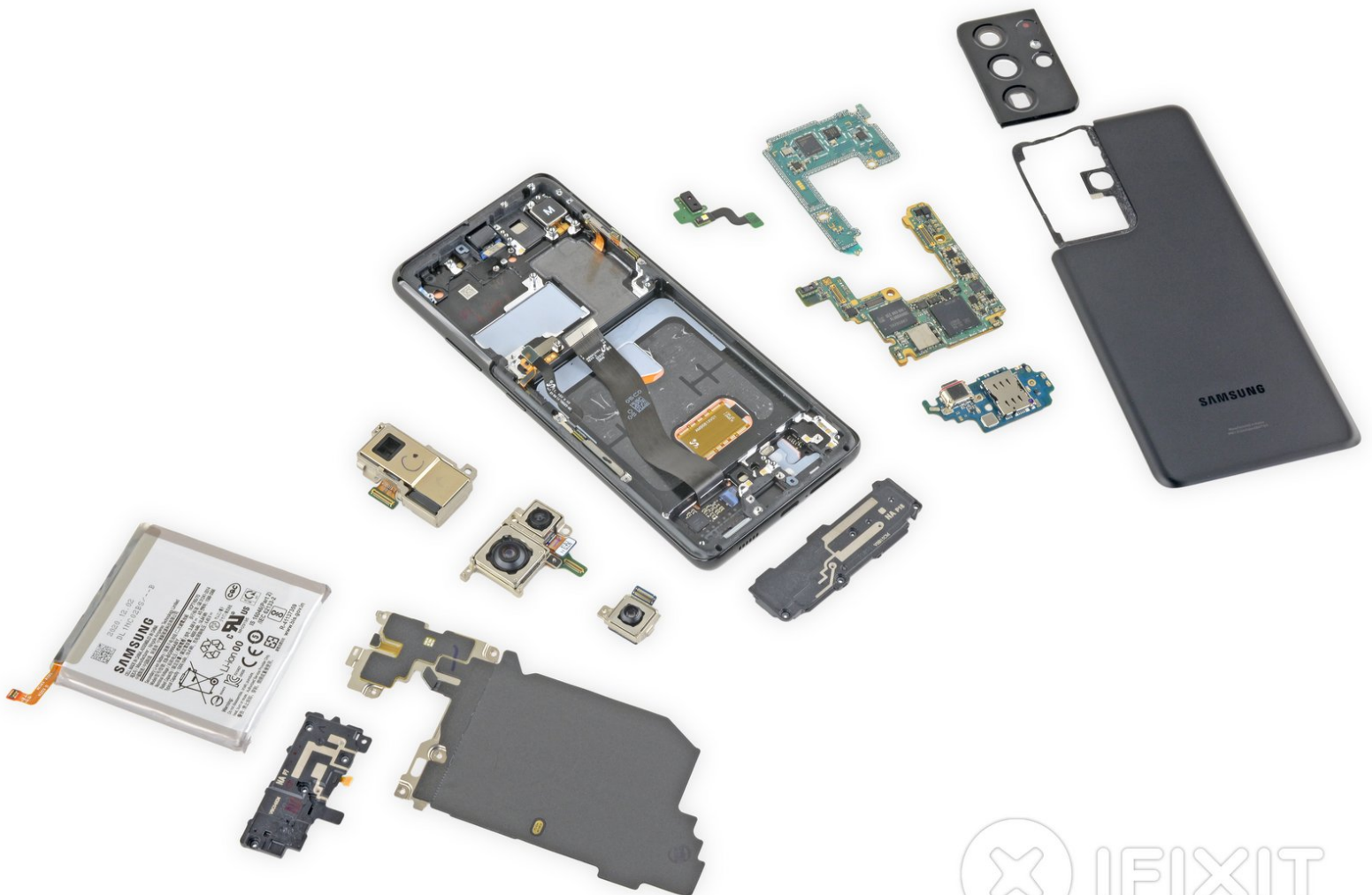




Samsung Galaxy S21 Ultra Teardown

iFixit's teardown of Samsung's 2021 Galaxy S21 Ultra flagship smartphone. Performed on March 10th, 2021.

Written By: Carsten Frauenheim



INTRODUCTION

What's better than a Max? Depends who you ask, but Samsung would answer with a resounding "Ultra!" That's right, the namesake is back, in the form of the Galaxy S21 Ultra, and it's better than ever—or at least that seems to be the prevailing opinion. Is there more to this phone than just a spec bump and minor facelift? There's only one real way to find out—yup, it's a teardown.

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TOOLS:

- [Phillips #000 Screwdriver](#) (1)
 - [Tri-point Y00 Screwdriver](#) (1)
 - [Spudger](#) (1)
 - [iOpener](#) (1)
 - [Suction Handle](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Tweezers](#) (1)
 - [Hot Air Rework Station Hakko FR-810](#) (1)
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Step 1 — Samsung Galaxy S21 Ultra Teardown



- The spec sheet for this phone looks very *ultra*—but is it more ultra than last year's model? Or is it basically an S20 Ultra in a mask? Judge for yourself:
 - 6.8" Quad HD+ Dynamic AMOLED 2X Infinity-O Display (3200x1440, 515ppi), variable refresh rate up to 120 Hz
 - Snapdragon 888 processor paired with 12 GB of LPDDR5 RAM (16 GB optional)
 - 128 GB flash storage (256 or 512 GB optional)
 - 5,000 mAh battery
 - Five cameras: 12 MP *f*/2.2 ultra-wide; 108 MP *f*/1.8 wide-angle; 10 MP *f*/2.4 telephoto; 10 MP *f*/4.9 periscope telephoto, and a 40 MP *f*/2.2 selfie camera
- If you read our [S20 Ultra teardown](#) and think you're [seeing double](#), you're not alone. But let's dig a little deeper to see if more than just the numbers line up.

Step 2



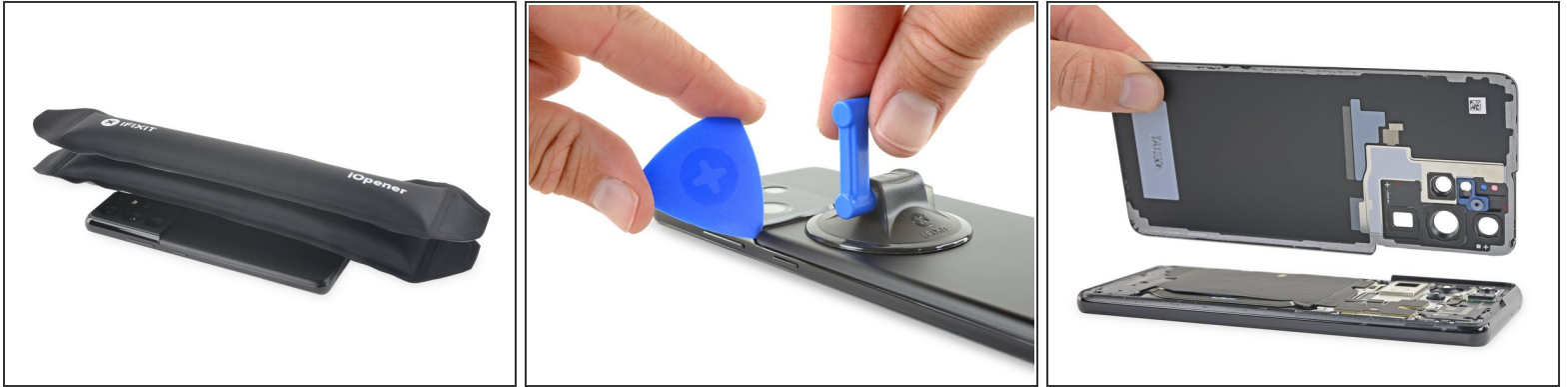
- Before we dismantle the phone, we first dismantle the box and accessories. Obviously, there's a cable and a wall charg—
 - ⓘ Wait ... you're telling us there's *no charger in the box*? Didn't Samsung mock Apple for doing this very thing last year? Oh, right—[Samsung deleted that too.](#)
- All kidding aside, it's not a surprising about-face from Samsung—and it's a small step in the right direction for reducing e-waste.
- Design-wise, this year's Galaxy S-series sports a less-rounded edge (although it's not as dramatic a [flattening](#) as Apple gave the iPhone).
- Meanwhile, the camera bump has spread all the way to the Ultra's aluminum edge, creating a smooth transition for the eyes (and fingers).
- [Camera bumps may be here to stay](#), but expandable storage has gone the way of the dodo—the microSD tray is missing in the S21 series.
- ⓘ One thing we really love about the new design: The matte finish on the glass rear panel. (It doesn't *feel* much like glass, but packs a rather premium plasticky feel, if you're into that.)

Step 3



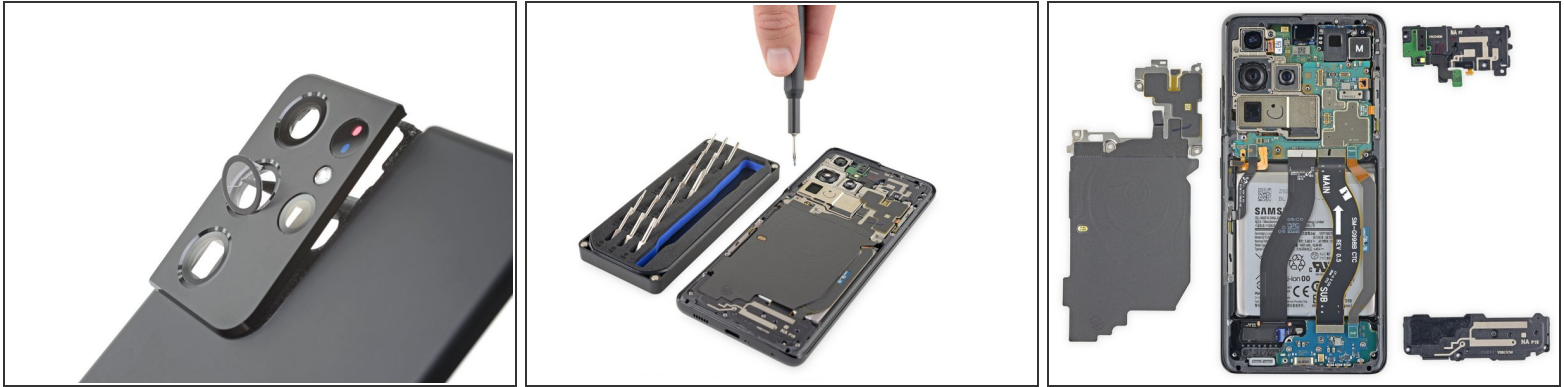
- Before we bust out the tools, let's put on our Ultra-vision goggles and get a glimpse inside, courtesy of our friends at [Creative Electron](#). What fun stuff can we find, compared to the [S20 Ultra's X-ray shot](#)?
- The vibration motor and the SIM card tray have traded places at either end of the phone. This seemingly makes room for a slightly larger earpiece speaker.
- The periscope telephoto camera is also noticeably larger, likely for extra optical zoom levels.
- Lastly, the wireless charging coils got a minor makeover. The outer charging coils are thinner, elongated, and got a few extra windings. This may help with better efficiency over a bigger charging area. The inner coils now have a two-gauge setup—the fine gauge windings might help charge smaller items (like [Galaxy Buds](#)) more efficiently.

Step 4



- Like a terrible (or genius?) physician, we take one glance and immediately prescribe a dose of heat and slicing to get the rear panel off. We've got patients to see!
 - ❗ Perhaps doubling the dosage of iOpeners will make our job easier? We might need more trials before approving this for wider use.
- After the heat treatment, it's time to make our incisions around the perimeter.
 - ❗ The new camera bump's contours make this procedure trickier. We worked out a lateral pick maneuver, but it still required more patience than we'd like.
- Operation successful! The rear panel comes off without any stray cables attached to it.

Step 5



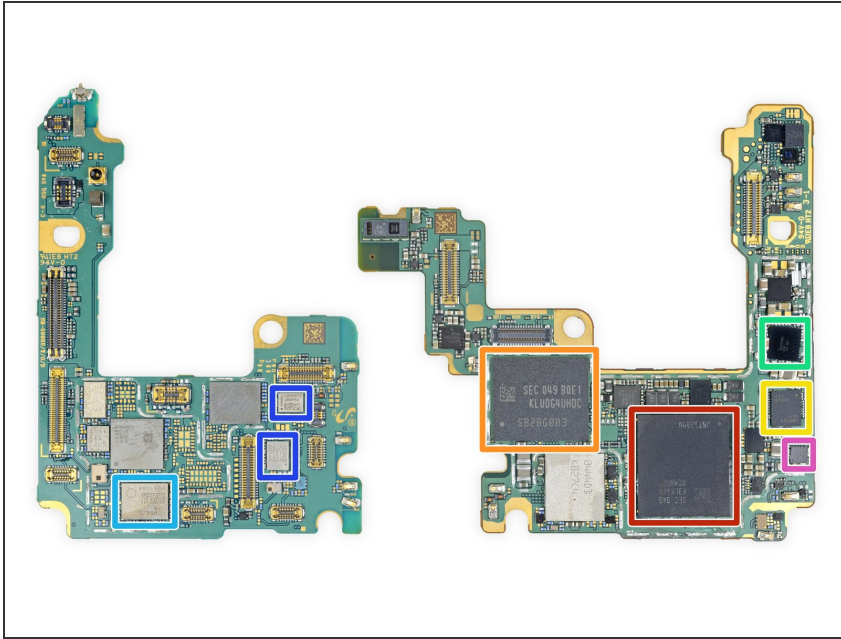
- The same large adhesive gasket holds both the back cover and camera bump in place—but the bump can be carved off separately, making for some interesting DIY customization possibilities.
 - ① ... and, unlike the S20 Ultra, the glass camera lenses can be individually replaced—which is [probably a good thing](#).
- With the back panel removed, we can gawk at how humongous this phone looks next to our tiny [Minnow Driver Kit](#).
 - ① The 'lil guy still gets the job done—proving it's not the size of the toolkit that matters, but how you use it.
- The guts seem a slight iteration over last year's [S20 Ultra](#), with minor changes to the wireless charging coil and upper antenna assemblies.
- The [earpiece speaker](#) comes out with the antenna assembly this go-round, which is an updated design we first saw in the [Note 20](#)—as opposed to being separately adhered to the frame in prior phones like the S20 Ultra.

Step 6



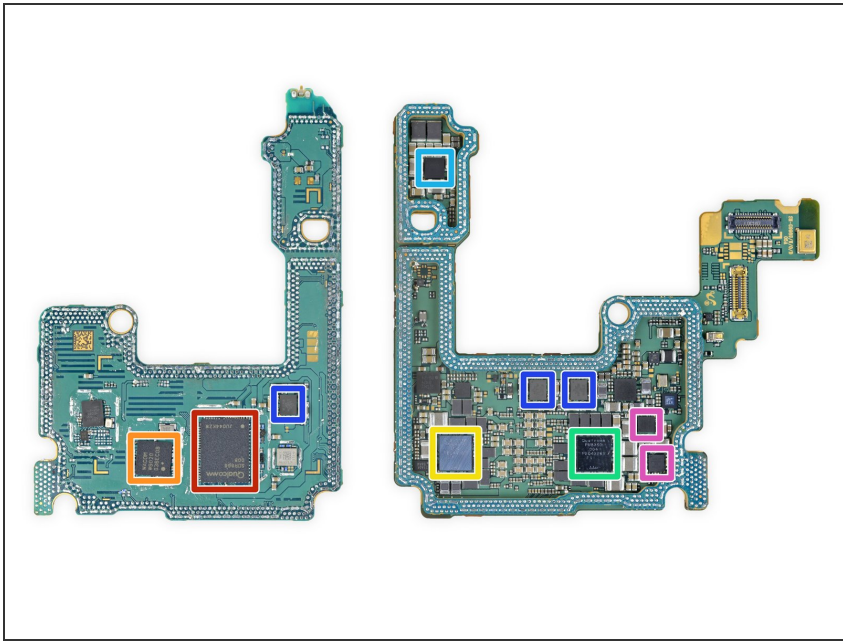
- After we delicately yank the motherboard out, we make a beeline for the camera assemblies, where we're greeted by a familiar friend from the S20 Ultra, the 12 MP ultra-wide.
- Also making a reappearance is the main 108 MP $f/1.8$ wide-angle camera, but this year he slimmed down from a 26 to 24 mm equivalent focal length (beach season is coming!).
- The periscope telephoto camera makes a return as well, albeit with a complete makeover, sacrificing some features in favor of others:
 - ❗ The resolution dropped from 48 MP to 10 MP; focal length increased from 103 to 240 mm (going from 4x to 10x optical zoom); the sensor area shrunk ($1/2.0''$ to $1/3.24''$) but the pixels got larger (0.8 to $1.22\ \mu\text{m}$); finally (drumroll please), a slower aperture, from $f/3.5$ to $f/4.9$. If you absorbed all of that, we salute you.
- One big change to the camera array: The [DepthVision](#) camera from the S20+ and Ultra has packed up and moved out, making room for a 10 MP $f/2.4$ 70 mm telephoto camera as the periscope's new roommate.
 - ★ Seems like DepthVision [wasn't everything it was cracked up to be](#), with Samsung opting for good 'ole software processing to take care of it from now on.
- Also new: this laser AF module, which is awesome AF (at focusing). It's like a miniature *golf rangefinder*—perhaps you can use it as a *miniature golf* rangefinder?

Step 7



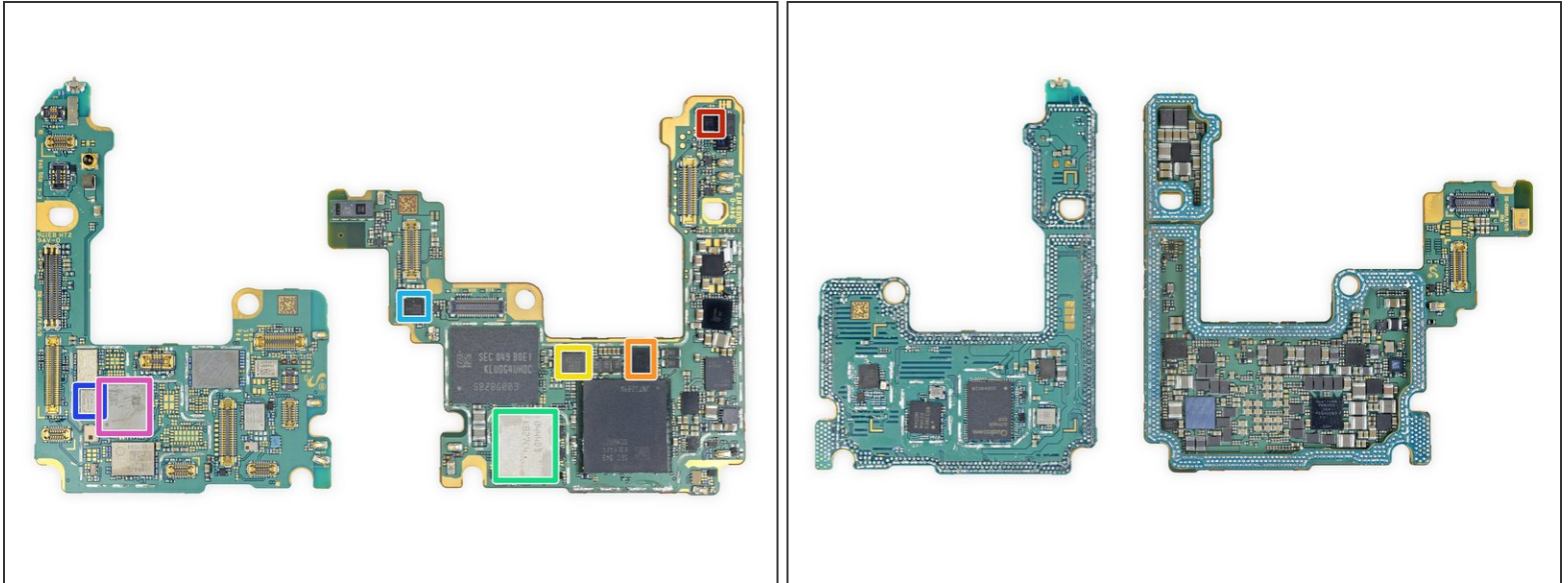
- Do these boards look like howling dogs? Anyways, let's check out what makes this phone tick:
 - Qualcomm Snapdragon [888](#) layered beneath Samsung K3LK4K40CM-BGCP 12 GB LPDDR5 RAM
 - Samsung flash storage [KLU0G4UHD0-B0E1](#) 128 GB
 - Qualcomm SMR526 5G modulator
 - Maxim MAX77705C power management IC
 - Qualcomm QPM5825 power management IC
 - Qualcomm QDM5872 and QDM4820 Front-End Module
 - Cirrus Logic CS35L40 audio amplifier IC

Step 8



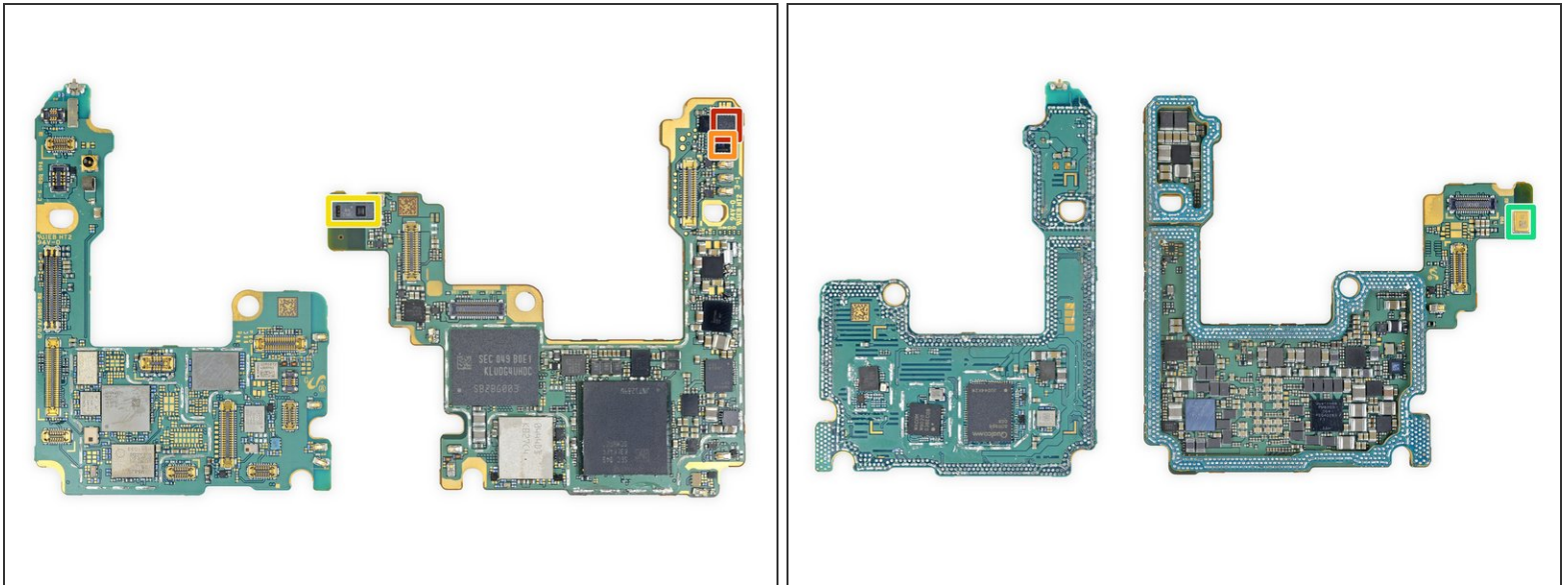
- This right board looks like a suspicious dinosaur. Here are some more chips:
 - Qualcomm SDR868 RF transceiver
 - WACOM W9020 IC (the little secret behind the S Pen) digitizer controller (likely)
 - Qualcomm PM8350C power management IC
 - Qualcomm PM8350 power management IC
 - Samsung SM3080 power management IC
 - Qualcomm QET5100 envelope tracker IC
 - Cirrus Logic CS35L40 and [CS40L25](#) audio amplifier IC

Step 9



- IC identification, continued:
 - STMicroelectronics [STM32G071K8T6](#) 32-Bit ARM Cortex-M0 Microcontroller w/ 64 KB Flash
 - Renesas (formerly Integrated Device Technology) P9320S Wireless Power Receiver
 - NXP Semiconductor SN110T Secure Element
 - Samsung 0444D1 Bluetooth Module (likely)
 - ON Semiconductor [NCP59744](#) 3A LDO Regulator
 - Skyworks [SKY77368-11](#) Power Amplifier Module
 - Broadcom (Formerly Avago) AFEM-9146 RF Front End Module (likely)

Step 10



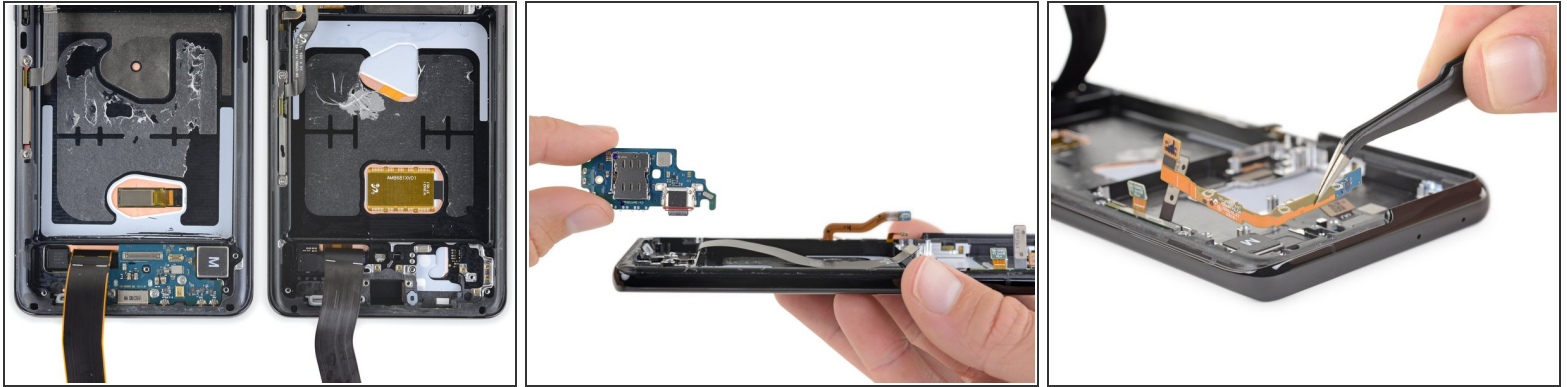
- We hear your insatiable desire for more chip ID, so here are the sensors on the board:
 - STMicroelectronics [LSM6DSL](#) 3-axis accelerometer/gyroscope (likely)
 - STMicroelectronics [LPS22HH](#) pressure sensor
 - Austria Micro Systems ambient light/color/proximity sensor
 - Knowles [SPH0655LM4H-1](#) MEMS microphone (likely)

Step 11



- Familiarity breeds contempt. That couldn't be more ~~glue~~ true as we begrudgingly pull out our isopropyl alcohol and get to work extracting the battery.
- Speaking of familiarity, this power pack looks *awfully* familiar...
 - No wonder! It's very nearly the [same battery from the S20 Ultra](#), with just a couple tiny updates.
- ① If you need a refresher, you're looking at a 5000 mAh power pack, running at 3.88V for 19.40 Wh. (Last year's model ran the battery at 3.86 V, for 19.30 Wh.)
- This puts the iPhone 12 Pro Max's [14.13 Wh](#) battery to shame—along with, oddly, the Note 20 Ultra's seemingly-gargantuan [17.46 Wh](#) power pack. Samsung, your product positioning, it confuse.

Step 12



- Holy fingerprint sensor, Batman! The new in-screen sensor on the S21 Ultra (right) is a whopping 77% larger than the S20's now-puny-looking one.
 - ❗ On top of [software improvements](#), the larger surface area lets you be more lax with finger placement, while also collecting more data per scan.
- ✦ The S21 Ultra annoyingly skips the convenience of a modular display cable, like the one [we found in the regular S21](#). That makes screen replacements slightly more cumbersome.
- We peek through a cutout and spot [the display chip](#). We'll leave the display ungluing ceremony for a real repair guide.
- As seen from our [X-ray shot](#) earlier, the SIM card reader has moved from the top of the phone—where it was connected to the motherboard—to the bottom of the phone, now connected to the daughterboard, right next to the USB-C charging port.
- Squeezed into the corner of the frame is a new antenna, perhaps of the UWB variety? This isn't the [first Samsung device with UWB](#), but it's the first Galaxy S phone to include the tech, which is [pretty interesting](#).

Step 13



- Samsung is known for pushing the boundaries of what's possible for a smartphone, but this seems more like a maintenance year for the Galaxy series—keeping the things that worked and getting rid of the nice-tries, resulting in a refined product.
- With that said, the repairability of the S21 Ultra certainly hasn't been refined from previous generations...

Step 14 — Final Thoughts

REPAIRABILITY SCORE:



- Samsung's Galaxy S21 Ultra earns a **3 out of 10** on our repairability scale (10 is easiest to repair):
 - All the important fasteners are identical Phillips screws in size and length, simplifying the repair process.
 - Many components are modular and independently replaceable, but the missing modular display cable and polycarbonate rear panel from the regular S21 are a step backward.
 - The rear panel is glued down and difficult to remove, even more so thanks to the new ridge around the camera bump's edge.
 - The battery and display continue to be difficult repairs, as both components are held down with some serious adhesive and require a fair bit of disassembly to get to.