

SCHENKER KEY 18 Pro (E25): Memory Guide

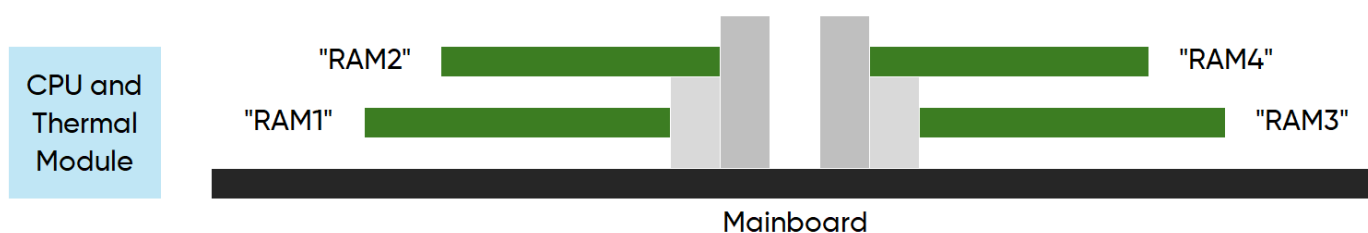
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Introduction

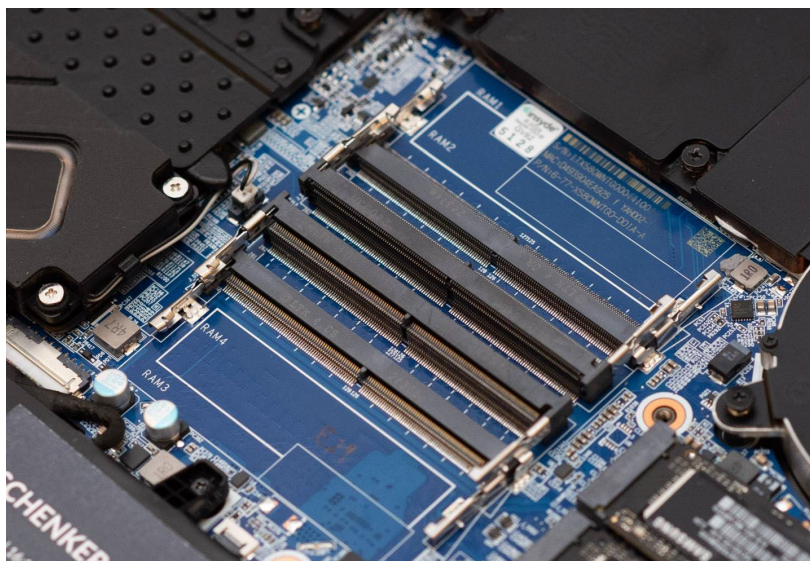
SCHENKER KEY 18 Pro features four memory slots (2x CPU side, 2x far side) compatible with DDR5 SO-DIMM and CSO-DIMM modules. While Intel officially limits Arrow Lake HX to DDR5-4400 on 4-slot SO-DIMM mainboards, our system is able to support higher frequencies when assembling the right kind of modules into the right slots.

1. Slot layout overview

This picture shows a schematic overview of the memory slot layout.



Slots "RAM1" and "RAM2" are on the CPU-side of the mainboard, "RAM3" and "RAM4" are on the far side. The numbering of the slots is printed on the mainboard itself.



The numbering of the slots does not directly align with the self-identification of the slots in system monitoring tools (via DMI). See this reference table for actual slot identification:

Location	Printed number	Self-identification
CPU side, bottom	"RAM1"	Controller0-ChannelB-DIMM0
CPU side, top	"RAM2"	Controller0-ChannelB-DIMM1
Far side, bottom	"RAM3"	Controller0-ChannelA-DIMM1
Far side, top	"RAM4"	Controller0-ChannelA-DIMM0

For the sake of consistency, we will only refer to the "Printed number" slots in this document.

2. Dual Channel operation

Dual-channel mode is available with both two-module and four-module configurations:

- Two modules: only possible if the modules are installed in slots RAM2 and RAM3. This corresponds to one DIMM per channel, ensuring proper dual-channel activation.
- Four modules: if all four slots are populated, dual channel is enabled as well. This is called a “two DIMM per channel” configuration.

3. Memory speed tiers and supported configurations

We have defined three validated performance tiers depending on module type, rank, and total capacity.

Tier	Module Type	Capacity per module	Validated operating speed		Max total capacity
			2 Modules	4 Modules	
Tier 1 (High Speed)	CSO-DIMM, Single Rank	16–24 GB	5600 MT/s	5600 MT/s	96 GB
Tier 2 (Balanced)	CSO-DIMM, Dual Rank	32–48 GB	5000 MT/s	4200 MT/s	192 GB
Tier 3 (Max Capacity)	SO-DIMM, Dual Rank	64 GB	5000 MT/s	4600 MT/s	256 GB

These speeds are chosen to balance performance with system stability.

Our guidelines keep memory speeds roughly 600 MT/s below the point where boot or stress-test stability fails. For example:

- A 4x64GB configuration (Tier 3) is rated at 4600 MT/s
- It can reach up to 5000 MT/s, though stability isn’t guaranteed above 4600 MT/s.
- In our test, this configuration does not boot anymore at 5200 MT/s.

4. Recovery mechanism for memory speed tuning

If the system fails to boot due to overly aggressive memory tuning, use the recovery hotkey:\n

- Power down the laptop completely.
- Hold down Fn + D on the keyboard.
- While holding the keys, press the power button.
- Keep holding Fn + D until the system shuts down and reboots.
- You can now release the keys. The system will cycle through restarts for up to one minute.
- Once booted, default memory settings will be restored, and you can re-enter BIOS.

Note: This function should always work, but we still recommend raising speeds only in small 200 MT/s steps to avoid needing it. Default/automatic memory speed is 4000 or 4400 MT/s, depending on configuration. If you update or reset the BIOS, the system will revert to default/automatic, so you will need to set the memory speed again to our approved and advertised level.

5. Performance impact of Dual Channel

In dual-channel mode, memory bandwidth nearly doubles compared to a two-slot configuration, as verified through the AIDA64 Memory Benchmark (see [Appendix B](#)).

Performance impact on gaming and workstation workloads will depend on the use-case.

Overview:

- Gaming is massively improved in dual-channel mode, especially when running with NVIDIA Optimus. Exceptions are only highly GPU-limited configurations such as 4K resolution with Ultra presets.
- Workstation workloads depend on the scenario. A tile-based all-core CPU rendering benchmark like Blender or Cinebench will not see much of a difference, but most other workloads will.
- Everyday app performance for office, web-browsing and multitasking will also greatly benefit from Dual Channel mode.

Due to the clear performance difference in most games and many professional workloads, we strongly recommend configuring SCHENKER KEY 18 Pro either with all four slots populated, or with a two-module configuration in slots "RAM2" and "RAM3".

6. Best practices

We recommend the following best practices:

- Configure memory with CSO-DIMMs to achieve the highest supported speeds.
- Prioritize single-rank CSO-DIMMs for the best performance per GB.
- Adjust speed manually in BIOS if needed, in steps of 200 MT/s (see [Appendix A](#)).
- Use two or four matched modules only from our validated list (AVL) (see [Appendix C](#)).

7. Non-supported configurations

The following configurations are not supported:

Configuration	Remark
Configuration with three modules.	Not tested, not recommended, not supported.
Two-module configurations in RAM1+RAM3	Will not boot.
Two-module configurations in RAM1+RAM4	Will not boot.
Two-module configurations in RAM1+RAM2.	Single Channel, not recommended. Stability OK.
Two-module configurations in RAM3+RAM4.	Single Channel, not recommended. Stability OK.
Configuration with only one module (any slots).	Single Channel, not recommended. Stability OK.

8. Note for reviewers

Please reconfigure your sample unit to match one of the validated memory tiers above. Manual adjustment of memory speed is available in BIOS. Contact us for specific AVL module recommendations or questions about benchmark performance under each configuration.

Appendix A: Basic procedure for manual tuning

Patience is required for manual memory tuning. If you want to avoid instability and "no boot" scenarios, you must proceed according to the principle of "small, gradual adjustments".



This procedure applies especially to RAM tuning, CPU voltage tuning, or any other high-risk tuning.

Preparation:

- Make sure that you have installed the latest EC/BIOS versions.
- Download benchmarks for stability tests (e.g. Prime95, AIDA64).
- Create a backup of important data in case something goes wrong.

Step 1: Make a small adjustment

- Start with the default or recommended value.
- Make a **small** adjustment, e.g. increase the clock rate or lower the voltage minimally.
- Do not overdo it! Excessive jumps can cause immediate instability or result in the system no longer booting up.

Step 2: Perform stability test

- Restart the system and run the first stability test (Prime95 w/o AVX; or AIDA64).
 - Prime95 "Small FFT" for CPU tuning
 - Prime95 "Large FFT" for RAM tuning
- Let the test run for at least 10-15 minutes to draw initial conclusions.
- Watch out for blue screens, crashes, freezes or graphics errors.

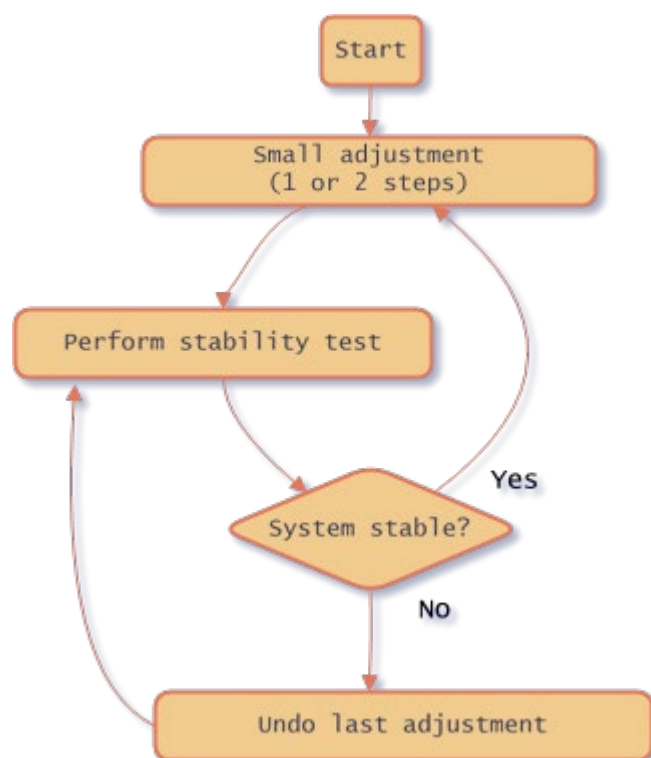
Step 3: Evaluate result

- System stable?
 - No problems? Good! Go back to step 1 and make another small adjustment.
- System unstable?
 - If you notice blue screens, crashes or other errors: Cancel the last adjustment immediately. Adjust the values back to the previous stable status or reset them to the default values.

Step 4: Repeat process

- Continue by repeating steps 1 to 3 until you achieve the desired result.
- Always proceed in **small steps**. Patience is the key to successful overclocking.

The illustration on the right shows the procedure described here as a flowchart.



Appendix B: Benchmark overview

Tier	Module Type	2 Modules (RAM2+RAM3) Dual Channel			4 Modules Dual Channel			2 Modules (RAM1+RAM2) Single Channel for comparison	
		Operating speed	Benchmark read rate	Max total capacity	Operating speed	Benchmark read rate	Max total capacity	Operating speed	Benchmark read rate
Tier 1 (High Speed)	CSO-DIMM, Single Rank	5600 MT/s	80300 MB/s	48 GB	5600 MT/s	80800 MB/s	96 GB	5600 MT/s	43300 MB/s
Tier 2 (Balanced)	CSO-DIMM, Dual Rank	5000 MT/s	71000 MB/s	96 GB	4200 MT/s	57300 MB/s	192 GB	5000 MT/s	n/a
Tier 3 (Max Capacity)	SO-DIMM, Dual Rank	5000 MT/s	71100 MB/s	128 GB	4600 MT/s	63000 MB/s	256 GB	5000 MT/s	n/a

Testing conducted with AIDA64 Memory Benchmark (v7.60.7300).

Appendix C: AVL - Approved Vendor List

We only support the following DDR5 SO-DIMM and CSO-DIMM modules in SCHENKER KEY 18 Pro (E25). This list may grow over time with further validation.

Size	Type	Rated Speed (of module, not in system)	Part number	DRAM IC	Rank
16 GB	CSO-DIMM	DDR5-6400 CL52	NMCS516F82-6400JA00-XMG	SK Hynix	Single Rank
24 GB	CSO-DIMM	DDR5-6400 CL52	NMCS524H82-6400JA00-XMG	SK Hynix	Single Rank
32 GB	CSO-DIMM	DDR5-6400 CL52	NMCS532F86-6400JA00-XMG	SK Hynix	Dual Rank
48 GB	CSO-DIMM	DDR5-6400 CL52	NMCS548H81-6400JA00-XMG	SK Hynix	Dual Rank
64 GB	SO-DIMM	DDR5-5600 CL46	Crucial CT64G56C46S5	Micron	Dual Rank