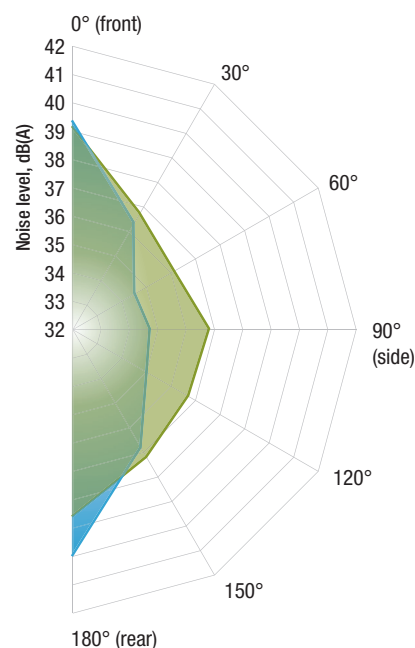
Average
 18.1 dB(A)
 23.2 dB(A)

75% fan speed



Average
 29.5 dB(A)
 30.6 dB(A)

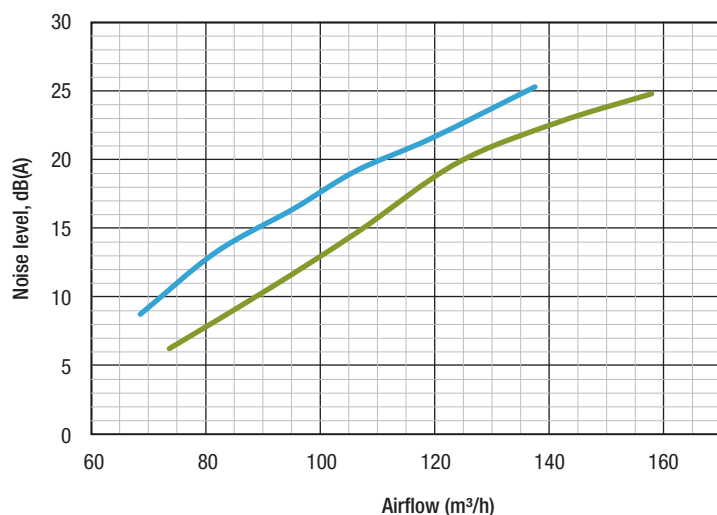
100% fan speed



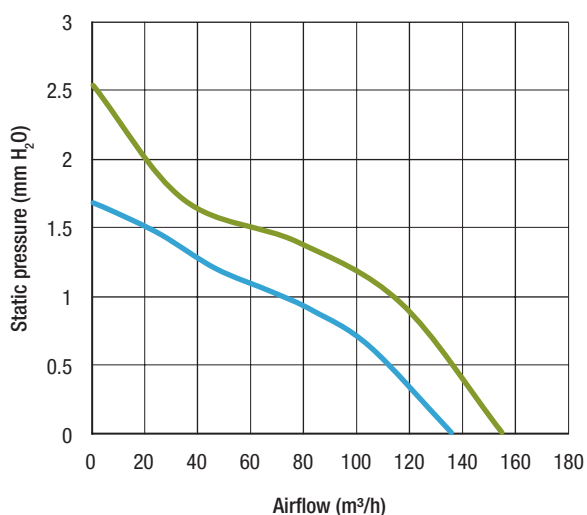
Average
 37.4 dB(A)
 36.7 dB(A)

— Noctua Edition — Stock

Fan performance compared

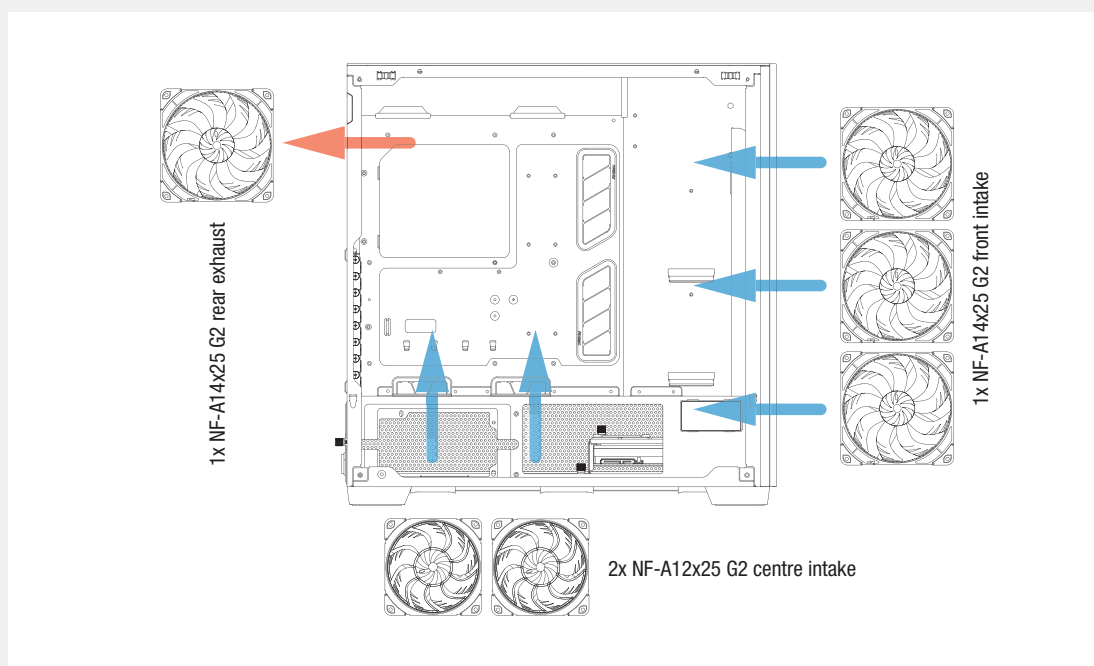


— Noctua NF-A14x25 G2 — Stock fans



Antec Flux Pro Noctua Edition

Fan configuration



ASUS GeForce RTX 5080 Noctua Edition



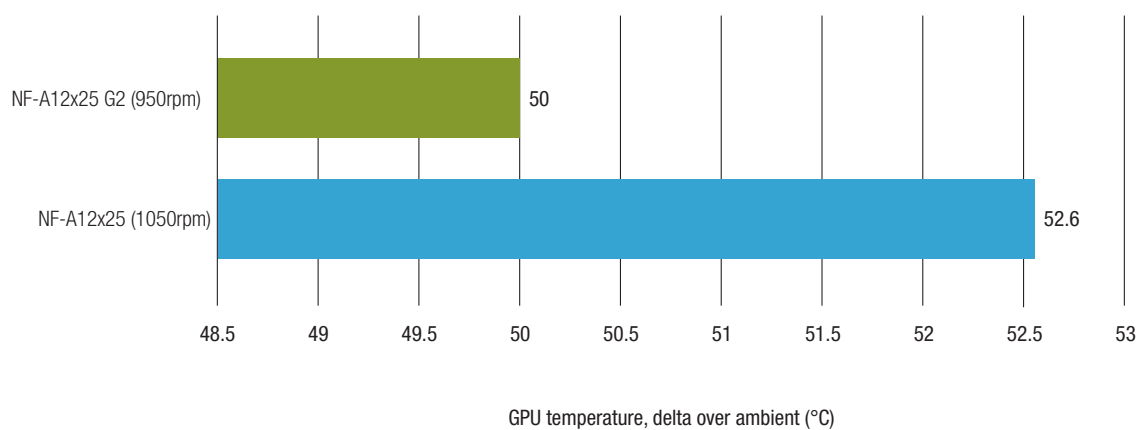
- Three next-generation NF-A12x25 G2 120mm fans for superior quiet cooling performance
- Fan speed offset helps to avoid periodic humming or vibrations due to beat frequency phenomena
- Custom-engineered heatsink with extensive vapour chamber and eleven 8mm heatpipes provides optimal performance in combination with the new NF-A12x25 G2 fans
- Significantly improved performance-to-noise efficiency compared to the standard ASUS TUF Gaming and ROG Astral models
- Nvidia GeForce RTX 5080 platform combines high-end gaming performance with sub-400W heatloads that enable extremely quiet cooling solutions
- **Current ETA: Q3 2025**

ASUS GeForce RTX 5080 Noctua Edition

Performance of G1 vs. G2 fans

NF-A12x25 G2: Noise-normalised GPU cooling performance

(ASUS GeForce RTX 4080 Super Noctua Edition)



Seasonic PRIME PX HPD Noctua Edition PSUs



- Ultra-quiet Noctua Editions of the upcoming Seasonic PRIME PX HPD (High Power Density) series power supplies with only 125mm length
- 850W, 1000W and 1200W options
- Noctua NF-A12x25 G2 fan and custom-designed, highly optimised fan grill
- Semi-passive operation: Fan stays off at regular loads and ambient temperatures for virtually noise-free operation, slowly ramps up to near inaudible levels with increasing loads
- ATX 3.1 and PCIe 5.1 compliant, 12V-2×6 connector for safely powering high-end graphics cards
- Fully modular, Noctua themed cabling for clean and tidy builds
- Platinum level energy efficiency (92% at 50% load)
- Current ETA: Q2 2026

Pulsar Feinman Noctua Edition



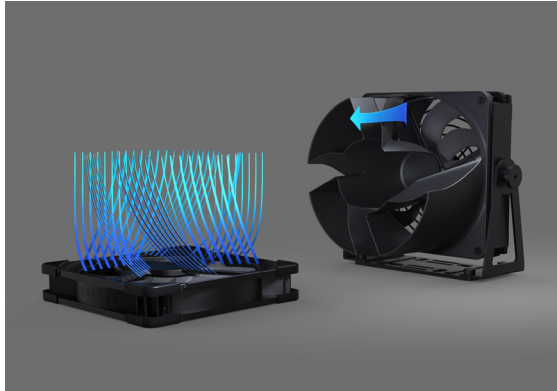
- Pulsar's flagship Feinman F01 gaming mouse
- Integrated Noctua NF-A4x10 5V PWM fan provides quiet airflow towards your palm to minimise hand sweat with minimal power draw
- Ultra-lightweight design
- XS-1 32000 DPI sensor with 8KHz polling rate
- Magnesium alloy exoskeleton
- USB-C charging dock
- Fan speed can be controlled individually through Pulsar control software
- Unique styling in signature Noctua colourway
- **Current ETA: November 2025**

140mm size desk fan



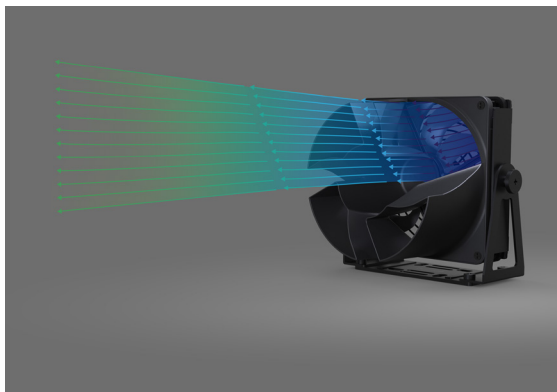
- Highly versatile premium quality fan set for home, office and multi-purpose ventilation applications such as desk fans, room fans, device cooling, etc.
- Next-gen NF-A14x25 G2 140mm fan with NV-AA1-14 airflow amplifier combines superior ventilation efficiency with outstanding quietness of operation
- Sturdy, steel-made NV-FM1 pivoting fan mount for flexible angle adjustments, can be installed using the integrated magnets, screw holes or zip-tie slots (screws, wall plugs and zip-ties included)
- USB-powered with NV-EC4 1m extension cable for a combined total cable length of 2m, pre-installed NA-FG1 fan grill for extra safety
- New inline USB fan controller allows adjusting the fan from maximum airflow performance to near-silent operation as well as monitoring, remote-controlling and programming through OpenSFC protocol
- **Current ETA: Q1 2026**

Three-way airflow amplification system



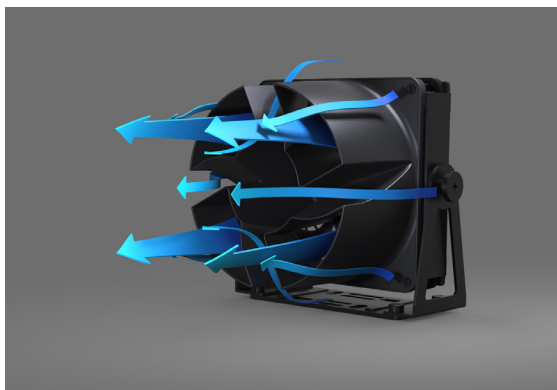
STEP 1 *HELIX ENERGY RECOVERY*

The air that comes out of an axial fan has a high amount of rotational energy, which results in a helix-shaped flow path. The NV-AA1-14 recovers this rotational energy and uses it to accelerate the airflow. With the inside shape of the NV-AA1-14's funnel carefully fine-tuned to the helix structure produced by the NF-A14x25 G2 fan, it achieves an extremely high rate of energy recovery.



STEP 2 *PROGRESSIVE FLOW ACCELERATION*

Following the principle of mass continuity, a fluid's speed increases when it's forced through a reduced cross-sectional area, so when the air is driven through the NV-AA1-14's progressively narrowing funnel, air speed increases continuously until it reaches maximum velocity at the outlet.



STEP 3 *VENTURI-EFFECT VOLUME ENHANCEMENT*

In accord with the principle of conservation of energy, air pressure must decrease as air velocity increases (Bernoulli's principle). This reduction in pressure that occurs when a fluid flows through a constriction, the so-called Venturi-effect, creates a suction force at the outlet, which draws in additional air from the sides and through the cuts of the NV-AA1-14's funnel, thereby enhancing the airflow volume.

USB inline fan controller



- Ultra-compact inline design neatly integrates into the cable
- Buttons for manual control (+/- and on/off), settings remain saved through power disconnect
- USB-A interface for easy integration, USB-C compatibility via most data-capable adaptors
- Virtual COM Port (VCP) serial interface enables connectivity with Microsoft Windows, MacOS and Linux operating systems
- OpenSFC (Serial Fan Control) protocol for status monitoring and PWM speed controls, easy programming for various automation tasks
- Power bank mode prevents power banks from going into sleep mode when running low-current fans
- **Current ETA: Q1 2026**

OpenSFC (Serial Fan Control)

Commands

Serial Command	Function
?	Returns firmware version and available commands
pwm1:XXX	Sets PWM cycle %, XXXX can be set 1-100
spd1:XXXX	Read current speed, XXXX is the fan speed in RPM
run1:X	X set to 1 starts fan, X set to 0 stops fan.
uid:	Returns unit ID
sas:	Saves current PWM setting
lds:	Loads saved PWM setting
psa:	Will activate power bank mode. Three different levels can be set XXXX

Example script (Python)

This example script turns the fan on, sets the PWM signal to 80% and then reads the speed once per second for 10seconds.

```
import time
import serial

#Open a serial connection to the the fan controller's COM port.
ser = serial.Serial('COM3', baudrate=9600, timeout=.1, write_timeout=.1)

try:
    #Send command run1:1 to turn on the fan.
    ser.write(bytes('run1:1\n', 'utf-8'))

    #Let the fan controller send the same command back as acknowledgement.
    print(ser.readline().decode('utf-8').rstrip())

    #Set the output PWM signal to 80 by sending pwm1:80.
    ser.write(bytes('pwm1:80\n', 'utf-8'))

    #Let the fan controller return the command as acknowledgment.
    print(ser.readline().decode('utf-8').rstrip())

    #Create a variable to keep track of the time.
    t = 0

    #Create a loop that runs for around 10s.
    while t < 10:
        #spd1: asks the fan controller for the speed of the fan.
        ser.write(bytes('spd1:\n', 'utf-8'))
        #The answer will be in the form spd1:XXX\n rstrip can be used to remove the newline
        #character in the output.
        print(ser.readline().decode('utf-8').rstrip())

        #Sleep for one second.
        time.sleep(1)

        #Increment the time variable by one.
        t += 1

finally:
    #Close the serial port to not block the com port afterwards. Putting it in a finally block
    #make sure that the serial connection is closed even if an exception occurs.
    ser.close()
```