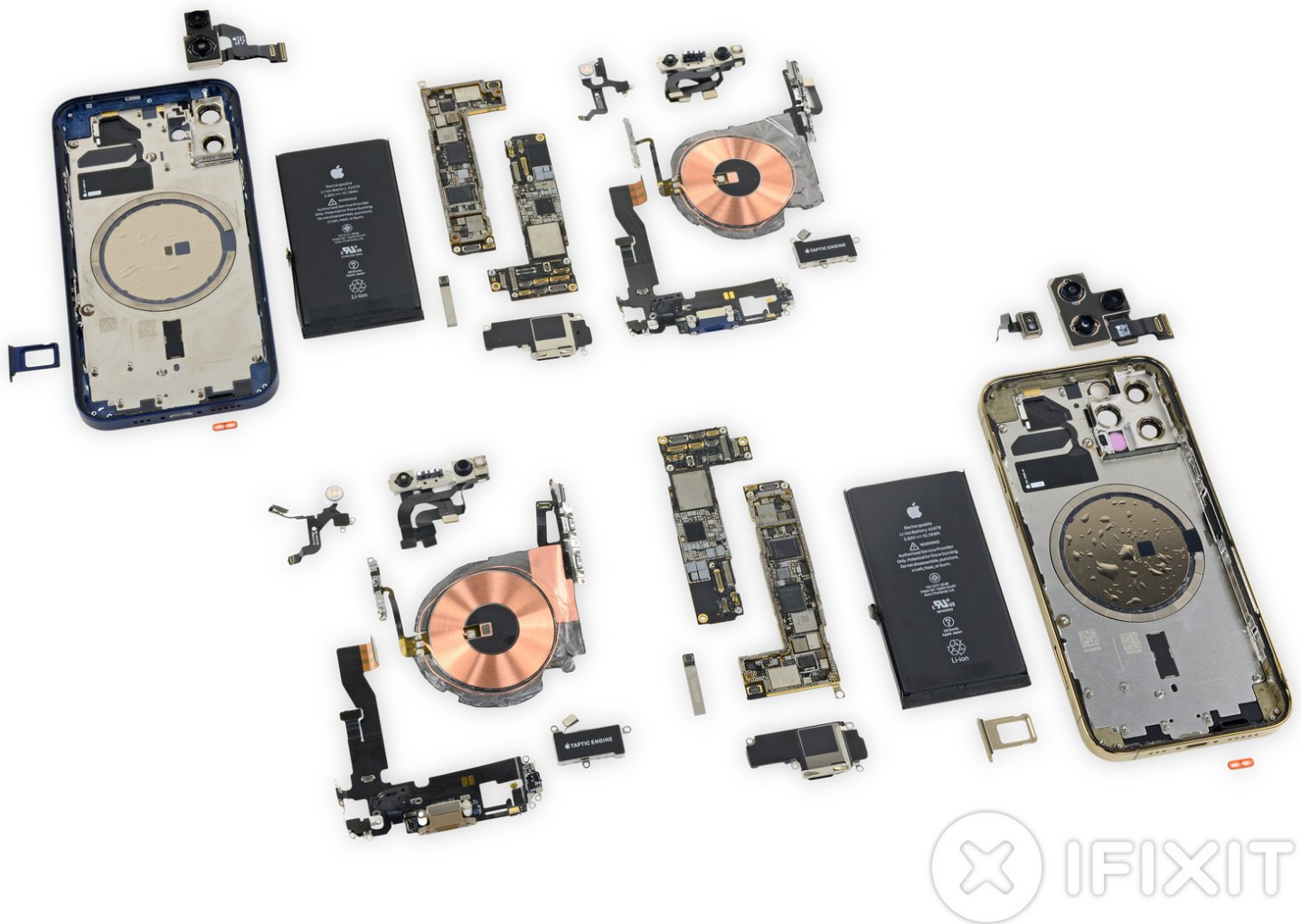




# iPhone 12 and 12 Pro Teardown

A side-by-side teardown of the new iPhone 12 and 12 Pro shows 5G advances with significant tradeoffs in other areas.

Written By: Taylor Dixon



# INTRODUCTION

**Thanks for joining us for a live teardown of the iPhone 12 and 12 Pro!** If you missed the livestream, no worries—you can still catch the recording above. Or scroll down for the written analysis, including some bonus disassembly of the new **MagSafe** power puck. And if that doesn't quite quench your iPhone 12 teardown thirst, check out our teardowns of the [iPhone 12 mini](#) and the [iPhone 12 Pro Max](#)!

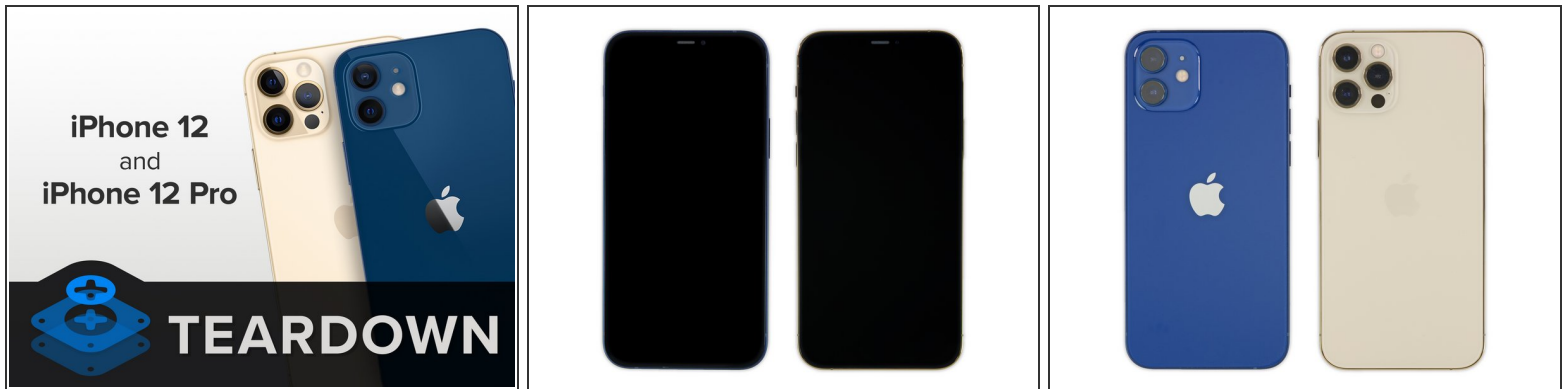
Be sure to follow iFixit's [YouTube channel](#), our [Instagram](#), and our [Twitter](#), and subscribe to our [newsletter](#) so you'll be the first to know when the newest consumer tech hits the teardown table.

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## TOOLS:

- [P2 Pentalobe Screwdriver iPhone](#) (1)
  - [Suction Handle](#) (1)
  - [Heavy-Duty Suction Cups \(Pair\)](#) (1)
  - [Curved Razor Blade](#) (1)
  - [Heat Gun](#) (1)
  - [iFixit Opening Picks set of 6](#) (1)
  - [Tri-point Y000 Screwdriver](#) (1)
  - [Standoff Screwdriver for iPhones](#) (1)
  - [Spudger](#) (1)
  - [Phillips #00 Screwdriver](#) (1)
  - [Tweezers](#) (1)
  - [Jimmy](#) (1)
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## Step 1 — iPhone 12 and 12 Pro Teardown



- While we wait with bated breath for the Mini and Max to show up, we can at least get started on the inbetweeners. Let's see what they're packin':
  - A14 Bionic with fourth-generation Neural Engine
  - 6.1 inch (2532 × 1170 pixels) Super Retina XDR OLED display with True Tone and HDR
  - 12 MP camera system with ultra-wide angle ( $f/2.4$ ) and wide angle ( $f/1.6$ ) cameras—plus the Pro includes a telephoto ( $f/2.0$ ) camera and a LiDAR scanner
  - Onboard storage of 64 GB (iPhone 12) and 128 GB (12 Pro)
  - 5G (sub-6 GHz and mmWave) connectivity, plus 4x4 MIMO LTE, 802.11ax Wi-Fi 6, and BT 5.0
  - MagSafe 15 Watt wireless charging
  - Improved IP68 rating, now good for maximum depth of 6 meters up to 30 minutes under IEC standard 60529

## Step 2



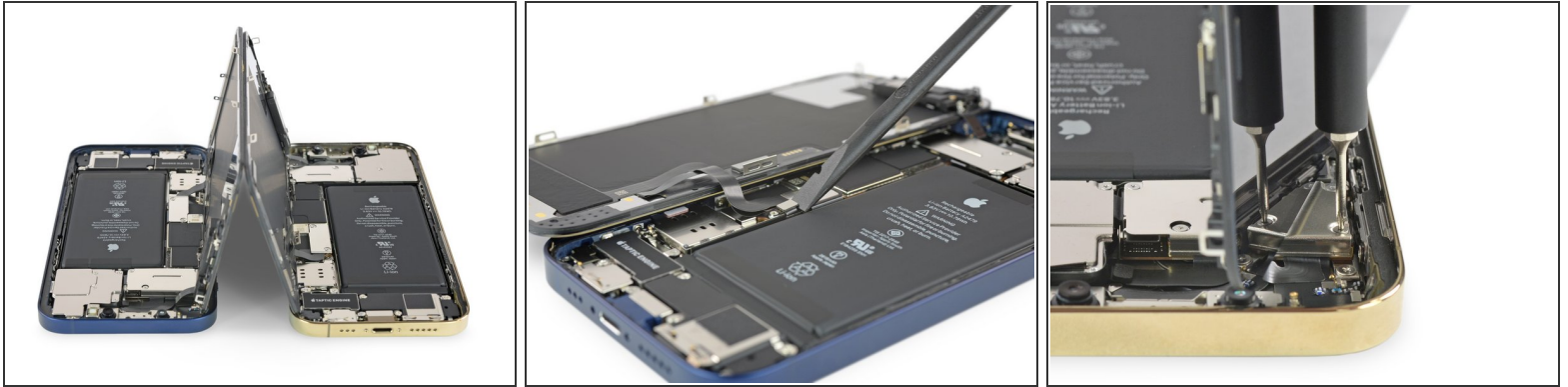
- Remember when the [iPhone 4](#) introduced [Braun-like](#) squared edges—scandalously leaked by a [developer unit left at a bar](#)?
- Square is back, baby! With less scandal this time. These flat edges shake up a familiar design, but might also allow for more screen real estate without making the phone any bigger.
- For a walk down design memory lane, we've stacked up the iPhone 11 Pro, the iPhone 12, 12 Pro, and an iPhone 4 to cap it off!
- Can you spot the differences? The US models have a wee millimeter wave window. The designers likely hate that, but probably not as much as those EU regulatory markings...
- ① That's right! These chrono-shifted phones come courtesy of our EU team, who did quick work while the U.S. was sleeping (or doom-scrolling).

## Step 3



- Enough about the past—let's get these things open!
- Per usual, a couple of pesky Pentalobe screws form the first obstacle—but we're armed and ready.
- A couple of suction handles and opening picks should get us in with relative ease—we've played this game before.
- Heat and patience are on our side—it's not a *totally* new opening experience, but different teardown engineers here faced varying difficulties in opening. Maybe the adhesive was reformulated for that extra two meters of immersion protection?
- ① Meanwhile, Apple is making authorized repair centers [use heat for the first time in their opening procedure](#). So Apple's own approach to opening iPhones has evolved, that much is certain.

## Step 4



- The display now opens from the right edge, perhaps making repairs easier for the lefties in the crowd. High five!
- ❗ iPhones have opened from the opposite side [ever since the 7](#). Before that, the 5 and 6-series models [opened bottom-to-top](#). Before *that*, iPhones opened after a [near-total disassembly](#).
- It's a bit wonky trying to remove the connector shield with the screen still attached, but you can maneuver the screen to make more room for the screwdriver.
- On the plus side, we get this super cool mirrored photo.



## Step 5



- With both screens off, we play a game of "Spot the Differences." The 12 is on the left, with the 12 Pro on the right.
- Aside from the camera shields, there actually aren't any major differences from a bird's eye view. Surprising!
- ❗ We gotta say, the 12 Pro isn't looking so Pro yet. But let's dig a little deeper.
- On the bright side, we now have some great wallpaper fodder. Keep your eyes peeled to the iFixit homepage where we'll slap up some primo wallpapers for both the iPhone 12 and 12 Pro.
- 🔖 Our early tests indicate both displays work interchangeably when swapped between the standard 12 and 12 Pro—even though the max brightness specs are [ever-so-slightly different](#), as [careful observers](#) have pointed out. There's a little more to the story here; we'll see if we're able to unearth more details later.

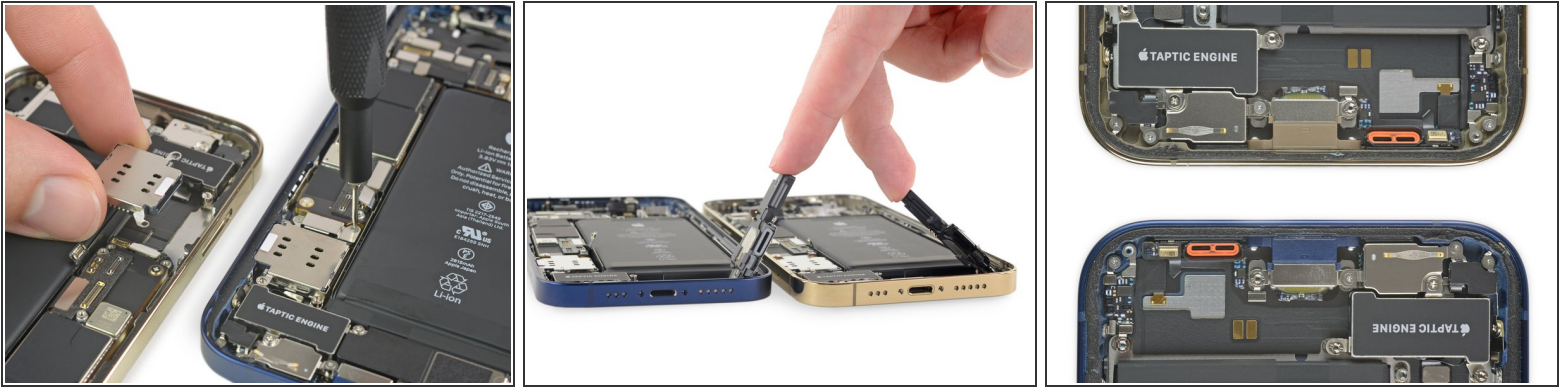
## Step 6



- Ah, here we go! Removing the camera shields reveals the biggest difference between these two phones: an extra snapper on the Pro.
- But we turn our attention to the 12 and ... what's this? A high-tech piece of plastic?
  - ⓘ Turns out these phones are so similar, that where the Pro keeps its extra camera module + LiDAR sensor, the standard 12 has... a plastic spacer.
- Both phones sport 12 MP wide and ultra-wide cameras with f/1.6 and f/2.4 apertures, respectively, while the Pro tacks on the f/2.0 telephoto lens.
- The Pro cameras also have a few other bells and whistles, like ProRAW, dual OIS, and the low-light photography benefits that LiDAR brings.



## Step 7



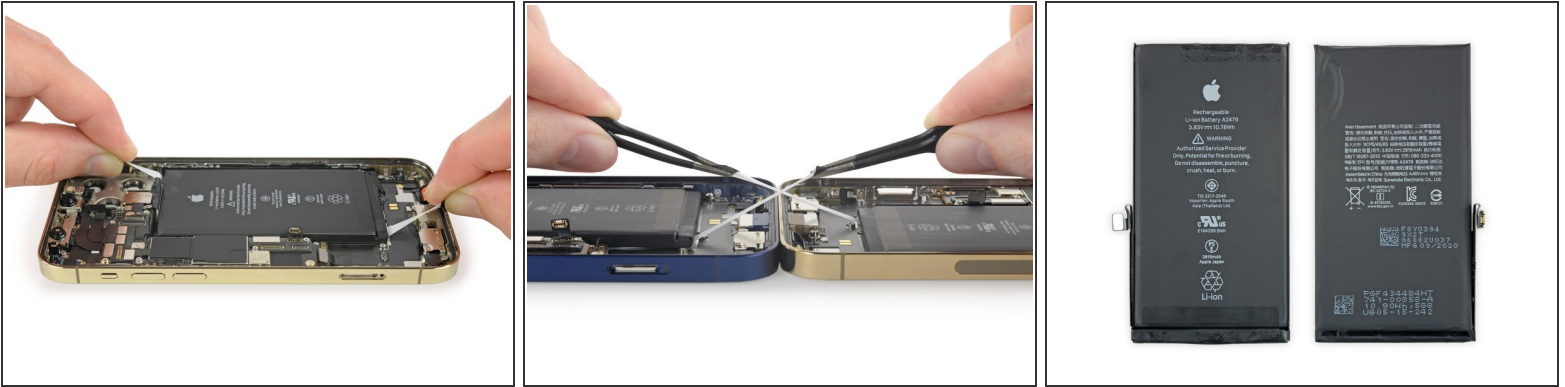
- These modular SIM card readers are excellent for repair, if a little oddly placed—the SIM tray, logic board, and battery have all flipped sides from previous models.
  - ⓘ Why the switcheroo? The smoking gun is the logic board. It has grown enormously in size since the 11—probably to accommodate Qualcomm's 5G chips—and no longer fits in its old home beneath the cameras.
- The speakers in both models are held in place with Phillips screws for a change, and they're a walk in the park to remove.
- As we remove the speakers, we notice something different: instead of sticky adhesive, we find bright orange rubber gaskets sitting behind the speaker grilles—somewhat like we're used to seeing in Samsung phones.
  - ⓘ This makes for a *much* easier speaker removal and replacement procedure than in years past, which required reworking messy adhesive. Since the speaker has to be removed for battery replacement, this is a thoughtful design and a win, repair-wise.

## Step 8



- We see a lot of standoff screws near the bottom of the case. Luckily, our [Marlin Precision Screwdriver Set for iPhones](#) has a standoff driver for just such occasions.
  - ⓘ Dare we say, there's just a bit of unused space in here. Maybe just enough to fit, say, a plug of the 3.5 mm variety? (Probably not quite that much, but one can dream.)
- It's the exact same Taptic Engine in both the 12 and 12 Pro—functionally interchangeable in our tests—and it's just a smidge smaller than what we saw in the vanilla iPhone 11, but also a smidgen thicker.
  - ★ If it's specifics you want, specifics we got: the 12-series Taptic Engine measures 22.25 mm x 9.48 mm x 3.56 mm, while last year's variant (from the minty green iPhone 11, at left) comes in at 26.9 mm x 11.18 mm x 3.44 mm.


## Step 9



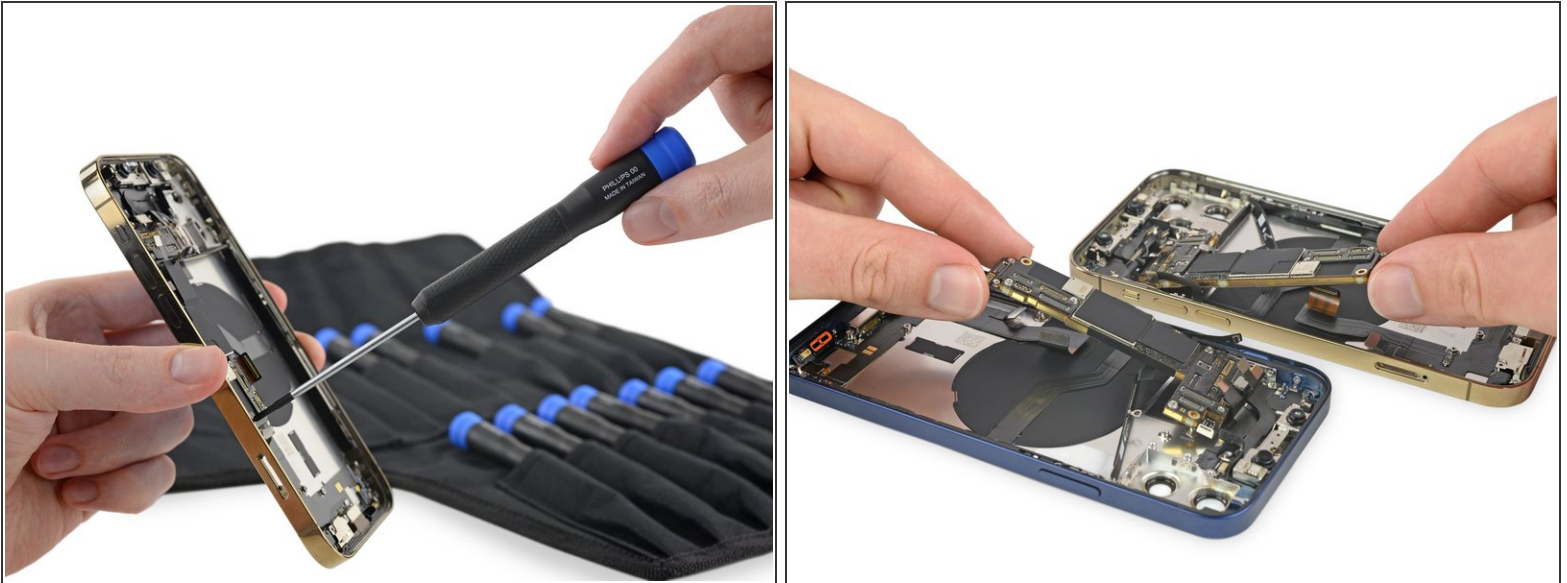
- Beneath the battery, stretch release adhesive just where we expect it, like a familiar tune on your drive to work. The 12 and 12 Pro have four tabs each, and they perform as expected.
- One thing that could stand to change, though: the tiny, flimsy pull-tab "starter" section Apple provides. What are these, pull tabs for *ants*?
- We've heard through the applevine that the 12 and 12 Pro are using the exact same battery. With that said (*puts on examination glasses*) yup! We see 10.78 Wh for both batteries.
- ✦ They are also interchangeable in our parts swap tests.
- This is a marked decrease from the 11 and 11 Pro, which ring in at [11.91 Wh](#) and 11.67 Wh, respectively. But the highly efficient new 5nm-process A14 chip might be making up for that difference: as per Apple's official specs, battery life doesn't suffer at all.
- ❗ It's a bit disappointing to see Apple back away from the unique [L-shaped battery](#) designs it developed for recent iPhones. [Rumors](#) pointed to Apple using cheaper parts to offset the cost of 5G, and this seemingly bears that out.

## Step 10



- We interrupt this teardown to bring you this excellent X-ray intermission from our pals at [Creative Electron](#). It's a glance at the guts before we go!
  - The obvious standout here is the MagSafe wireless charging array, and it's cool to finally see it with our eyes. [Magnet paper works too](#), but X-rays are so much better.
  - And nope, we didn't add a black border to the iPhone 12 Pro X-ray on the right. That's the result of the stainless steel frame compared to the aluminum frame on the iPhone 12—steel is denser, thus more opaque in X-ray shots.
-  Not pictured in the X-rays: all the fingerprints we inevitably put on these things...

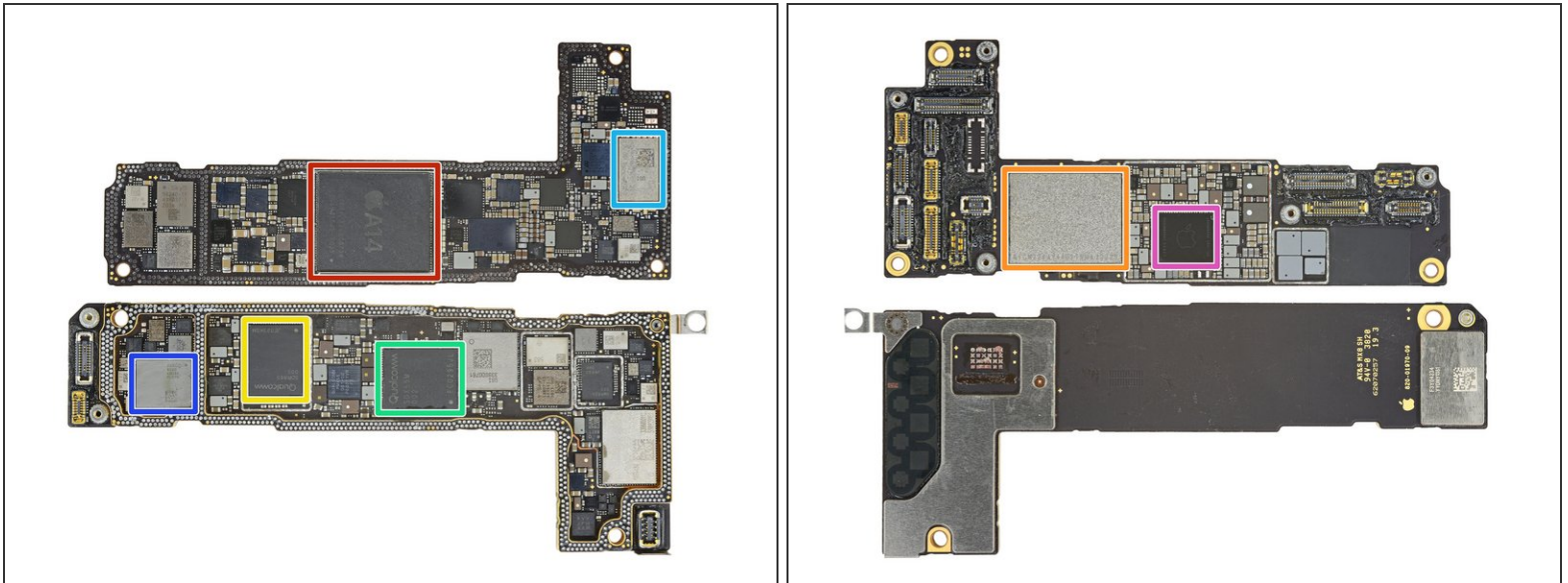
## Step 11



- With the battery jettisoned, we turn our attention to the brains of the operation.
- We disconnect many many cables from the logic board, and fortunately it's only pinned down by three screws on both units. Our Marlin driver moves in for the final stroke.



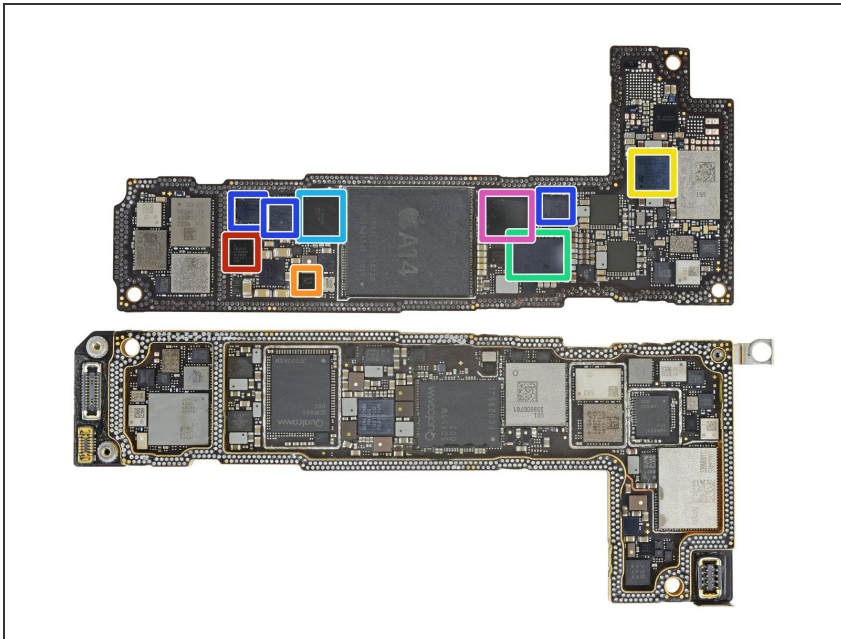
## Step 12



- A little heat (a lot of heat) and a little prying yields two boards for the price of one! We split one of the iPhone 12 boards open to get a look at all that sweet silicon, and if it seems hard to guess which one, you're not alone—the logic boards of the 12 and 12 Pro are nearly identical, apart from a few serial numbers.
- Apple APL1W01 A14 Bionic SoC, layered under Micron D9XMR MT53D512M64D4UA-046 XT:F 4 GB LPDDR4 SDRAM (6 GB RAM on the 12 Pro)
- KICM224AY4402TWNA12029, 64 GB of [Kioxia NAND flash](#) memory.
- Qualcomm [SDR865](#) 5G and LTE transceiver
- Qualcomm [SDX55M](#) 5G modem-RF system and SMR526 intermediate frequency IC
- USI/Apple [U1](#) ultra-wideband chip
- Avago AFEM-8200 high/mid power amplifier with integrated duplexer
- Apple APL1094 343S00437 power management IC

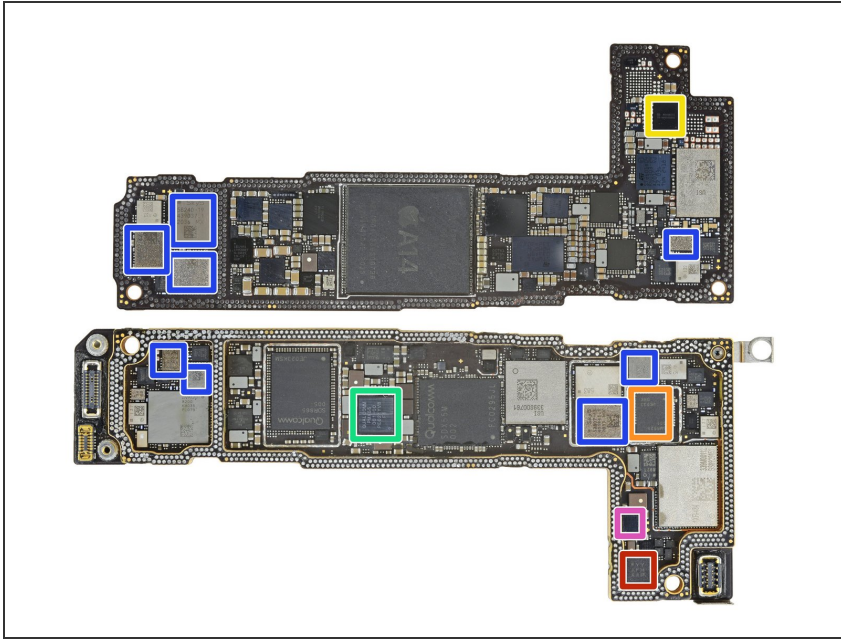


## Step 13



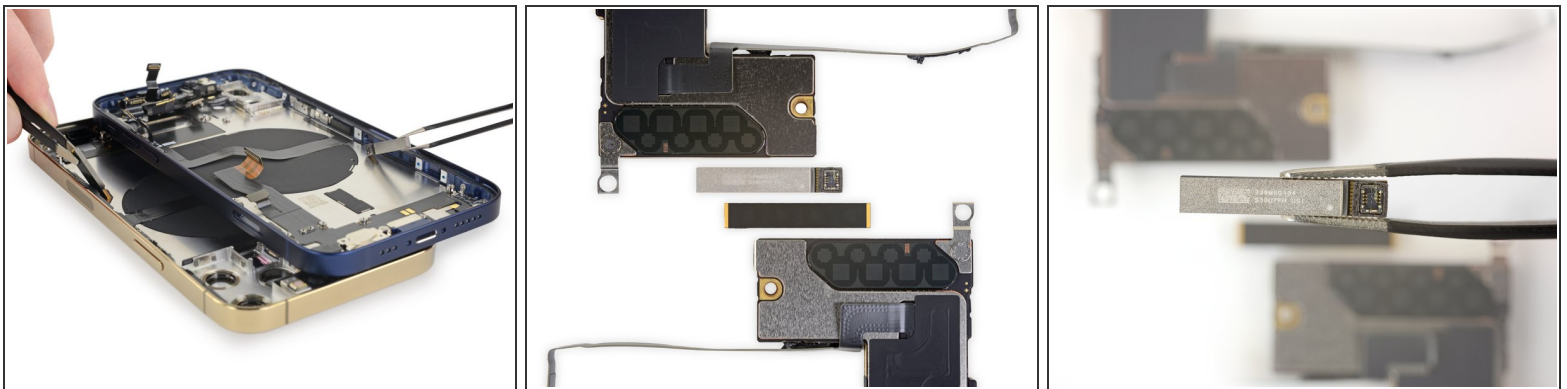
- Thanks to our awesome community, here is IC Identification, Pt. 2:
  - NXP Semiconductor CBTL1614A1 display port multiplexer
  - Texas Instruments SN61280 camera power management
  - STMicroelectronics STB601A04 power management
  - STMicroelectronics STWPA1-3033ABM wireless charging IC
  - Texas Instruments SN2611A0 battery charging IC
  - Apple/Cirrus Logic 338S00537 mono audio amplifier
  - Apple/Cirrus Logic 338S00565 ? audio codec

## Step 14



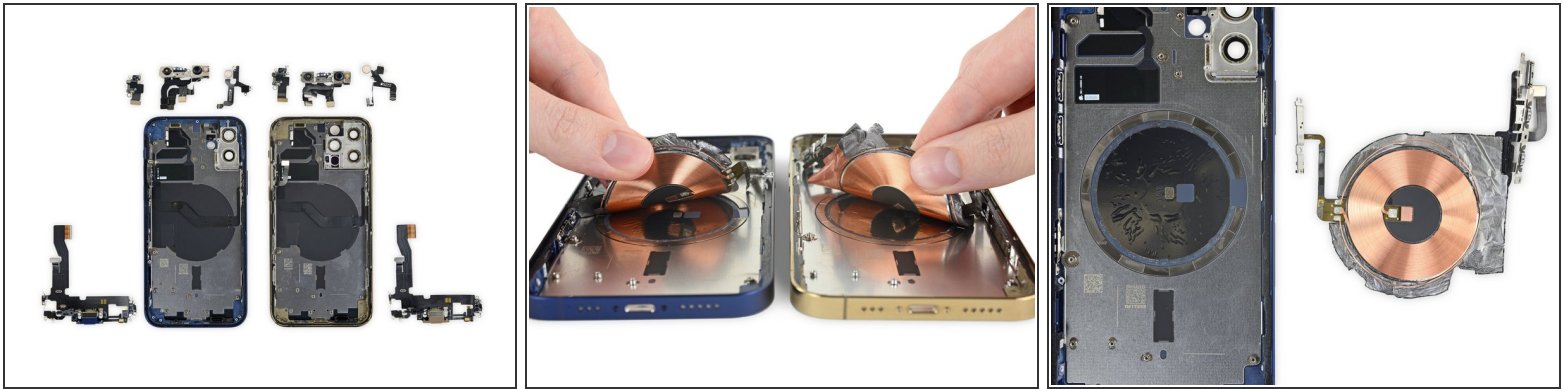
- IC Identification
  - Bosch Sensortec unknown accelerometer
  - Qualcomm SMR526 RF transceiver
  - Apple 338S00564 power management
  - Qualcomm PMX55 power management
  - Skyworks Sky5 RF module
  - Texas Instruments LM3637 LED driver (likely)

## Step 15



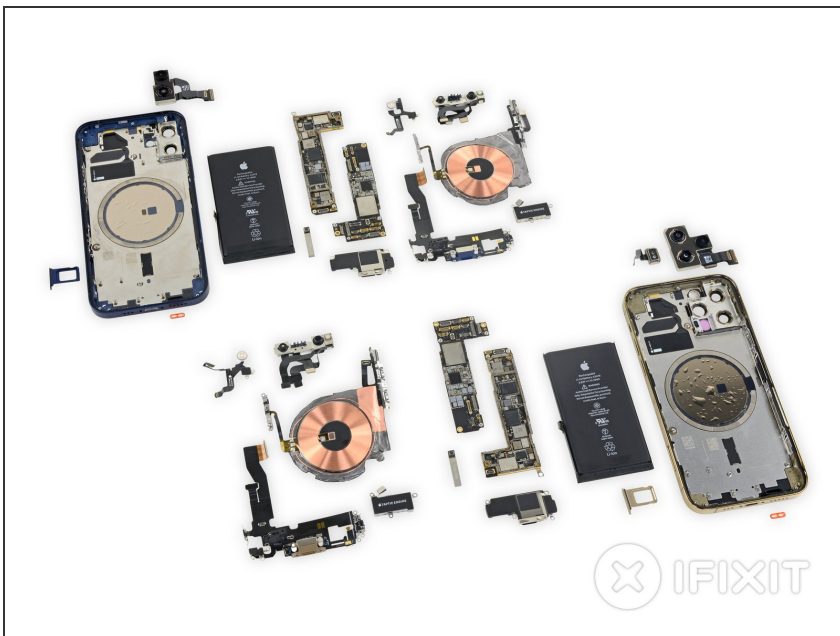
- Our US models come with some of these nifty 5G mmWave antenna modules—one embedded in the side of the frame, and another on the back of the logic board.
- ⓘ We think these have something to do with what Apple [spent so much time talking about](#) during their keynote?
- The antenna embedded in the frame is a USI product, labeled 339M00104 S30U7FH.

## Step 16



- We're getting down to the [bare necessities](#) with the Lightning connector assemblies, Face ID, flash modules, and more—most of which look to be identical across models, save for some slight ribbon cable detours.
- You didn't think we forgot about the miraculous MagSafe charging arrays, did you? The coils are nothing new, but those 18 magnets sure are.
- ❗ The [polarity of the magnets](#) seems to expand the effective placement of the phone while still enforcing proper alignment for charging efficiency.

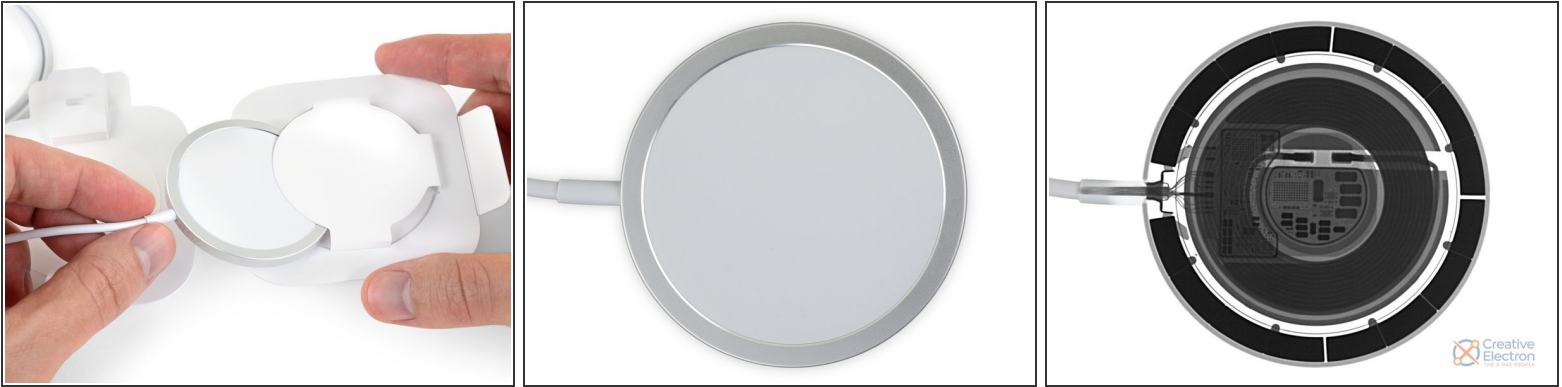
## Step 17



- mmWave goodbye, high 5Gs all around! This teardown is a wrap.
- It's shaping up to be a 5G world, and Apple's living in it. It seems like they made some serious compromises to make way for shiny new 5G components.

- The new battery is gaunt and relatively low-tech, no longer an elegant L. The logic board has ballooned in size, giving up the gains in miniaturization from recent years. The Taptic Engine seems smaller, and the speakers are a new shape—maybe not diminished, but different.
- It's odd to see such concessions to this nascent technology. Of all the possible Apple innovations, this feels the least inventive. But! At least Apple didn't give up their tried-and-true screen and battery repair procedures.
- 📌 That said, the iPhone 12's repairability score comes with a huge, ugly asterisk. We've laid out some troubling findings in a followup article: [Is This the End of the Repairable iPhone?](#)
- Before we score it though, there's one more thing.

## Step 18



- Hey look! We found something else to take apart.
  - Apple's new MagSafe charger doesn't come in the teeny tiny iPhone box (you have to give them more money for it), but we did make sure to order one for some... testing.
  - It's compatible with all iPhone models (and other devices) capable of Qi-flavored wireless charging. We have a different destiny in mind for ours, though.
- i** Here's our first peek inside—an X-ray view courtesy of [Creative Electron](#).
- This makes for a fun comparison with the *other* inductive charging puck Apple makes, for its Apple Watch. You can see a detailed breakdown of those internals [here](#).
  - One obvious difference is the dark ring of magnets around the exterior—that's right, there are corresponding magnets in *both* the charging puck and the new iPhones. The Apple Watch charger uses but a single magnet in the center.



## Step 19



- The only seam to be found is where the rubber meets the metal, making that the obvious entry point.
- Optimistically, we blast it with some heat in order to soften the adhesive which, presumably, holds this thing together. Then we attach two perfectly-fitting suction cups, one to either side, and start tug-of-warring.
- The white cover material on the charging surface starts to *stretch* slightly, but the actual gap doesn't budge. (Sometimes we're *too* optimistic.)
- So, under the knife it goes! Some persuasion from our razor knife gets us past the white cover, between the plastic and metal underneath, where we can start prying.



## Step 20



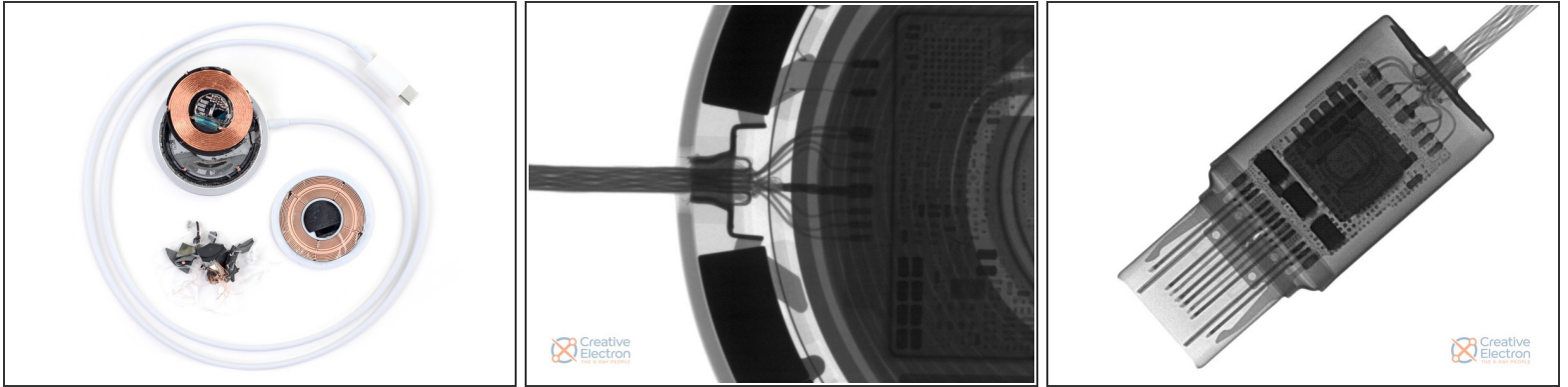
- Inside... charging coils!?!?! Who would have guessed!!
- On the underside of the white cover is an etched copper sticker, with traces corresponding to four leads spaced around the outside of the charging coil.

## Step 21



- Prying up the coils reveals the circuit board—alas, It's covered by a metal shield.
- With new iPhones on the horizon, there's no time for microsoldering today. We skip straight to the flush cutters to get through. The result isn't beautiful, but it's what we came for.
  - The little circuit board houses a chip labeled STWSPA1. This is likely a close cousin to STMicroelectronics' [STWBC-EP](#), their 15 W wireless charger IC.

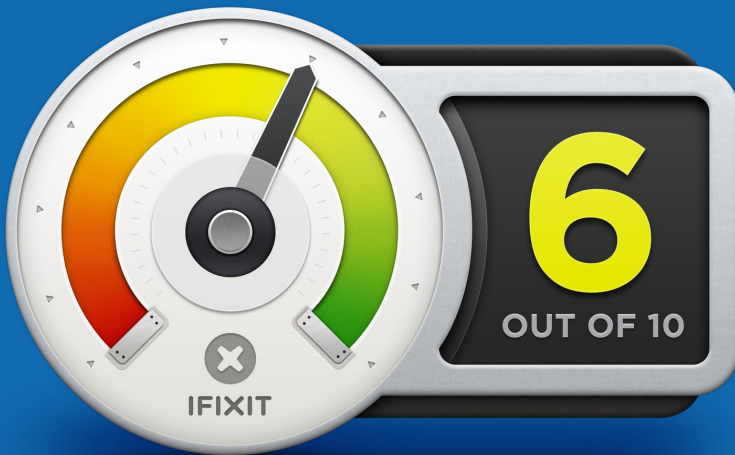
## Step 22



- Further disassembly might not yield much, but that's what X-rays are for. Here's a closeup of the strain relief at the cable attachment point, and a nice closeup of that USB-C connector.
  - If you're hungry for even more iPhone 12 content, check out our latest story: [How LiDAR Works, and Why It's in the iPhone 12 Pro](#)
- 📌 And when you're done with *that*, check out our [teardown of the iPhone 12 mini](#)!

## Step 23 — Final Thoughts

### REPAIRABILITY SCORE:



- The iPhones 12 and 12 Pro both earn a **6 out of 10** on our repairability scale (10 is the easiest to repair):
  - Display and battery replacements remain a priority in the new iPhones' design.
  - Most other important components are modular and easy to access or replace.
  - Liberal use of screws is preferable to glue—but you'll have to keep them all organized, and bring out your special drivers (pentalobe, tri-point, and standoff) in addition to the standard Phillips.
  - Increased waterproofing measures complicate some repairs, but make difficult water damage repairs less likely.
  - Glass on front and back doubles the likelihood of drop damage—and if the back glass breaks, you'll be removing *every* component and replacing the entire chassis.