



# iPhone XR Teardown

Teardown of the Apple iPhone XR performed on October 26, 2018.

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## INTRODUCTION

Don't want to spend \$1,000 on a smartphone? This year Apple brings top-tier specs to the iPhone XR so you can get all the fancy features you want for less. Did they compromise too much? Not enough? Since when is \$750 cheap? There's only one way to find out—let's tear it down!

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### TOOLS:

- [P2 Pentalobe Screwdriver iPhone](#) (1)
- [Phillips #000 Screwdriver](#) (1)
- [iOpener](#) (1)
- [Suction Handle](#) (1)
- [Spudger](#) (1)
- [Halberd Spudger](#) (1)
- [Standoff Screwdriver for iPhones](#) (1)
- [Tri-point Y000 Screwdriver](#) (1)
- [Tweezers](#) (1)

## Step 1 — iPhone XR Teardown



- The iPhone XR may look a little different on the outside, but the specs look pretty familiar:
  - Hexa-core A12 Bionic SoC with a "next-generation" Neural Engine
  - 6.1" Liquid Retina LCD display with 1792 x 828 resolution at 326 ppi, True Tone, and wide color (P3) gamut support
  - 12 MP rear camera at  $f/1.8$  aperture with OIS, and 7 MP selfie cam paired with TrueDepth FaceID hardware
  - 64 GB of onboard storage (128 GB and 256 GB optional configs)
  - Broad cellular band support with eSIM capability and 802.11 a/b/g/n/ac Wi-Fi w/MIMO + Bluetooth 5.0 + NFC
  - IP67 dust/water ingress rating

## Step 2



- There were a lot of colors to choose from, but we have an affinity for [blue and black](#).
- Colors don't matter much when you can see through anything though! Our friends from [Creative Electron](#) gave us a sneak peek at the inside of this new iPhone with some XR-ays.

### Step 3



- Trying to stir up a bit of sibling rivalry, we stack the XR against the XS and see what differences we can spot.
- We start our search at the bottom edge, where the XR's missing antenna band and nice symmetrical grilles remind us more of [last year's X](#).
- ⓘ The XR inherited many of the same traits as its XS siblings, but it did not inherit speedy [gigabit-LTE](#) capabilities.
- Switching on the displays, it's easy to see that the XR's bezels are a bit bigger—and if you get *really* close, the curves start to get a little [rough around the edges](#).
- The XR inherited a lot of features from the XS, but only got one camera—the wide-angle, while the telephoto stays with the XS.

## Step 4



- Similarities to the XS continue with the opening procedure: pentalobe screws surround the [not-quite-centered-anymore](#) charging port, and opening takes just a little help from an [iOpener](#).
  - Differences include: surprisingly non-color-matched pentalobe screws, and a SIM slot that slid down toward the bottom of the phone.
- ⓘ One difference we can't seem to pin down is where the XS got its extra [IP point](#)—opening the XR feels about the same as the XS!

## Step 5



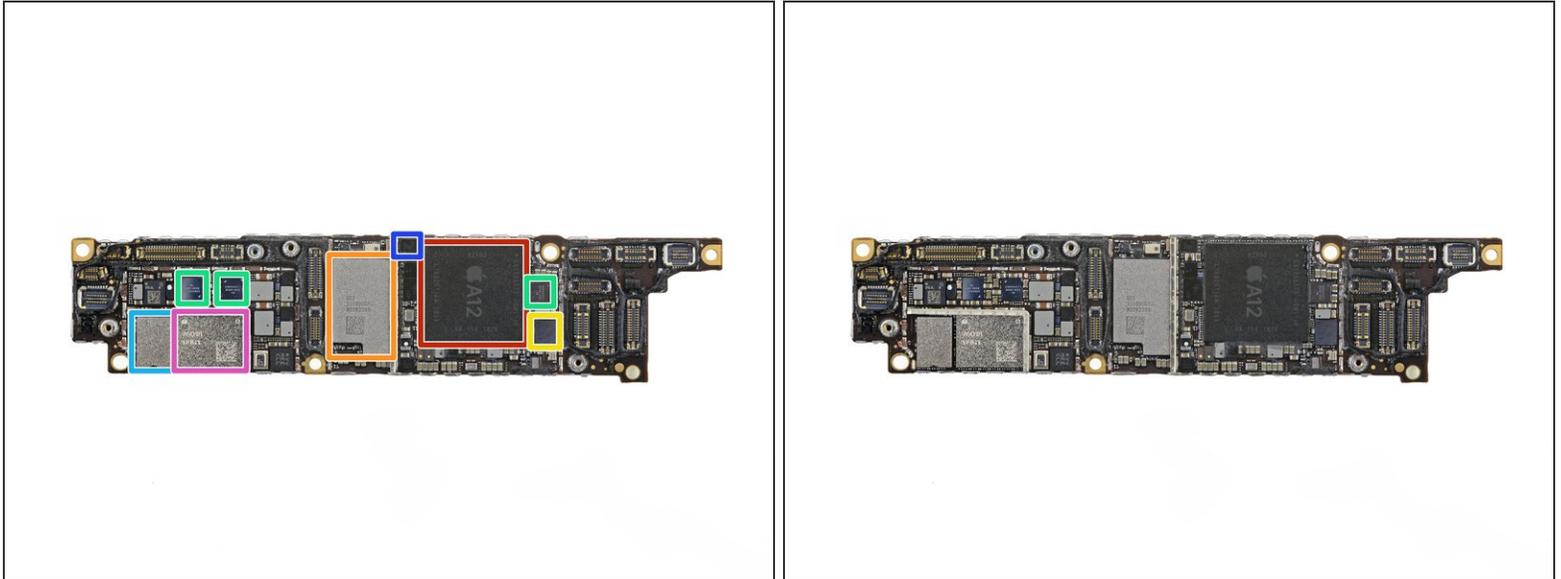
- The thoughtful, display-first opening procedure is over with just like that—about as painless as it gets on a water-resistant smartphone.
- ⓘ Apple perfected this design all the way back on the [iPhone 5](#)—and thankfully, they've never changed it.
- Inside, the XR starts to look more like a fun hybrid between the [8](#) and the [X](#). We're back to a rectangular battery, but there's also a rectangular logic board.
- The question is: How many [layers](#) does that logic board have?

## Step 6



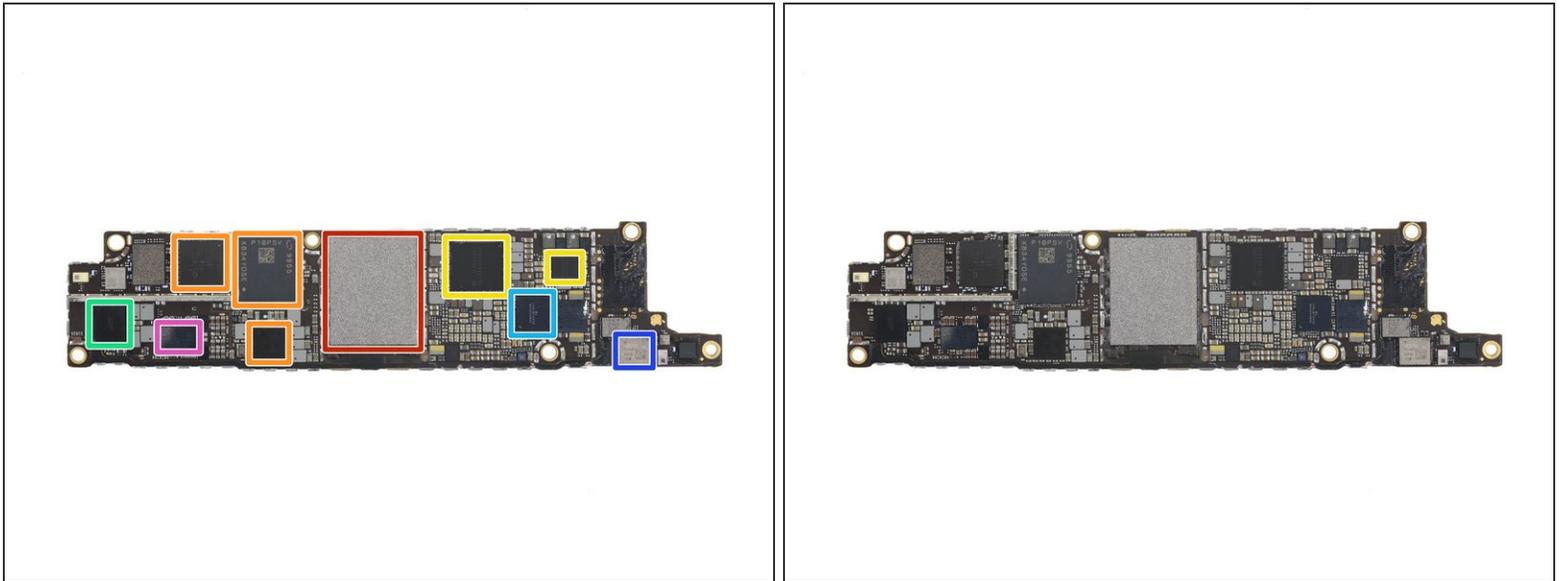
- On the way to freeing up the logic board, we're encountering a veritable plethora of standoff screws. We're used to one or two per iPhone, not ¥ ten.
- Luckily, we're [armed and ready](#).
- What's this? A modular SIM card reader! That's an iPhone first.
  - ⓘ Not only does this mean quick swaps of a dead SIM reader, it also reduces the cost of replacing your logic board! Win-win!
  - This is likely a concession to the Chinese market, where eSIM is not supported—so in order to enable dual-sim functionality on Chinese models, Apple installs a dual Nano-SIM reader. The modular approach makes this much easier than it would be if the reader were soldered to the main board, as in past models.
- The svelt, non-elbowed, single-decker logic board is now free to escape!

## Step 7



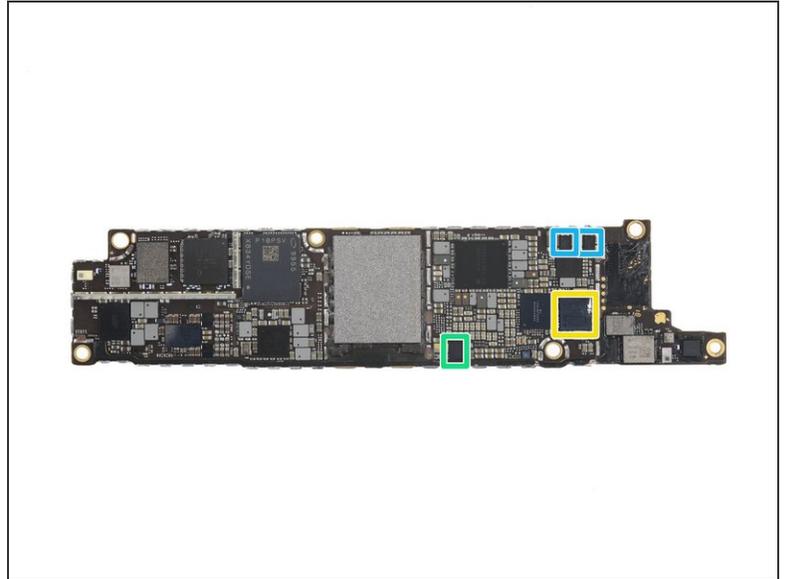
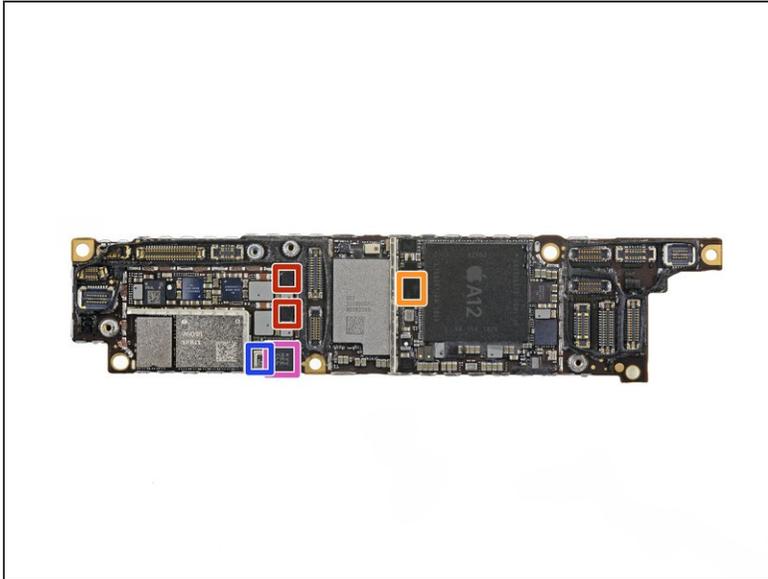
- With the logic board out, we get our first look at the onboard silicon:
  - Apple [APL1W81](#) A12 Bionic SoC, layered over Micron MT53D384M64D4SB-046 XT:E 3 GB LPDDR4x SDRAM
  - Apple/USI 339S00580 (likely a WiFi/Bluetooth module, similar to [what's found in the XS](#))
  - NXP Semiconductor SN100V NFC controller
  - 3x Apple/Cirrus Logic 338S00411 audio amplifiers
  - Skyworks 203-15 G67407 1838 (likely a power amplification module)
  - Infineon (formerly Cypress Semiconductor) [CYPD2104](#) USB type-C port controller
  - Qorvo QM76018 RF Front End Module

## Step 8



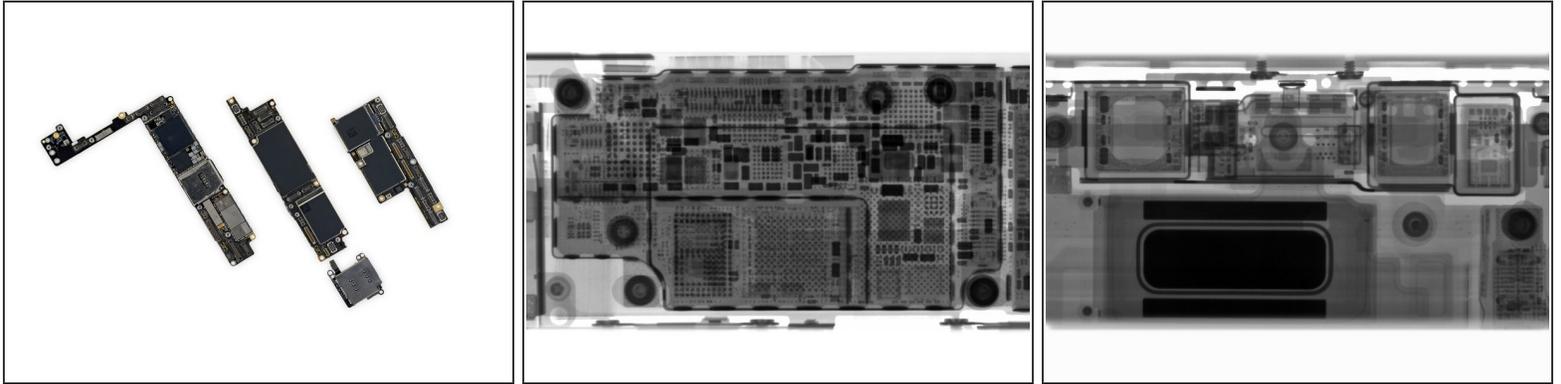
- More chips on the back side of the logic board. Show us your identification, please...
  - Toshiba TSB3243VC0428CHNA1 64 GB flash storage
  - Intel PMB9955 (likely the XMM7560 LTE Advanced Pro 4G LTE baseband processor), PMB5762 RF transceiver, and PMB5829
  - Apple 338S00383-A0, 338S00375-A1 power management IC's (possibly from Dialog Systems)
  - Texas Instruments SN2600B1 battery charging IC
  - Apple/Cirrus Logic 338S00248 audio codec
  - Skyworks SKY13768 front end module
  - Broadcom BCM59355A2IUB4G (likely a variation of the [BCM59350](#) wireless power receiver chip)

## Step 9



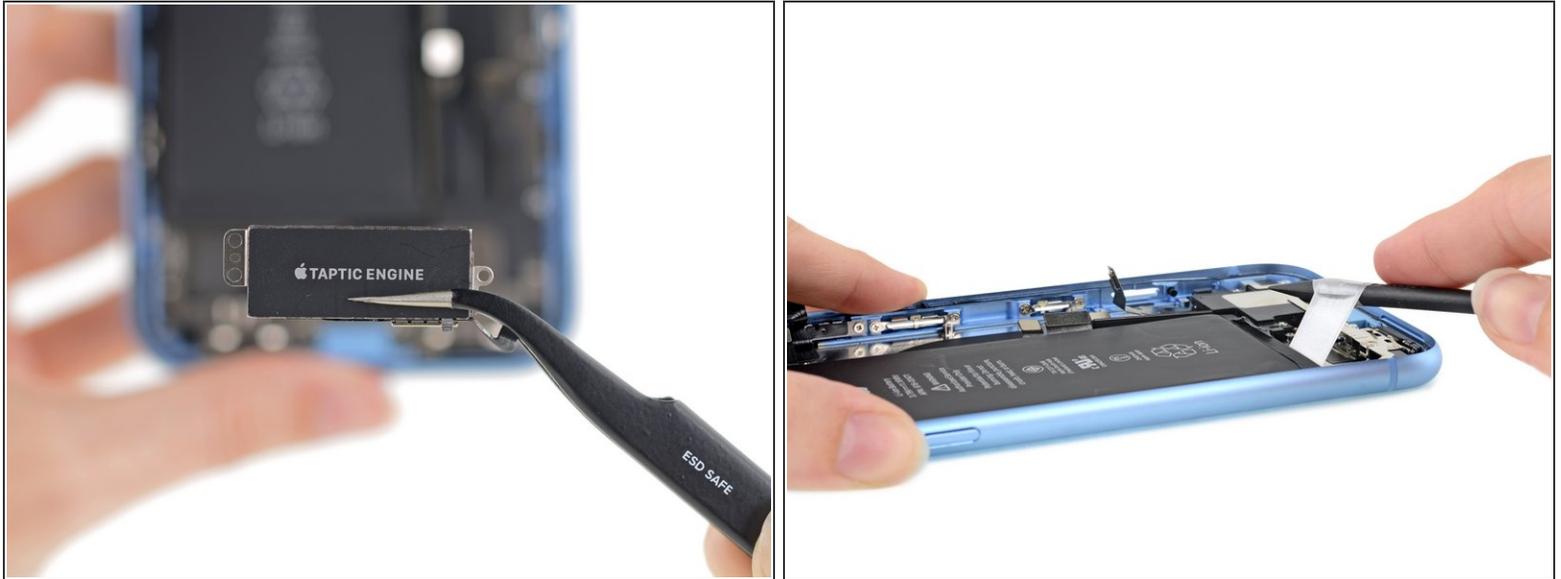
- IC Identification, pt 2.
  - Texas Instruments LM3539 backlight driver
  - NXP Semiconductor CBTL161x display port multiplexer (likely)
  - STMicroelectronics STB601A0 power management
  - Texas Instruments TPS65730 display power management
  - Texas Instruments LED driver (likely)
  - Bosch Sensortec BMP282 pressure sensor
  - Bosch Sensortec accelerometer

## Step 10



- Moving on from the logic board, here are two more logic boards.
- The new XR board + SIM reader (center) looks a bit like an unfolded iPhone X board (right). The sprawling iPhone 8 Plus board is shown at left for comparison.
- This new form factor pretty much perfectly fills the gap in the evolution of iPhone logic boards.
- A closeup via X-rays reminds us that this "simplified" iPhone logic board is still enormously complex.
- Even more silicon hides beneath other components, like the TrueDepth camera system.

## Step 11



- With the logic board out of the way, we fish out the famous Taptic Engine!
  - ⓘ Though the XR does not support 3D Touch, it does get Haptic Touch, which is basically a long touch rather than a strong touch. Looks like the haptics are driven by a [familiar](#) linear-oscillating vibration motor.
- Next out is that rectangle battery! We're more than happy to encounter four whole adhesive pull tabs that make removal quite breezy.

## Step 12



- All four tabs perform admirably, and the 11.16 Wh battery is removed goo-free!
- We've already heard that the XR has the best iPhone battery life yet, but just how does it stack up? Time for a battery parade!
  - Left to right, we have: [iPhone 8](#) (6.96 Wh), iPhone XR (who is #winning), [iPhone 8 Plus](#) (10.28 Wh), and [iPhone XS](#) (10.13 Wh).
- ☑ The XR battery looks a bit smallish compared with that of the 8 Plus—but these looks are deceiving. The XR battery is thicker, and packs more juice, not less.
  - If you're looking for an Apples-to-oranges comparison, Android is still winning the pure capacity game. The [Galaxy S9+](#) remains champion at 13.48 Wh, and the [Pixel 3 XL](#) follows closely at 13.2 Wh.
- While we're stacking, let's take the opportunity to X-amine some X-series X-rays. Left to right, we have the iPhone X, the XR (with its less-dense aluminum frame), and the XS Max!

## Step 13



- Here's the single rear camera—the same newly-updated wide-angle module from the [XS and XS Max](#).
- ★ The single-sensor XR seems like a logical competitor for Google's similarly-equipped Pixel 3—but Google's phone [somehow manages](#) to blow even the dual-camera XS Max out of the [water beer](#). Solution? [More cameras, maybe](#).
- We line the camera up alongside the TrueDepth system powering FaceID—which, as far as we can tell, looks pretty much unchanged from when we first saw it in the [iPhone X](#).
- Not to be left behind, the lower speaker is next—it's still pretty easy to remove, which is good, because you'll probably want it out of the way for a battery replacement.

## Step 14



- Next we turn our attention to Apple's [much-discussed](#) Liquid Retina display.
- The XR's LCD is 0.3" larger across than the XS's AMOLED, but it's also thicker and heavier—as is expected from an LCD.
- ⓘ The need for a backlight means an LCD display assembly will always necessitate a slightly larger form factor than an equivalent AMOLED assembly.
  - As far as we can tell, this thicker display assembly is what has pushed the Lightning connector off-axis.
- Getting back into the case, we dig out the wireless charging coil for a closer look.
- We've struck copper! Copper's lower resistance (compared to [FPC in the X](#)) should mean faster charging with less heat.

## Step 15



- With the XR fully excavated, we display the tidbits from our dig:
- ☑ A peek under the hood revealed design hallmarks reminiscent of both the iPhone 8 (rectangular battery, single layer board) and X (square-ish logic board, Face ID), making this the spiritual "iPhone 9."
- ☑ But the XR isn't all throwback—it's got the latest silicon, and contains features entirely new to iPhones. We found Apple's first-ever modular SIM reader, possibly there to help with their newfangled multi-SIM plans.
- Thanks again to our good friends at [Creative Electron](#). Now we'll leave you with a really good joke:
- What's a pirate's favorite iPhone?
  - The X-*ARRRrrrrr*

## Step 16 — Final Thoughts

### REPAIRABILITY SCORE:



- The iPhone XR earns a **6 out of 10** on our repairability scale (10 is the easiest to repair):
  - The display-first opening procedure and easy access to the battery remain design priorities.
  - A broken display can be replaced with minimal hardware removal, and with a little care you can preserve Face ID.
  - Apple again uses tiny uncommon Pentalobe and tri-point screws to stymie repair, but these fasteners are preferred over tough glue.
  - Waterproofing measures complicate some repairs, but make difficult water damage repairs less likely.
  - Glass on front and back doubles the crackability—and broken back glass requires an entire chassis replacement.