



# iPhone 12 Pro Max Teardown

We've torn down the mini iPhone and the two...

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## INTRODUCTION

We've torn down the [mini iPhone](#) and the [two medium iPhones](#), but we saved the biggest for last: the iPhone 12 Pro Max. If you caught our [livestream](#) last week, you got a sneak peek at what it's packin'—but we wanted more (and our DMs tell us you do, too)! Time to give this full-bodied phone the full teardown treatment.

To put the iPhone 12 Pro Max camera to the ultimate test, we used it to secretly snap two photos in this teardown with the [Halide camera app](#). Can you spot them? Place your bets, and then scroll down to [Step 14](#) for the answer.

P.S. If you like what you see, you should probably follow iFixit's [YouTube channel](#), [Instagram](#), and [Twitter](#)—because if you enjoy teardowns and nitty-gritty tech findings, those are the best places to catch 'em all. While you're at it, subscribe to our [newsletter](#) so you can keep up with our other shenanigans. P.P.S. Don't miss our [Holiday Gift Guide](#) for the latest iFixit deals, and keep an eye out for something that rhymes with *bee zipping* coming this Monday.

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### TOOLS:

- [P2 Pentalobe Screwdriver iPhone](#) (1)
  - [Suction Handle](#) (1)
  - [Heat Gun](#) (1)
  - [iFixit Opening Picks \(Set of 6\)](#) (1)
  - [Tri-point Y000 Screwdriver](#) (1)
  - [Spudger](#) (1)
  - [Phillips #00 Screwdriver](#) (1)
  - [Tweezers](#) (1)
  - [Standoff Screwdriver for iPhones](#) (1)
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- Once more unto the breach! Here are the stats on this final iPhone boss:
  - A14 Bionic SoC with fourth-generation Neural Engine
  - 6.7 inch (2778 x 1284 pixels) Super Retina XDR OLED display with P3 wide color gamut and True Tone
  - 12 MP triple camera system with wide angle  $f/1.6$  (OIS), ultra-wide angle  $f/2.4$ , and telephoto  $f/2.2$  (OIS) cameras, with a LiDAR module
  - 6 GB of RAM and 128 GB of storage (256 and 512 GB configs available)
  - 5G (sub-6 GHz and mmWave connectivity), plus 4x4 MIMO LTE, 802.11ax Wi-Fi 6, ultra-wide band (UWB), NFC, and Bluetooth 5.0
  - MagSafe 15 watt wireless charging
  - IP68 rating, water resistant to a maximum depth of 6 meters for up to 30 minutes under IEC standard 60529

## Step 2



- In case you haven't heard, square is the new round... [again](#).
- Sorry to break it to you, but size *does* matter—at least when it comes to camera sensors. To achieve their alleged [87% improvement](#) in low-light performance, the 12 Pro Max uses the biggest sensor in an iPhone yet. But before we nerd out on cameras, let's compare iPhones to iPhones:
  - Making our way around the iPhone clock, we've got a green iPhone 11 Pro Max, a gold iPhone 12 Pro, and a blue iPhone 12 Pro Max.
- If big things are *your* thing, the iPhone 12 Pro Max delivers. Everything is bigger—even the camera bump.

## Step 3



- Friends don't let friends tear down devices without an X-ray blueprint. Lucky for us, we're BFFs with the fine folks at [Creative Electron](#) who supply us with endless X-rays.
- The basics of this iPhone look about the same as the rest of the 12 family, but the dark steel frame is Pro-only. Also, that MagSafe ring that [didn't even fit in the 12 mini](#) looks positively dinky in this Max.
- One item we're especially interested to see: the wider L-shaped battery—especially because we were bummed by the [boring rectangle](#) in the Pro. The Max alone holds onto an L, but, hey, other iPhones? You're still a W in your own special way.

## Step 4



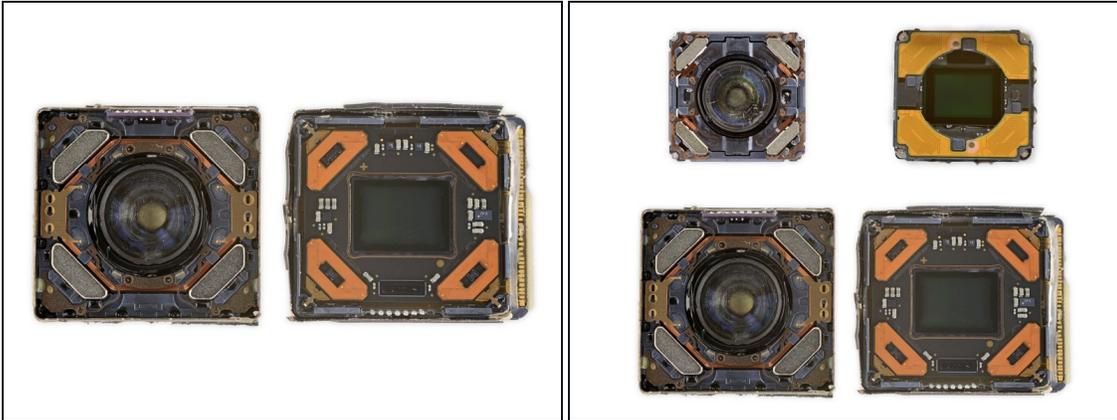
- A standard-issue heat and and iSclack application persuades this big Pro Max to let its guard down and share some secrets.
- Like the other iPhones 12, the Pro Max opens just like a book: to the left, and with a good story inside.
  - Sure, it's not *exactly* like a book, but you get the point. With a little help from [our guides](#), anyone can [fix their iPhone](#).
- But, iFixit, what if I don't need to fix my iPhone and I just want to stare at its gorgeous guts? We've got you covered with these nifty [Pro Max wallpapers](#).

## Step 5



- No time for frivolity today, we've got places to go and [other teardowns](#) to attend to. We head straight for the headline Pro Max feature: the new cameras.
  - The standard wide camera (bottom left in the group of three) is the source of all the 12 Pro Max chatter. It's reportedly housing a 47% larger sensor, allowing it to gather more light and thus, better photos.
  - With X-ray vision, we see that the standard wide's sensor is definitely bigger. We can also clearly see the four magnets surrounding it—telltale signs of Apple's brand-new sensor-shift image stabilization system.
- If you're more interested in the LIDAR capabilities, check out this [video explainer](#).

## Step 6



- Unmasked, the iPhone 12 Pro Max's primary (wide-angle) sensor is... large. Not unlike the phone it lives in.
- Sometimes we're skeptical when a "Pro" feature only makes it into a larger, more expensive model. But there's a decent chance this sensor wouldn't fit in the cramped corner of the smaller iPhone 12 Pro without compromises.
- This sensor dwarfs the iPhone 12's. It's 47% larger but with the same 12 MP resolution, so each pixel is larger and captures more light.
- ⓘ This sensor also has that other trick up its sleeve: sensor-shift image stabilization.
  - That's a technology many modern DSLR and mirrorless cameras use. When your hands shake, there are two main ways to stabilize the image: you can move the *lens*, or you can move the *sensor*.
  - Most smartphones that tout image stabilization use lens-based optical image stabilization (OIS) to smooth out jitters. Many internet battles have been fought over which stabilization technique works best in professional cameras.
  - Since Apple went out of their way to bring sensor-shift to the iPhone, either they think that's the way to go, or perhaps they just couldn't adequately stabilize the larger version of their new f/1.6 lens.

## Step 7



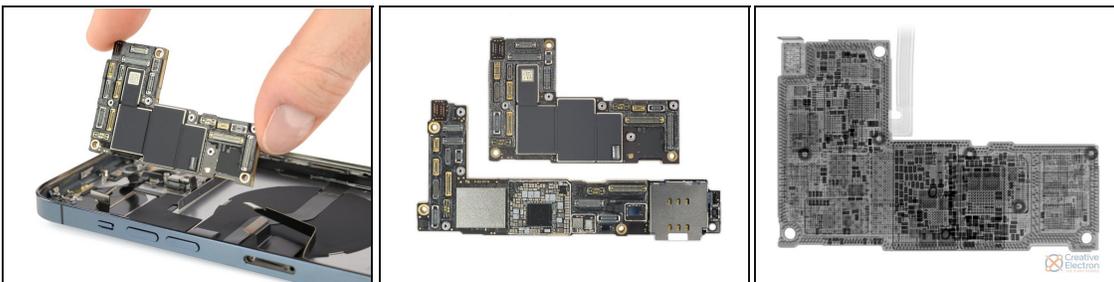
- The loudspeaker and Taptic Engine are a snap to remove with the help of our [hyper-pocketable Minnow Driver Kit](#).
- ⓘ If you've got a keen eye and would like your own personal Minnow, [enter our giveaway here](#) and tell us which two steps in this teardown contain a photo shot on an iPhone with the [Halide camera app](#).
- The Max Taptic Engine sports a little black plastic sidecar. What for, you ask? It could help support the display, or maybe it's an extra battery bumper. Either way, it's unusual to find anything in an iPhone that seemingly just fills "unused" space—but [not unprecedented](#).
- Apple's engineers seem satisfied enough with the battery capacity to give the Taptic Engine and speaker more room to boom. Compared to the mini, these bits are *maxssive*.

## Step 8



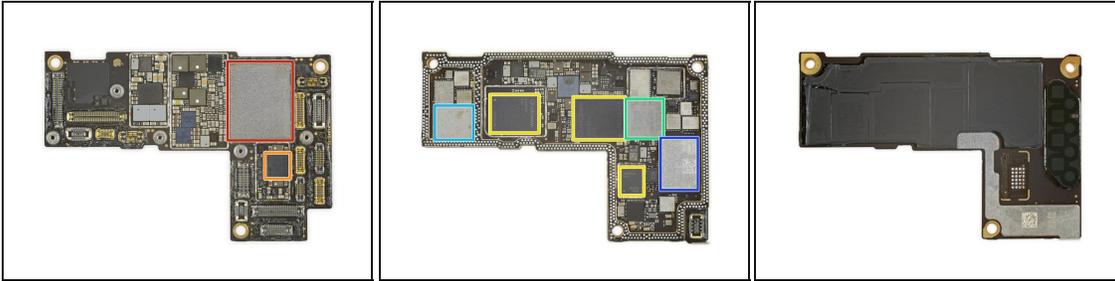
- With those lower components conquered, we have the perfect angle of attack for those stretch-release battery adhesive tabs.
- Don't let that "L" deceive you—the Max has the winning battery out of all the iPhones 12, not just in power, but in technology. X-ray vision shows that the Max's battery pack isn't quite full to the brim, but it's darn close—and the [high-tech shape](#) allows it to turn the corner on capacity.
- The Max power source weighs in at 14.13 Wh, tipping the scales against the 8.57 Wh [mini battery](#) and the 10.78 Wh [12 and 12 Pro](#).
- ⓘ This is a *slight* step down from the 15.04 Wh pack in the [iPhone 11 Pro Max](#), and it definitely falls behind the [Galaxy Note 20 and 20 Ultra](#) (16.69 Wh and 17.46 Wh respectively).

## Step 9



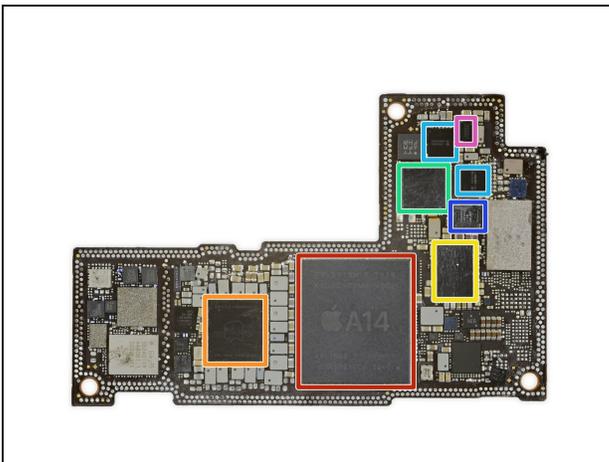
- With the Pro Max's logic board extracted, we're tempted to say it might be even more compact than the one in the iPhone 12 mini (bottom)—but, the mini's integrated SIM reader also leaves it at an unfair disadvantage.
- ⓘ The 12 Pro Max benefits from a detached, modular SIM reader [like in the 12 and 12 Pro](#)—which also happens to be a bit more repair-friendly.
- Here's a quick X-ray view of the board before we slice it open. We'll have to take it one layer at a time, but it's neat to see them all at once. It's an amazingly intricate city of silicon driving these iPhones.

## Step 10



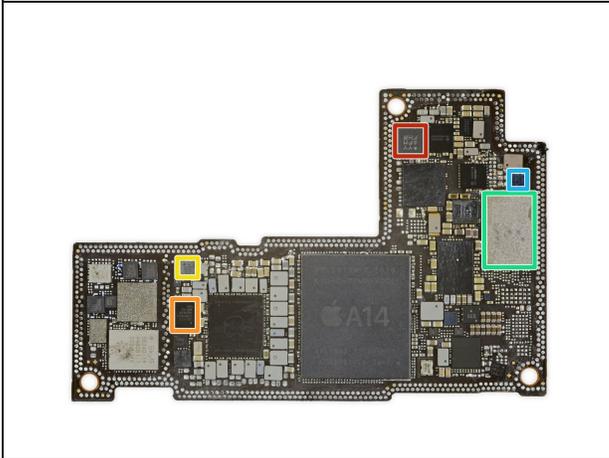
- Fair warning, there were some minor casualties in today's [board delamination](#). A little slip of the knife at 300° C is all it took to smear some of these chips right off the board. We blame our [robot intern](#). Here are some of the bits he managed to salvage:
  - 128 GB of [Kioxia NAND flash](#) memory
  - STMicroelectronics STB601A power management IC
  - Qualcomm's [SDR865](#) 5G and LTE transceiver, [SDX55M](#) 5G modem-RF system, and SMR526 intermediate frequency IC
  - USI 339S00761 WLAN / Bluetooth module
  - Avago 8200 high/mid-band power amplifier with integrated duplexer
  - Murata 1XR-482 mmWave front-end module
- ⓘ Looking for that sweet, sweet A14 chip with 6 GB of layered memory? Keep reading for a detailed look at the rest of the board.

## Step 11



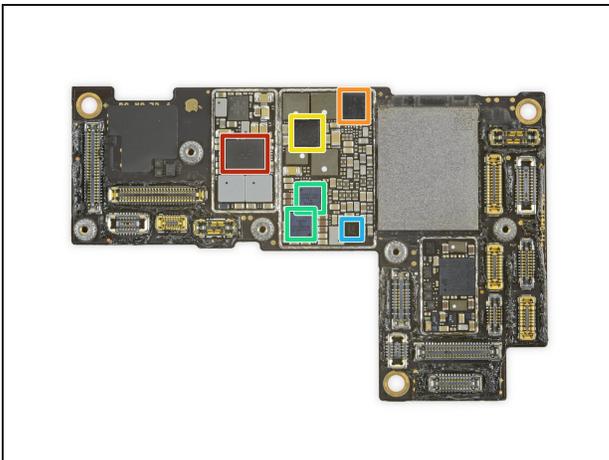
- Let's get to that A14 straight away—and some of the chips around it.
  - Apple A14 SoC layered over 6 GB of Samsung K3UHCHC0MM-VGCL RAM
  - Apple 343S00437 power management IC
  - Possibly an STMicroelectronics wireless power receiver
  - Possibly an Apple/Cirrus Logic audio codec
  - Apple 338S00564-B0 power management IC
  - Apple/Cirrus Logic 338S00537 mono audio amplifier
  - Apple 338S00616, likely a display power management IC

## Step 12



- And a few more chips on the same side:
  - Possibly a Bosch Sensortec accelerometer
  - NXP Semiconductor CBTL1614A1 display port multiplexer
  - Possibly a Maxim Integrated MAX8559 300 mA LDO regulator
  - Apple/USI U1 ultra-wideband chip
  - Texas Instruments LM3562A1, probably an LED driver

## Step 13



- And finally, let's take another look at the storage side of the board:
  - Texas Instruments SN2611A0 battery charger
  - Broadcom BCM15960A0, likely Wi-Fi / Bluetooth SoC
  - Texas Instruments TPS68836 display power management
  - Apple/Cirrus Logic 338S00537 audio amplifier
  - Texas Instruments [SN61280](#) battery DC-DC converter

## Step 14



- Thanks to viewers like you, we did it! This season's fourth and final iPhone has been laid to rest in pieces. The only thing left to do? Load up some sweet [teardown wallpapers](#).
  - The Pro Max is arguably Apple's finest iPhone-related achievement this year, adding some pretty demanding 5G tech with no obvious compromises to other components.
  - We're pleased to see this iPhone retain its high-tech L-shaped battery. Here's hoping those make a stronger comeback in the whole iPhone lineup next year—bigger batteries generally need fewer replacements over their lifetimes. (They're also just really cool.)
- ✦ PS: We're pretty impressed with the new camera's capabilities—If you didn't already guess, the two images we *shot on iPhone* are [here](#) and [here](#). Congrats to our lucky [prizewinners](#) who guessed correctly!
- ⓘ Oh by the way, our iPhone 12 Pro Max thankfully gave us no trouble in our camera repair tests—[unlike the standard iPhone 12](#). Let's hope those bugs were just a fluke.



- The iPhone 12 Pro Max earns a **6 out of 10** on our repairability scale (10 is the easiest to repair):
  - Screen and battery remain prioritized and reasonably accessible for replacement.
  - Most components are fairly modular and replaceable.
  - Some uncommon screws complicate all repairs, but reusable fasteners are preferred over adhesives.
  - Waterproofing helps reduce the frequency of some repairs while complicating others.
  - The glass back makes drops even more dangerous and requires a full case replacement if it breaks.