



Samsung Galaxy Note10+ 5G Teardown

We tear down the 5G flavor of the new Galaxy Note 10+. Along the way we encounter millimeter wave antennas, a sticky battery, a sneaky speaker, and more!

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INTRODUCTION

Samsung just *penned* the death of the headphone jack with its newest phablet, the everything-but-the-kitchen-sink Galaxy Note10+ 5G. What else lies within that monolithic slab? In this teardown adventure, we breach its water-resistant seals, dredge its depths in search of elusive 5G chips, and encounter some surprising hardware along the way.

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TOOLS:

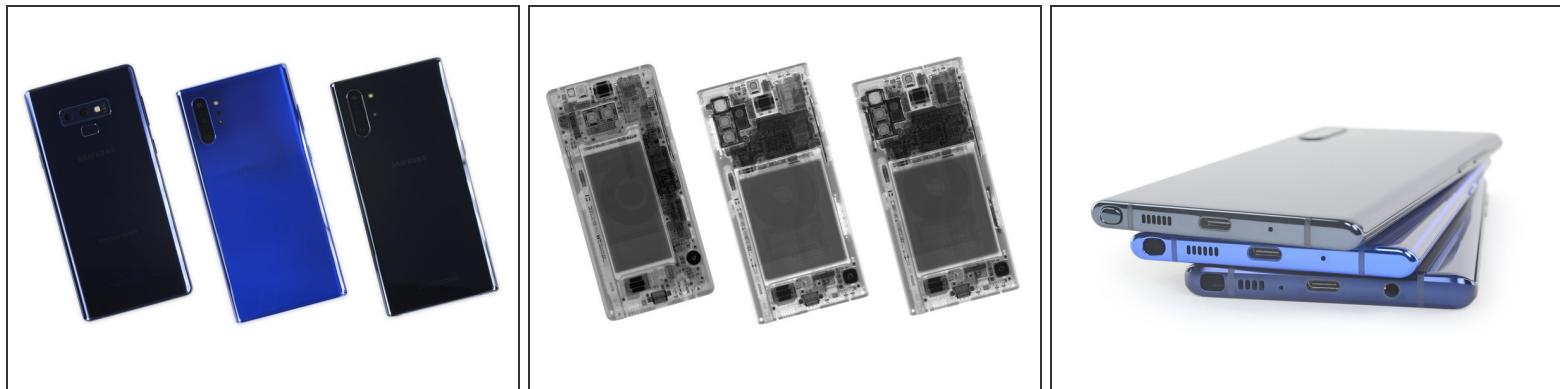
- [Heat Gun](#) (1)
- [Suction Handle](#) (1)
- [iFixit Opening Picks set of 6](#) (1)
- [Phillips #00 Screwdriver](#) (1)
- [Spudger](#) (1)
- [Tweezers](#) (1)
- [iSclack](#) (1)
- [Ultrasonic Cutter](#) (1)
- [Hot Air Rework Station Hakko FR-810](#) (1)

Step 1 — Samsung Galaxy Note10+ 5G Teardown



- Before we tear down, we take Note of these 10+ 5G specs:
 - 6.8" AMOLED Infinity-O display with 3040×1440 resolution (498 ppi), HDR10+ certified
 - Qualcomm Snapdragon 855 paired with 12 GB RAM and 256 GB internal storage
 - 4,300 mAh battery
 - Four rear-facing cameras (16 MP ultra-wide, 12 MP wide-angle with OIS, 12 MP telephoto with OIS, VGA DepthVision camera), plus a 10 MP selfie cam
 - Ultrasonic in-screen fingerprint sensor
 - S Pen stylus with Bluetooth connectivity and 6-axis sensor
 - IP68 dust and water resistance rating

Step 2



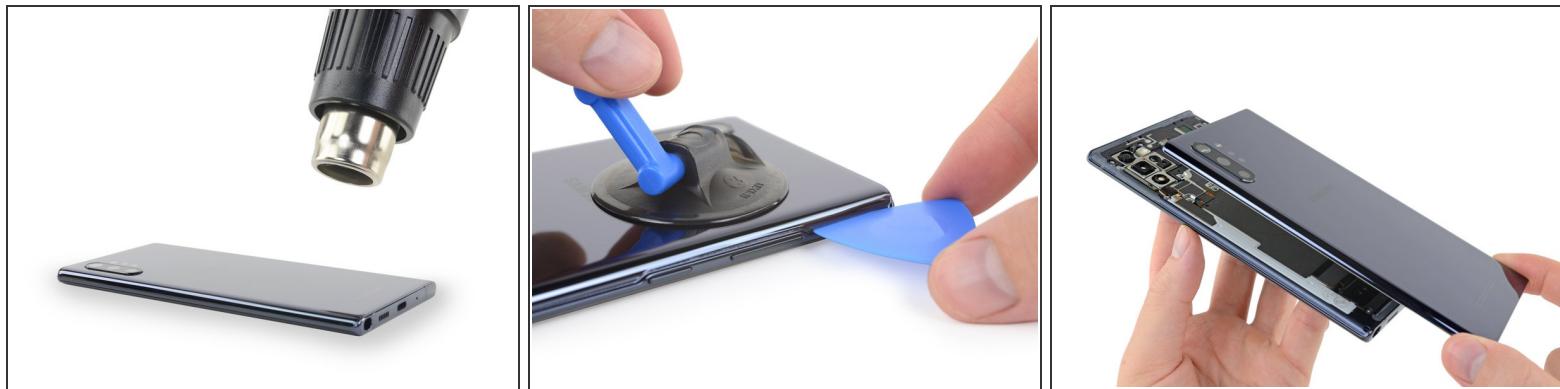
- We lay out (from left to right) last year's Note9 next to the new Note10+ and Note10+ 5G and try to spot the differences.
- This year Samsung realigned the Note's cameras vertically. They also got rid of the rear fingerprint sensor—that's been moved under the display, like what we saw [earlier this year](#).
- At last, we're forced to mourn the loss of the headphone jack—[supposedly a necessary tradeoff](#) for a larger battery and improved haptic feedback.
- *(i)* It seems that Samsung, one of the last remaining Rebel allies, has decided to join [the dark side](#).
- Before we get any further, [Creative Electron](#) gives us a peek at some interesting internals—looks like we've got some fun exploration ahead.

Step 3



- Out comes the star of this show: the magic wand new and improved S Pen.
- *(i)* Now with gesture control, for wizard-like wireless control of your Note10.
- Cameras on all the newest Notes are vertically aligned, but the 10+ includes a fancy new feature alongside that stack of sensors.
- *(i)* Samsung's DepthVision time-of-flight sensor—exclusive to the largest Note10—uses an infrared illuminator and VGA camera to quickly and accurately measure distance. This sensor enables or enhances many of the Note's features, including Live focus, AR effects, and 3D object scanning.

Step 4



- Annnnd we're off! The delightful duo Heat and [Pick](#) get under the back cover without breaking a sweat (although the same may not be said for their wielders). It's almost like they do this every day.
 - [*i*](#) This is standard procedure for most modern, [glue-laden smartphones](#), but we sure wish that wasn't the case.
- As we slice away at the adhesive, we notice that, this year, the cover is contoured around the volume and ~~Bixby~~ power buttons—not *quite* the change to the opening procedure we hoped for.

Step 5



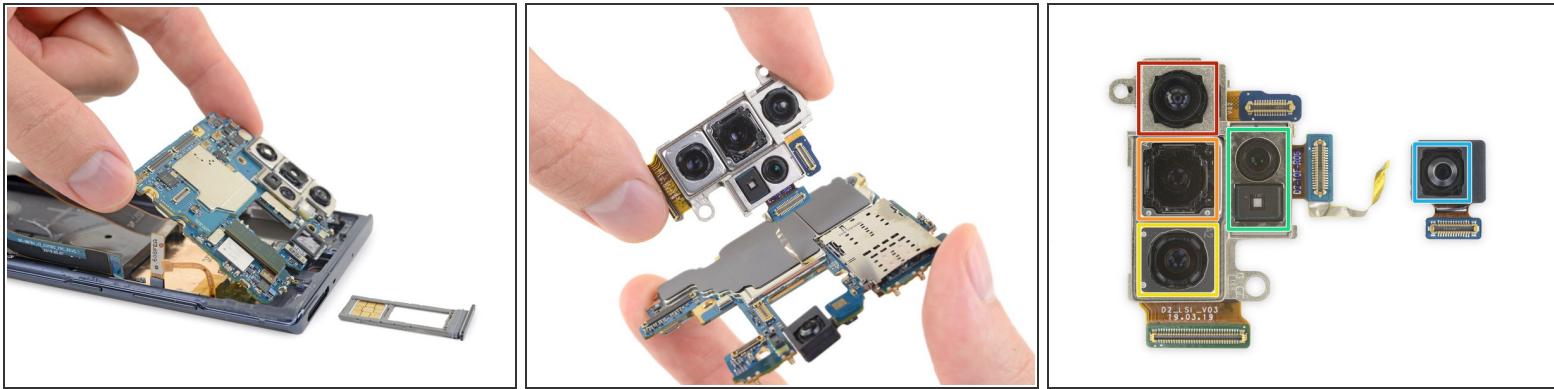
- A few Phillips screws hold down the midframe assembly—nothing our tried-and-true [Mako 64 bit kit](#) can't handle!
- With the midframe removed, we encounter a somewhat radical change: the motherboard is solely at the top of the device, [Pixel-style](#).
 - ⓘ While this allows for a wider battery, it makes the connection between mother and daughterboard trickier, necessitating these annoying interconnect cables that block battery access.
- At least the cables are on top, rather than under a battery and primed for pry damage. So far, Apple's interlocking "L" shapes seem to be the best use of space we've seen...

Step 6



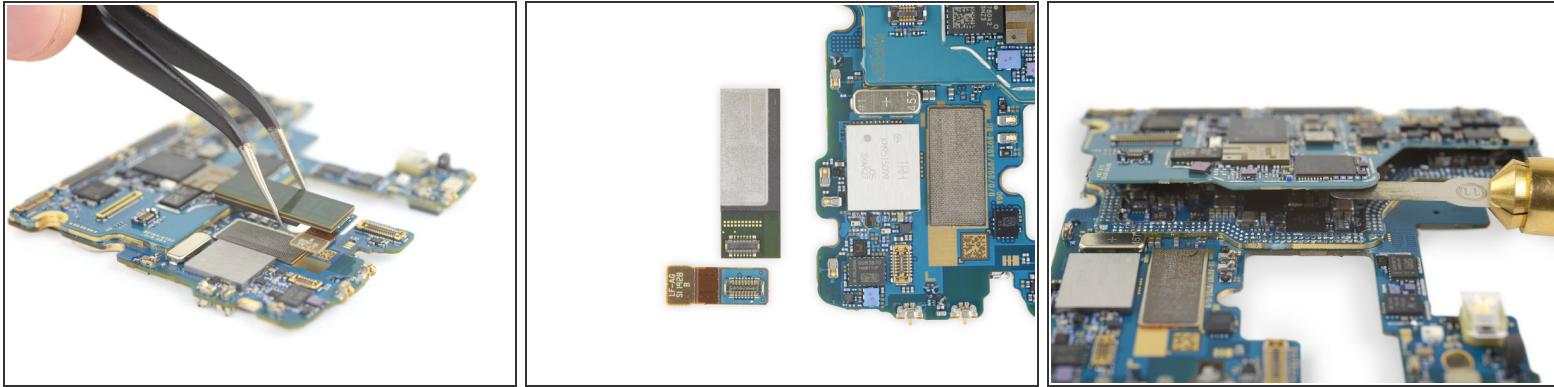
- Our trusty [iSclack](#) works so well on heavily-glued displays that we decide to try it on this glued-down battery.
- The iSclack gives us some solid leverage on the battery, but it still takes a *lot* of isopropyl alcohol—and even more patience—before the adhesive surrenders the battery (beware those display cables!).
- If we called the [Note9's 15.4 Wh battery](#) "ludicrous," the Note 10+'s 16.56 Wh powerhouse must be "[plaid](#)."
 - This energy bar weighs in at 59.1 g and measures 77.3 mm x 58.4 mm x 5.5 mm. That's 4.4 g heavier and 3 cm³ larger than the Note9's battery.

Step 7



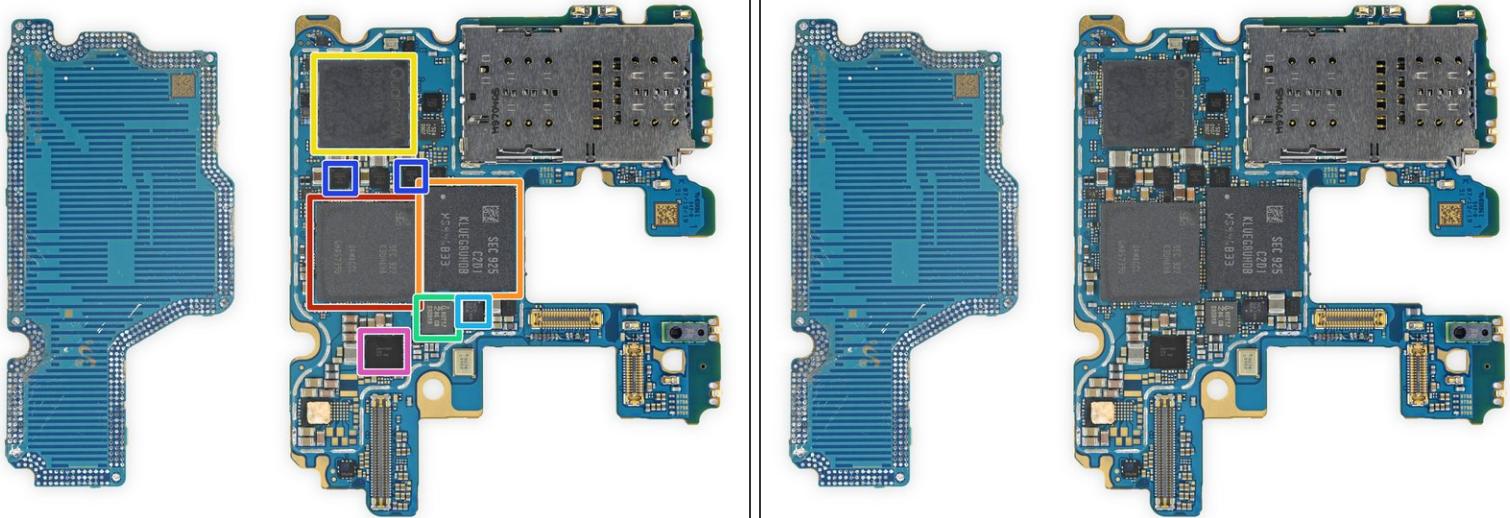
- We jettison the SIM + microSD tray—a luxury that the smaller 6.3" Note10 has [traded away](#)—and release the motherboard.
- Along for the ride are this Note's *five* cameras:
 - 16 MP ultra-wide (123° FoV)
 - 12 MP wide-angle with dual aperture ($f/1.5-f/2.4$)
 - 12 MP telephoto (2x optical zoom)
 - DepthVision time-of-flight infrared illuminator and sensor
 - 10 MP selfie cam

Step 8



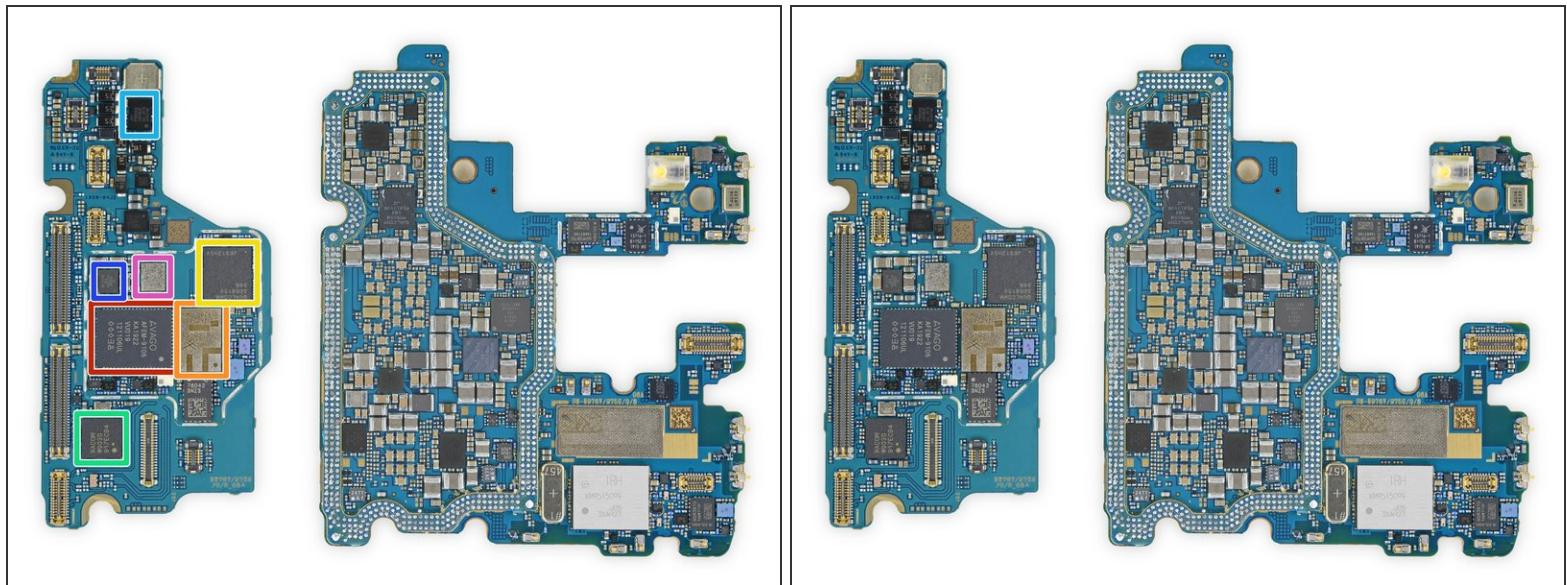
- Although relieved of its many cameras, this board still feels like it's carrying some extra weight.
- We pry off this mysterious green rectangle—which turns out to be a Qualcomm [QTM052](#) mmWave antenna module.
(i) "Millimeter wave" refers to RF signals with wavelengths measured in millimeters (24 GHz to 100 GHz). It offers super-duper fast download speeds, but can't travel long distances or penetrate walls very well. TL;DR: [YMMV](#).
- And one more thing: more board! Looks like Samsung took a note out of Apple's playbook and [stacked their motherboard](#) for maximum space savings.
- We've been down this road before—and with a little help from our [hot air station](#), we quickly carve through the vias and separate the boards.

Step 9



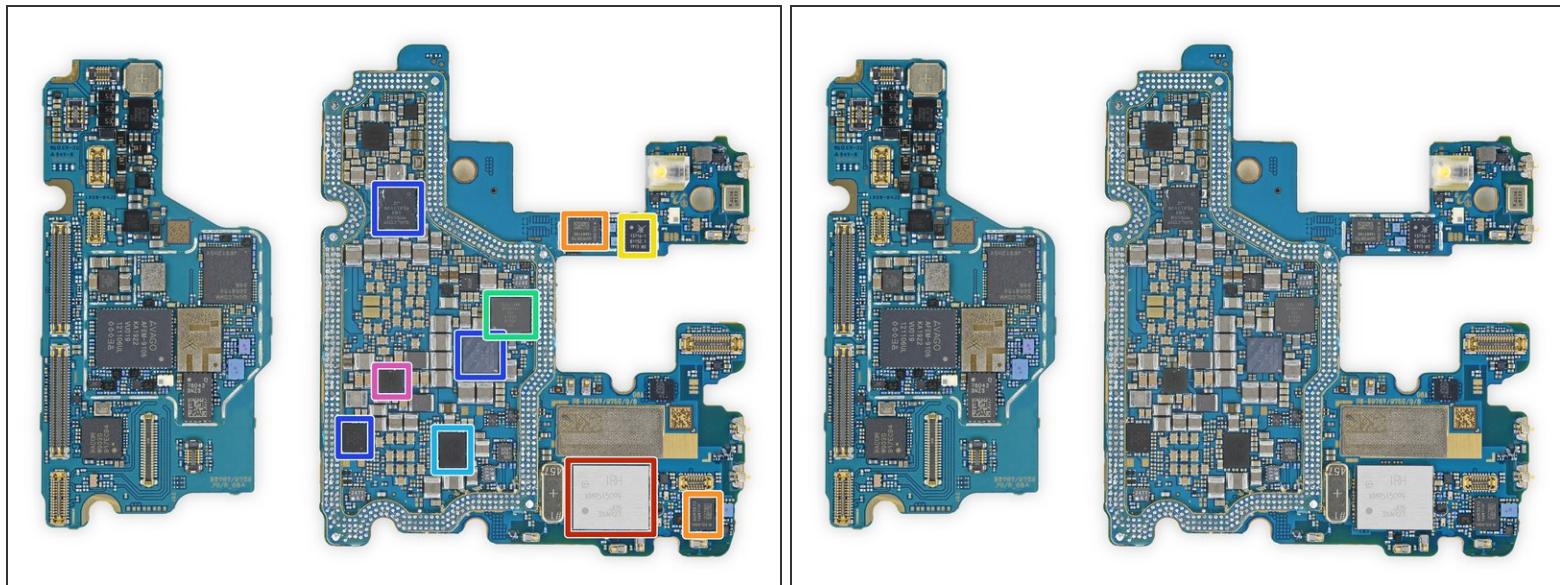
- Let's open this silicon sandwich and see what lies inside:
 - 12 GB Samsung K3UHAHA LPDDR4X RAM layered over Qualcomm [Snapdragon 855](#) SoC
 - 256 GB Samsung KLUEG8UHDB eUFS 3.0 flash storage
 - Qualcomm [X50](#) 5G modem
 - NXP 80T17 NFC controller
 - ON Semiconductor [NCP59744](#) voltage regulator
 - Cirrus Logic CS35L40 audio amplifiers
 - Maxim MAX77705C PMIC

Step 10



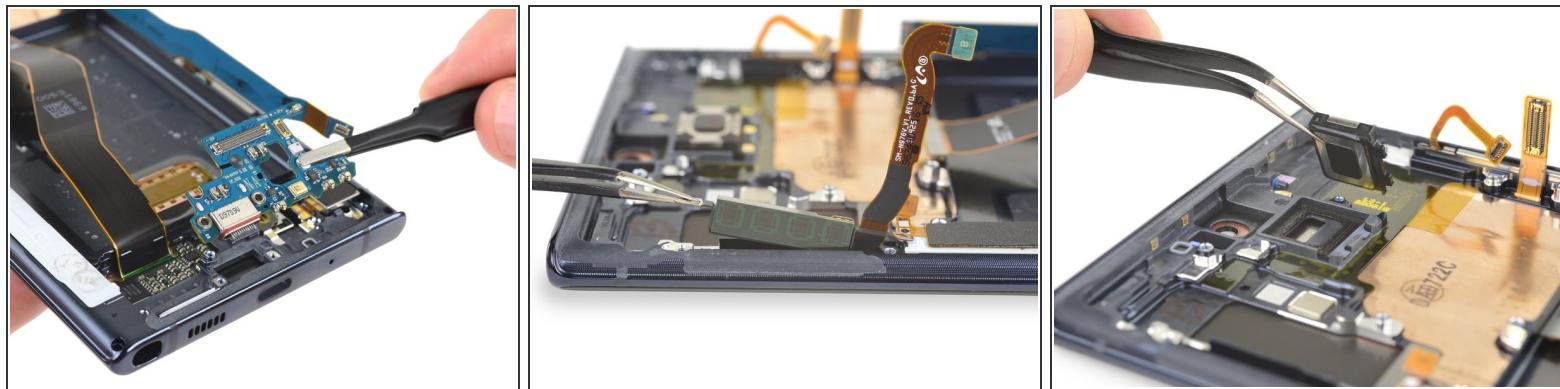
- Even more silicon filling:
 - Avago AFEM-9106
 - Skyworks 78160 front end module
 - Qualcomm SDR8150 (likely RF transceiver)
 - WACOM W9020
 - IDT R9320S 1918DS SL-3YA 244106
 - Qualcomm QET5100 envelope tracker
 - Skyworks [77365](#) power amplifier

Step 11



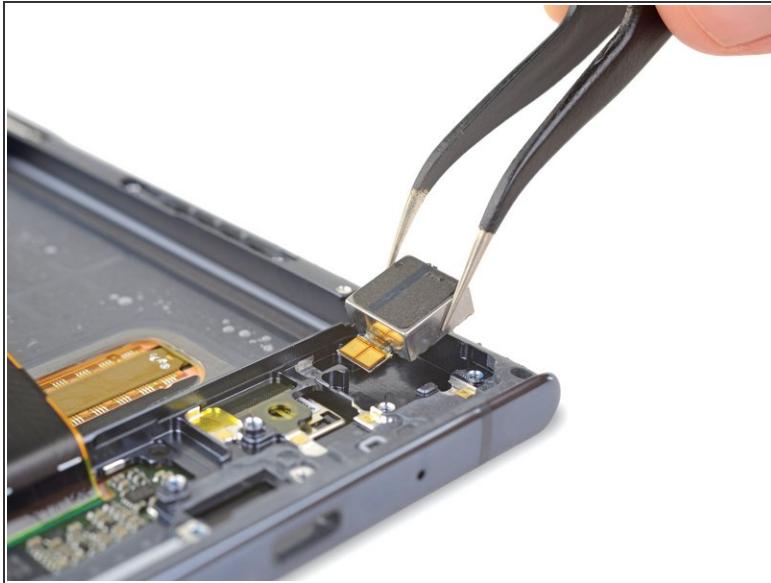
- And just a little more:
 - Murata 1RH KM9515099 Wi-Fi/Bluetooth module
 - Qualcomm QDM3870 LTE RF FEM
 - Skyworks [13716-11](#) front-end module
 - Qualcomm [WCD9341](#) Aqstic audio codec
 - Qualcomm PMX50 PMIC for the X50 modem
 - Qualcomm PM8150, PM8150C, and PM8005 (likely PMICs)
 - S2D0S05 608B58 (likely a PMIC)

Step 12



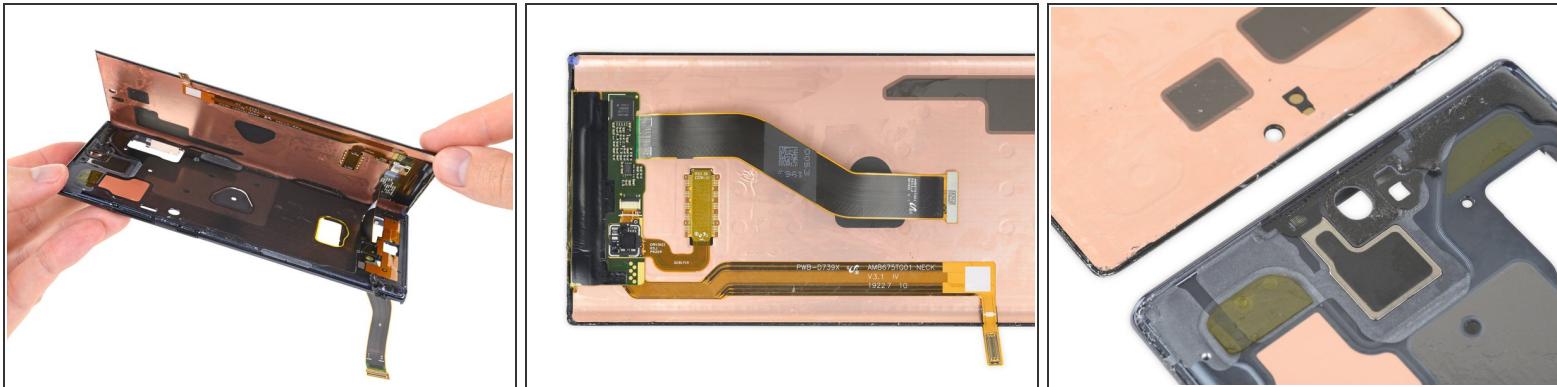
- The daughterboard comes out without a fuss, bringing the soldered-on USB-C port and lower microphone in tow.
- **(i)** Soldered-on isn't our favorite flavor of USB-C port, but at least there isn't much on this board, so replacements shouldn't be too expensive.
- We frisk the edges of the phone to find ... two more mmWave antenna modules! Given 5G mmWave's limitations, having these directional, beam-forming antennas on each side (plus the third one facing the screen) helps the Note10+ achieve *maximum effort*.
- The earpiece speaker looks pretty ordinary, except that it's completely trapped behind the screen. How do the songs get out? More on that later...

Step 13



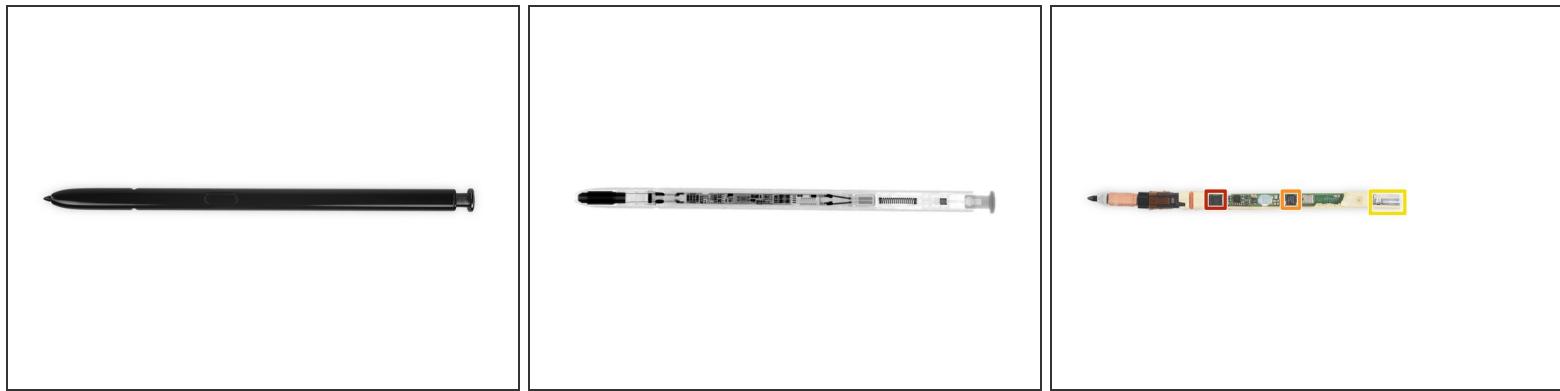
- Just a couple components separate this phone from emptiness:
 - First, a square-ish vibration motor! For as long as we can remember, Samsung has employed the same circular [LRA](#) motor for all its phones' buzzers.
 - *(i)* This new, larger motor may be the first sign that Samsung is finally [taking haptic feedback seriously](#).
 - Or, hear us out—maybe they just needed something to take up a little more room where the headphone jack once was.
 - Finally, we pull out the new vapor chamber—no doubt the product of countless hours of engineering, since this phone is essentially a space heater with a battery. 5G tech and reverse-wireless charging don't come cheap in the cooling department.

Step 14



- After some tedious behind-the-scenes heating and prying, we are rewarded with a peek at the backside of this Samsung-made 6.8" Dynamic AMOLED Infinity-O display.
 - **i** This is the [biggest, brightest, most color-accurate display](#) ever on a Note phone—but we can't help but wonder what's keeping Samsung from a refresh rate update to 90 Hz, like its phablet competitor, the [OnePlus 7 Pro](#).
- The ultrasonic fingerprint sensor clings to the back of this behemoth display, just as it did to the [S10](#) we tore down not too long ago.
- With the screen removed, we see that the earpiece speaker actually fires into a shallow metal chamber, which channels the sound waves into the *teeny tiny* grille along the top edge of the frame.
- Can't quite make it out? We couldn't either. [Computer, zoom and enhance.](#)

Step 15



- Our teardown eyes (x)(x) shift towards the S Pen. The seamless construction makes us reluctant to pry it open, so we get creative with some electrons, courtesy of [Creative Electron](#).
- Though, now that we think about it, this pen *does* have a few new features ... it's probably totally different from [last year's](#) on the inside ... oh heck, you know we couldn't resist. Ultrasonic cutter, meet S Pen.
- The guts of the new S Pen are encased in an extra layer of hard plastic and epoxy. Chipping those away, we find:
 - A mystery chip marked **SP912**, likely the 6-axis sensor Samsung mentioned at their Unpacked event. Something's gotta be detecting those wand waves.
 - Dialog [DA14585](#) Bluetooth 5 SoC
 - Nichicon [2.4v SLB lithium-ion battery](#)

Step 16



- Well, we don't know about you guys, but we sure learned a heck of a lot from these bits—were you taking notes?
- We saw a 5G millimeter wave antenna for the first time.
- We de-layered Samsung's first "iPhone X" style board.
- We solved the mystery of the missing earpiece speaker grille.
- We even removed the stubborn battery *without* busting the display.
- We'll call this teardown a win, but we can't say we're the biggest fans of this Note, and we have a feeling the repairability score will bear that out...

Step 17 — Final Thoughts

REPAIRABILITY SCORE:



- Samsung's Galaxy Note10+ 5G earns a **3 out of 10** on our repairability scale (10 is the easiest to repair):
 - Equally-sized Phillips fasteners means you only need to bring one driver for repairs.
 - Many components are modular and independently replaceable, but no more headphone jack means double duty for the USB-C port.
- Every repair starts with painstakingly un-gluing the fragile glass rear cover.
- Replacing the glued-down battery is tougher than ever, especially with board interconnect cables to work around.
- All-too-common display repairs require either a complete teardown or replacing half the phone.