

Heat sink test



Heat sink test

Setup

The Ghost S1 was tested with an Intel Core i7-7700K Kaby Lake Processor, Socket-LGA1151, Quad Core, 4.2GHz, 8MB cache, 91W, 14nm, MSI Gaming Carbon Pro Z270i, 16 GB Corsair Vengeance, Samsung 950 PRO M.2 (back mounted), ASUS GTX 1080, Corsair SF600 and bottom mounted 120 x 25 mm fan from Noctua, NF-F12 PWM set at a constant 800 RPM

Method

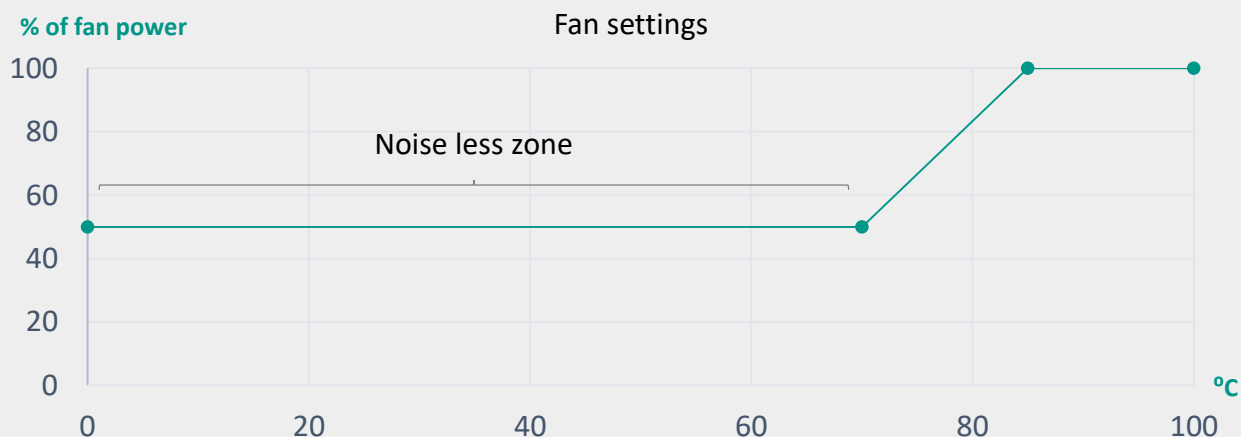
In order to create a more fair comparison of the tested CPU heat sinks the BIOS CPU fan settings have been individually. The fan settings have been set on four different temperatures:

- 0 degrees Celsius
- 70 degrees Celsius
- 85 degrees Celsius
- 100 degrees Celsius

The two first levels (0 and 70) were set at a level where the noise of the fan was not audible and could be considered quiet ~20 dB. For every heat sink this level is different and means that as long as the CPU core temperatures are below 70 degrees Celsius the system would be quiet.

The two other levels (85 and 100) were set to 100% on all heat sinks, this means that the fans would reach full RPM when the core temperatures went above 85 degrees Celsius with a linear acceleration between 70 and 85 degrees Celsius

Example:



This is by no means optimal for any one heat sink in terms of noise to heat dissipation balance but it creates an even playing field for comparison of both temperature build up and noise levels. In theory the temperatures should stay pretty close to each other among heat sinks that are able to dissipate enough heat.

Test

With every heat sink the CPU was loaded synthetically using Prime95 blended test for 20 minutes, HWinfo was used to log the sensors every 2 seconds, after the load was removed another 4 minutes of cool down was logged. Noise has been measured 10 cm away from the CPU-side of the case.



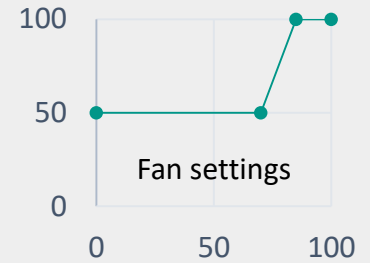
Heat sink test

The Line-up

Noctua NH-L9i



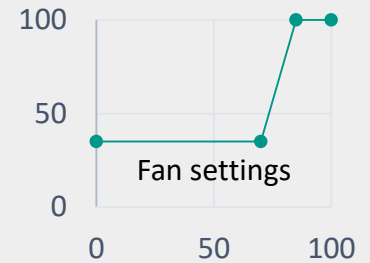
Total height	37 mm
Fan distance from side wall	31 mm
Max rpm*	2 320



Noctua NH-L9x65



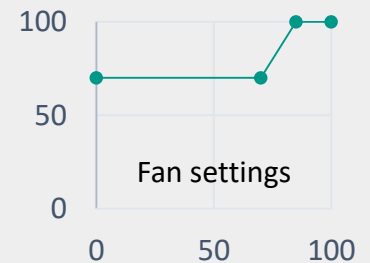
Total height	65 mm
Fan distance from side wall	3 mm
Max rpm*	2 640



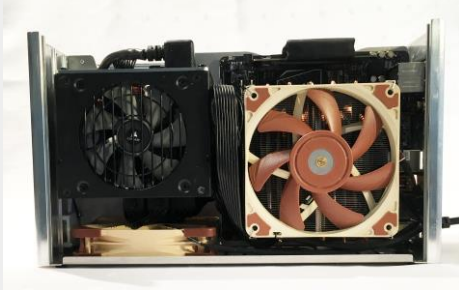
ZALMAN CNPS8900 Quiet



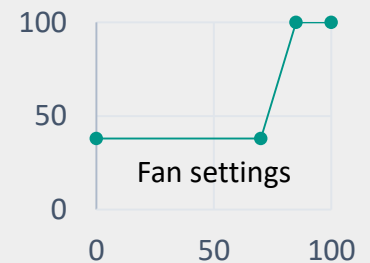
Total height	60 mm
Fan distance from side wall	8 mm
Max rpm*	1 340



Big Shuriken 2 Rev. B + NF-A12x15 PWM



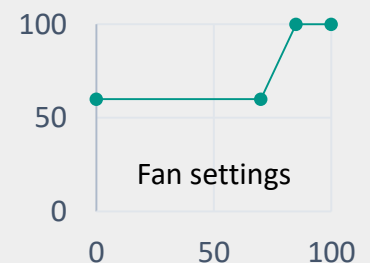
Total height	61 mm
Fan distance from side wall	7 mm
Max rpm*	1 740



Noctua NH-L12 (bottom fan only)



Total height	66 mm
Fan distance from side wall	25 mm
Max rpm*	1 720



* Maximum RPM the CPU fan reached when set to 100% in BIOS

Heat sink test

High level results

Noctua NH-L9i



Average temp.	85,9,3 °C
Average noise	27,6 dB
Peak RPM*	100%
Throttling	YES

Comments

Throttling

This cooler is too small to handle the heat generated by the CPU, resulting in throttling, even with a larger fan the results were comparable

Noctua NH-L9x65



Average temp.	72,3 °C
Average noise	26,1 dB
Peak RPM*	99,9%
Throttling	NO

Pass

Does a good job cooling but does not leave a lot of room for over clocking and creates some turbulence noise

ZALMAN CNPS8900 Quiet



Average temp.	71,5 °C
Average noise	25,8 dB
Peak RPM*	97,8%
Throttling	NO

Stable

The most temperature and noise stable cooler, very low noise fluctuation that can be annoying in itself

Big Shuriken 2 Rev. B + NF-A12x15 PWM



Average temp.	68,3 °C
Average noise	25,7 dB
Peak RPM*	86,4%
Throttling	NO

Powerful

This cooler has been modified from its original state with a more efficient fan creating a powerful combo

Noctua NH-L12 (bottom fan only)



Average temp.	70,3 °C
Average noise	23,9 dB
Peak RPM*	89,6%
Throttling	NO

Quiet

This heat sink has a superior layout for the Ghost with a 25mm thick fan far away from the side wall



* Maximum RPM the CPU fan reached during test

Heat sink test

Detailed result

