



iPhone 12 mini Teardown

An exploratory teardown of the teeny tiny iPhone 12 mini. Performed on Friday the 13th of November, 2020.

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INTRODUCTION

The mini has landed! It's iPhone 12 teardown time —[again](#)—and while the phone may be small, this teardown is bigger than ever. It's so big, we had to split it into two parts! We even dished on all the chips and other 5G hardware differences between the US version and those sold to our friends in the EU. (Yes, we tore down both.)

Meanwhile, we're chasing a whale of a teardown week! Arm your harpoons and take a look at our [Xbox Series X teardown](#), a [side-by-side PlayStation 5/Xbox comparison](#), and oodles of [live video teardowns](#). And if even that's not quite big enough for you, check out the full [iPhone 12 Pro Max teardown](#).

Feeling overwhelmed by all the new tech? Fix what matters instead! We've put together a [list of our favorite gifts](#)—from our workshop to yours, to help you and your favorite fixer keep the repair spirit going strong. Want some more community spirit? Keep up on our [YouTube channel](#), [Instagram](#), or [Twitter](#) for all the latest inside-out adventures—or sign up for our [newsletter](#) and always be in-the-know.



TOOLS:

- [P2 Pentalobe Screwdriver iPhone](#) (1)
- [Heavy-Duty Suction Cups \(Pair\)](#) (1)
- [iFixit Opening Picks \(Set of 6\)](#) (1)
- [Tri-point Y000 Screwdriver](#) (1)
- [Phillips #00 Screwdriver](#) (1)
- [Standoff Screwdriver for iPhones](#) (1)
- [Tweezers](#) (1)
- [Spudger](#) (1)
- [Heat Gun](#) (1)

Step 1 — iPhone 12 mini Teardown



- Sometimes big specs come in small packages, and that's certainly the case here. We grabbed both the US and EU models so as not to miss anything:
 - A14 Bionic with fourth-generation Neural Engine
 - 5.4 inch (2340 × 1080 pixels) Super Retina XDR OLED display with True Tone and HDR
 - Dual 12 MP camera system with ultra-wide angle ($f/2.4$) and wide angle ($f/1.6$) cameras
 - 64, 128, or 256 GB of storage
 - 5G (sub-6 GHz and mmWave) connectivity, plus 4x4 MIMO LTE, 802.11ax Wi-Fi 6, Bluetooth 5.0, and ultra-wide band (UWB)
 - MagSafe 12 W wireless charging
 - IP68 rating, water resistant to a depth of 6 meters for up to 30 minutes

Step 2



- iPhones are fully onboard the "normal is big, and big is *really* big" train—despite [continued calls](#) for a return to the wee phones of yore.
 - ❗ Since we tear down phones regardless of size, here's a sampler plate of iPhone, in all different sizes. From left to right: [iPhone 4](#), [SE 2020](#), 12 mini, [12](#), and 12 Pro Max.
- Unfortunately, a return to a (slightly) smaller size doesn't mean a return of our friend the headphone jack. RIP to an OG.
- The iPhone 12 mini does bring an interesting new feature: increased grille asymmetry (presumably to Jony Ive's chagrin). It appears that the smaller phone needs a little more space for that antenna band.
- [As is the case for the other iPhones 12](#), a small mmWave window on the side marks the US models, while the EU's feature some regulatory tribal tattoos.

Step 3



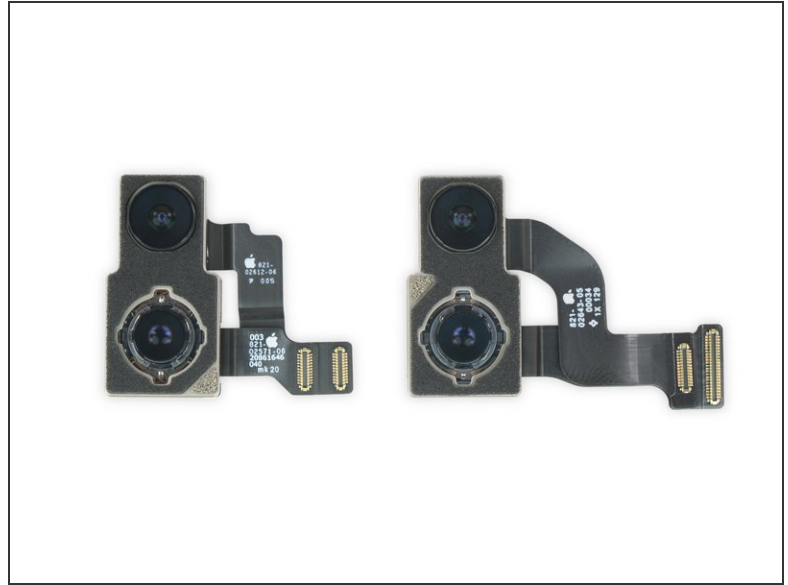
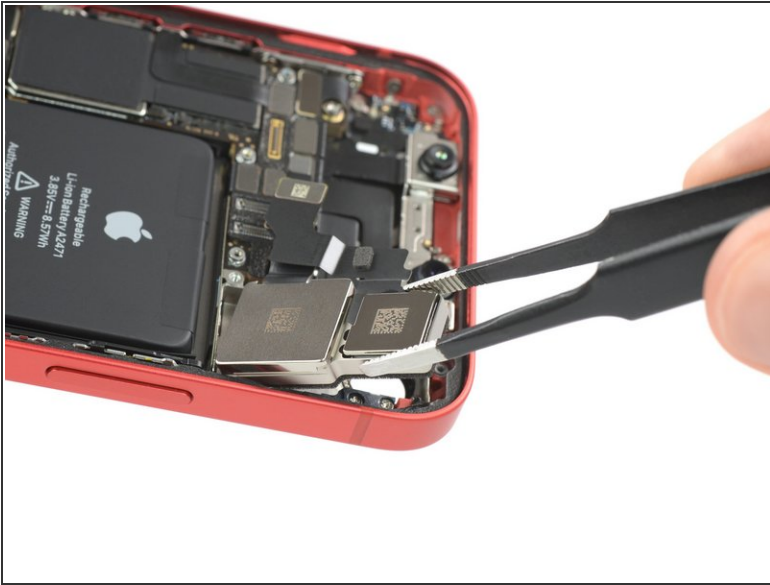
- iPhone design may change over the years, but the Pentalobe screws remain the same. Good thing our toolkits have all the bits you'll need.
 - ★ Hang on a sec ... that toolkit looks awfully *mini*. Could a cute, pocketable toolkit soon be [on its way](#) from our workshop?
- Like its siblings, the iPhone 12 mini's display is held down by some tough adhesive. It's no match for some heat and the big ~~guns~~ [suction cups](#).
- With the Pentalobe screws gone and the adhesive sliced, the display opens in the same lefty-loosey manner we've seen in the [iPhone 12 and 12 Pro](#).

Step 4



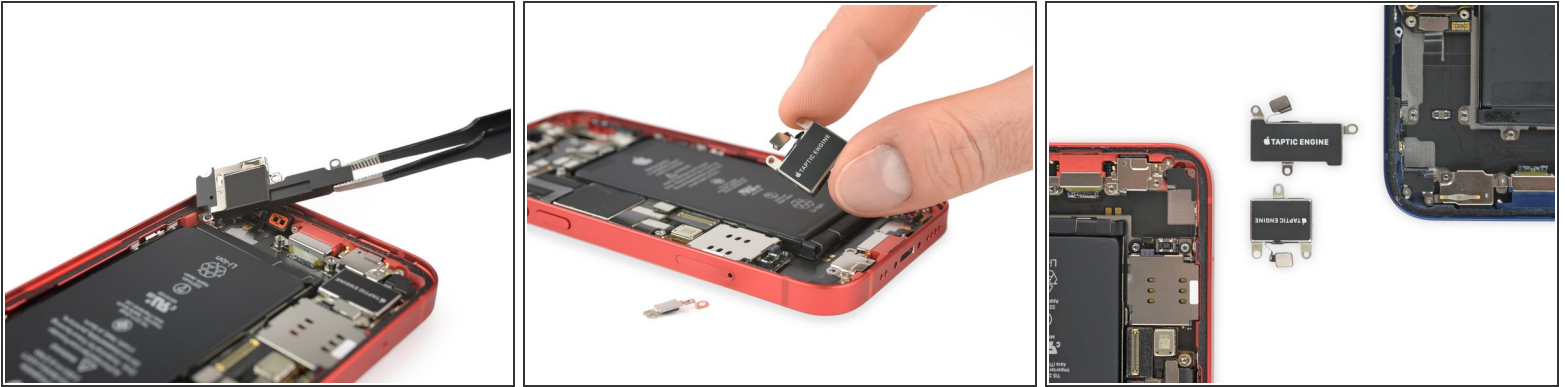
- Alright, we're done with "Operation"—who wants to play a little "I spy"? Compared to the [regular 12](#) we see:
 - Two display cables instead of three
 - A miniaturized battery, Taptic Engine, and loudspeaker
 - Some migrated display silicon
- The upper sensor assembly, containing the speaker, Face ID, and sensors also got a rework to fit its slightly smaller home.
- ⓘ This smaller non-pro iPhone punches well above its weight in the display department. It's got a 5.4 inch 2340 x 1080 OLED screen, topped with Apple's Ceramic Shield glass.

Step 5



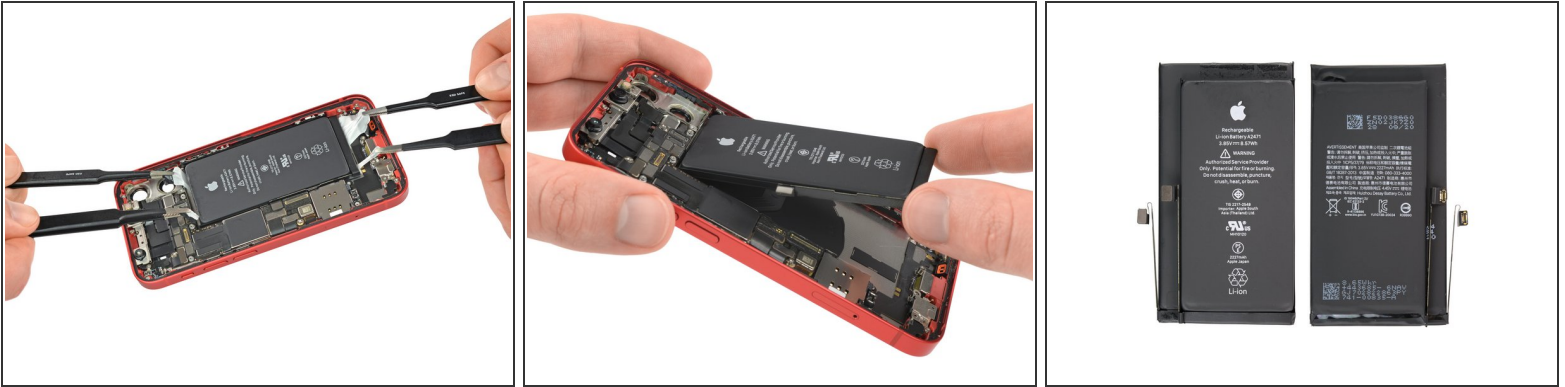
- This is the first time we've seen "más" cameras in a "menos" iPhone. It's impressive to see, especially if no corners were cut in the process.
- ⓘ No [plastic spacers](#) here—it *sort of* made sense to see that in the larger iPhone 12, but space is at even more of a premium in the mini. There just isn't a square to spare.
- The mini camera (left) has the same $f/1.6$ wide-angle and $f/2.4$ ultra wide-angle cameras found in the [regular iPhone 12](#) (right). The wide-angle module also features optical image stabilization (OIS)—and we have the X-rays to prove it!
- ⓘ We're impressed by the additional camera in this small-bodied phone, but it *may* have come at the expense of the already paltry battery life. Hard to stay mad at this li'l guy, though.
- ✦ One spot of good news: camera replacements perform perfectly in our tests. So far, there's no sign that the mini shares the regular iPhone 12's [problematic camera repair situation](#).

Step 6



- Removing the speaker reveals [the 12-series-standard](#) (and festive) orange ingress-prevention gasket.
- Considering the [already shrunken](#) Taptic Engines, we're surprised to see an even shrimpier one in this mini.
 - This tiny Taptic Engine measures 15.14 mm x 10.9 mm x 3.44 mm—25% smaller than the motor in the 12 and 12 Pro.
 - Taking advantage of that "extra" space: a beefier cable and socket.
- ⓘ We [had suggested](#) there *might* have been enough space for a headphone jack in the 12 and 12 Pro—no such luck for the mini. The Taptic Engine and speaker fit much more snugly here.

Step 7



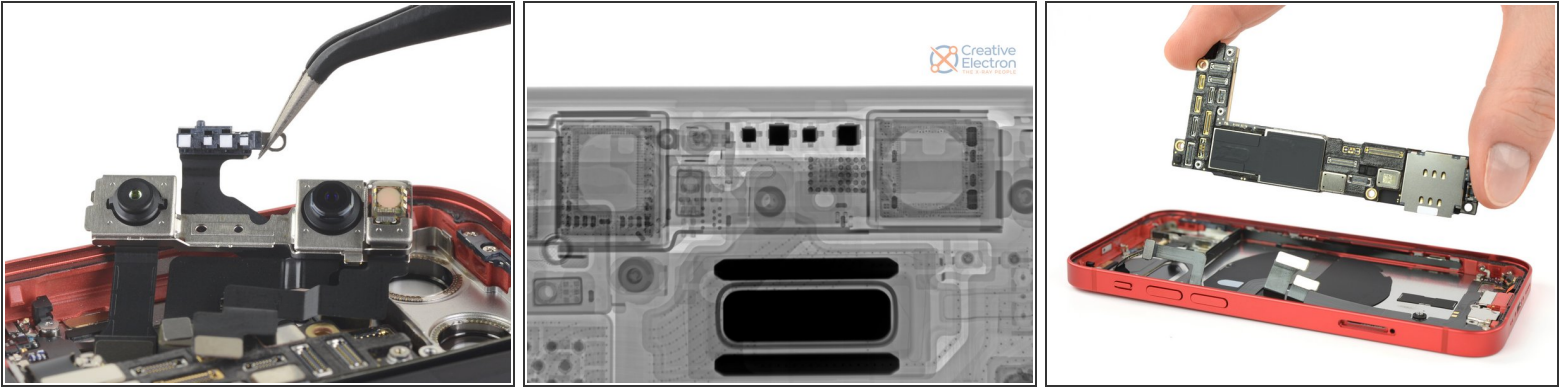
- Grab your tweezers and pull! These standard stretch release tabs are mighty big compared to their petite home, but we've got the muscle for this mini.
- This mini battery packs a surprising 8.57 Wh. That's more juice than the [iPhone SE 2020's](#) 6.96 Wh, but understandably short of the 10.78 Wh of the [standard 12](#) it's stacked on top of.
- While its three bigger siblings offer 15 W wireless charging, the mini sips up juice at a slightly less thirsty 12 W.
- ☑ That said, all four phones pump their batteries up with 20 W fast charging when plugged in. Wireless charging is [never the ideal choice](#).
- ⓘ While the battery connectors are the same as the iPhone 12 Pro Max, the Pro Max battery is a *little* bit [too much for the mini to handle](#).

Step 8



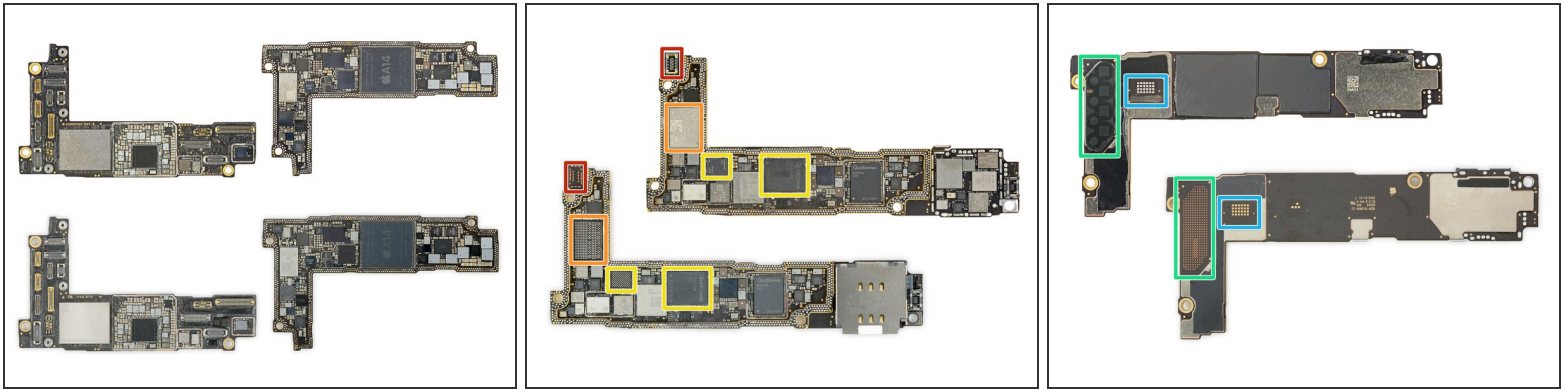
- We're back after a much needed [catnap](#)! But superheroes never sleep—and [Creative Electron](#) has saved the day with this neat X-ray.
- What can we learn? As usual, the dark bits are the dense, often magnetic parts of the phone, namely:
 - OIS magnets on the lower camera, earpiece, and loudspeakers, as well as the teeny Taptic Engine.
- Perhaps most interestingly, we see the MagSafe ring has been *miniaturized* ... kinda.
 - ❗ The standard MagSafe circumference doesn't quite fit in this pint-sized phone, so the right and left edges of the circle have been lopped off.
- But what are those dense spots in the upper sensor array? Time to investigate.

Step 9



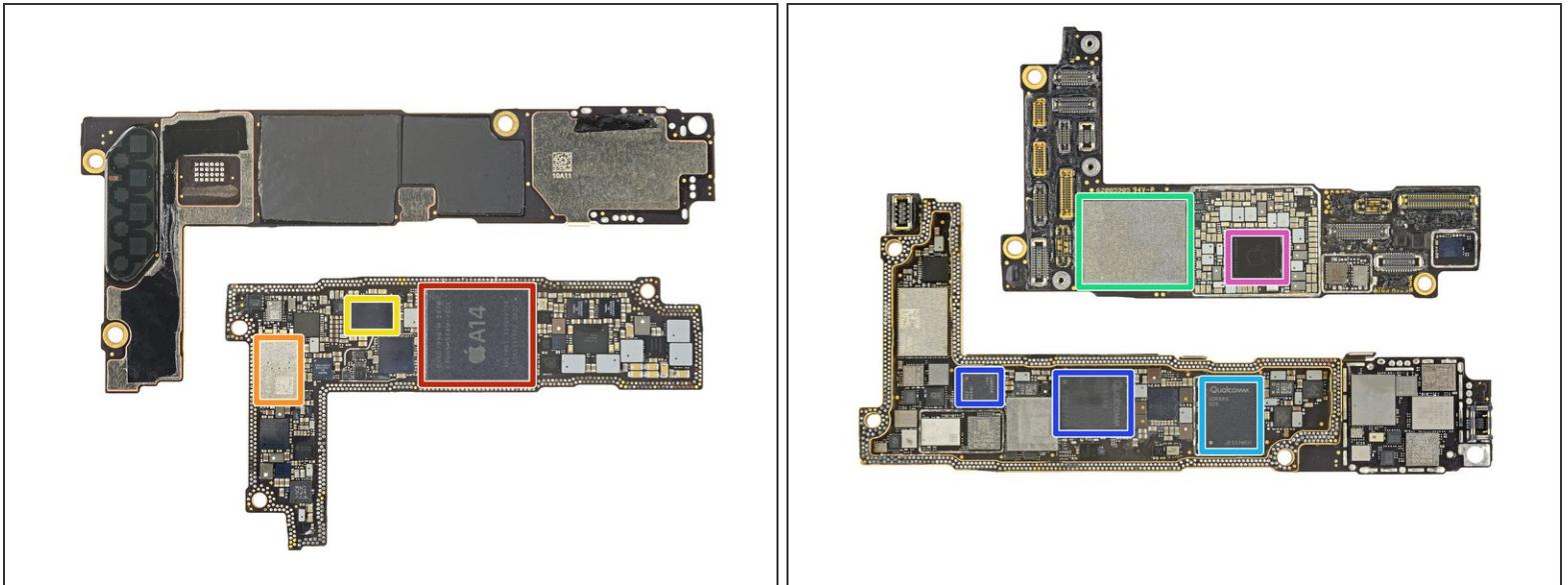
- The US *face-facing* cameras are once again packing a little something extra where the [EU edition](#) was bare.
 - ★ We saw these mysterious squares during our [iPhone 12 teardowns](#). They live in a snug little space between the Face ID camera modules, roughly where you might expect to find an older iPhone's [ambient light sensor](#).
 - Their absence in the EU iPhone may suggest this is a third mmWave antenna of some sort (although it doesn't look like any mmWave antenna we're familiar with). We tried blasting it with X-rays, but it refused to talk.
 - It makes you wonder whether someone at Apple earned their paycheck for the year miniaturizing the ambient light sensor even further to free up this space. [Where'd it go?](#)
 - ⓘ The logic board comes out from its new home along the left edge, as in its [fellow 12ers](#), clearing space for the beefy rear-facing cameras on the right.
- ⚠ The US board has a mmWave antenna flex cable soldered to its underside (which we de-soldered off-stage). US fixers, beware—don't try to yank the board out!

Step 10



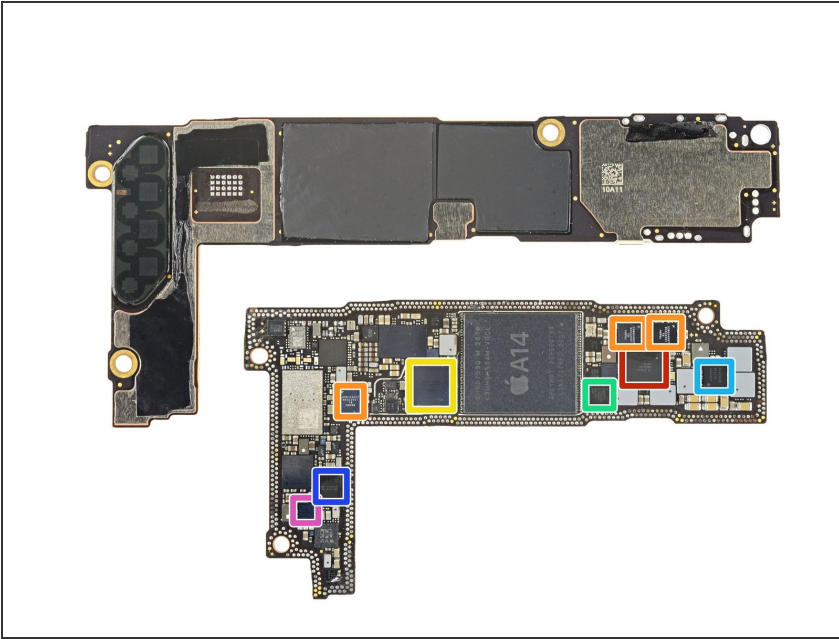
- Let's check out these logic board [sandwiches](#). For reference, the US version is on top in these images, EU below. (Don't read into it—that's just how the chips fell.)
- First, the similarities—the US and EU *upper* sections are identical and have the same spread of chips on both sides.
- The *lower* sections are a bit more interesting. (Note: SIM readers are the same, but we only desoldered it from the US version.) Here's where the US board starts accommodating all that mmWave tech:
 - An extra socket, which connects to the front mmWave antenna mentioned in the previous step
 - A Murata 1XR-482 mmWave front-end module
 - A Qualcomm SMR526 intermediate frequency IC, working in conjunction with Qualcomm's SDX55M 5G modem
 - One more mmWave antenna right on the board
 - A flex cable soldered to this patch, which connects to the side edge mmWave antenna

Step 11



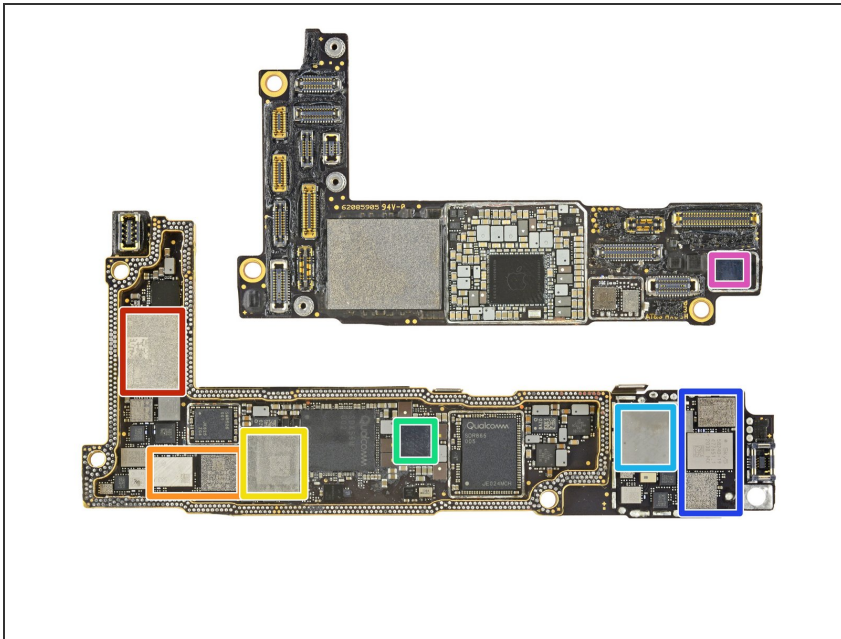
- After learning the finer points of US vs. EU *sandwicherie*, let's tuck into the (mostly familiar) US silicon layers:
 - Apple APL1W01 A14 Bionic SoC with Micron MT53D512M64D4UA-046 XT:F 4 GB LPDDR4 SDRAM layered over it (same as the [iPhone 12/12 Pro](#))
 - [1UED](#), most likely a [U1](#) ultra-wideband chip similar to the USI chip in other iPhones
 - STMicroelectronics STWPA1-3033ABM wireless charging IC, possibly something similar to their [STWBC-EP](#) chip
 - KIC M224 BE0408 TWNA 12031, 64 GB of [Kioxia NAND flash](#) memory
 - Qualcomm [SDR865](#) 5G and LTE transceiver
 - Qualcomm [SDX55M](#) 5G modem-RF system and SMR526 intermediate frequency IC
 - Apple APL1094 power management IC

Step 12



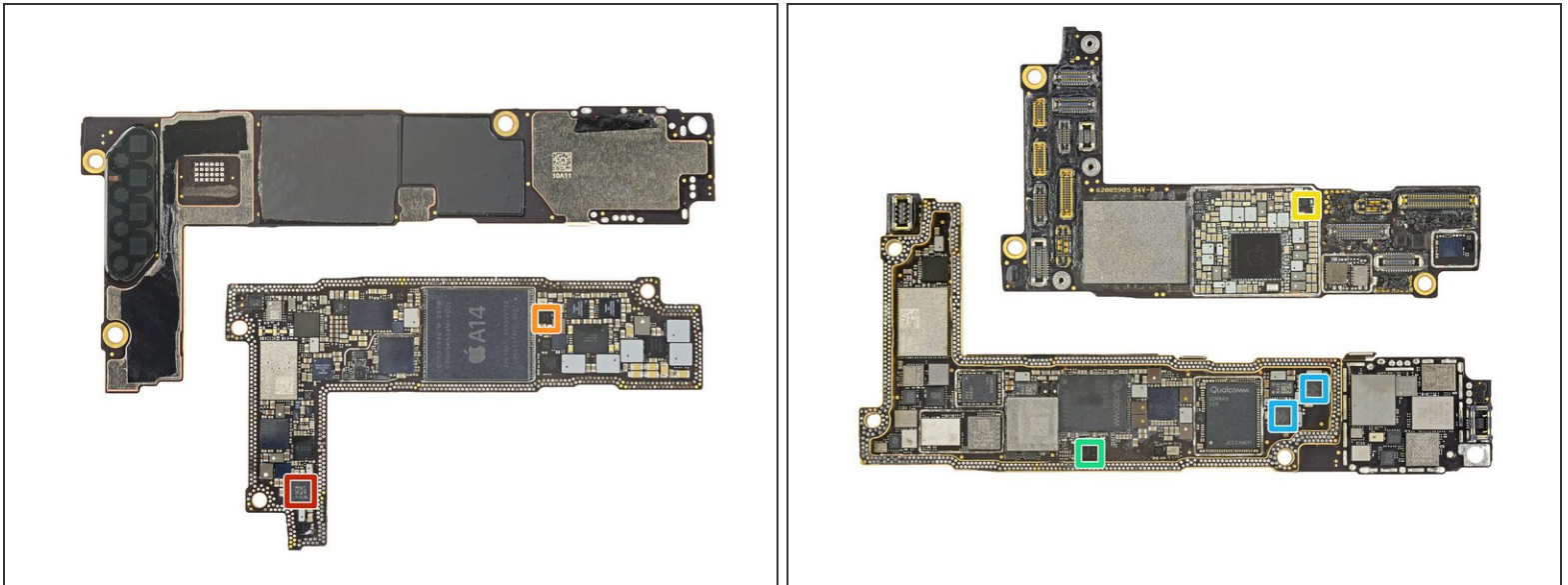
- Processor PCB IC identification continued:
- Texas Instruments SN2611A0 Li-Ion Battery Charger
- Apple/Cirrus Logic 338S00537 Mono Audio Amplifier
- Apple/Cirrus Logic Unknown Audio Codec
- NXP Semiconductor CBTL1614A1 Display Port Multiplexer
- Samsung S2DOS24 Display Power Management
- Apple 338S00564-B0 ? Power Management
- Texas Instruments LM3562A1 LED Driver

Step 13



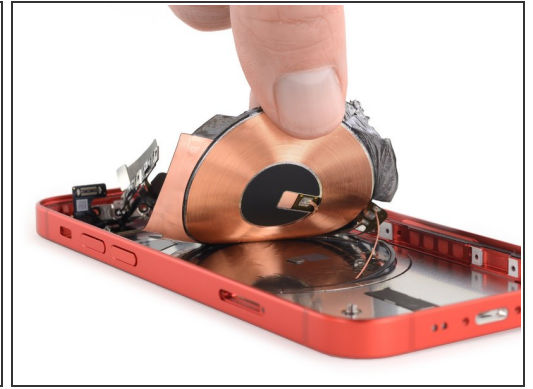
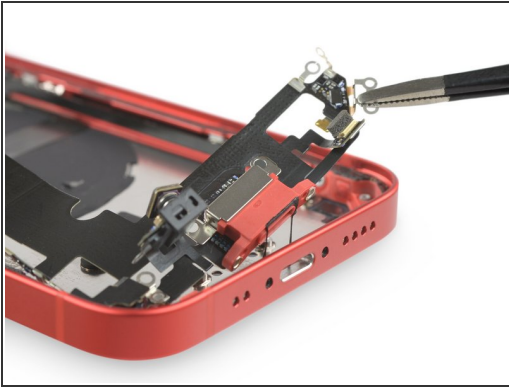
- And a little more US silicon:
 - Murata 1XR-482 mmWave front-end module
 - Murata 583 and Skyworks 53807 diversity receive modules
 - USI 339S00761 WLAN / Bluetooth module
 - Qualcomm PMX55 power management IC
 - Avago 8200 high/mid-band power amplifier with integrated duplexer
 - Skyworks 5824x power amplifiers
 - Broadcom BCM15960A0

Step 14



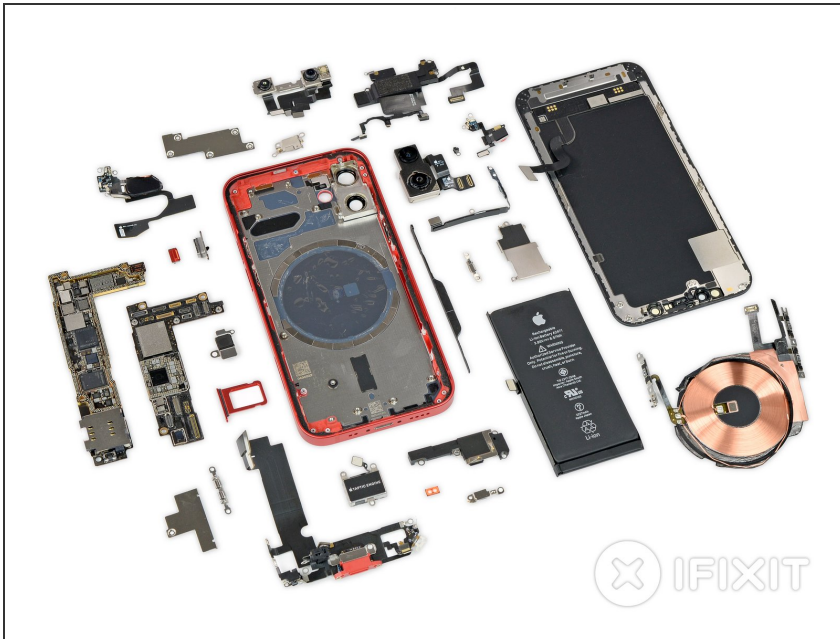
- IC identification, continued:
 - Bosch Sensortec unknown accelerometer
 - Texas Instruments SN61280 li-ion battery DC-DC converter
 - Maxim Integrated MAX8510 120 mA LDO regulator
 - STMicroelectronics ST33JZ90 secure microcontroller
 - Qualcomm QET5100 envelope tracker

Step 15



- Like the day after Thanksgiving, we pick from the leftovers sitting in the fridge case.
 - We pilfer some ribbon cables, antennas, microphones, the flash module, and the Lightning connector.
- Emulating its larger brethren, the last component that comes up is [the MagSafe coil & button assembly](#).
- ❗ Perhaps unsurprisingly, the mini is *too* mini for some upright wireless chargers, coming in [just short of the coils lining up](#).

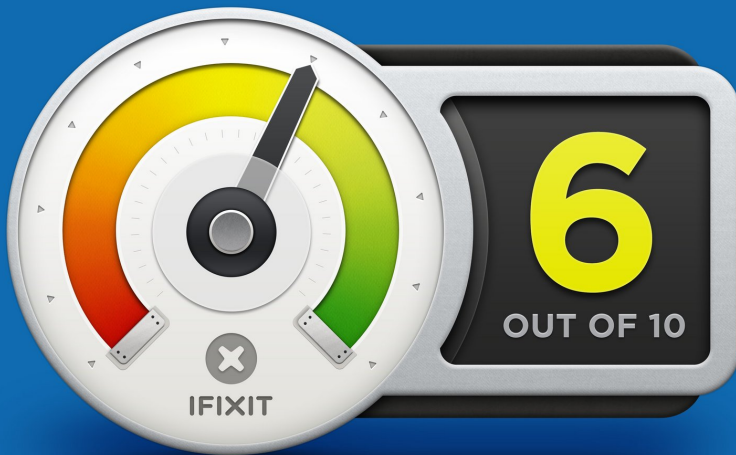
Step 16



- The iPhone 12 mini is a small phone with big ambitions. We're surprised by how familiar the internals look compared to other iPhones this year, given the differences in size among them.
- Miniaturizing components like the speaker and Taptic Engine conserves some space, but battery capacity still takes an unfortunate hit.
- ❗ What lies at the opposite end of the iPhone-size spectrum? Stay tuned for our iPhone 12 Pro Max teardown, coming soon—or check out the [livestream](#) for a sneak peek.
- Last but not least, does the mini manage to score big on our repairability scale? Keep scrolling to find out.

Step 17 — Final Thoughts

REPAIRABILITY SCORE:



- The iPhone 12 mini earns a **6 out of 10** on our repairability scale (10 is the easiest to repair):
 - The two most common smartphone repairs—display and battery—are well-prioritized here.
 - Most major components are modular enough to be accessed/replaced independently.
 - Specialized screws complicate repairs, but remain preferable to overuse of glue.
 - Waterproofing measures make many repairs more difficult, but safeguard against (extremely difficult) water damage repairs.
 - Glass covering the rear housing is fragile and impractical to replace—a single drop could necessitate replacing the entire body of the iPhone.