# MacBook Pro (16-inch, 2021) - Technical Specifications



**Finish**

- Silver
- Space Gray

**Chip**
**Apple M1 Pro chip**

- 10-core CPU with 8 performance cores and 2 efficiency cores
- 16-core GPU
- 16-core Neural Engine
- 200GB/s memory bandwidth
- Media engine
  - Hardware-accelerated H.264, HEVC, ProRes, and ProRes RAW
  - Video decode engine
  - Video encode engine
  - ProRes encode and decode engine
- Configurable to:
  - M1 Max with 10-core CPU and 24-core GPU
  - M1 Max with 10-core CPU and 32-core GPU

**Apple M1 Max chip**

- 10-core CPU with 8 performance cores and 2 efficiency cores
- 32-core GPU
- 16-core Neural Engine
- 400GB/s memory bandwidth
- Media engine
  - Hardware-accelerated H.264, HEVC, ProRes, and ProRes RAW
  - Video decode engine
  - Two video encode engines
  - Two ProRes encode and decode engines

**Display**
Liquid Retina XDR display

- 16.2-inch (diagonal) Liquid Retina XDR display;[1] 3456-by-2234 native resolution at 254 pixels per inch

XDR (Extreme Dynamic Range)

- 1,000,000:1 contrast ratio
- XDR brightness: 1000 nits sustained full-screen, 1600 nits peak[2] (HDR content only)
- SDR brightness: 500 nits

Color

- 1 billion colors
- Wide color (P3)
- True Tone technology

Refresh rates

- ProMotion technology for adaptive refresh rates up to 120Hz
- Fixed refresh rates: 47.95Hz, 48.00Hz, 50.00Hz, 59.94Hz, 60.00Hz

**Memory**
Apple M1 Pro chip

- 16GB unified memory
  *Configurable to 32GB (M1 Pro or M1 Max) or 64GB (M1 Max)*

Apple M1 Max chip

- 32GB unified memory
  *Configurable to 64GB*

**Battery and Power**[3]

- Up to 21 hours Apple TV app movie playback
- Up to 14 hours wireless web
- 100-watt-hour lithium-polymer battery[3]
- 140W USB-C Power Adapter
- USB-C to MagSafe 3 Cable
- Fast-charge capable with included 140W USB-C Power Adapter

**Storage**[4]
Apple M1 Pro chip

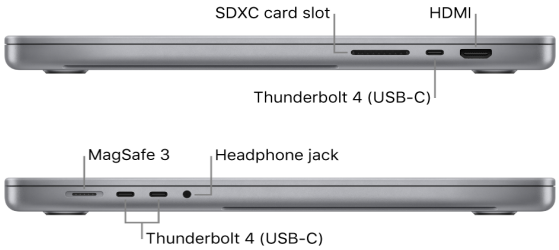
- 512GB SSD
  *Configurable to 1TB, 2TB, 4TB, or 8TB*

Apple M1 Max chip

- 1TB SSD
  *Configurable to 2TB, 4TB, or 8TB*

**Charging and Expansion**

- SDXC card slot
- HDMI port
- 3.5 mm headphone jack
- MagSafe 3 port
- Three Thunderbolt 4 (USB-C) ports with support for:
  - Charging
  - DisplayPort
  - Thunderbolt 4 (up to 40Gb/s)
  - USB 4 (up to 40Gb/s)




**Display Support**
Simultaneously supports full native resolution on the built-in display at 1 billion colors and:

- Up to two external displays with up to 6K resolution at 60Hz at over a billion colors (M1 Pro) or
- Up to three external displays with up to 6K resolution and one external display with up to 4K resolution at 60Hz at over a billion colors (M1 Max)

Thunderbolt 4 digital video output

- Native DisplayPort output over USB-C
- VGA, HDMI, DVI, and Thunderbolt 2 output supported using adapters (sold separately)

HDMI digital video output

- Support for one display with up to 4K resolution at 60Hz
- DVI output using HDMI to DVI Adapter (sold separately)

**Video Playback**

- Supported formats include HEVC, H.264, and ProRes
- HDR with Dolby Vision, HDR10, and HLG

**Audio Playback**

- Supported formats include AAC, MP3, Apple Lossless, FLAC, Dolby Digital, Dolby Digital Plus, and Dolby Atmos

**Keyboard and Trackpad**
Backlit Magic Keyboard with:

- 78 (U.S.) or 79 (ISO) keys including 12 full-height function keys and 4 arrow keys in an inverted-T arrangement
- Touch ID
- Ambient light sensor
- Force Touch trackpad for precise cursor control and pressure-sensing capabilities; enables Force clicks, accelerators, pressure-sensitive drawing, and Multi-Touch gestures

**Wireless**

Wi-Fi

- 802.11ax Wi-Fi 6 wireless networking
- IEEE 802.11a/b/g/n/ac compatible

Bluetooth

- Bluetooth 5.0 wireless technology

**Camera**

- 1080p FaceTime HD camera
- Advanced image signal processor with computational video

**Audio**

- High-fidelity six-speaker sound system with force-cancelling woofers
- Wide stereo sound
- Support for spatial audio when playing music or video with Dolby Atmos on built-in speakers
- Spatial audio with dynamic head tracking when using AirPods (3rd generation), AirPods Pro, and AirPods Max
- Studio-quality three-mic array with high signal-to-noise ratio and directional beamforming
- 3.5 mm headphone jack with advanced support for high-impedance headphones

**Operating Requirements**

- Line voltage: 100V to 240V AC
- Frequency: 50Hz to 60Hz
- Operating temperature: 50° to 95° F (10° to 35° C)
- Storage temperature: -13° to 113° F (-25° to 45° C)
- Relative humidity: 0% to 90% noncondensing
- Operating altitude: tested up to 10,000 feet
- Maximum storage altitude: 15,000 feet
- Maximum shipping altitude: 35,000 feet

**Size and Weight**

- Height: 0.66 inch (1.68 cm)
- Width: 14.01 inches (35.57 cm)
- Depth: 9.77 inches (24.81 cm)
- Weight (M1 Pro): 4.7 pounds (2.1 kg)[5]
- Weight (M1 Max): 4.8 pounds (2.2 kg)[5]

**Operating System**

**macOS**

macOS is the most advanced desktop operating system in the world. macOS Ventura makes the things you do most on Mac even better, so you can work smarter, play harder, and go further.

Learn more about latest Operating System

macOS User Guide

**Accessibility**

Accessibility features help people with disabilities get the most out of their new MacBook Pro. With built-in support for vision, hearing, mobility, and learning, you can create and do amazing things.

Learn more about Accessibility

Features include:

- Voice Control
- VoiceOver
- Zoom
- Increase Contrast
- Reduce Motion
- Siri and Dictation
- Switch Control
- Live Captions

**Built-in Apps**[6]

- App Store
- Books
- Calendar
- Contacts

- FaceTime
- Find My
- GarageBand
- Home
- iMovie
- Keynote
- Mail
- Maps
- Messages
- Music
- News
- Notes
- Numbers
- Pages
- Photo Booth
- Photos
- Podcasts
- Preview
- QuickTime Player
- Reminders
- Safari
- Shortcuts
- Siri
- Stocks
- Time Machine
- TV
- Voice Memos

**In the Box**

- 16-inch MacBook Pro
- 140W USB-C Power Adapter
- USB-C to MagSafe 3 Cable (2 m)

**Configure to Order**

- Configure your MacBook Pro with these options at apple.com:
  - M1 Max with 10-core CPU and 24-core GPU
  - M1 Max with 10-core CPU and 32-core GPU
  - 32GB unified memory (M1 Pro and M1 Max)
  - 64GB unified memory (M1 Max)
  - 1TB, 2TB, 4TB, or 8TB SSD

**MacBook Pro and Environment**
The 16-inch MacBook Pro is designed with the following features to reduce its environmental impact:[7]
See the 16-inch MacBook Pro Product Environmental Report

Made with better materials

- 100% recycled aluminum in the enclosure
- 100% recycled rare earth elements in all magnets, representing 98% of the rare earth elements in the device
- 100% recycled tin in the solder of the main logic board
- 35% or more recycled plastic in multiple components

Energy efficient

- ENERGY STAR® certified[8]

Smarter chemistry[9]

- Arsenic-free display glass
- Mercury-, BFR-, PVC-, and beryllium-free

Green manufacturing

- Apple's Zero Waste Program helps suppliers eliminate waste sent to landfill
- All final assembly supplier sites are transitioning to 100% renewable energy for Apple production

Responsible packaging

- 100% of virgin wood fiber comes from responsibly managed forests
- 90% or more fiber-based packaging

Apple and the Environment

We're committed to making our products without taking from the earth, and to become carbon neutral across our entire business, including products, by 2030.
See Apple's commitment

**Acoustic Performance**
Declared noise emission values in accordance with ECMA-109

| | **Sound Power Level** $L_{WA,m}$ **(B)** | **Sound Pressure Level Operator Position** $L_{pA,m}$ **(dB)** |
|---|---|---|
| **Idle** | 1.3 ($K_V$ = 0.3) | 3 |
| **Wireless web** | 1.3 ($K_V$ = 0.3) | 3 |

1. $L_{WA,m}$ is the mean A-weighted sound power level, rounded to the nearest 0.1 B.
2. $L_{pA,m}$ is the mean A-weighted sound pressure level measured at operator position (rounded to the nearest 1 dB).
3. 1 B (bel) = 10 dB (decibel)
4. $K_V$ is the statistical adder for computing upper-limit of A-weighted sound power level.
5. The quantity, $L_{WA,c}$ (formerly called $L_{WAd}$) may be computed from the sum of $L_{WA,m}$ and $K_V$.
6. The Wireless web test browses 25 popular websites.
7. Configuration tested: M1 Max, 10-core CPU, 32-core GPU, 32GB unified memory, 1TB storage.

1. The displays on the 14-inch and 16-inch MacBook Pro have rounded corners at the top. When measured as a standard rectangular shape, the screens are 14.2 inches and 16.2 inches diagonally (actual viewable area is less).
2. In temperatures less than 25° C.
3. Actual rating of 69.6 watt-hours (14-inch model) or 99.6 watt-hours (16-inch model). Testing conducted by Apple in September 2021 using preproduction 14-inch MacBook Pro systems with Apple M1 Pro, 8-core CPU, 14-core GPU, 16GB of RAM, and 512GB SSD; and preproduction 16-inch MacBook Pro systems with Apple M1 Pro, 10-core CPU, 16-core GPU, 16GB of RAM, and 1TB SSD. The wireless web test measures battery life by wirelessly browsing 25 popular websites with display brightness set to 8 clicks from bottom. The Apple TV app movie playback test measures battery life by playing back HD 1080p content with display brightness set to 8 clicks from bottom. Battery life varies by use and configuration. See apple.com/batteries for more information.
4. 1GB = 1 billion bytes and 1TB = 1 trillion bytes; actual formatted capacity less.
5. Weight varies by configuration and manufacturing process.
6. iMovie, GarageBand, Pages, Numbers, and Keynote are available on the Mac App Store. Downloading apps requires an Apple ID and a device that is compatible with the OS version required for each app.
7. Data accurate as of product launch.
8. ENERGY STAR and the ENERGY STAR mark are registered trademarks owned by the U.S. Environmental Protection Agency.
9. Apple defines its restrictions on harmful substances, including definitions for what Apple considers to be "free of," in the Apple Regulated Substances Specification. Every Apple product is free of PVC and phthalates with the exception of AC power cords in India, Thailand (for two-prong AC power cords), and South Korea, where we continue to seek government approval for our PVC and phthalates replacement.

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