

# Tech specs

The Commodore 64 Ultimate has two type of specifications. The real hardware specifications. And programmed specifications.

The 'Commodore 64' part is powered by [FPGA hardware](#).

Fundamentally, an FPGA-based Commodore 64 is a hardware recreation of the original computer.

The FPGA is programmed with the exact logic of the C64's CPU, video, sound, and I/O chips, so it behaves just like the 1982 hardware—even though the underlying chip is far more powerful.

For the user, the experience is indistinguishable from using a real C64: the same keyboard, ports, video output, and timing, allowing original software to run unchanged.

The being said; the actual hardware has much more resources then an original C64 ever had available.

So the C64U has configuration that the original does not had. 'Comfort of life' options like easily switch between PAL or NTSC video output. The ability to simulate original hardware, like a tape recorder or floppy drive. To allocate more RAM or to increase the clock speed.

You **are not** going to run Windows or something like this on the C64U <sup>1)</sup> but it can behave as an extremely souped up original Commodore 64.

## Hardware specs

- **Core:** AMD Xilinx Artix-7 FPGA
- **Memory:** 128MB DDR2 RAM (16 MB system, 16 MB REU, 16 MB GeoRAM (soon), remaining MB RAM Disk), 16MB NOR flash
- **Video:**
  - 1080p @ 50Hz (PAL) or 60Hz (NTSC)
  - HDMI-certified
  - Virtually Zero-lag
  - DVI-compatible via HDMI
  - Analog via DIN-8: CVBS, S-Video, or RGB
- **Audio:**
  - 2 × SID sockets (6581/8580) with auto voltage and filter detection
  - UltiSID octal core FPGA SID emulation
  - SID-TAP header
  - On board piezo speaker for disk sounds and more
- **Controls:**
  - Rocker switch (power, reset, menu, freeze)
- **Storage & Compatibility:**
  - Operating System: Standard Commodore 64 or GEOS
  - USB thumbdrives: FAT, FAT32, exFAT
  - File formats: .D64, .D71, .D81, .G64, .T64, .TAP, .PRG, .ROM, and more

- Commodore 64 ROMs will be included under license or via guided ROM setup on first boot
- ISO-9660 image support
- Integrated Ultimate-II+ functionality with tape emulation and DMA loader
- **Keyboard:**
  - 66-key mechanical
  - Gateron Pro 3.0 55g switches (PTFE-free non-toxic lubed)
  - Original C64 layout and shapes
  - N-Key Rollover (NKRO): Press multiple keys at once - every one registers. No missed inputs.
- **Macros:**
  - Run long commands with a single keystroke.
- **Lighting:**
  - 70 RGB LEDs
    - Only Starlight and Founders edition. The basic edition has also the headers and software for it
  - Case and keyboard lighting thoughtfully integrated into motherboard and configurable via menu
  - Adjustable patterns, speeds, brightness

## Connections

- **USB:** 3 × USB-A 2.0, 1 × USB-C
  - One of the USB-A ports is internal. Only the top internal one works
  - The internal USB-C port is used for the keyboard
  - Note: these ports are intended for use with mass storage devices only. It has been reported that USB keyboards do work. Other devices **do not** work with USB (like mouse, gamepad, joystick)
- **MicroSD:**
  - Internal slot (card sold separately)
- **Display Output:**
  - HDMI Video & Audio (1080p/16:9 compatible monitor req., cable included)
  - 8-pin DIN (CVBS, S-Video, or RGB via optional cable)



Despite being labeled officially as '**a headphone jack**' there are strong indications that it is not a good idea to use it as an headphone jack. It is presumed to damage the device. - Advised is to use it as an 'line out' instead. And to use an amplifier for headphones between it.

- **Audio:**
  - 3.5 mm headphone jack
  - Optical S/PDIF
- **Networking:**
  - Ethernet (100 Mbps)

- Wi-Fi (built-in)
- **Expansion & Peripherals:**
  - Cartridge port (>99% compatible)
  - Datasette port (6-pin edge connector)
  - Disk drive port (6-pin IEC DIN)
  - 2 × DB-9 joystick/paddle ports
  - User port (26-pin internal, adapter sold separately)
- **Power:** 12V DC

[fundamentals](#)

<sup>1)</sup>

For who likes to run Windows or so on a 64 see C64X in the Commodore.net store

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