Overclocking Assistant (Performance Tuning Guide) for Intel® NUC Kit NUC8i7HNK and NUC8i7HVK

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WARNING

Altering PC memory frequency and/or voltage may (i) reduce system stability and useful life of the system, memory, and processor; (ii) cause the processor and other system components to fail; (iii) cause reductions in system performance; (iv) cause additional heat or other damage; and (v) affect system data integrity. Intel assumes no responsibility that the memory included, if used with altered clock frequencies and/or voltages, will be fit for any particular purpose. Check with the memory manufacturer for warranty and additional details.

Objective

The Purpose of this performance tuning guide is intended for validation and system characterization purposes only.

Memory Overclock Performance

Memory performance tuning is controlled via several platform mechanisms. Beyond this, the platform is also capable of supporting manual overrides to the memory frequency, timings, and voltage levels of both the integrated memory controller (iMC) and the DIMMs.

If you're going to try overclocking the module, you'll have to decide which is more important – the speed or the timings. In most cases, you can't have both.

Follow the settings below if you want to overclock your memory. **Note:** some memory modules don't allow any overclocking.

DDR4 Frequency QCLK	Memory Reference Multiplier (133MHZ/100MHz)	Memory Multiplier
1600	1.33	12
1600	1	16
1700	1	17
1733	1.33	13
1800	1	18
1867	1.33	14
1900	1	19
2000	1.33	15
2000	1	20
2100	1	21
2133	1.33	16
2200	1	22
2267	1.33	17
2300	1	23
2400	1.33	18
2400	1	24
2500	1	25
2533	1.33	19
2667	1.33	20
2700	1	27

2800	1.33	21
2800	1	28
2900	1	29
2933	1.33	22
3000	1	30
3067	1.33	23
3100	1	31
3200	1.33	24

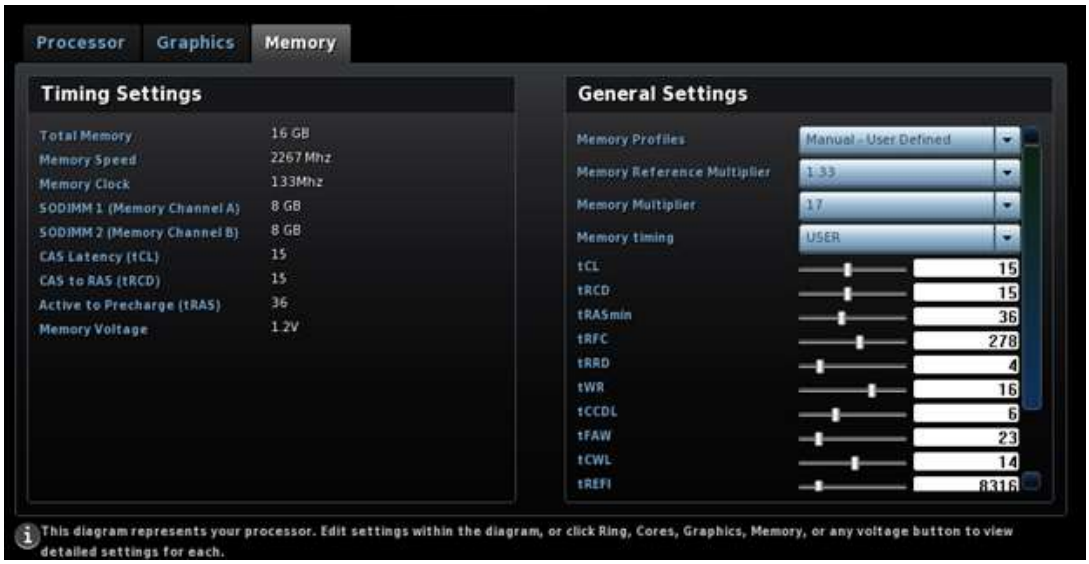
Manual Memory Overclocking Example

Example: You have a DDR4 2133 module and want to overclock to 2267 MHz. Using the settings shown in the table above, you need to set the Memory Reference Multiplier at 1.33 and the Memory Multiplier at 17.

1. Press **F2** during boot to enter BIOS Setup.
2. Click the **Advanced** button
3. Select **Performance** > **Memory**.
4. Change Memory Profiles to **Manual-User Defined.**
5. Change **Memory Multiplier** to **17**.
6. If you want to change the timing, change **Memory Timing** to **USER** (otherwise leave it set to Auto).

7. Press **F10** and click **Yes** to save and exit BIOS Setup.

BIOS now shows the memory speed is 2267MHz instead of 2133 MHz. You can use tools such as CPU Z to confirm this.



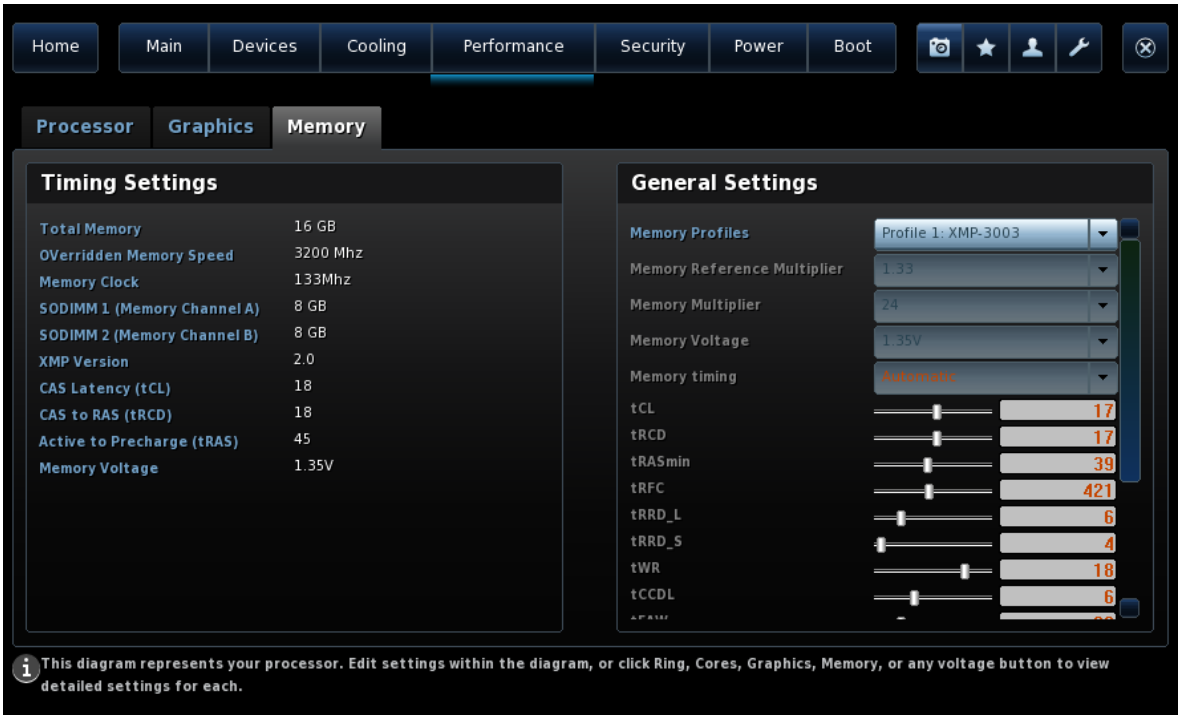
Memory XMP Example

Intel® Extreme Memory Profiles are traditionally designed with two distinct performance profiles:

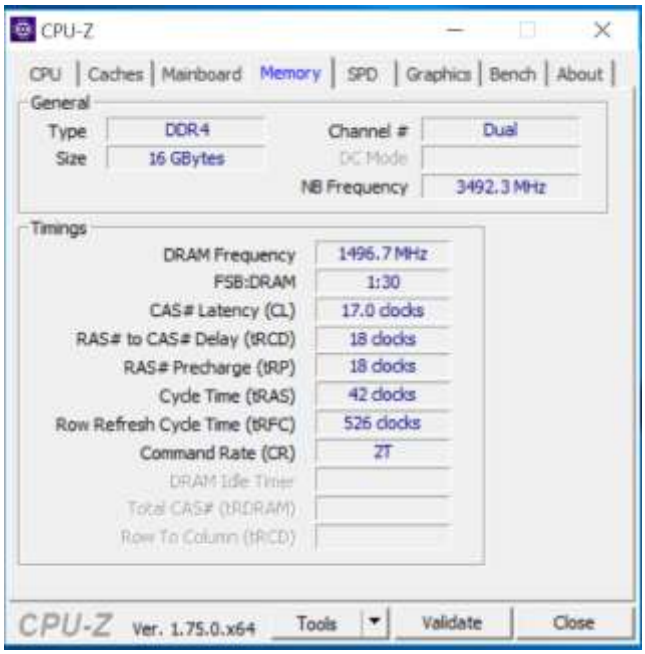
- **Profile 1** is used for the enthusiast/certified settings and is the profile that is tested under the Intel® Extreme Memory Certification program.
- **Profile 2** is designed to host the extreme or fastest possible settings that have no guard band. This profile may or may not work on every system.

Note: Extreme Memory Profiles aren't always defined as overfrequency/over-voltaged parts. In some cases, Extreme Memory Profiles can be used to define extremely power savvy settings or extremely fast latencies.

1. Press **F2** during boot to enter BIOS Setup.
2. Click the **Advanced** button.
3. Select **Performance** > **Memory**.
4. Change **Memory Profiles** to **Profile 1** or **Profile 2** (depending on your module).
5. Press **F10** and click **Yes** to save and exit BIOS Setup.



You can use tools such as CPU Z to check the memory speed.



Set the Voltage System Agent in BIOS Setup, based on the requested memory speed above 2993MHz, if board isn't stable. Intel won't provide guidance on this voltage. You can try from 50mv to 200mv.

1. Press **F2** during boot to enter BIOS Setup.
2. Click the **Advanced** button.
3. Select **Performance** > **Processor**.
4. Increase SA Voltage (for example 0.15v = 150mv).
5. Press **F10** and click **Yes** to save and exit BIOS Setup.