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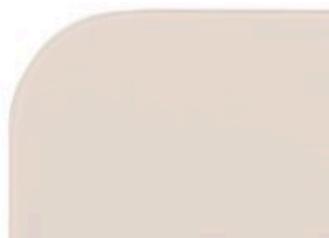
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More Modular Than Ever Before: iPhone 16 Pro and Pro Max Teardown

Teardowns



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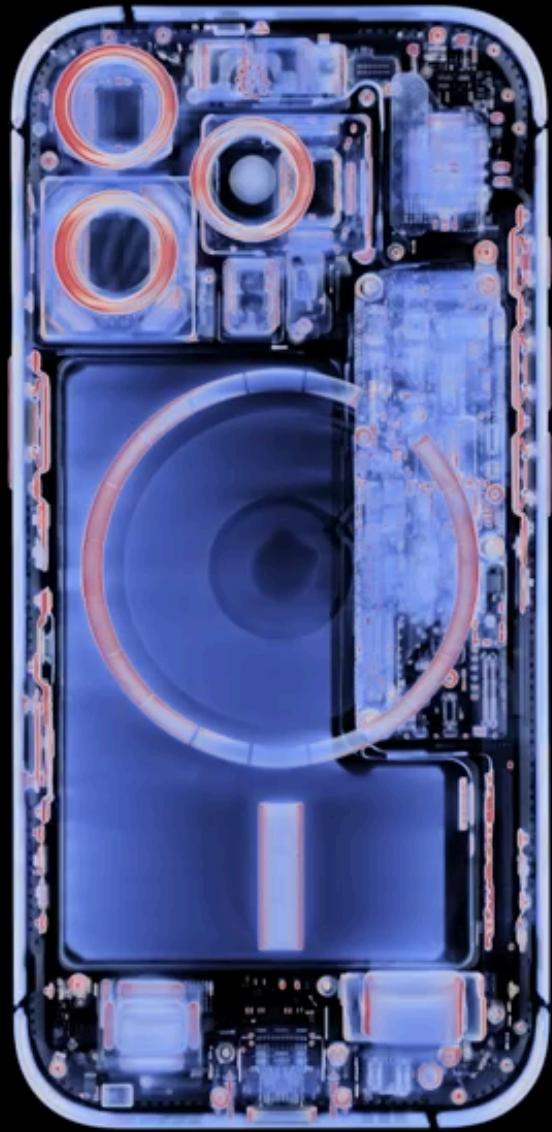
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We first [cracked into the iPhone 16](#) lineup over the weekend, and we were impressed. The vanilla iPhone 16 earned a respectable 7 out of 10 repairability score. It's the most repairable iPhone in years: the fancy new electrically released adhesive will make battery repairs easier. Most repairs can be completed without having to go through other fragile components. And that's supported with even better software news: with iOS 18, iPhones now have an on-device Repair Assistant that will enable you to pair used Apple parts.

But did the full lineup get the repair-friendly treatment? Today, we're taking a deeper dive into the Pro and Pro Max.



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Holy Metal Battery Enclosure, Batman!

In a major departure from the base iPhone, the Pro battery is encased in aluminum. We've seen this sort of enclosure before in the Apple Watch, but never in an iPhone. Some reports have suggested that this aluminum casing [could help heat dissipation](#). But in our world, we're excited to see it because it's a boon for repair—a slip of a screwdriver won't puncture it, and you won't have to worry about your pry tool bending it if you broke some adhesive strips. A bent battery can cause a short between the layers of the battery, which can make it ignite.



The iPhone 16 battery family: vanilla, Plus, Pro, and Pro Max, from left to right.

Speaking of which, we think we might've found another safety mechanism built into the Pro: There's a button-like protrusion under the battery management system that could be a blowout valve, serving as a pressure release mechanism in case of battery swelling (aka [a spicy pillow](#)).



The underside of the Pro battery. Is this a blowout valve?

To be clear, stretch-release adhesive is a [huge step up](#) from adhesives that don't give up so easily. But pulling the strips out cleanly is still a little tricky to do right under the best of circumstances, and the strips tend to get brittle over time.



Stretch-release adhesive has become industry standard. Here's a strip in a Pixel 4.

Why didn't the Pro Max get either the electrically released adhesive or the aluminum-encased battery? Maybe next year. Apple loves to test changes in a subset of the product family before they roll it out to every model. We frequently see small changes introduced in one model before they roll it out to the entire product line.



The aluminum-cased iPhone 15 Pro battery, compared to the iPhone 16 Pro battery.

Fix Your Speakers Without Risking Your Screen

The way this phone opens is a great example of Apple doing exactly that. Just like the iPhone 16 and iPhone 16 Plus, this phone opens from the front and the back. We're really glad to see that the "open from the front and back" design now is present in all models of iPhone.



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We first saw this in the [vanilla iPhone 14](#) (which we praised mechanically but [retroactively downgraded](#) because of parts pairing). Last year, the [iPhone 15 Pro](#) and [Pro Max](#) had a worse version of this feature—the phones opened both ways, but the phones were built largely on the back side of the frame instead of the front. This meant that most repairs required going through the fragile OLED panel.

Now, the iPhone 16 Pro and Pro Max have been designed so that you can get to most of the important stuff—battery, cameras, speakers—through the less-expensive and less-fragile back glass. That's a big repair win, especially for people doing at-home repairs for the first time.



When you take off the back glass of the iPhone 16 Pro (left), you've got repair access to basically everything except the screen. Under the back glass of the iPhone 15 Pro (right), the frame is in your way.

Not Quite Picture Perfect

The Pro and Pro Max cameras are now identical in specs and function. Both models include a 48-megapixel ultrawide and a 48-megapixel Fusion camera (whichever you use, [Wired says](#), “you’re going to be pretty happy with the results”). Both include the new Camera Control button and the new Photographic Styles feature. We hoped that identical functionality might mean the camera modules would be interchangeable between Pro and Pro Max. The more models that share a part, the more widely available and less expensive it usually is.

But we were frustrated to discover that the Pro and Pro Max camera housing differ by a single screw. Can you spot the difference?



Camera assemblies for the iPhone Pro (left) and Pro Max (right), with LiDAR assemblies separated.

Spoiler: On the Pro camera, a screw sits on the top of the housing, far to the right, whereas on the Pro Max camera, it's on the right side, toward the top. The cables are also slightly different lengths. These small changes mean that the camera assemblies can't be swapped between the Pro and Pro Max.

The LiDAR assembly, on the other hand, is now its own independently accessible unit. You can replace the LiDAR together with the camera assembly, or replace it on its own. When we first compared the camera assemblies, we noticed that the LiDAR looked nearly identical between the Pro and Pro Max, aside from a slightly metal bracket. This naturally made us wonder: Can we swap LiDAR assemblies between models? We had to give it a try. The LiDAR sensor is adhered to the bracket with a light adhesive. We were able to remove that bracket and put the Pro Max LiDAR scanner into the Pro. It worked right out of the box, no calibration needed. Sweet!

Speaking of high-precision repairs, did you know we just released our [new smart soldering iron](#)?

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More Modular Future

The LiDAR assembly being independently replaceable and even interchangeable between models is exactly the kind of modularity we're always hoping for.

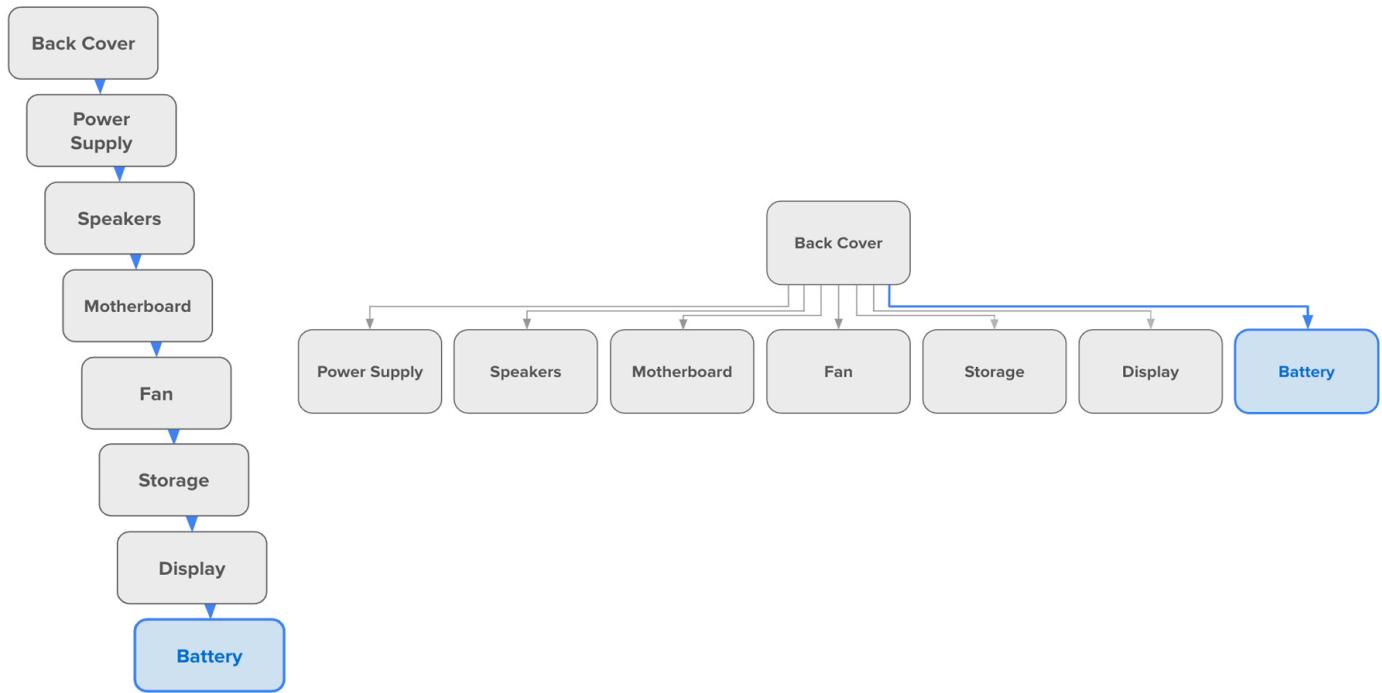
In the iPhone 15, the LiDAR assembly was completely unrepairable: When [we swapped in a new LiDAR sensor](#), the camera app would initially load and then crash. Now, swapping in a new LiDAR assembly is a painless process. And swapping in a whole new camera assembly is nearly as easy, with the help of Repair Assistant walking you through configuration—provided it's an original Apple part (stay tuned for third-party parts tests in the months ahead).

Our iPhone 16 Pro and Pro Max disassembly revealed some other great modularity upgrades: for the first time ever, the logic board is removable after taking out just one other component, the upper speaker assembly.

That's really important: one of the biggest things we consider when rating the repairability of a product is its [disassembly tree](#): that is, how buried are the parts you're most likely to repair? How many other components will you have to remove to get to them?

Imagine a product that was really time consuming to repair. This make-believe monstrosity is put together sequentially, burying one component under the next, and the next under that, and so on, all the way down to the frame of the phone. Every time you handle fragile connectors between each component, you risk breaking something else.

In this hypothetical disassembly tree below left, featuring a phone pulled straight from the fires of hell, the battery is buried under literally every other component. The best devices have a shallow disassembly tree, like the right tree below, where each component is easily and independently accessible when you take off the back cover.



We're excited by the iPhone 16 lineup in large part because Apple has made a bunch of moves toward a shallow disassembly tree. In addition to the more-modular logic board (huge, and an impressive feat of engineering—consider how many connections it must have!), we loved to see how much more modular the USB-C port is.



As Shahram put it in our teardown video,

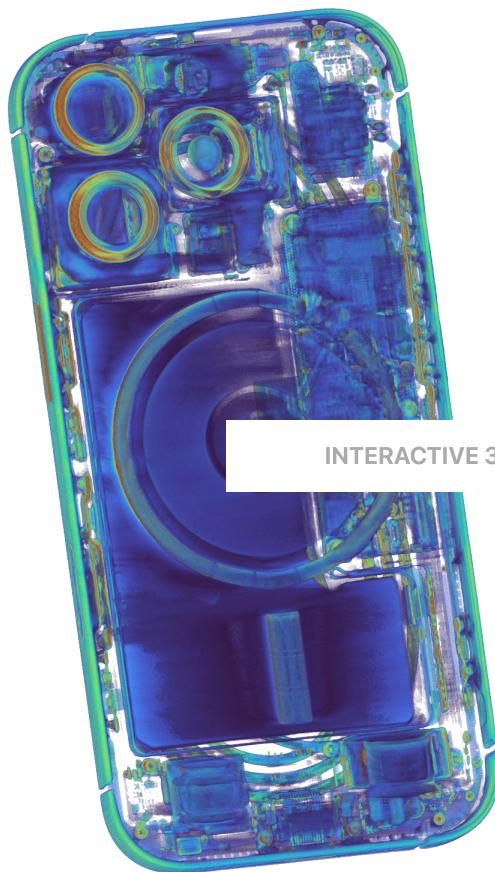
This marks the first time that I haven't had to remove a dozen tri-point, Phillips, and standoff screws from one side of the frame to the other to access a USB-C port. It's a massively simplified design and a welcome change.

Apple has not made any mention of selling USB-C ports, even though the repair should be easy now. We'll get the part stocked as soon as we can.

It's a bit more involved than removing the USB-C port, but the Taptic Engine saw a modularity upgrade, too: it can be removed without removing the battery (although it requires a fixed blade driver).

What about mmWave?

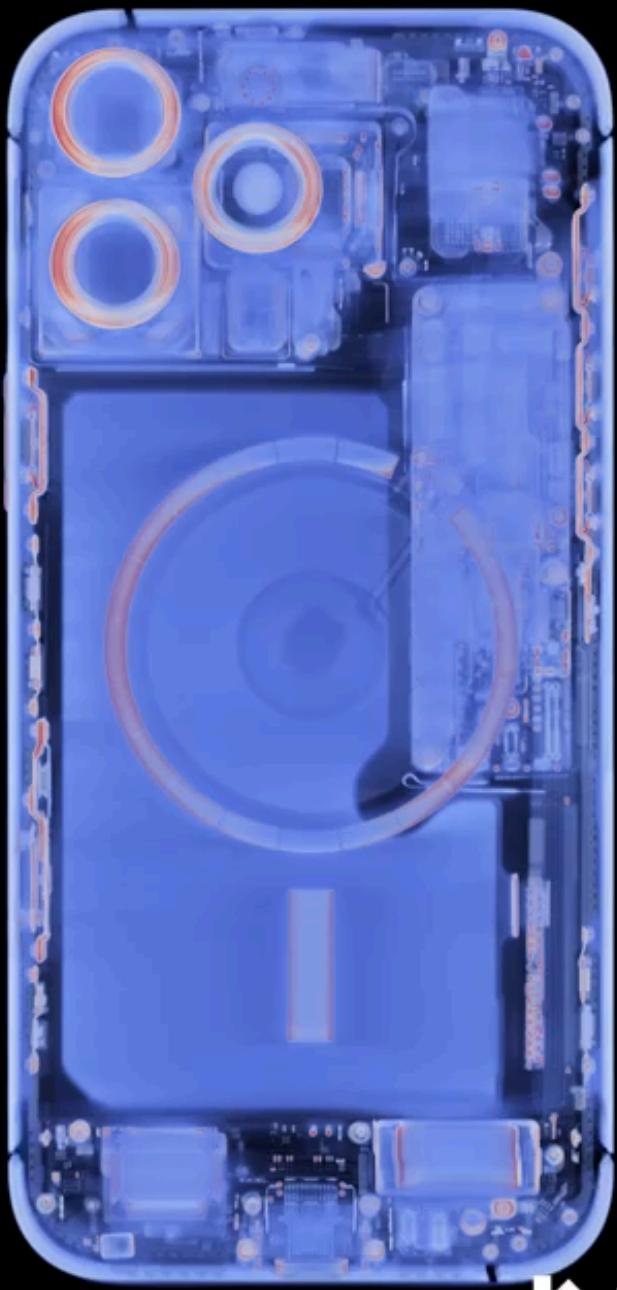
We reported that the iPhone 16 and 16 Plus removed one 5G mmWave antenna to make way for the camera button. To confirm the situation in the Pro and Pro Max, we put them into our handy [Lumafield](#) Neptune CT scanner. Check out a 3D spin of the Pro at the top of this post, or explore deeper yourself in this embed:



INTERACTIVE 3D MODEL

[Explore the Scan](#)

Here's a 3D spin of the Pro Max. See if you can find the Camera Control button:



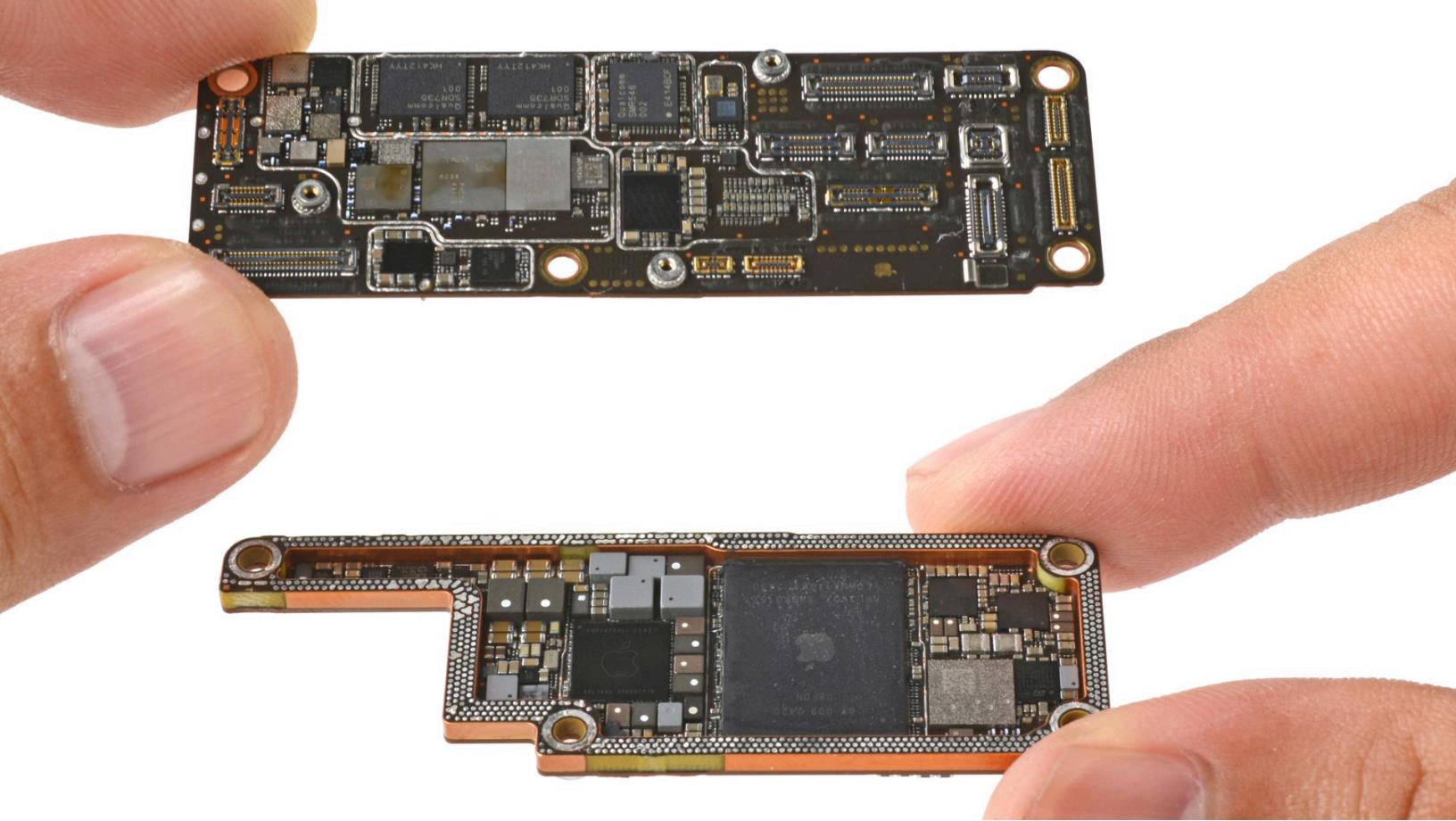
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Sure enough, one mmWave antenna has been replaced by the camera button in the Pro and Pro Max, too. But these phones have to get a signal through their titanium frames, denser than the aluminum of the vanilla and Plus models. We suspect that's why the remaining antenna has been moved up and closer to the outer edge, into a hollowed-out section near the top of the phone that appears to have been widened for this purpose.

A Tiny World of Chips

A full chip ID is incoming. But briefly, on the logic board, we have the A18 Pro System on Chip located in the center of the sandwich. This SoC contains a 6-core CPU, 6-core GPU, and a 16-core neural engine, layered underneath 8GB of LPDDR5 SDRAM.

On the reverse side, we have the Kyoxia 128GB NAND flash storage, which is the minimum capacity available on the 16 Pro. Amazingly, a Chinese technician has [posted a video](#) upgrading this to 1 TB of storage. For a full silicon overview, head over to our [iPhone 16 Pro chip ID](#) post.



Repairability Score

Overall, we're impressed with the moves toward repairability that all the phones in this iPhone 16 lineup have made. The repairability benefits and drawbacks are pretty similar across the whole product family. The dual-entry design is standout, particularly now that even the Pro models are built such that most repairs are possible without taking off the screen.

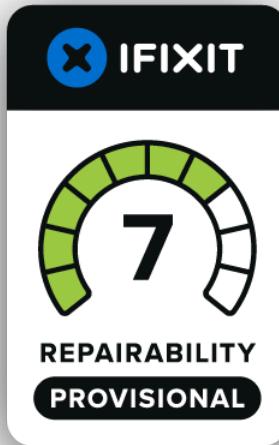
Adhesives still create some challenges getting inside—and heat required to open the phone means that it's probably not yet compliant with [the upcoming EU Battery Regulation](#).

Though we appreciate that everything inside the phone screws and clips together securely whether or not you've got replacement adhesive on hand, the complexity and variety of screws hurt the phone's score. Sure, Apple will now sell you a pentalobe screwdriver, and yes, anyone with an iFixit Pro Tech Toolkit has all the bits you need to disassemble an iPhone. But many people don't have a panoply of tiny tools on hand, and having to swap out bits frequently complicates repairs.

The excellent repair manuals for the Pro and Pro Max are equivalent in quality to the manuals for the vanilla and Plus models, and again, we're thrilled to see them available on launch day. Circuit schematics would be a welcome addition to support repair shops.

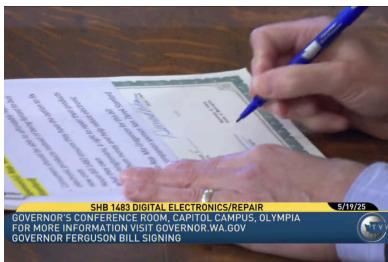
We've yet to test any third-party parts, but our parts swapping tests went fairly well, and Repair Assistant ultimately worked. On the Pro Max, we experienced a few minor network error hiccups along the lines of what we saw when testing the tool with the iPhone 15. The Pro Max Repair Assistant process also required a ~5 minute camera calibration procedure that we didn't see in the vanilla and Plus models, but it worked smoothly and was clearly documented.

Like the vanilla and Plus models, the iPhone 16 Pro and Pro Max both earn a provisional 7 out of 10 repairability score.



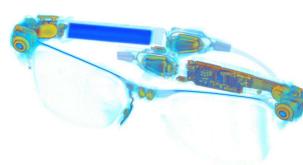
Teardown season isn't over yet! Next up, we'll take a look inside the new AirPods and Apple Watch models, plus we'll release pretty internal component wallpapers for the whole family. We're also going to keep digging into this new line of iPhones—Apple says that third-party parts won't have artificially disabled functionality in the iPhone 16. You can bet we'll hold them to that.

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5 COMMENTS

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Weird, so the Pro Max gets neither the new metal battery nor the new electrical adhesive, the 16 gets the electrical adhesive, and the regular Pro gets pull tabs. Odd mix. Hope next year it's all metal and all electric pull tabs.
tipoo - Sep 26, 2024

16 Pro's battery is also using stacked battery tech (Pro Max I think also) which has rumored for the 15 Pro. Watch WekiHome's video. Absolutely amazing teardown with details. Just turn on captions and watch carefully.
Also finally 16 Pro/Max got M14 OLED materials in it's display. M12 was used in 14 Pro/15 Pro. Regular 16 is also with M12.
boris_dg - Sep 27, 2024

Regarding the score deduction based on needing the different size and shaped drivers, in future teardown, will you at least explain why it's the screws are designed that's way to begin with? Surely you know every screw isn't a #4 Philips head for a legitimate packaging and torque specification. I'm perhaps certain sizes use that are extra small use different alloys and patterns to ensure minimal cam out and max fastener tension you know?
You guys always do fantastic with these tear downs! I've used ifixit batteries, guides, and screens more than once! Keep it up!
Austin Ollar - Oct 16, 2024

Any confirmation that all storage capacities are using TLC NAND, including the 1 tb?
[deleted] - Nov 29, 2024

@kyle any clarity on this from your work?
[deleted] - Dec 2, 2024

B I </> ⌘ | ⌂ ⌄

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