

## Documentation

# MacBook Pro (16-inch, Nov 2023) - Technical Specifications

Year introduced: 2023

## Finish

- Space Black
- Silver

## Chip

### Apple M3 Pro chip

- 12-core CPU with 6 performance cores and 6 efficiency cores
- 18-core GPU
- Hardware-accelerated ray tracing
- 16-core Neural Engine
- 150GB/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
  - AV1 decode
- Configurable to:
  - M3 Max with 14-core CPU and 30-core GPU (300GB/s memory bandwidth) or M3 Max with 16-core CPU and 40-core GPU (400GB/s memory bandwidth)

### Apple M3 Max chip

- 14-core CPU with 10 performance cores and 4 efficiency cores, 16-core CPU with 12 performance cores and 4 efficiency cores
- 30-core GPU, 40-core GPU
- Hardware-accelerated ray tracing
- 16-core Neural Engine
- 300GB/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
  - AV1 decode
- Configurable to:
  - M3 Max with 16-core CPU and 40-core GPU (400GB/s memory bandwidth)

## Display

Liquid Retina XDR display

- 16.2-inch (diagonal) Liquid Retina XDR display;<sup>1</sup> 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<sup>2</sup> (HDR content only)
- SDR brightness: 600 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 M3 Pro chip

- 18GB unified memory
  - *Configurable to 36GB (M3 Pro or M3 Max with 14-core CPU) or 96GB (M3 Max with 14-core CPU) or 48GB, 64GB, or 128GB (M3 Max with 16-core CPU)*

Apple M3 Max chip

- 36GB unified memory
  - *Configurable to 96GB (M3 Max with 14-core CPU) or 48GB, 64GB, or 128GB (M3 Max with 16-core CPU)*

## Battery and Power<sup>3</sup>

- Up to 22 hours Apple TV app movie playback
- Up to 15 hours wireless web
- 100-watt-hour lithium-polymer battery<sup>3</sup>
- 140W USB-C Power Adapter
- USB-C to MagSafe 3 Cable
- Fast-charge capable with included 140W USB-C Power Adapter

## Storage<sup>4</sup>

Apple M3 Pro chip

- 512GB SSD
  - *Configurable to 1TB, 2TB, or 4TB; 8TB (M3 Max only)*

Apple M3 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

### M3 Pro

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 over Thunderbolt, or one external display with up to 6K resolution at 60Hz over Thunderbolt and one external display with up to 4K resolution at 144Hz over HDMI
- One external display supported at 8K resolution at 60Hz or one external display at 4K resolution at 240Hz over HDMI

### M3 Max

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

- Up to four external displays: Up to three external displays with 6K resolution at 60Hz over Thunderbolt and one external display with up to 4K resolution at 144Hz over HDMI
- Up to three external displays: Up to two external displays with 6K resolution at 60Hz over Thunderbolt and one external display with up to 8K resolution at 60Hz or one external display with 4K resolution at 240Hz over HDMI

### Thunderbolt 4 digital video output

- Support for native DisplayPort output over USB-C

### HDMI digital video output

- Support for one display with up to 8K resolution at 60Hz or 4K resolution at 240Hz

## Video Playback

- Supported formats include HEVC, H.264, AV1, 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:

	<ul style="list-style-type: none"><li>• 78 (U.S.) or 79 (ISO) keys including 12 full-height function keys and 4 arrow keys in an inverted-T arrangement</li><li>• Touch ID</li><li>• Ambient light sensor</li><li>• Force Touch trackpad for precise cursor control and pressure-sensing capabilities; enables Force clicks, accelerators, pressure-sensitive drawing, and Multi-Touch gestures</li></ul>
<b>Wireless</b>	<p>Wi-Fi</p> <ul style="list-style-type: none"><li>• Wi-Fi 6E (802.11ax)<sup>5</sup></li></ul> <p>Bluetooth</p> <ul style="list-style-type: none"><li>• Bluetooth 5.3</li></ul>
<b>Camera</b>	<ul style="list-style-type: none"><li>• 1080p FaceTime HD camera</li><li>• Advanced image signal processor with computational video</li></ul>
<b>Audio</b>	<ul style="list-style-type: none"><li>• High-fidelity six-speaker sound system with force-cancelling woofers</li><li>• Wide stereo sound</li><li>• Support for Spatial Audio when playing music or video with Dolby Atmos on built-in speakers</li><li>• Spatial Audio with dynamic head tracking when using AirPods (3rd generation), AirPods Pro, and AirPods Max</li><li>• Studio-quality three-mic array with high signal-to-noise ratio and directional beamforming</li><li>• 3.5 mm headphone jack with advanced support for high-impedance headphones</li><li>• HDMI port supports multichannel audio output</li></ul>
<b>Operating Requirements</b>	<ul style="list-style-type: none"><li>• Line voltage: 100V to 240V AC</li><li>• Frequency: 50Hz to 60Hz</li><li>• Operating temperature: 50° to 95° F (10° to 35° C)</li><li>• Storage temperature: –13° to 113° F (–25° to 45° C)</li><li>• Relative humidity: 0% to 90% noncondensing</li><li>• Operating altitude: tested up to 10,000 feet (3000 meters)</li><li>• Maximum storage altitude: 15,000 feet</li><li>• Maximum shipping altitude: 35,000 feet</li></ul>
<b>Size and Weight</b>	<ul style="list-style-type: none"><li>• Height: 0.66 inch (1.68 cm)</li><li>• Width: 14.01 inches (35.57 cm)</li><li>• Depth: 9.77 inches (24.81 cm)</li><li>• Weight (M3 Pro): 4.7 pounds (2.14 kg)<sup>6</sup></li><li>• Weight (M3 Max): 4.8 pounds (2.16 kg)<sup>6</sup></li></ul>

## Operating System

### macOS

macOS is the most advanced desktop operating system in the world. And with macOS Sonoma, work and play on your Mac are even more powerful — with new ways to elevate your video presentations, boost your gaming performance, and personalize your device.

[Learn more about latest operating system](#)

## 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
- Closed Captions
- Text to Speech

**Built-in Apps<sup>7</sup>**

- App Store
- Books
- Calendar
- Contacts
- FaceTime
- Find My
- Freeform
- 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](https://apple.com):
  - M3 Pro with 12-core CPU, 18-core GPU, and 16-core Neural Engine
  - M3 Max with 14-core CPU, 30-core GPU, and 16-core Neural Engine
  - M3 Max with 16-core CPU, 40-core GPU, and 16-core Neural Engine
  - 36GB unified memory (M3 Pro and M3 Max with 14-core CPU)
  - 48GB unified memory (M3 Max with 16-core CPU)
  - 64GB unified memory (M3 Max with 16-core CPU)
  - 96GB unified memory (M3 Max with 14-core CPU)
  - 128GB unified memory (M3 Max with 16-core CPU)
  - 1TB, 2TB, or 4TB SSD (M3 Pro or M3 Max)
  - 8TB SSD (M3 Max)

## MacBook Pro and the Environment

The 16-inch MacBook Pro is designed with the following features to reduce its environmental impact:<sup>8</sup>

[See the 16-inch MacBook Pro Product Environmental Report \(PDF\)](#)

### Made with better materials

- 36% recycled or renewable content in the device,<sup>9</sup> including:
  - 100% recycled aluminum in the enclosure
  - 100% recycled copper in the finstack of the heat sink — a first for Apple
  - 100% recycled gold in the plating of multiple printed circuit boards
  - 100% recycled rare earth elements in all magnets, representing 99% of the rare earth elements in the device
  - 100% recycled tin in the solder of multiple printed circuit boards
  - 35% or more recycled plastic in multiple components

### Energy efficient

- ENERGY STAR® certified<sup>10</sup>

### Smarter chemistry<sup>11</sup>

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

### Green manufacturing

- 40% manufacturing electricity sourced from supplier clean energy projects<sup>12</sup>
- Apple's Zero Waste Program helps suppliers eliminate waste sent to landfill

### Responsible packaging

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

### Progress toward our 2030 goal

- 41% emissions reduction against baseline<sup>13</sup>

### Apple and the Environment

Today, Apple is carbon neutral for global corporate operations, and we are focused on our Apple 2030 goal to make every product carbon neutral.

[See Apple’s commitment](#)

Declared noise emission values in accordance with ECMA-109

Acoustic Performance

	Sound Power Level	Sound Pressure Level
	$L_{WA,m}$ (B)	Operator Position
		$L_{pA,m}$ (dB)
Idle	1.3 ( $K_v = 0.3$ )	4
Wireless web	1.3 ( $K_v = 0.3$ )	4

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 6 tabs with a mix of content including media.
7. Configuration tested: M3 Max, 16-core CPU, 40-core GPU, 48GB 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 and October 2023 using preproduction 14-inch MacBook Pro systems with Apple M3, 8-core CPU, 10-core GPU, 8GB of RAM, and 512GB SSD; preproduction 14-inch MacBook Pro systems with Apple M3 Pro, 12-core CPU, 18-core GPU, 18GB of RAM, and 1TB SSD; and preproduction 16-inch MacBook Pro systems with Apple M3 Pro, 12-core CPU, 18-core GPU, 36GB of RAM, and 512GB 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. Wi-Fi 6E available in countries and regions where supported.
6. Weight varies by configuration and manufacturing process.
7. 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.
8. Data accurate as of product launch.
9. Product recycled or renewable content is the mass of certified recycled material relative to the overall mass of the device, not including packaging or in-box accessories.
10. ENERGY STAR and the ENERGY STAR mark are registered trademarks owned by the U.S. Environmental Protection Agency.
11. Apple’s Regulated Substances Specification describes Apple’s restrictions on the use of certain chemical substances in materials in Apple products, accessories, manufacturing processes, and packaging used for shipping products to Apple’s end-customers. Restrictions are derived from international laws or directives, regulatory agencies, eco-label requirements, environmental standards, and Apple policies. Every Apple product is free of PVC and phthalates except for 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. Apple products comply with the European Union Directive 2011/65/EU and its amendments, including exemptions for the use of lead such as high-temperature solder. Apple is working to phase out the use of these exempted substances for new products where technically possible.
12. We estimate emissions savings from supplier clean electricity by allocating to our carbon model clean electricity generated



by our suppliers in the prior fiscal year, based on the supplier manufacturing allocations at time of product launch.

13. Carbon reductions are calculated against a baseline scenario: 1) No use of clean electricity for manufacturing or product use, beyond what is already available on the grid (based on regional emissions factors). 2) Apple's carbon intensity of key materials as of 2015 (our baseline year for our 2030 product carbon neutrality goal). Carbon intensity of materials reflects use of recycled content and production technology. 3) Apple's average mix of transportation modes (air, rail, ocean, ground) by product line across three years (fiscal years 2017 to 2019) to best capture the baseline transportation emissions of our products.

Helpful?

Yes

No

Support

MacBook Pro (16-inch, Nov 2023) - Technical Specifications

Copyright © 2024 Apple Inc. All rights reserved.

[Privacy Policy](#)

[Terms of Use](#)

[Sales and Refunds](#)

[Site Map](#)

United States