

INTRODUCTION

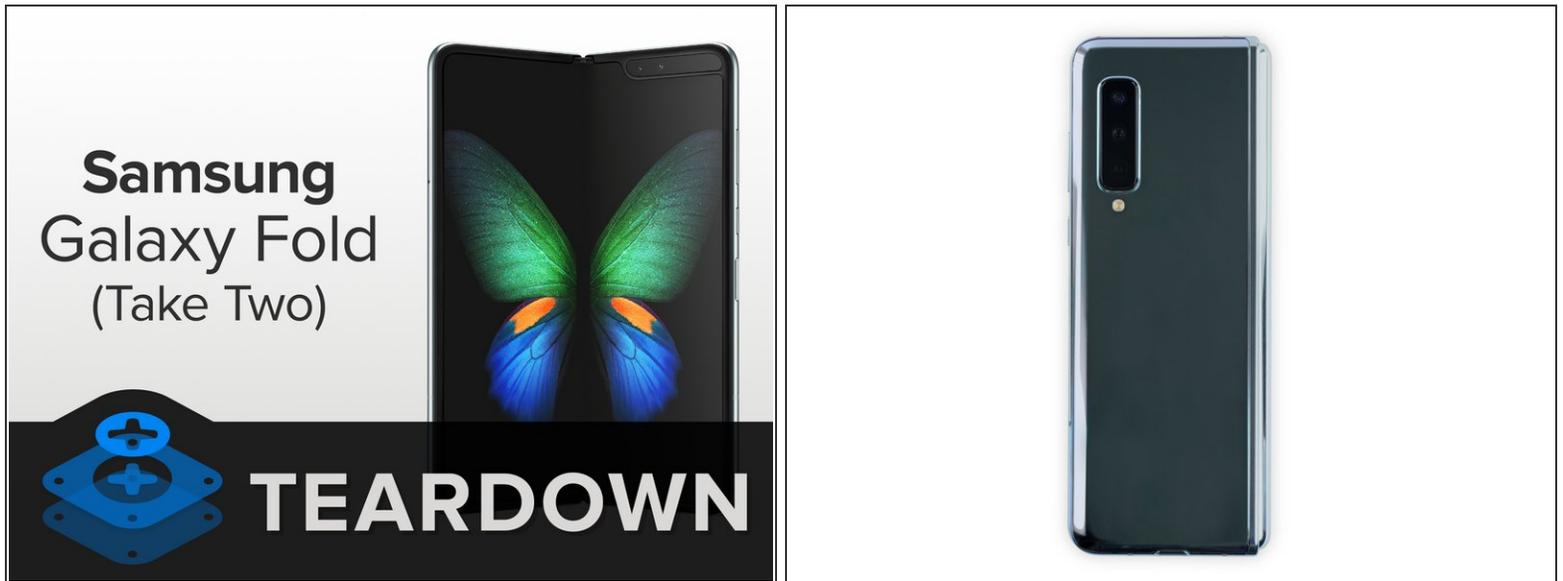
Teardown Update: After Samsung tried to make our initial teardown [disappear from the internet](#) five months ago, we're back with a teardown of the final, really-for-real this time retail Galaxy Fold. This model incorporates Samsung's late-breaking hardware revisions for improved durability—but is it enough, or is the design fatally flawed? Join us for Galaxy Fold Teardown, Part Two: The Re-Unfolding.

Follow us on [Instagram](#) and [Twitter](#) for more exclusive teardown and repair content, and subscribe to our [newsletter](#) to get iFixit delivered right to your inbox.

TOOLS:

- [iOpener](#) (1)
 - [Suction Handle](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Halberd Spudger](#) (1)
 - [Spudger](#) (1)
 - [Tweezers](#) (1)
 - [Phillips #000 Screwdriver](#) (1)
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Step 1 — Samsung Galaxy Fold Teardown



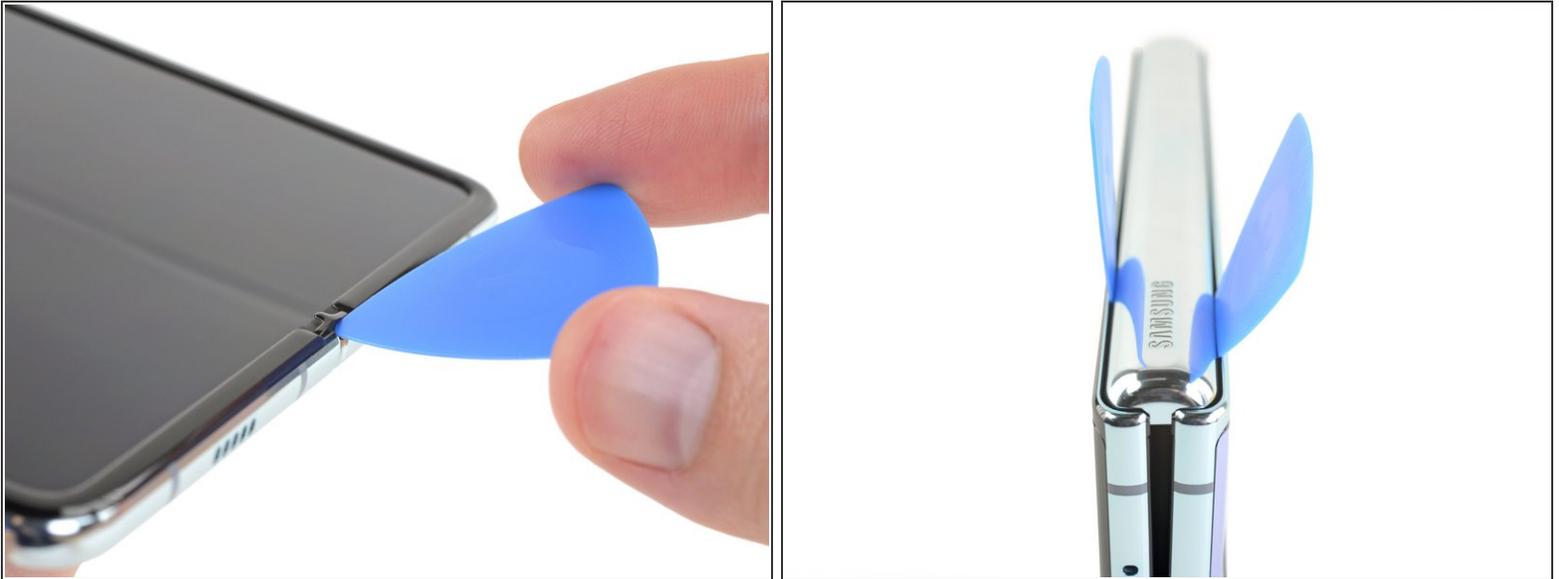
- We always like to review the hardware specs going into a teardown, and for once we get to copy our own homework. These look like nearly the same specs we jotted down back in April:
 - One 7.3" dynamic AMOLED *Infinity Flex* main display (2152 × 1536 resolution, 362 ppi), and one 4.6" super AMOLED cover display (720 × 1680, 399 ppi)
 - Qualcomm Snapdragon 855 64-bit octa-core processor
 - 12 GB RAM with 512 GB internal storage
 - A total of *six* cameras, from front to back: 10 MP "closed" selfie camera, 10 MP "open" selfie camera, 8 MP RGB depth camera, 16 MP ultra-wide rear camera, 12 MP wide-angle rear camera, 12 MP telephoto rear camera
 - Capacitive fingerprint sensor / Bixby button combo
 - USB Type-C power/data port (but nary a headphone jack to be found)
- ⓘ Oh! Looks like this fragile butterfly has put on a couple extra grams since we last saw it—13 grams, to be exact, for a total of 276.

Step 2



- New for this release: detailed care instructions, including warnings against touching the touchscreen too hard, and exposing the phone to dust.
- Looks like Samsung really wants us to take care of this thing ... it doesn't say anything about taking it apart though? So I guess we'll continue?
- "When folding the device, do not place any objects, such as cards, coins, or keys, on the screen." [We would never do that.](#)
- If you haven't seen one of these in person, here's how it stacks up:
 - In "folded" configuration, it's narrower, taller, and *much* thicker than a [Galaxy S10+](#).
 - In "unfolded" form, however, it's ... big. Not quite [iPad mini 5](#) big, but its bezels are tiny—so in terms of usable screen real estate, the two devices are actually pretty comparable.
- ❗ It also [folds more easily than an iPad Pro](#), and without the shower of glass shards.

Step 3



- Samsung has shored up many of the leaky spots that previously plagued this phone.
- Perhaps the most prominent entry point for display-killing debris was at either end of the fold, where a break in the hard plastic bezel left a big gap.
 - We're happy to see that Samsung added a small protective cover to close the gap and prevent ~~our tools~~ debris from sneaking in behind the screen.
- When closed, the *screen* is protected—but the *spine* is still flanked by gaps that our opening picks hop right into. These gaps are less likely to cause immediate screen damage, but will definitely attract dirt.
- ⓘ It seems Samsung is trying to cover the most immediately threatening ingress points, but it's extremely challenging to completely seal off a phone with this many moving parts. It'll be interesting to see how future folding designs overcome this.

Step 4



- Did we mention it's thick? Folding phones are cool and all, but good luck fitting this thing into your skinny jeans.
- The hinge area packs the bulk of the, uh, bulk—partly because the screen doesn't fold completely flat. It closes more like a binder than a book, making contact only at the outer edge.
- ⓘ Putting the fold on the inside rather than around the outside makes for a tighter radius and a whole different set of camera placement problems than, say, [Huawei's approach with the upcoming Mate X](#).
- In its unfolded form, the main screen sports a slightly raised bezel, meaning there's a noticeable lip around the edges that you can feel under your fingers. This likely protects the display when it's folded or resting face-down on a table.
 - Word on the street is that [scandalous screen protector](#) now extends all the way under this raised bezel, away from prying hands. Will that protect it from us, though? Probably not.
- The phone ships *un*-folded—but fold it even once, and that crease becomes pretty easy to spot if you're looking.

Step 5



- Right, so, this is supposed to be a teardown, and unfolding it doesn't count. Time to pick a point of entry and go for it. Arm iOpeners!
- [Experience tells us](#) that Samsung likes to build their phones from the front, and stick the back cover on last—so we start there.
- Once again a little heat from our [iOpener](#) softens the glue up nicely, and we slice off the first of the two outside covers. We're in.
- ⓘ Samsung's usual curved glass covers, like the one we [recently pulled off the Note 10+](#), can be stressful to pry under, so the flat point of entry here is a welcome relief.

Step 6



- Even lightly-glued back covers are a repair headache—but with that out of the way, these screws are a treat. Wacky phone design, meet mercifully boring ordinary Phillips fasteners.
- Our first jab below the surface reveals pretty standard-looking [Galaxy smartphone parts](#). First out: the wireless charging coil and antenna assembly.
- ⓘ This half looks like a pretty complete phone all by itself—it just needs a speaker and vibration motor.
 - So, what's hiding in the other half?

Step 7



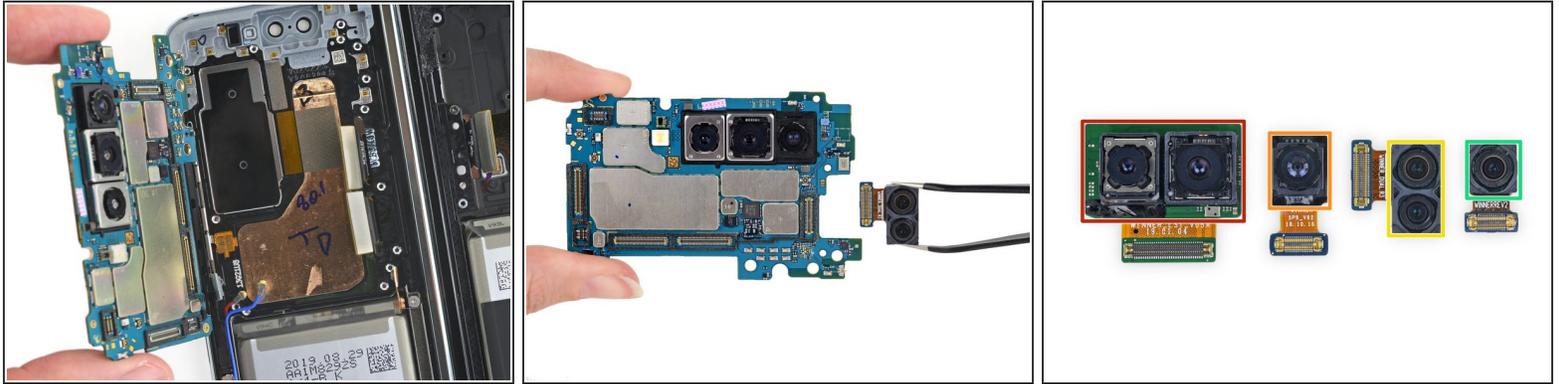
- Hey look, there's a phone attached to this phone! We set about opening this phone's second half, where a comparatively tiny notification screen is flanked by some seriously massive bezels.
- This non-folding front screen comes off with a little heat and fairly little drama, for a Samsung.
 - It's helped by the flat edges and big bezels—which despite looking kinda funky, actually leaves ample room to pry without stabbing the delicate OLED panel in the process.
- Flipping the display over reveals the OLED panel is made by Samsung, to the surprise of no one.
 - Along for the ride is Samsung's own S6SY761X touch controller, last seen in [pretty much every Samsung teardown](#).
 - Winbond [W25Q80EW](#) 4 Mb serial flash memory

Step 8



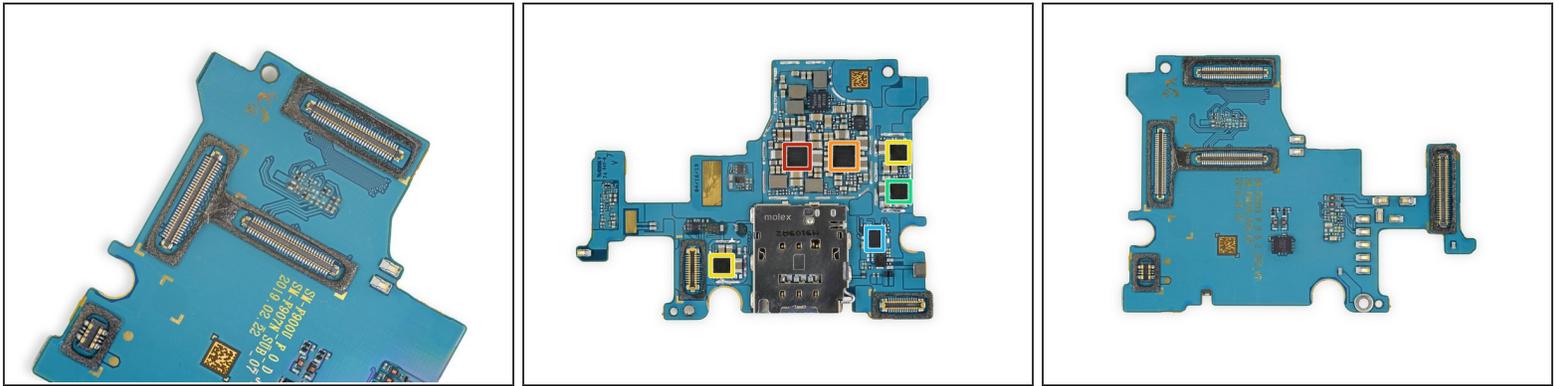
- One battery, two batteries, way-too-much-glue batteries. In typical Samsung fashion, they come out with isopropyl alcohol and a lot of swearing.
- If dimensions are your thing, the taller, front-facing battery is 42.2 x 76.8 x 3.8 mm, and the battery in the rear-facing section with all the cameras measures 42.6 x 64.3 x 4.8 mm.
- But really, here's the measurement that matters: 8.22 and 8.65 Wh, respectively, or 2135 mAh and 2245 mAh.
- ⓘ Those are each less potent than the 11+ Wh power packs in any of the [S10 phones](#), but in tandem they provide 16.87 Wh of power.
 - *That's* less than most tablets, including the 19.32 Wh cell in the newest [iPad Mini](#)—but since this is technically a smartphone, that's ... impressive?

Step 9



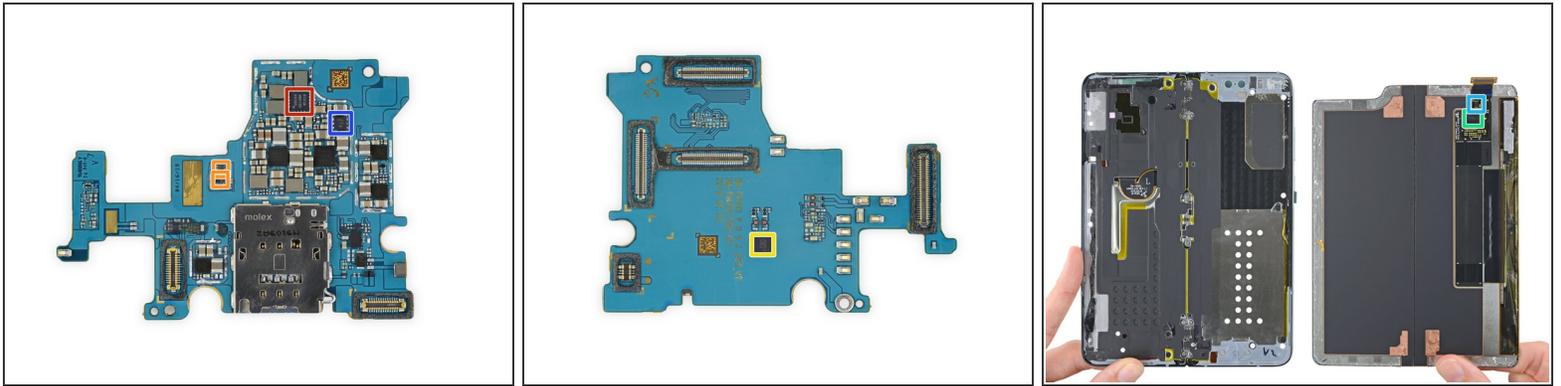
- Beneath the main board, a sign. Some friendly manufacturing QA professional has inscribed the copper heat sink with the letters *TD*—which, come on, can only mean *Tear Down*. Samsung? Is that you? Was this meant to be?
- You probably could have spent your \$2,000 USD on a pretty nice DSLR or mirrorless camera, so it's slightly appropriate that this phone folds *six* cameras into its frame. Consolation prize?
- ❗ The only other time we've seen this many cameras in a smartphone teardown is Huawei's [P30 Pro](#).
- We line up the unblinking eyes:
 - Rear-facing 12 MP telephoto and 12 MP wide-angle cameras
 - Rear-facing 16 MP ultra-wide camera
 - "In-the-fold" 10 MP selfie cam (top) and 8 MP RGB depth cam
 - "Folded" front-facing 10 MP selfie cam

Step 10



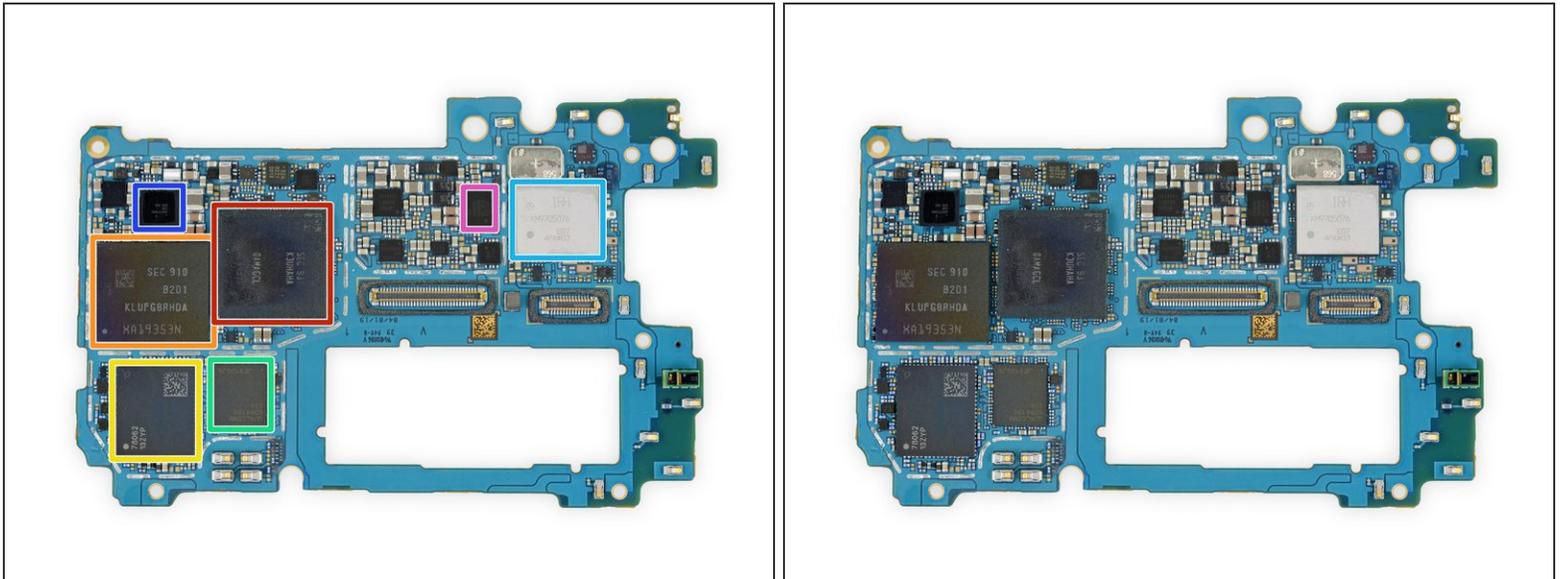
- Let's check out the left-side board.
- Are those *silicone seals* around the flex cable connectors? It sure looks like it. We first spotted these [ingress-protection measures way back on the iPhone 6s](#), but they're not a common sight on Samsung products. When the chassis isn't water or dust-proof, this is how you build in a little board protection.
- Meanwhile, here's the *silicon* we found on this board:
 - Samsung S2MPB02 camera power management
 - Samsung S2DOS05 display power management
 - Cirrus Logic [CS35L40](#) haptic driver w/ digital signal processor
 - Cirrus Logic CS40L25 audio amplifier
 - Samsung S2ASL01 over-current protection (likely)

Step 11



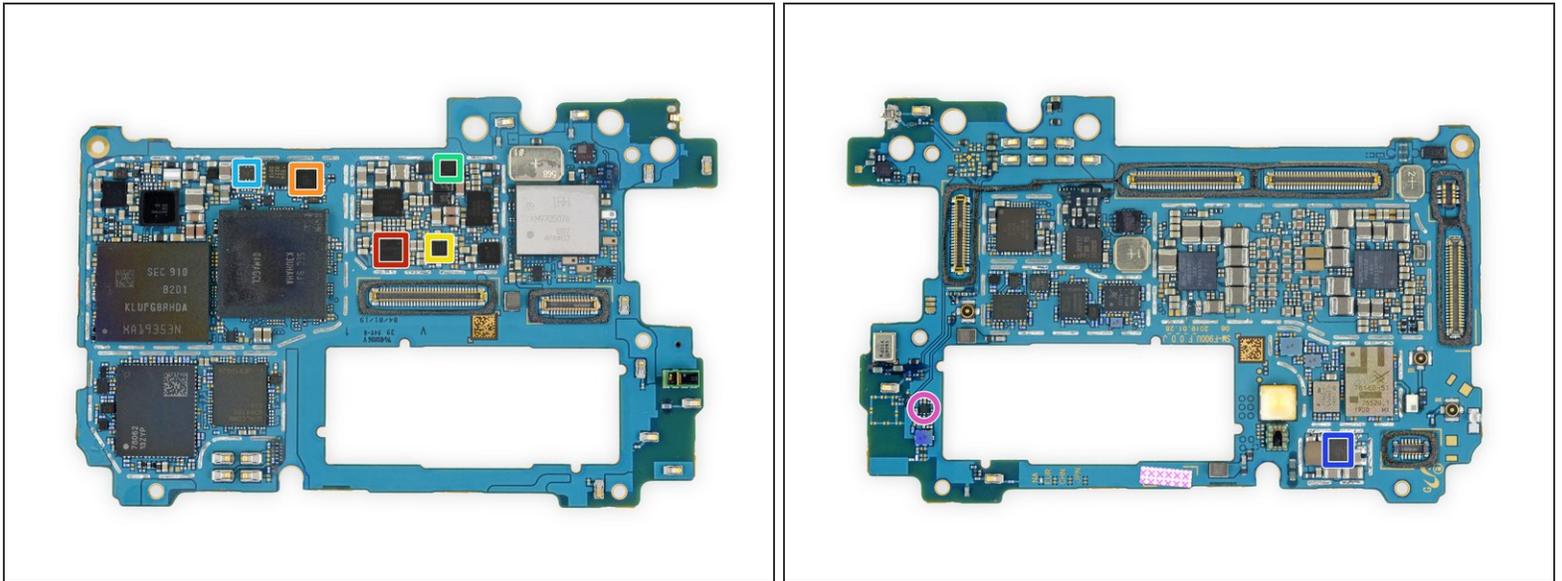
- SIM card PCB IC ID continued, plus bonus touchscreen chips:
 - Samsung S2DOS04 backlight controller (Likely)
 - NXP Semiconductor [NCX2200](#) low voltage comparator
 - STMicroelectronics [LSM6DSO](#) accelerometer
 - STMicroelectronics [FingerTip](#) touch screen controller
 - GigaDevice GD25LH80C 8 Mb serial flash memory
 - Richtek [RT8010](#) step down DC-DC converter

Step 12



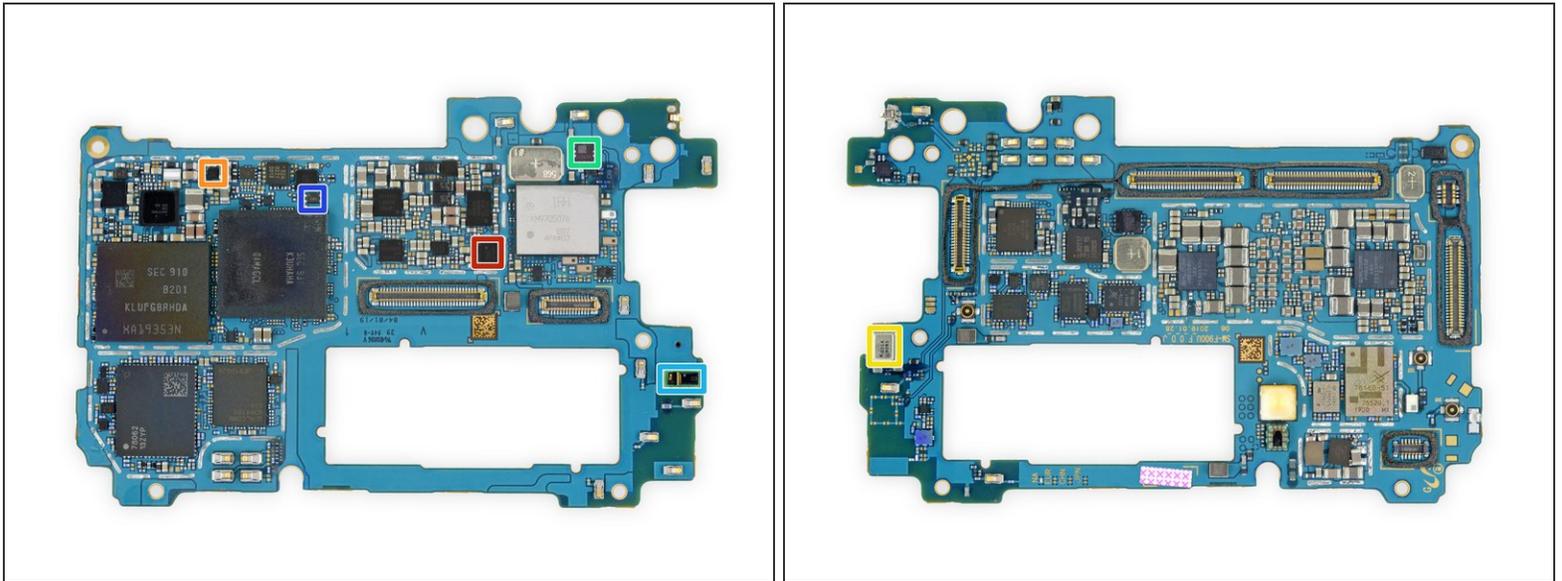
- Double the phone, double the fun! Found on the right side's main board:
 - Samsung [K3UHAHA0AM-AGCL](#) 12 GB RAM layered over Qualcomm Snapdragon 855
 - Samsung KLUGF8RHDA-B2D1 512 GB eUFS NAND flash storage
 - Qorvo QM78062, likely a [RF Fusion](#) front-end module
 - Qualcomm SDR8150 RF transceiver
 - Murata KM9705076 front end module (likely)
 - Maxim MAX77705C PMIC
 - IDT P9320S Wireless charging IC

Step 13



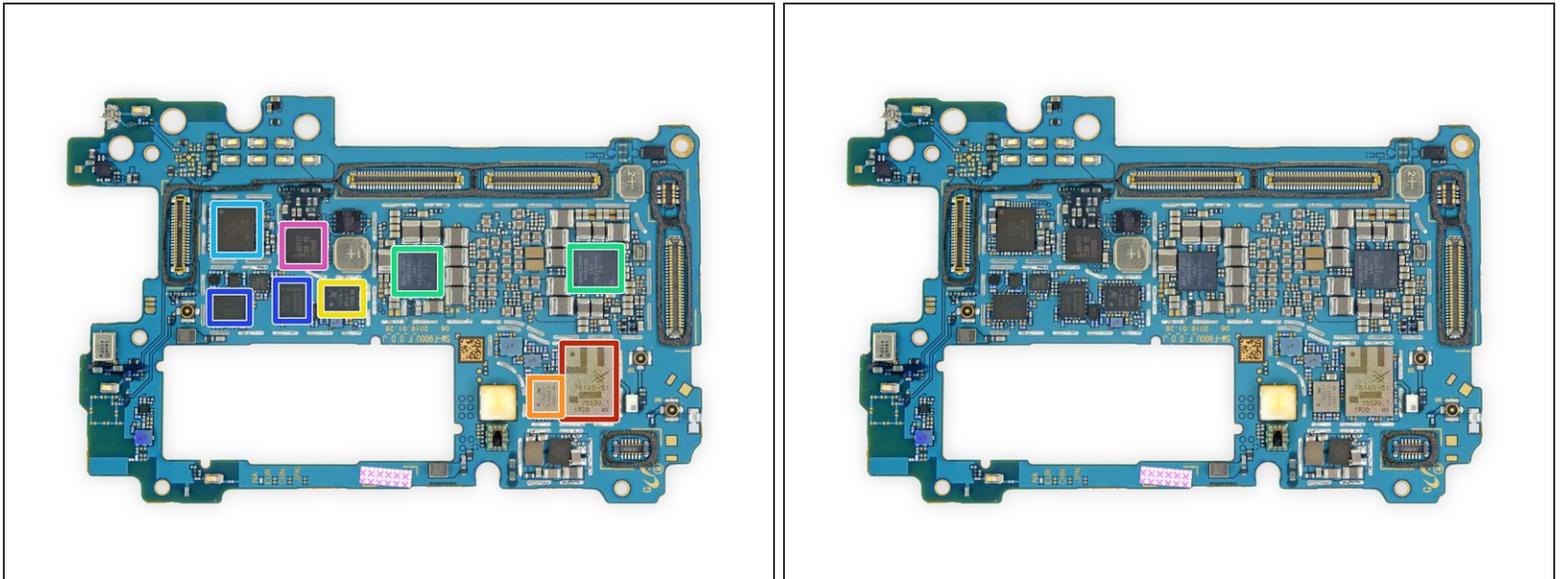
- Main PCB IC ID, part 2:
 - STMicroelectronics [ST33G1M2](#) 32-Bit ARM Cortex-M3 secure microcontroller
 - STMicroelectronics [STM32G071EB](#) 32-Bit ARM Cortex-M0+ microcontroller w/ 128 Kb flash
 - Samsung S2MPB03 camera power management
 - Samsung S2MIS01 [Magnetic Secure Transmission \(MST\)](#) driver
 - Vishay [DG2730](#) 480 Mbps DPDT analog switch
 - Qualcomm QET5100 envelope tracker
 - NXP Semiconductor [BGU8103](#) GPS/GLONASS/Galileo/COMPASS

Step 14



- Main PCB IC ID, part 3:
 - ON Semiconductor [FSA644](#) 1.5 Gbps SPDT analog switch
 - ON Semiconductor [FAN48618](#) 1 A boost converter
 - Goertek MEMS microphone
 - STMicroelectronics [LPS22HH](#) pressure sensor
 - STMicroelectronics [LSM6DSO](#) accelerometer
 - Seiko Instruments Hall Effect sensor
 - AMS ambient light/proximity/color sensor with IR emitter

Step 15



- And on the final flip side:
 - Skyworks [SKY78160-51](#) low noise amplifier
 - Skyworks [SKY77365-11](#) power amplifier module
 - Skyworks [SKY13716-11](#) low band front-end module
 - Qualcomm PM8150C power management
 - Qualcomm [WCD9341](#) audio codec
 - Qualcomm QDM3870 RF front end module
 - NXP [PN80T](#) NFC controller w/ secure element

Step 16



- With all the interesting inner bits out of the way, we turn our attention to the star of the show: the foldable OLED display itself.
 - The interior bezel lip—still held only by light adhesive—comes up without much of a fight.
 - Normally we overwhelmingly prefer a light touch when it comes to adhesive. And yet, in this case, we can't help but worry these bezels may peel over time, exposing the screen to damage.
 - These bezels are super slim—when peeled up, they *barely* cover two millimeters of display.
 - With the bezels pulled up, you can see the new T-shaped plastic protection caps guarding either edge of the display's fold. A flexible gasket stretches over the gap, tucking under the tail of the T.
 - This is definitely an improvement over the gaping hole left here in the gen-1 Fold—but will it really keep all your pocket lint and Cheeto dust from working its way into that display? For that matter, what about [ants](#)? No really, [what about ants](#)?
-  Better hope you [live in a bubble...](#)

Step 17



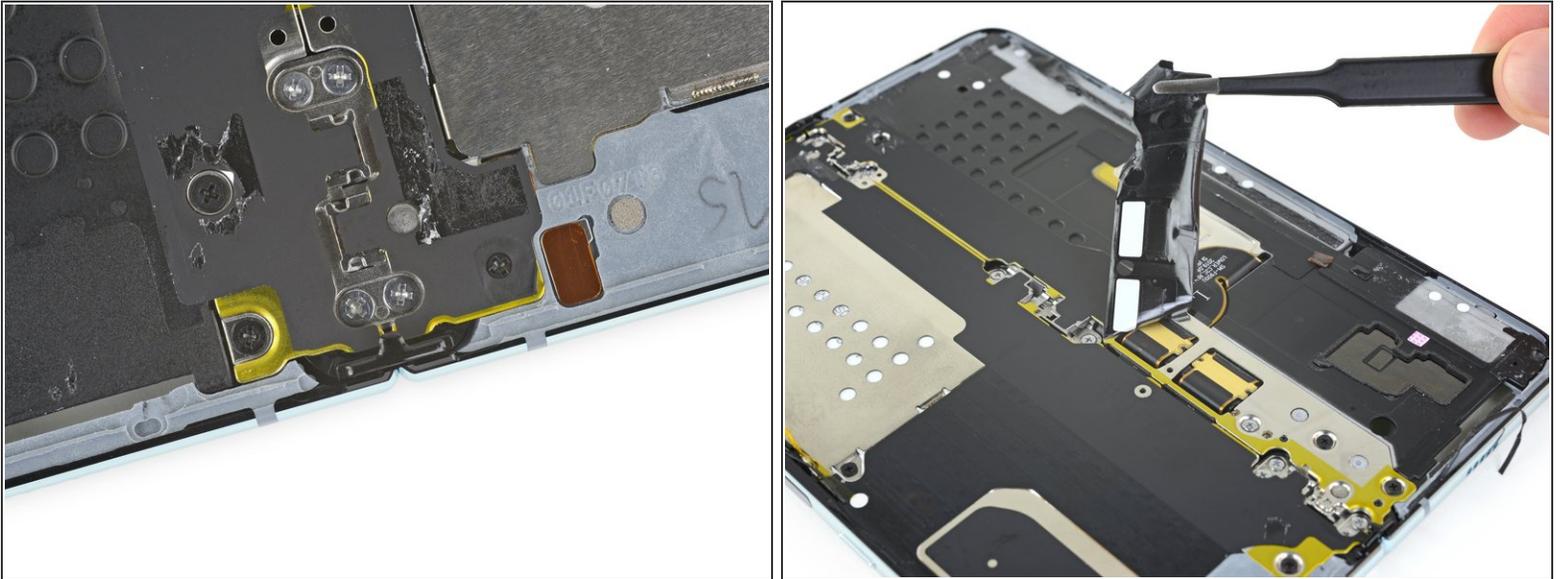
- Now bezel-less, the screen is primed for prying off! We didn't need any heat last time, but today it seems Samsung isn't taking chances—they want this screen to stay put, and have added an extra sticky strip of black tar goop.
- The screen is still adhered only along the outer edges—probably to allow the screen to float as it opens and folds.
 - For once, the relative difficulty of replacing the screen is not even our biggest beef. You wouldn't even have to drop this thing to break it, meaning screen replacements seem *inevitable*, and that's a scary thought.
 - Samsung generously offers to [replace it for just \\$149](#)—but *only once*, so make sure you [use a light touch](#).
- ⓘ Granted, using plastic instead of glass as an OLED substrate means this display is less likely to *shatter*—but there are [other modes of failure](#).
- A single [ultra-wide display cable](#) connects the display to the board.
- ⓘ That means *The Verge's* reported "[jelly scrolling](#)" was probably due to the [display driver](#) software, not a split display.
- *Could* they have updated the display driver for the second launch? Absolutely! Did we turn ours on to test before we took it apart? You ask too many questions.

Step 18



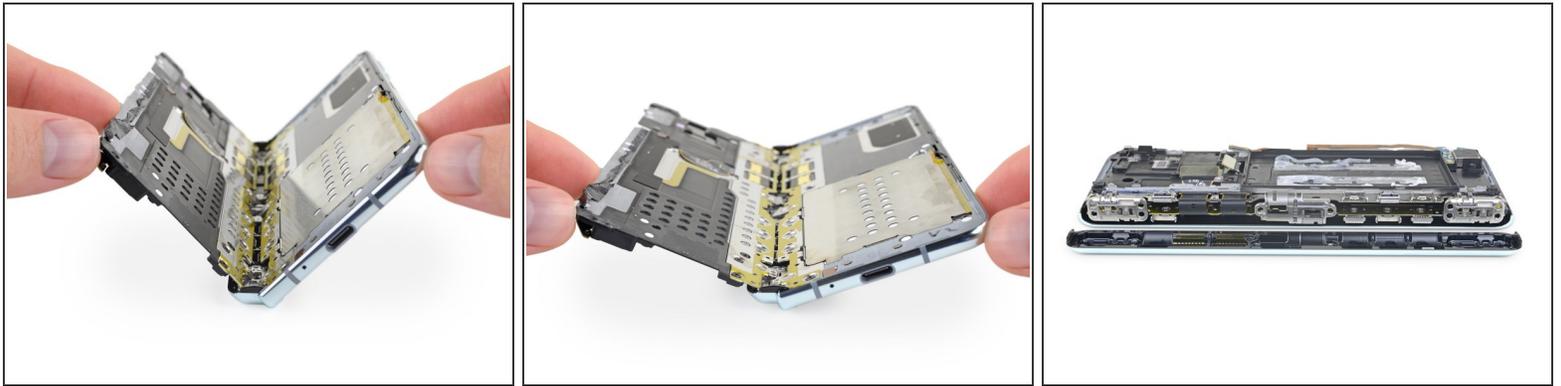
- Well, well—this must be the [reinforced screen](#) we've heard so much about. And we do indeed find an extra metal layer, like chainmail armor between the backing plates and the display.
 - Backing the new notched armor layer are the aforementioned metal support plates, whose edges are adhered to the phone's frame. This leaves the center spine free of adhesive for a wider-radius fold.
- ⓘ All this metal makes the display surprisingly rigid, even when separated from the chassis.
- Once removed from the chassis, the display looks completely flat, with no fold or scoring in sight.
- The "Advanced Polymer Protective Layer" on top of this flexible display—the one that caused [all that ruckus before](#)—is still [not to be removed](#). But at least Samsung has removed temptation by extending it just about all the way to the edges of the screen.
 - We still can't believe that this layer wasn't hidden from the get-go. It looks so similar to the pre-installed screen protectors that ship with [Galaxy S10 phones](#). Did they really think no one would pick at it?
- We're guessing that removing this layer still kills the display, and since Samsung asked nicely, we'll leave it in place ... for now.

Step 19



- Next we notice that the hinges, formerly bare, are newly covered in tape—probably to block debris from sneaking in through the pick-sized gaps in the outer spine.
- ⓘ Dirt and debris can still get into the hinge and potentially gunk it up over time, but at least it will have a harder time making its way to the display. [As we all know](#), anything lodged between the fragile display and its hard metal backplate can become a fatal pressure point.
- Enough staring at tape—let's rip it off and check out the hinges hiding beneath.

Step 20



- Next up: the magic hinge that makes all of this folding wizardry possible, looking [pretty similar](#) to the last Fold we saw. Let's count it down:
 - **Four** [spring-loaded clasps](#) lock the display in the "open" position. The system is well-engineered and likely to last a long while.
 - **Two** hinges, secured to the spine—one at the top and one at the bottom—allow for some horizontal play in order to absorb any torsion force.
 - **One** center hinge, which sports a gear system. This distributes the opening force equally, ensuring that the two halves of the phone open synchronously.
- The two well-routed flex cables serve as a [corpus callosum](#) between the phone halves. Each end of the cable is held securely in place before the bend, giving the cable room to flex freely.
- ⓘ Routing flex cables through hinges is a serious reliability concern over the long haul. This one looks designed to hold up—but if it doesn't, at least the cable itself is modular, [unlike some others we've seen](#).

Step 21



- And here's that beautiful spine in motion!
 - At the top: the single rounded sliding hinge.
 - Just below that: one of the springy clasps, for latching the phone open.
 - And towards the bottom: the gear array, stabilizing the center and distributing force.
- ★ Samsung says they folded these phones more than 200,000 times, and with this hinge system we don't doubt it. But we think it's safe to say that humans aren't quite as gentle as Samsung's robots are? Plus, even a [different robot](#) couldn't achieve the same results.

Step 22



- Despite its improvements, this beautiful butterfly's life was still tragically short.
- For the most part, it looks like Samsung quietly made all the durability quick-fixes we suggested in our original Fold teardown! You're welcome, Samsung.
- We found covers over the gaps on either side of the display crease and tape around the inside of the hinge, both working to keep debris away from the backside of the display.
- For further reinforcement, there's an extra layer of metal bonded to the back of the display.
- Last but not least, the screen protector is slightly larger, hiding its tempting edges beneath the plastic bezel.
- That said, this thing is still pretty fragile. We'll have to see how it holds up in the real world, but for now we can't help but wonder: why weren't these revisions a part of the first Fold? It took reviewers (and us) less than a week to figure out the phone's weak points. Why ship something they must have known to be so easily breakable?

- While the phone is easier to get into than some, it still seems alarmingly fragile—a bad sign for repair.

Step 23 — Final Thoughts

REPAIRABILITY SCORE:



- Samsung's Galaxy Fold earns a **2 out of 10** on our repairability scale (10 is the easiest to repair):
 - A single Phillips driver takes care of all the screws.
 - Many components are modular and can be replaced independently.
 - The mechanics involved in the fold are likely to wear over time, causing stress to hinges and display, necessitating eventual replacement.
 - The fragility of the main display means you'll almost certainly be replacing it before long—a pricey repair.
 - Battery replacements are possible, but unnecessarily difficult—solvents help, but risk damage to the display supports.
 - Glued-down glass both front and back means greater risk of breakage, and makes repairs difficult to start.