



iPhone 7 Plus Teardown

Teardown of the iPhone 7 Plus performed on Friday, September 16, 2016 in Tokyo, Japan.

Written By: Andrew Optimus Goldheart



INTRODUCTION

Since Apple's announcement day, we've been anxiously awaiting the chance to delve into their latest and greatest tech. Today, we're kicking off our teardown trifecta with the iDevice that boasts both the greatest surface area and the highest number of cameras: the iPhone 7 Plus.

Looking for even more teardown action? Check out our [Apple Watch Series 2 teardown](#) for the first look at the cutting edge of wearable tech.

Our teardown trio is just getting started. Follow along on [Facebook](#), [Instagram](#), or [Twitter](#) for the latest news from the repair world.

[video: https://www.youtube.com/watch?v=0s_zg4_DZp8]



TOOLS:

- [64 Bit Driver Kit](#) (1)
with Y00 tri-point bit
 - [iSclack](#) (1)
 - [P2 Pentalobe Screwdriver iPhone](#) (1)
 - [Phillips #000 Screwdriver](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Spudger](#) (1)
-

Step 1 — iPhone 7 Plus Teardown



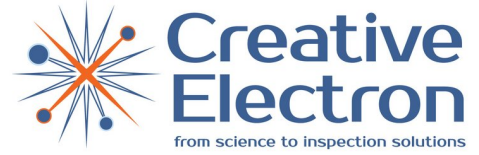
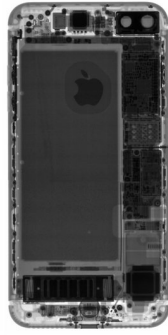
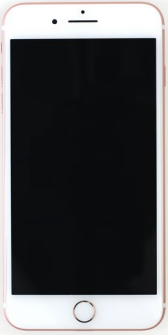
- There's a lot to learn about what's hidden inside the "best, most advanced iPhone ever"—but first, let's take a moment to review what we already know:
 - Apple A10 Fusion processor with embedded M10 motion coprocessor
 - 32, 128, and 256 GB onboard storage capacity (jet black model not available in 32 GB)
 - 5.5-inch multitouch IPS Retina HD display with 1920 × 1080 pixels (401 ppi)
 - Dual 12 MP wide-angle and telephoto cameras with $f/1.8$ and $f/2.8$ apertures (respectively), 2x optical zoom, and 10x digital zoom
 - 7 MP FaceTime HD camera with $f/2.2$ aperture and 1080p HD recording capability
 - Solid-state Home button with Touch ID, driven by new Taptic Engine
 - 802.11a/b/g/n/ac Wi-Fi + MIMO Bluetooth 4.2 + NFC

Step 2



- The dimensions of the iPhone 7 Plus are identical to those of its predecessor, at 158.2 mm × 77.9 mm × 7.3 mm—and yet it's slightly lighter, at 6.63 oz (vs. the 6s Plus at 6.77 oz). Hopefully Apple didn't remove anything important.
- The 7 Plus is also stamped with a new model number: A1785.
- For those more inclined to the dark side, Apple is now offering matte black and [scratchable](#) jet black versions of the iPhone 7 Plus, in addition to the already available silver, gold, and rose gold colors.
- The 7 Plus also drops some of those [unsightly antenna lines](#) of old, in favor of a more subtle appearance.
- Perhaps the most noticeable difference is the [Lightning to 3.5 mm headphone jack adapter](#) included in the box. It's going to take some [courage](#) for us to move on from the headphone jack. Sorry baby adapter. It's not you, it's us.

Step 3



- Before we dig into this three-eyed monster, we indulge ourselves with a sneak peek thanks to our friends at [Creative Electron](#).
- ❗ Stay tuned for more views of the new iPhone's internals courtesy of our X-ray X-perts!
- What advantage does the superpower of X-ray vision grant?
- For starters, we can see that the headphone jack got kicked out to make space for more Taptic Engine.
- Closer inspection shows a new, second lower speaker grille that leads... nowhere? Interesting.
- We can also see the new third eye in the camera array of the iPhone 7 Plus. What wisdom and vision does it hold? Let's find out!

Step 4



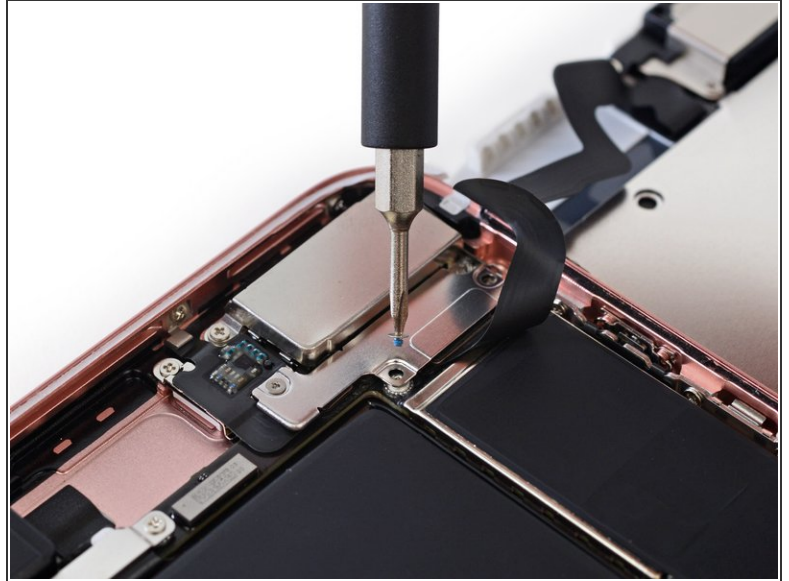
- Apple may have gotten rid of the headphone jack, but clearly stays loyal to the Pentalobe. Two now-familiar screws guard each side of the Lightning connector.
- Eager to see past the rose gold exterior, we perform some forceful [iSclack](#)-ing and a *great deal* of prying to get past the intense adhesive.
- ① The adhesive strip sealing the 7 Plus is considerably stronger than the strip we found in [its predecessor](#). Could this be our first sign of waterproofing?

Step 5



- What is this madness? The 7 Plus bizarrely opens to the side, despite the familiar clips at the top of the phone that help align the display as in previous models.
- We got lucky and didn't rip the display cables along the middle-right side. Thankfully, the top cable has some slack.
- ① Subtle design changes like this are where repair guides come in handy.
- Opening the 7 Plus reveals lots of black and white gooeey adhesives running along the perimeter of the phone.
- ① Our bet is that this penguin-themed stickiness is part of Apple's efforts to add water resistance. Then again, Apple's engineers might just really love glue.

Step 6



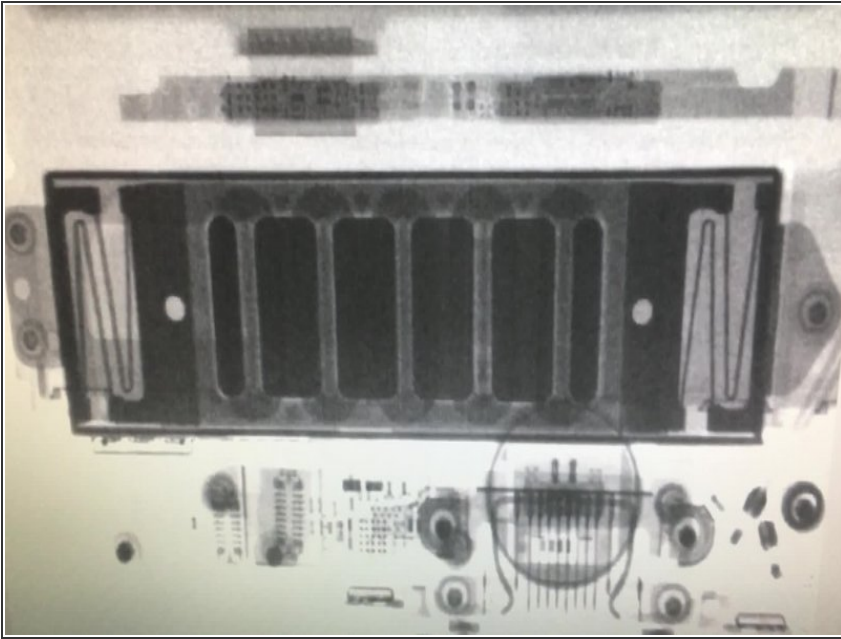
- Inside we find an army of *courageous* [tri-point](#) screws guarding the cable bracket that covers the battery connector and two of the display cables.
- ❗ A year ago we went out on a limb and added the Apple watch screw to our [64-bit toolkit](#). Boy, what a good thing we did.
- A second platoon of tri-points secure the bracket for the long and springy upper component display cable.
- ❗ Tri-point screws are uncommon. While you could make the argument that tri-point screws are less likely to strip, we assume if it was a choice of mechanical advantage, we'd see them throughout iDevices. It's pretty clear that they are here to simply hinder the two most common user repairs: battery and screen replacements.
- We dispatch our own ~~weaponry~~ screwdriver and force the bracket to surrender so we can continue our mission into the heart of the iPhone 7 Plus.

Step 7



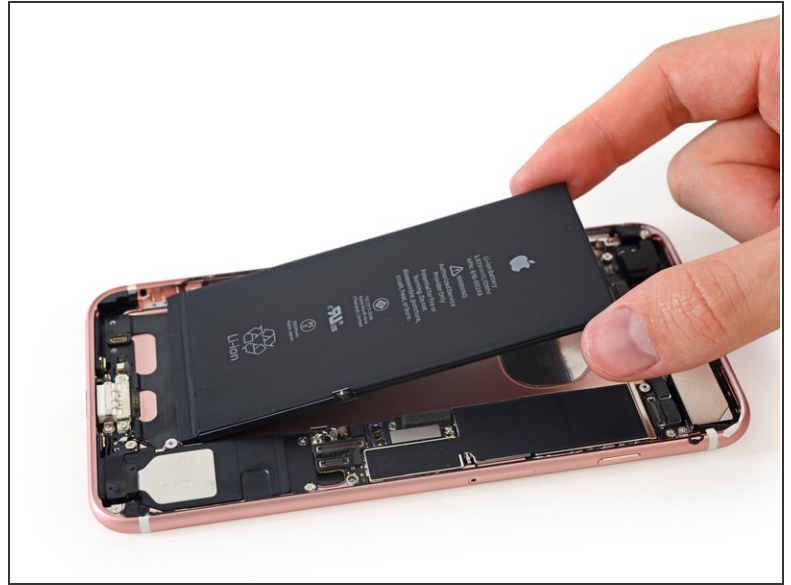
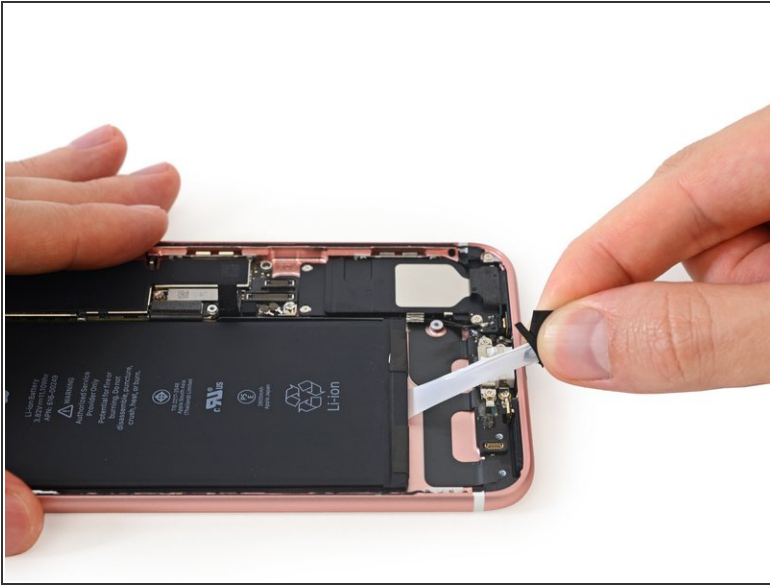
- In place of the headphone jack, we find a component that seems to channel sound from outside the phone into the microphone... or from the Taptic Engine out.
 - ⓘ No fancy electronics here, just some well-designed acoustics and molded plastic.
- **Teardown Update:** [According to Apple](#), this plastic component is a barometric vent. With the added ingress protection afforded by the watertight seal, the iPhone uses this baffle to equalize the internal and atmospheric pressures in order to have an accurate altimeter.
- Mechanical buttons are a thing of the past when you have a Taptic Engine! This sleek engine uses [haptic feedback](#) to simulate the push of a button, without having a real button.
 - ⓘ Anyone familiar with the touchpad in the [Retina MacBook 2015](#) has already experienced haptics from the Taptic Engine.

Step 8



- What do you do when things get shaky? You X-ray everything that moves. And that is exactly what we did with the Taptic Engine.
- "Taptic Engine" sounds like something found on an [intergalactic warship](#). In truth, we really are just working with a tiny [linear actuator](#) and some zig-zag springs that shake a weighted core.
- To be fair, this *is* the largest piece of mechanical machinery that we've seen in a smartphone.
- The Taptic Engine translates the pressure on the new solid state home button into finely controlled vibrations.
- We all love the sensation of clicking a button. The Taptic Engine's precise oscillation is designed to provide many types of tactile feedback, including the sensation of pressing a mechanical button.
- ⓘ Why not just use a regular button with a haptic addition like the [iPhone 6s](#)? Well, one less button is one less place for water to sneak in.

Step 9



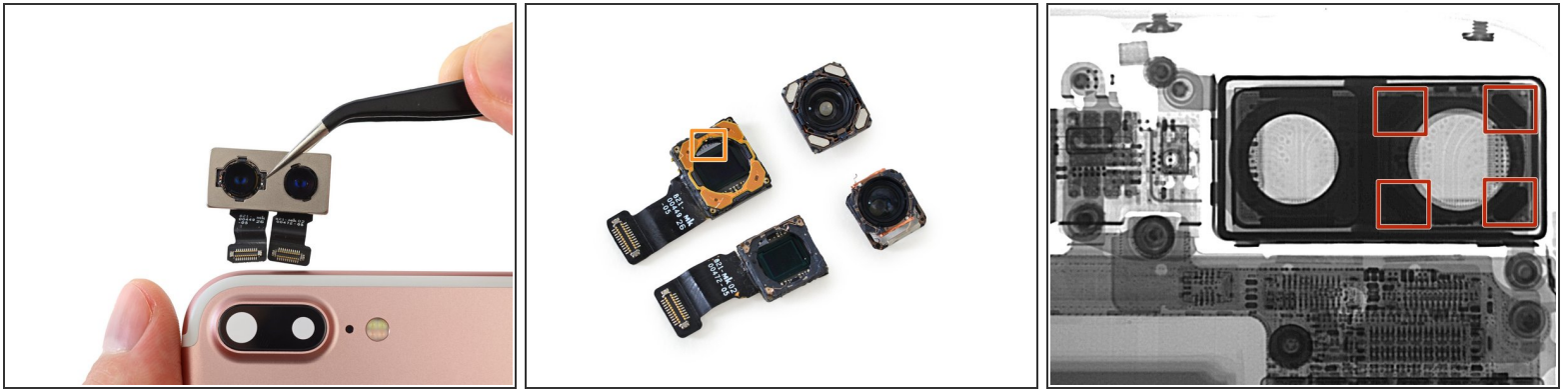
- We're glad to see Apple sticking with the [tradition](#) of including pull tabs for the battery adhesive.
- It's time for some battery yoga. We stretch each of the three adhesive pull tabs to release the battery and our tensions about difficult battery removal.

Step 10



- And here's the big bad battery itself!
- The battery is rated at 3.82 V and 2900 mAh, for a total of 11.1 Wh, a slight upgrade over the 10.45 Wh (3.8 V, 2750 mAh) of the [6s Plus](#), and on par with the 11.1 Wh, 2915 mAh cell found in the [6 Plus](#).
- ⓘ Apple claims battery life will be up to one hour longer than the 6s Plus—that is, 21 hours of 3G talk time, approximately 15 hours of Wi-Fi internet use, or up to 16 days on standby.

Step 11



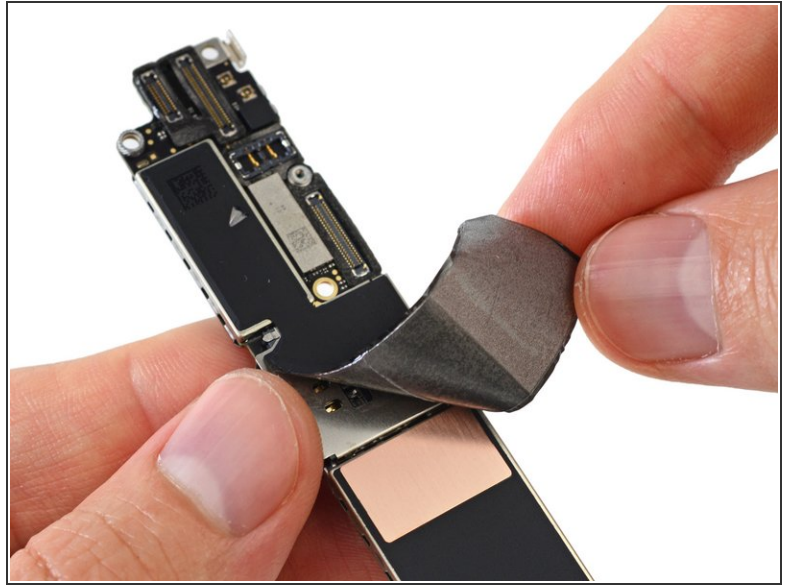
- Apple's got us seeing double as we pull out the camera array with two separate sensors, two lenses, and two little connectors.
- The two 12 MP cameras—one wide-angle with Optical Image Stabilization (OIS), just like in the iPhone 7, the second a telephoto—allow for optical zoom.
- Both cameras also sport a new image sensor that Apple claims is 60% faster and 30% more energy efficient than previous iPhones.
- ① The upgraded cameras almost make it worth the bigger exterior camera bump—now built into the chassis in another suspected waterproofing/dust-fighting tactic.
- We use our X-ray vision to initiate a staring contest with the camera array. Without blinking, we can see four metal pads around one camera. We're guessing these are the magnets that enable OIS.
- Analog Devices AD5842 OIS driver

Step 12



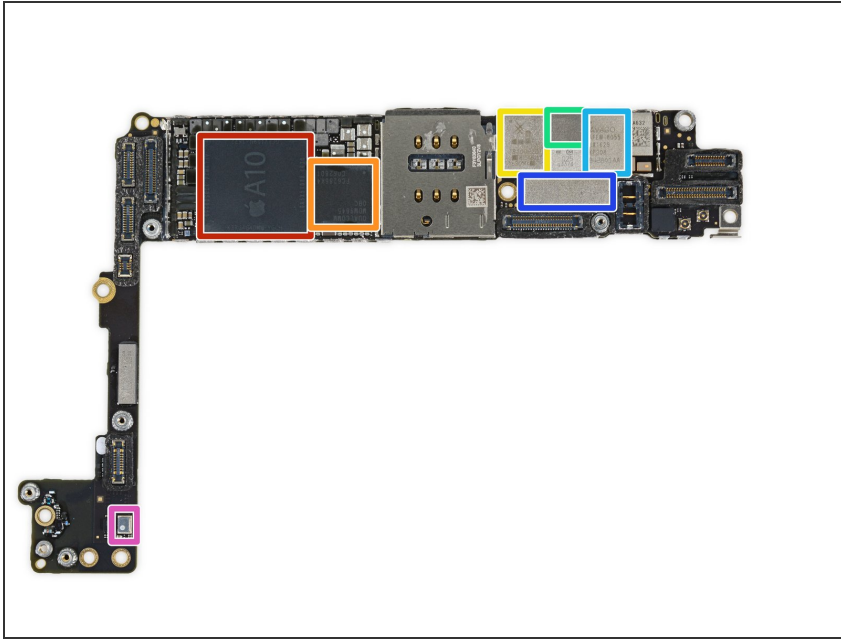
- Before we can dig the logic board out of the rear case, we have to remove portions of the antenna assembly—including the antenna flex cable, which acts as a bridge between antenna pathways.
- With the antenna flex cable removed, we focus our attention on the top left Wi-Fi antenna.

Step 13



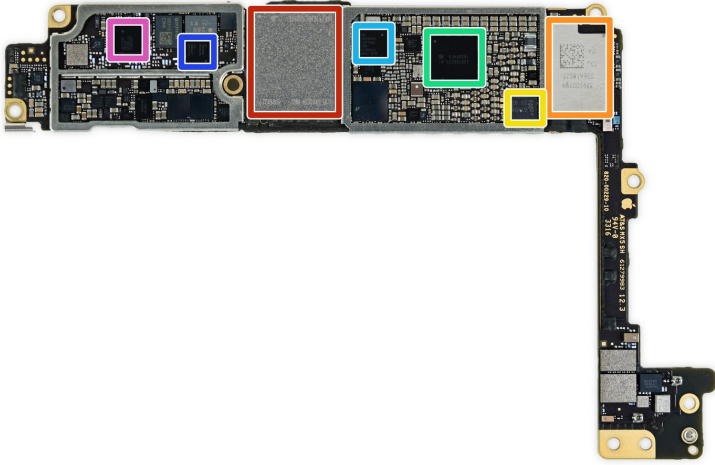
- Plucking the logic board from the 7 Plus is much easier than with [its predecessor](#). There's no need to flip over the logic board to remove the final connections.
 - ① It may seem like a small victory, but we're still encouraged—even small design changes can make a difference in terms of repairability.
- Peeling up the EMI stickers, we spy what might be some additional heat management.
 - ① Could that be the A10 under there?

Step 14



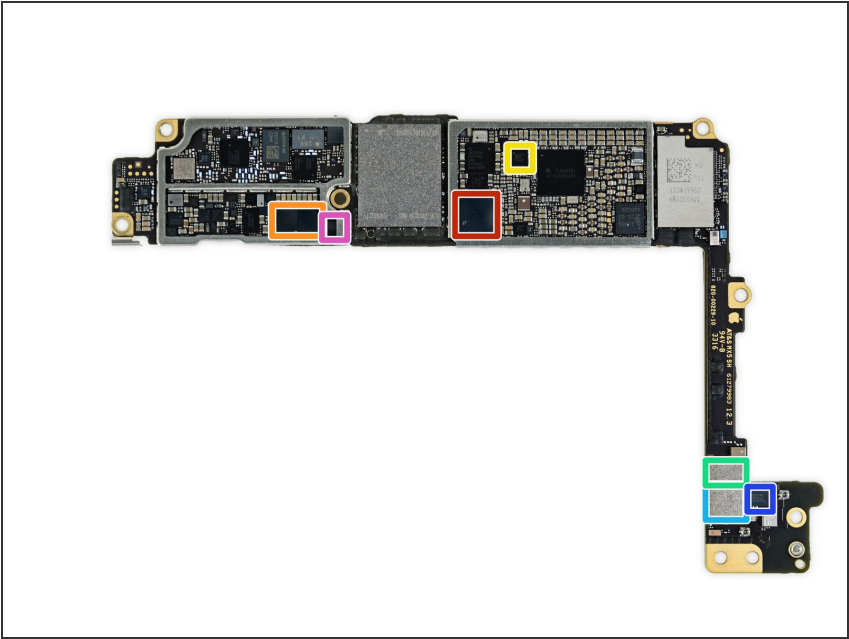
- The shields are down! The logic board is clear and ready for inspection. Let's see what this puppy is packing!
- Apple A10 Fusion APL1W24 SoC + Samsung 3 GB LPDDR4 RAM (as denoted by the markings K3RG4G40MM-YGCH)
- Qualcomm [MDM9645M](#) LTE Cat. 12 Modem
- Skyworks SKY78100-20 Power Amplifier Module
- Avago AFEM-8065 Power Amplifier Module
- Avago AFEM-8055 Power Amplifier Module
- Universal Scientific Industrial O1 X4 (likely the M2800 "Trinity" SIP)
- Bosch Sensortec [BMP280](#) Barometric Pressure Sensor

Step 15



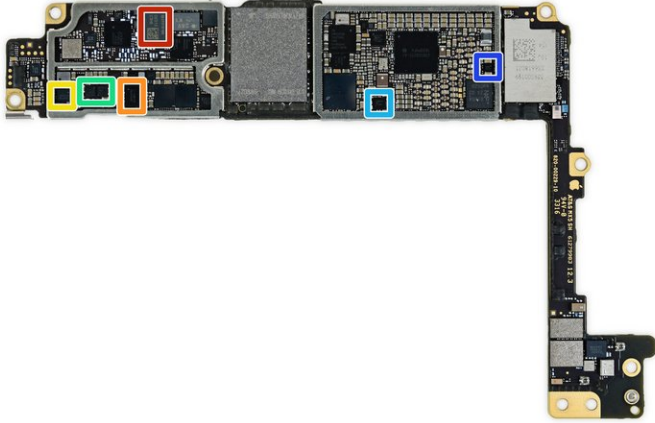
- Round the back now: another field of ICs!
- Toshiba THGBX6T0T8LLFXF 128 GB NAND Flash
- Murata 339S00199 Wi-Fi/Bluetooth Module
- NXP PN67V NFC Controller
- Dialog 338S00225 Power Management IC
- Qualcomm PMD9645 Power Management IC
- Qualcomm [WTR4905](#) Multimode LTE Transceiver
- Qualcomm [WTR3925](#) RF Transceiver

Step 16



- But wait, there are even more ICs on the back!
- Apple/Cirrus Logic 338S00105 Audio Codec
- Cirrus Logic 338S00220 Audio Amplifier(x2)
- Lattice Semiconductor [iCE5LP4K](#) iCE FPGA
- Skyworks SKY13702-20 Diversity Receive Module
- Skyworks SKY13703-21 Diversity Receive Module
- Avago LFI630 183439
- NXP Semiconductor CBTL1610A3 Display Port Multiplexer (likely)

Step 17



- Just a few last ICs on the back of the logic board:
 - TDK EPCOS D5315 Antenna Switch Module (likely)
 - Texas Instruments SN2400AB0 Battery Charger IC (likely)
 - Texas Instruments TPS65730A0P Power Management IC
 - Texas Instruments LM3539 Backlight Drivers
 - Texas Instruments SN61280 Power Management
 - ON Semiconductor DC-DC Converter (likely)
- And as always, thanks to our silicon experts at Chipworks for helping identify the key ICs at play! Head over to [their teardown page](#) for an in-depth analysis of the iPhone 7 control hardware.

Step 18



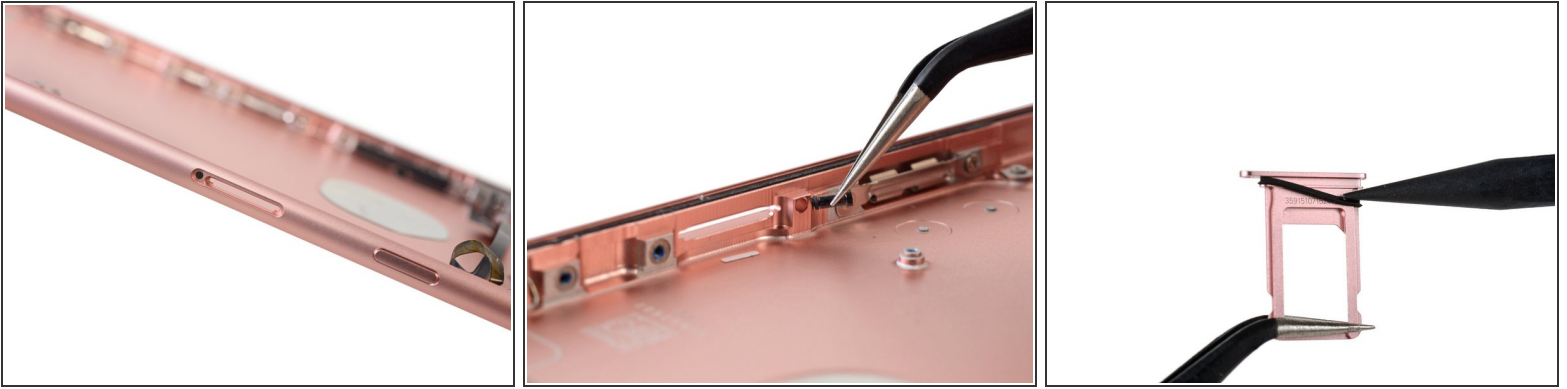
- Raising the rear loudspeaker out of the phone, we find some nice spring contacts and some mesh with ingress-protection!
- Sharing design similarities with the speakers in the [6 Plus](#) and [6S Plus](#), the speaker in the 7 Plus also bears a familiar antenna appendage.

Step 19



- Tiny ribbon cables attach the Lightning connector assembly to the microphones, which are firmly adhered to the speaker grilles.
- As predicted, the speaker grilles have ingress protection to keep the internals nice and dry.
- ⓘ And in case you haven't noticed, this Lightning connector assembly is huge! Like previous generations, it is moderately adhered and readily removed from the rear case.
- This cable assembly also features the most substantial gasketing we've seen on a Lightning connector. While [last year's models used foam adhesive](#) to keep out water and dust, this one features a full-on rubber gasket, capable of holding back a 50 meter column of water.

Step 20



- Water resistance has been touted as a big new feature in the iPhone 7 Plus—but what actually makes it water resistant? The evidence is everywhere:
 - Figures 1 and 2: a plastic SIM eject plug with a rubber gasket.
 - Figure 3: a rubber gasket on the SIM tray.
- ⓘ Rubber gaskets and plugs aren't new technology, but they are effective at keeping liquids and dust out of your phone. But there's a cost—when you replace a component you'll need to make sure you get the gasket in place and that it creates a good seal, which tends to be an extra, finicky step.

Step 21



- Pausing our rear case excavation, we take a moment to examine the display assembly and its respective bits.
- From the front face, it looks identical to the 1920-by-1080 displays we've popped off the iPhones 6 and 6s, but there are some notable changes: This guy supports a wider P3 color gamut than its older siblings, and is 25% brighter.
- We also notice a water damage indicator hanging out on the left edge of the display EMI shield. This gadget may be water *resistant*, but it looks like Apple won't be on the hook when you take your phone for a swim.

Step 22



- After we free a few standard Phillips screws, the earpiece speaker practically falls out from under the front-facing camera.
- ❗ This new earpiece speaker does double duty—for the first time, it also serves as a loudspeaker, giving the iPhone stereo sound for those times when you need to rock out and you *might* not have any place to plug in your headphones.
- The front-facing camera cable assembly is a little more of a handful. Normally when we're served something this tangled up, it comes with meatballs.
- All told, the upper components number:
 - Front-facing camera
 - MEMS Microphone
 - Stereo-enabling speaker
 - Proximity sensor and ambient light sensor

Step 23



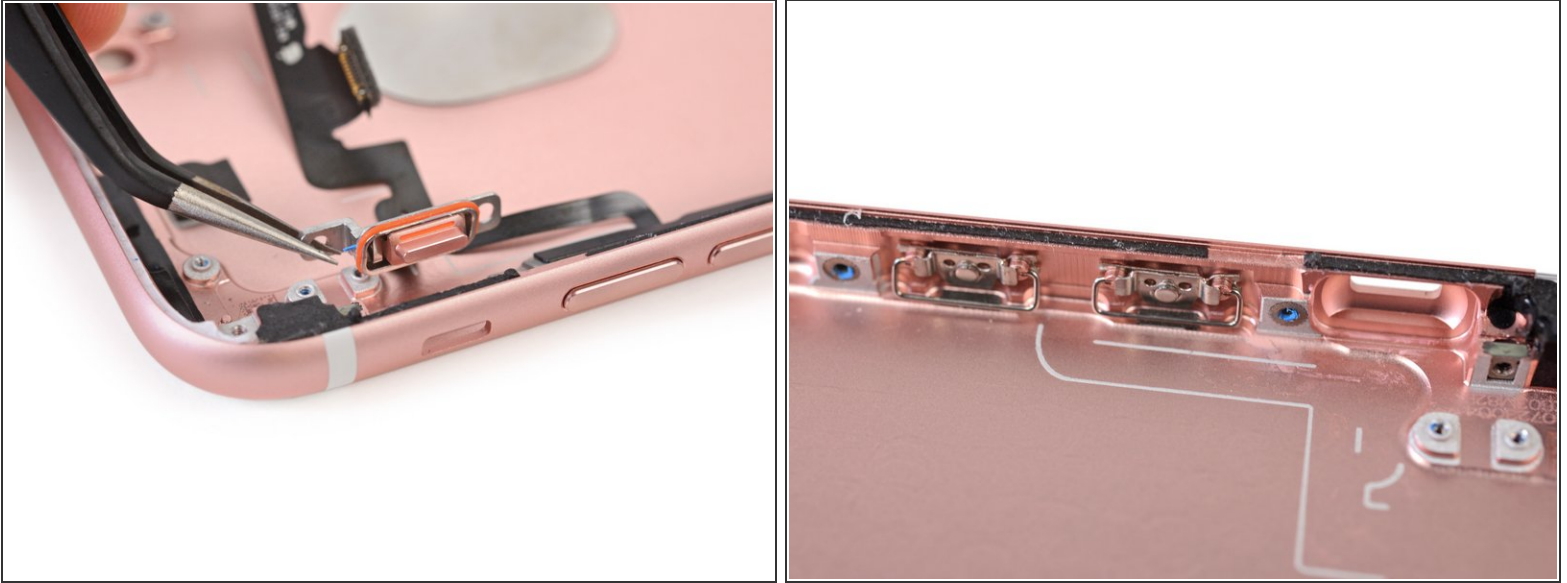
- More tri-point screws secure the home button and LCD shield plate.
- But luckily, there's no adhesive on the LCD shield plate—and the cables are nicely managed.
- There's not much to see here, so we quickly remove the shield plate and head for home, i.e. the home button.

Step 24



- Last to leave the display assembly: the home button.
 - It's more like the home *touch sensor* really. No buttons about it.
 - Analog Devices [AD7149](#) Capacitance Sensor Controller
- For those of you waiting with bated breath, it appears that the new solid state home button is removable. It won't be a simple procedure, with tiny tri-points and light adhesive on the cable—but there is no longer a delicate gasket to replace. Overall, it is a step in the right direction.
- ⓘ A replaceable home button is great news for consumers. The mechanical home button has been a point of failure on past iPhones. While our data shows that the reliability of the home button is better in the 6 and 6s compared to the 5 and 5s, we've still had close to 100,000 people use our [iPhone 6 home button](#) repair procedure.
- ⓘ Additionally, the move to a non-mechanical button should improve overall reliability and reduce the need for replacement. Not to mention, it looks great under an X-ray.

Step 25



- We're able to pull out the ring/silent switch, complete with gasket, and the rest of the button cable.
- However, the volume and power buttons are nestled snugly in the case, defying conventional removal.
- The design looks somewhat reminiscent of past [Apple patent filings for waterproof buttons](#), and requires some [deft disassembly technique](#).

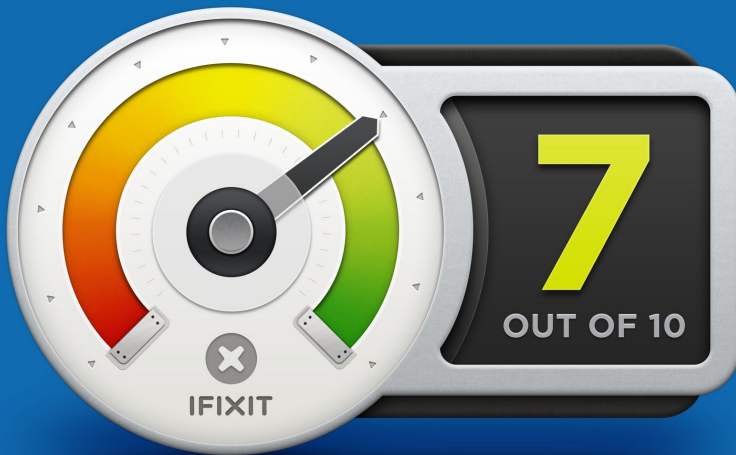
Step 26



- The grand finale! With the iPhone 7 Plus torn to bits, we line up our prizes for inspection.
 - ❗ But not for long—we have another cutting edge gadget from Cupertino coming your way soon. Stay tuned for more!
- Special thanks to our friends at Nikkei for lending us their office space in Tokyo to do what we do best!

Step 27 — Final Thoughts

REPAIRABILITY SCORE:



- The iPhone 7 Plus inherits a **7 out of 10** on our repairability scale (10 is the easiest to repair):
 - The battery is straightforward to access. Removing it requires specialty screwdrivers and knowledge of the adhesive removal technique, but is not difficult.
 - The solid state home button eliminates a common point of failure.
 - Improved water and dust protection greatly reduces the need for repairs associated with environmental damage and accidental spills (but also makes some repairs more difficult).
 - The display assembly continues to be the first component out, simplifying screen repairs, but the procedure has grown more complicated with improved waterproofing measures.
- With the addition of tri-point screws, many iPhone 7 Plus repairs will require up to four different types of drivers.