

Thermal Evaluation for Z-Cases – CPU

This guidance is created for our customers to evaluate on heat dissipation for Z-Cases P50

Platform Specification

The specification for the platform being tested is shown below

Processor: Intel i7-8086K @ 4.00GHz, Max TDP 95W. 6 Cores, 12 Threads

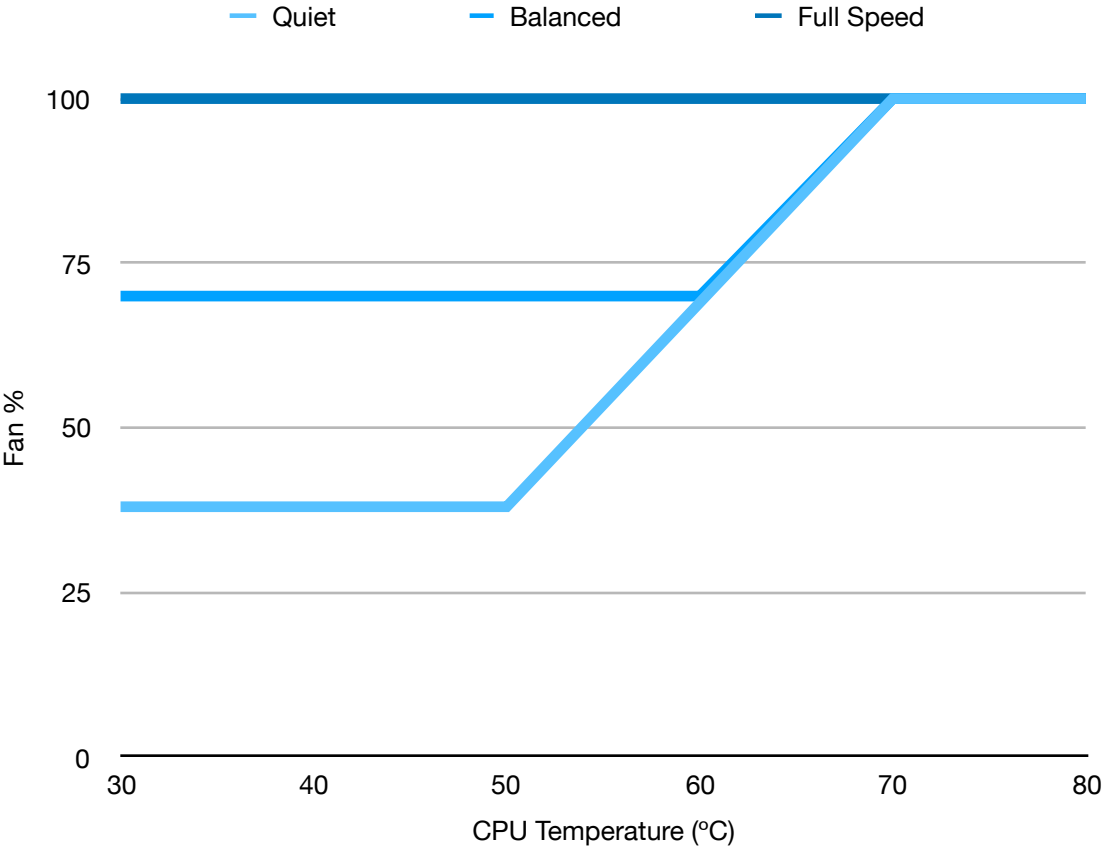
Motherboard: ASUS ROG STRIX Z390-I

Heat sink: Cryorig C7 Cu

Room Temperature: 25°C

Fan speed graph

In the following test. There are three configurations: Quiet, Balanced and Full Speed. The graph of them is drawn below



Fan Noise

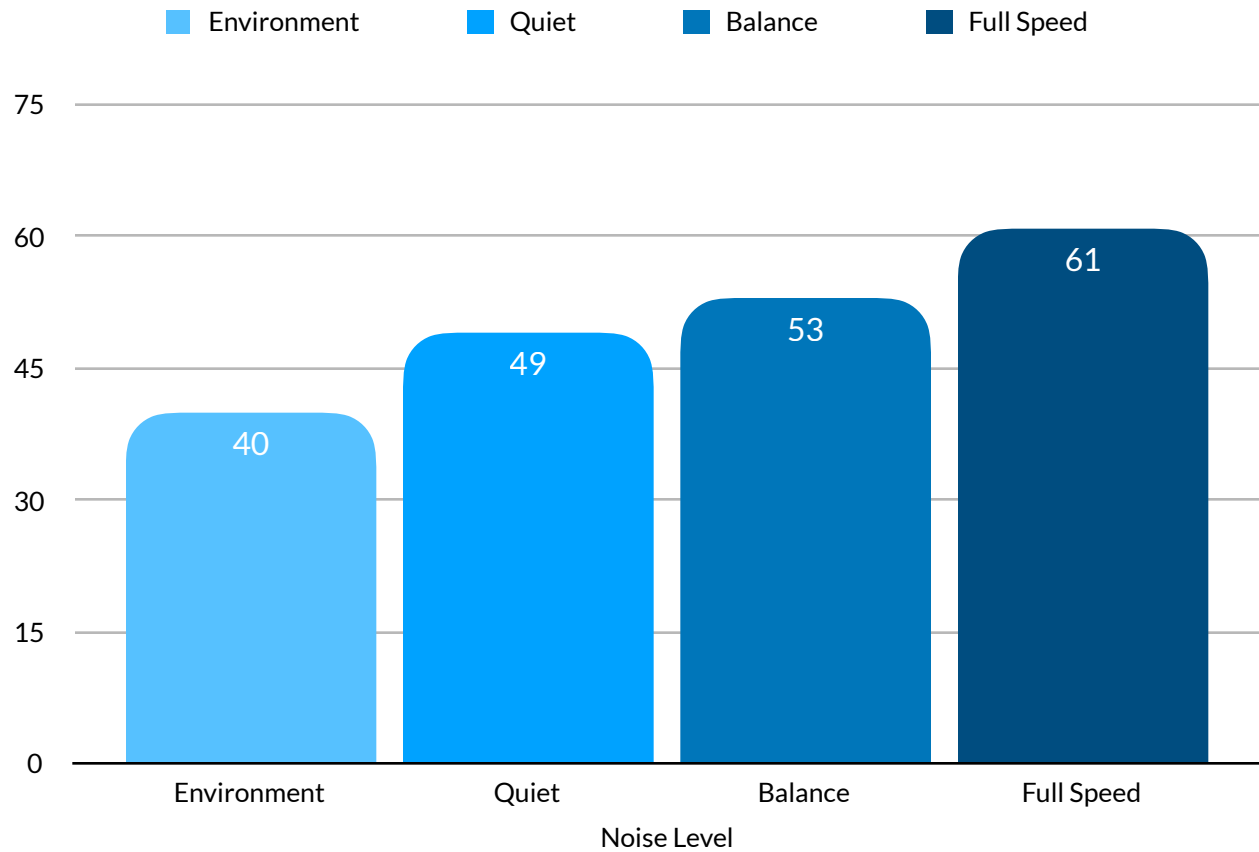
The Fan Noise is measured below, with source image available in the document download directory (<https://www.z-cases.com/document>). Measuring equipment: iPhone X

Environment noise: 40 Db (Quiet Library)

Quiet Mode, Fan Speed 1300rpm: 49 Db (Quiet Street)

Balance Mode, Fan Speed 2200rpm: 53Db (Quiet Street)

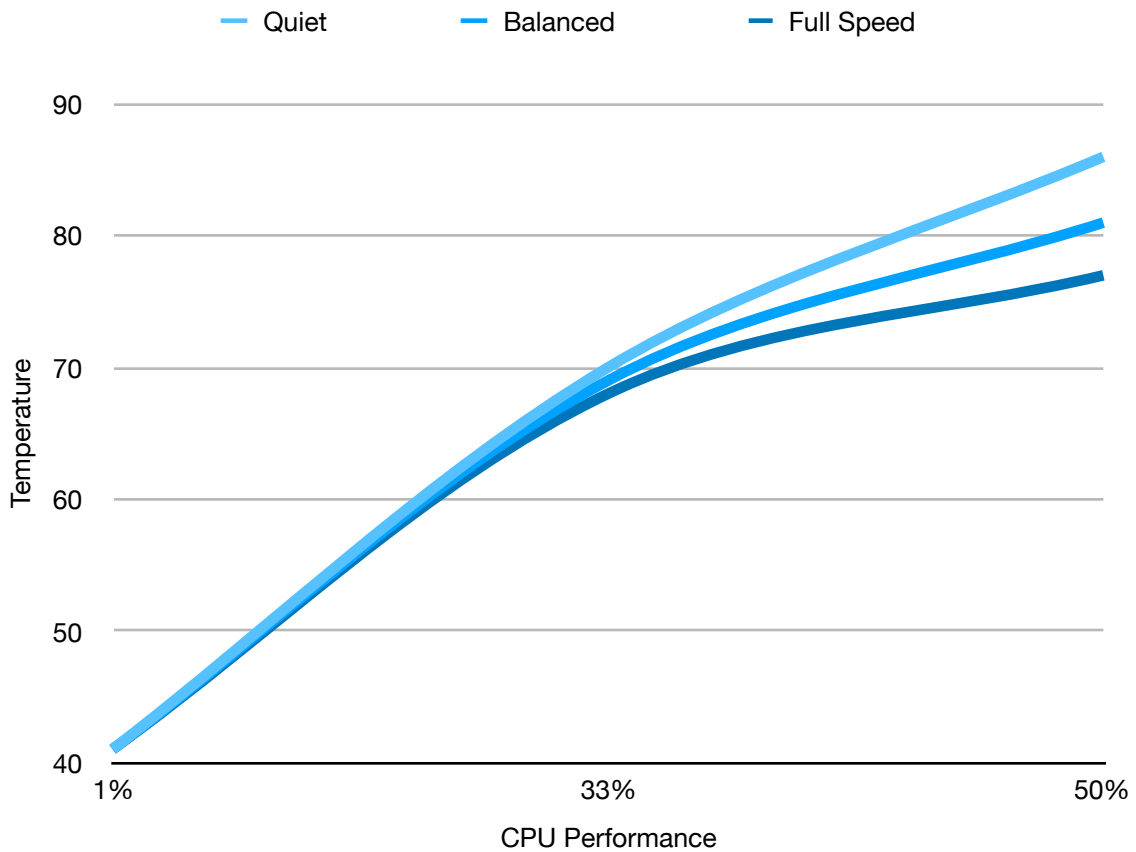
Full Speed Mode, Fan Speed 2700rpm: 61Db (Normal Conversation)



Test Result

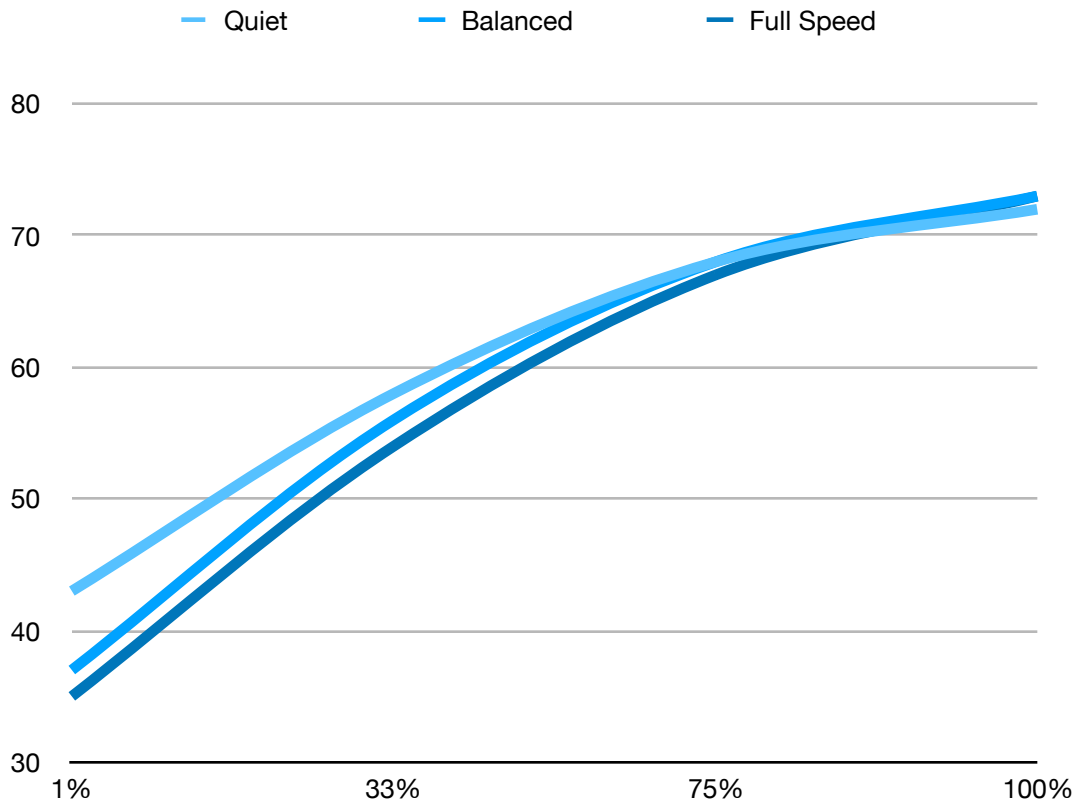
The test result is shown here in a graph and a table. The source image is also available in the download directory (<https://www.z-cases.com/document>). The test stretch from idle CPU to critical temperature (75°C) or 100% CPU, whichever comes first.

Without Standoff



CPU Performance	Quiet	Balanced	Full Speed
1%	41	41	41
33%	70	69	68
50%	86	81	77

With Standoff



CPU Performance	Quiet	Balanced	Full Speed
1%	43	37	35
33%	58	56	54
75%	68	68	67
100%	72	73	73

Note I: All the units in the table is in Celsius

Note II: The graph and the table is providing a reference to the thermal condition and might have deviations

Conclusion and Guidance

Based on the test, the thermal condition for normal use (ranging from 0% to 33% for processor 8086K, the typical case is using office software, viewing normal website, etc.) is acceptable and does not require any standoff. We recommend quiet mode or balanced mode for such users. If the user requires occasional heavy-duty calculation (for example, 2D drawing, CAE), it is possible to run the CPU fan in full speed mode without standoff. However, for hearing-sensitive users, it would be better to use standoff for better experience. And for users who usually do gaming and rendering works, we recommend a standoff and it is possible to run it in quiet mode, balanced mode, or full-speed mode.