Google Pixel 4 XL Teardown

We tear down Google's latest and greatest smartphone, the Pixel 4 XL. Inside we find the new Project Soli radar chip, along with some surprises!

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INTRODUCTION

This year's Pixel phones were leaked into oblivion, so when the keynote finally came, the internet gave a collective shrug. But you know what wasn't leaked? The insides! And there's only one way to get to get to those—with a teardown!

Want even more exciting teardown news? Check out our YouTube channel, follow us on Twitter, Instagram, or Facebook, and subscribe to our newsletter.

🔧 TOOLS:

- iOpener (1)
- Suction Handle (1)
- iFixit Opening Picks set of 6 (1)
- T3 Torx Screwdriver (1)
- Manta Driver Kit - 112 Bit Driver Kit (1)
- Tweezers (1)
- Heat Gun (1)

This document was generated on 2019-12-03 02:37:51 AM (MST).

Step 1 — Google Pixel 4 XL Teardown

- Normally we're all about high resolution, but this is shaping up to be the most Pixellated teardown ever. Check out the specs on our teardown unit:
  - 6.3" OLED display with QHD+ 3040 x 1440 resolution (537 ppi) and variable refresh rate up to 90 Hz
  - Octa-core 64-bit Qualcomm Snapdragon 855 processor, paired with 6 GB of LPDDR4X RAM
  - Dual rear-facing camera with one 12.2 MP ƒ/1.7 wide-angle module, and one 16 MP ƒ/2.4 telephoto module; single 8 MP ƒ/2.0 wide-angle selfie cam
  - 64 GB of onboard storage (128 GB optional)
  - IP68 ingress protection rating
  - Android 10 mobile OS
- ⓘ Google, we'll see your radar and raise you some X-rays. Our esteemed colleagues at Creative Electron provide an early look at this Pixel's internals—and it looks like a *completely* different layout from Pixels 2 and 3.

Step 2

- Lining up our new *Oh So Orange* Pixel 4 XL against last year's *Clearly White* 3 XL invites a few observations:

  - Notable changes include the loss of (one of) the front-facing speaker grilles and the fingerprint sensor of yesteryear. The new speaker setup still counts as stereo sound, but the lower speaker fires out the bottom (like an iPhone) instead of at your face.

  - The SIM tray also packed up and moved, likely to accommodate aforementioned speaker placement.

  - The Pixel 3's notch has evolved into a whole bezel! While everyone else in the industry works furiously to eliminate notches and bezels, Google's approach seems a little more laid-back.

  - At least they put the space to good use: inside they've crammed infrared facial recognition hardware, a wide-angle front-facing camera, and a cool new radar thing.

- (i) In case you're looking for a more Apples-to-Oranges comparison, here you go.

Step 3

- If this phone came with repair instructions, we're sure the first step would say "Apply heat to the surface marked in orange." So, we do just that.

- The adhesive underneath is mercifully thin, but strong nonetheless. At this point, we'll take anything over that thick goopy gunk from last year.

- With no more fingerprint sensor, we hoped to cut in without encountering any flex cable booby traps—but alas, a new *even shorter* cable connects the miscellany on the rear camera bump: flash, microphone, and the spectral + flicker sensor.

- Fortunately, the wireless charging coil & NFC coil, newly adhered to the back panel via a sheet of adhesive, use repair-friendly spring contacts.

  - ⓘ Unfortunately that means that back cover adhesive *needs* to be strong. You don't want loose contacts when it comes to charging circuitry.

Step 4

- We might not need all 112 bits to dismantle this Pixel, but we're glad we brought our [Manta Driver Kit](#) along for this one! We fish out a Torx 3 bit and start twirling away screws.

- Normally, we love pulling out stretch-release adhesives—they're far more repair-friendly than messy tapes and glues. But you gotta pull at a shallow angle to avoid snagging and breaking them, and good luck doing that here. Like in the 3 XL, you'll likely need to remove the motherboard for adequate clearance, which requires many additional steps.

- [With the benefit of experience](#), we carefully complete the battery extraction using some IPA and gentle prying.

- Underneath, a small but serious landmine lies in wait for would-be repairers: a delicate Active Edge flex cable, just begging to be accidentally sliced during battery extraction.

- ⓘ The battery itself is a **14.24** Wh cell (3700 mAh at 3.85 V). That's up from last year's [13.2 Wh](#), and nipping at the heels of the thumping big batteries in the iPhone 11 Pro Max ([15.04 Wh](#)) and Galaxy Note10+ ([16.56 Wh](#)).

Step 5
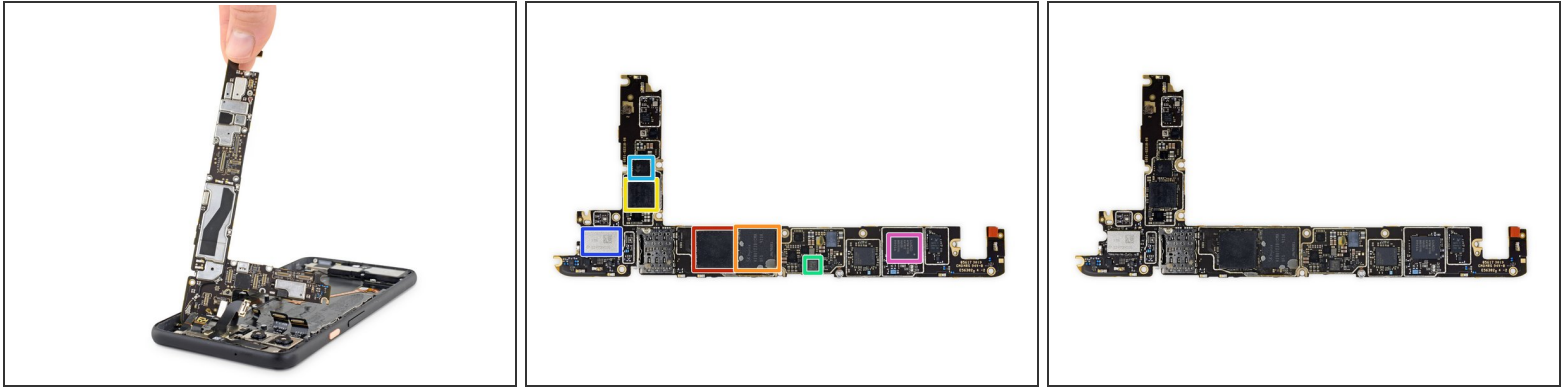
- We have to dispose of [quite a few brackets and shields](#) on our way to the motherboard, but it's all worth it for these chips:

  - 6 GB of Micron LPDDR4X RAM layered over the Qualcomm Snapdragon 855

  - SK hynix [H28U72301CMR](#) 64 GB Universal Flash Storage

  - Samsung K4U4E3S4AF-HGCJ mystery RAM, with a big "P" on it—best guess, this is dedicated RAM for the new [Pixel Neural Core](#) chip, likely hiding directly underneath

  - Pixel H1C2M3 Titan M security chip

  - Knowles [8508A](#) quad-core audio processor, no doubt to help with the new live [caption](#) and [transcription](#) features.

  - Murata SS9709025

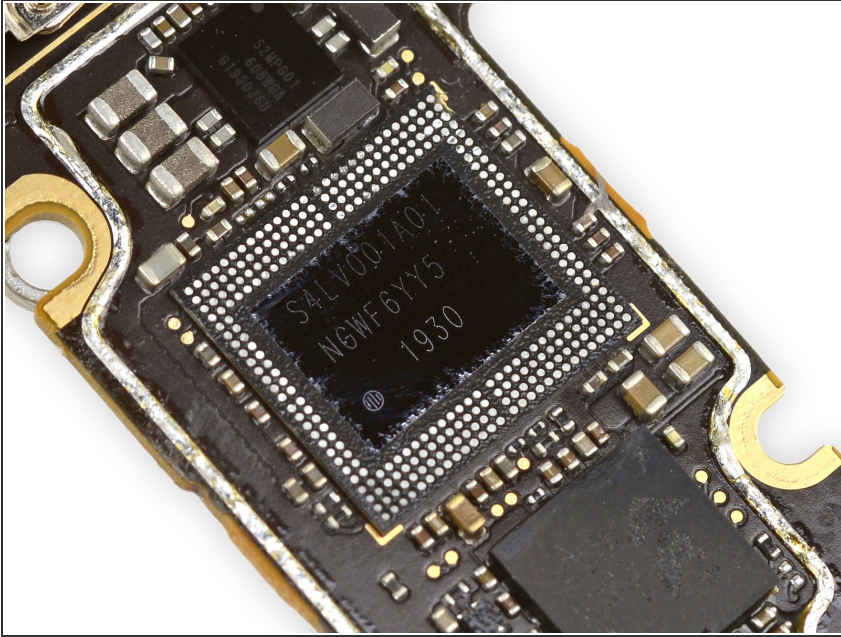 - Avago AFEM-9106 (likely a front-end module)

Step 6
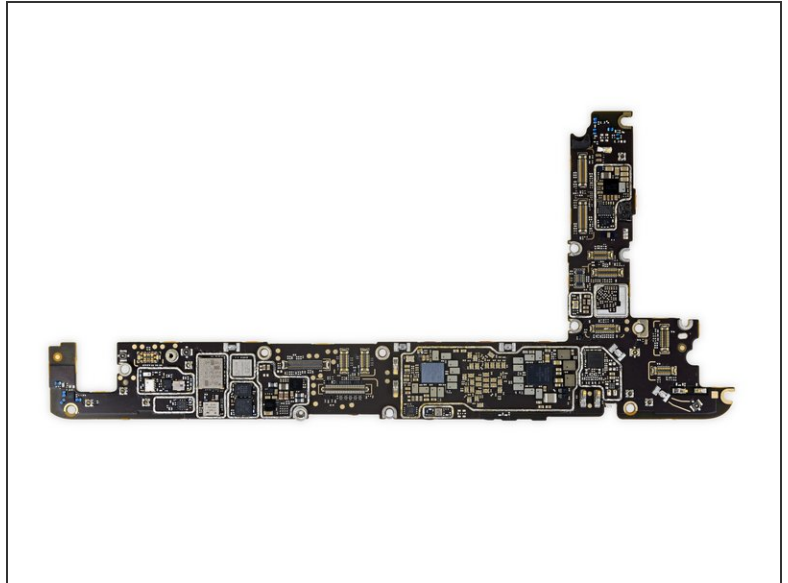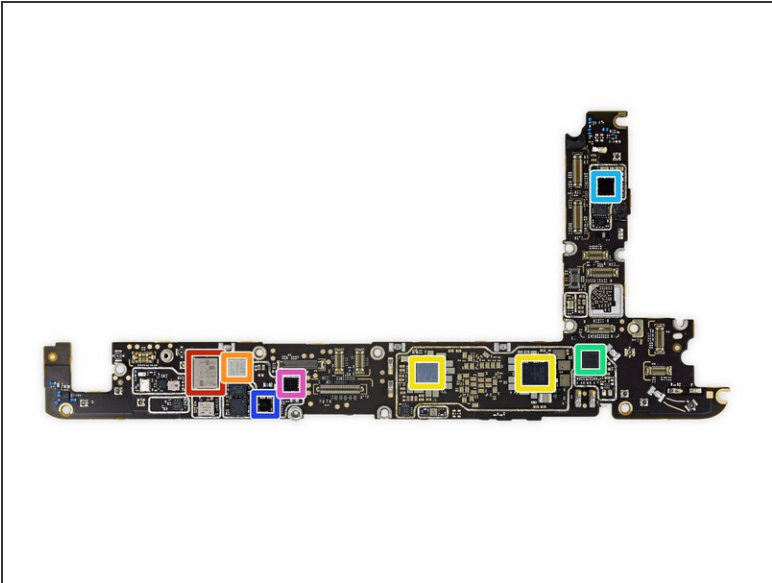
- Side B of this record features:

  - Skyworks [Sky5-8212-11](#) front-end module

  - Qualcomm [QET5100](#) envelope tracker

  - Qualcomm PM8150 and PM8150A PMICs

  - STMicroelectronics [ST54J](#) NFC controller

  - Maxim MAX77826 [companion PMIC](#)

 - XSPT6 SMC85201 Z

  - 35L36CWZ BOCW1909

Step 7

📌 **Teardown update**: We removed that mystery Samsung RAM chip referenced above, and found a new IC underneath. This *could* be some custom Google silicon, but the markings are unfamiliar to us.

- We'll work on tracking down its origin. Meantime, if you know more than we do, give us a shout in the comments!

- The chip package is marked:
   - S4LV001A01 NGWF6YY5 1930

Step 8
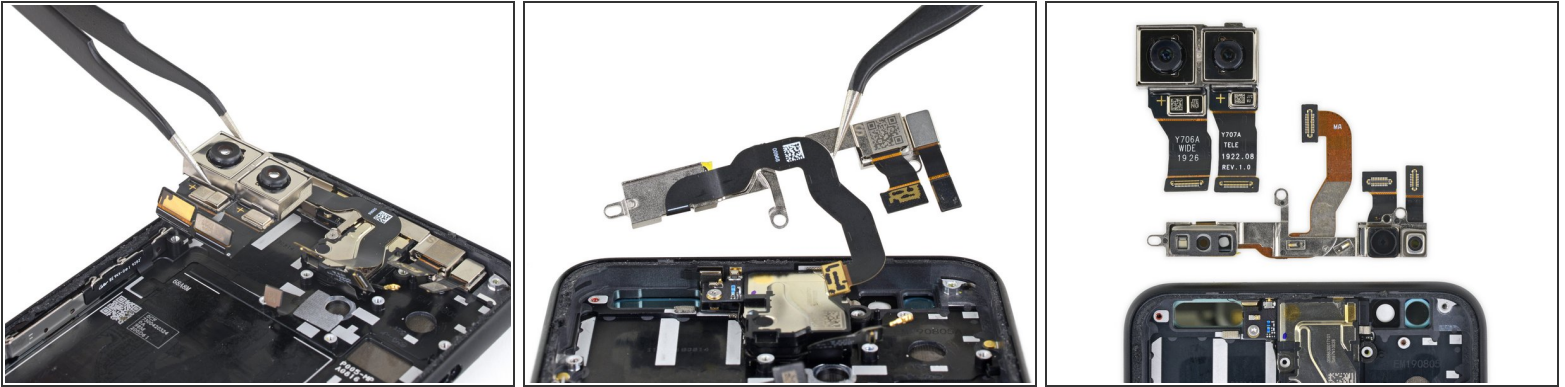
- The dual rear cameras come out, joined at the hip. They are nicely labeled "wide" and "tele" on the flex cables. Thanks, Google.

  - 📌 The 16 MP telephoto sensor might sound superior to the 12.2 MP when counting megapixels alone, but the wide sensor should handily win most image quality contests with its wider aperture and larger 1.4-µm pixel width.

- Next out: the front-facing sensors, including the 8 MP front-facing camera, and the ~~Face ID~~ face unlock hardware. (The ambient light sensor stays stuck to the display for now.)

  - The biometric hardware consists of two well-separated Near Infrared (NIR) cameras, a NIR flood emitter, and a NIR dot projector.

- ⓘ But where's that Soli radar chip? Okay Google, where did you hide it?

Step 9
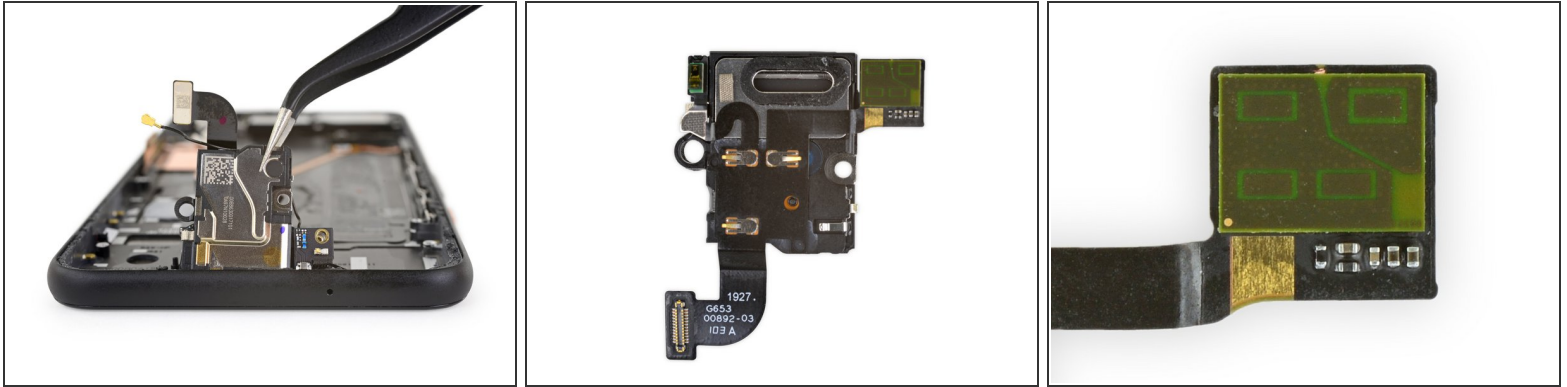
- Next we pry out this hunk of ... stuff, which turns out to be an earpiece speaker, mic, ambient light sensor, *and* the Soli chip, for interpreting your gestures using the power of radar.

- Google calls this implementation of its in-house Project Soli *Motion Sense.*

- Although radar technology has been in use for a long time and seems simple enough on paper, we're at a loss as to how Google stuffed the entire system into a tiny featureless rectangle with no moving parts.

- ⓘ Motion Sense works by emitting precisely tuned waves of electromagnetic energy. When those waves bounce off of something (like your hand), some of them reflect back to the antenna.

  - The Soli chip then studies the reflected waves and analyzes their time delay, frequency shift, and other data to learn the *characteristics* of the object that reflected them—how big it is, how fast it's moving, in which direction, etc.

  - Soli then runs that data against its known gesture database to determine what action, if any, needs to be performed in the OS.

- TL;DR: magic rectangle knows your every move.

Step 10
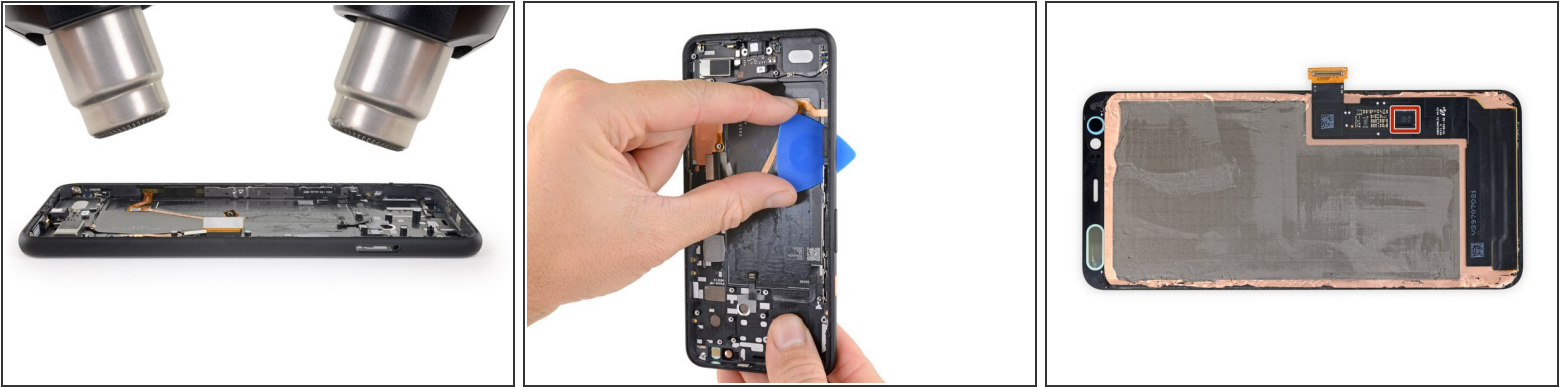
- Google gifted this Pixel with a supersmooth ([sometimes](#)) 90 Hz screen—a rarity thus far, even amongst the flagship-iest of smartphones.

- Google also made sure *nobody* could take it from the Pixel without a struggle. Strong perimeter adhesive + screen layers going literally to the edge + giant duct-tape-like adhesive pad = screen does not want to come out intact.

- In theory there's no reason to do this—only broken screens need be removed this way. But this is not a fun process for replacing an (all too common) broken screen.

- (i) At least in this case, the result is interesting: this display is manufactured by Samsung! This comes as something of a surprise, given that Samsung has not yet put a 90 Hz display *even in its own smartphones*.

  - On board, we also find a somewhat unexpected chip package from STMicro, likely a capacitive touchscreen controller.

Step 11

- While its construction remains (disappointingly) familiar repair-wise, we did find quite a few treats in this pumpkin:

  - The Motion Sense-managing Soli chip lives next to the speaker at the top of the phone, and is incredibly tiny, considering its functionality.

  - Our best guess is that the Pixel Neural core is layered under some dedicated Samsung RAM, meaning it must be doing some heavy lifting.

  - We also found a new Knowles audio processor chip, which is likely a major player in all of the new on-device speech recognition features.

  - Samsung made the 90 Hz-capable display—looks like Pixel beat the Galaxy phones to the punch on this feature.

- But back to that familiar feeling— what will this phone score?

Step 12 — Final Thoughts

REPAIRABILITY SCORE:

4 OUT OF 10

iFIXIT

- The Google Pixel 4 XL earns a **4 out of 10** on our repairability scale (10 is the easiest to repair):
  - All screws are standard T3 Torx fasteners.
  - The stretch-release adhesive securing the battery may not be foolproof, but its inclusion is repair-friendly.
  - Waterproofing measures complicate repairs, but hopefully make them less common.
  - Display repairs continue to be difficult, requiring complete disassembly of the phone.
  - All repairs require access through the stubbornly-glued back panel.
  - Glass on the front and back doubles potential drop damage.