



Written By: Arthur Shi



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:

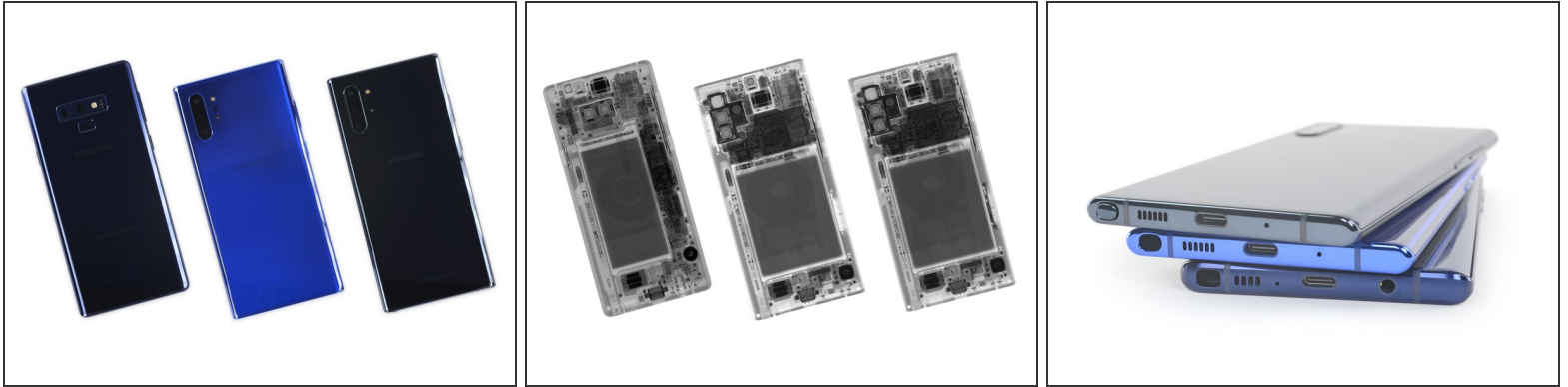
- [Heat Gun](#) (1)
 - [Suction Handle](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Phillips #00 Screwdriver](#) (1)
 - [Spudger](#) (1)
 - [Tweezers](#) (1)
 - [iSlack](#) (1)
 - [Ultrasonic Cutter](#) (1)
 - [Hot Air Rework Station Hakko FR-810](#) (1)
-

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



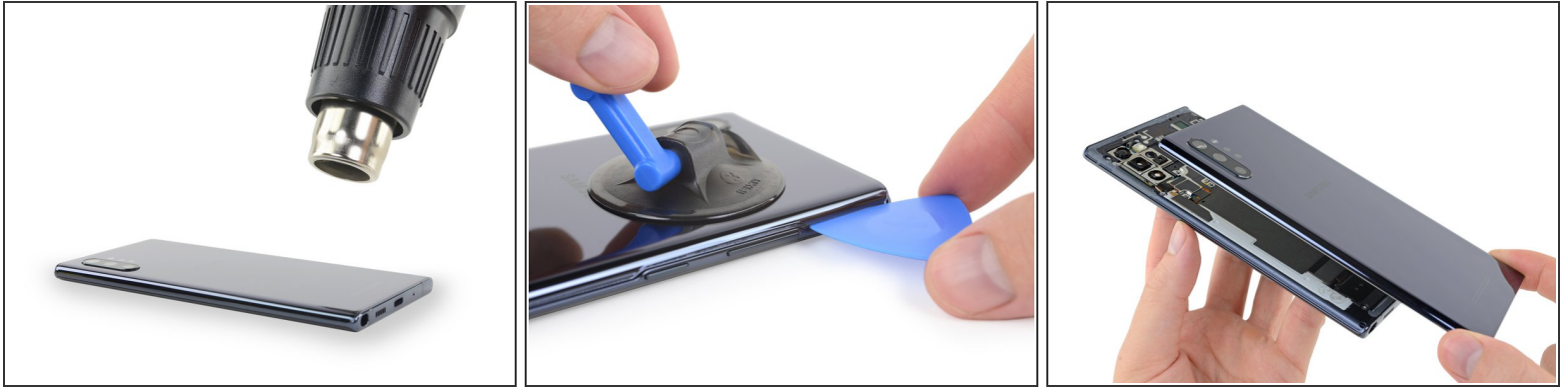
- We lay out (from left to right) last year's Note9 next to the new Note10+ and Note10+ 5G and try to spot the differences.
- This year Samsung realigned the Note's cameras vertically. They also got rid of the rear fingerprint sensor—that's been moved under the display, like what we saw [earlier this 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.
- ⓘ 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



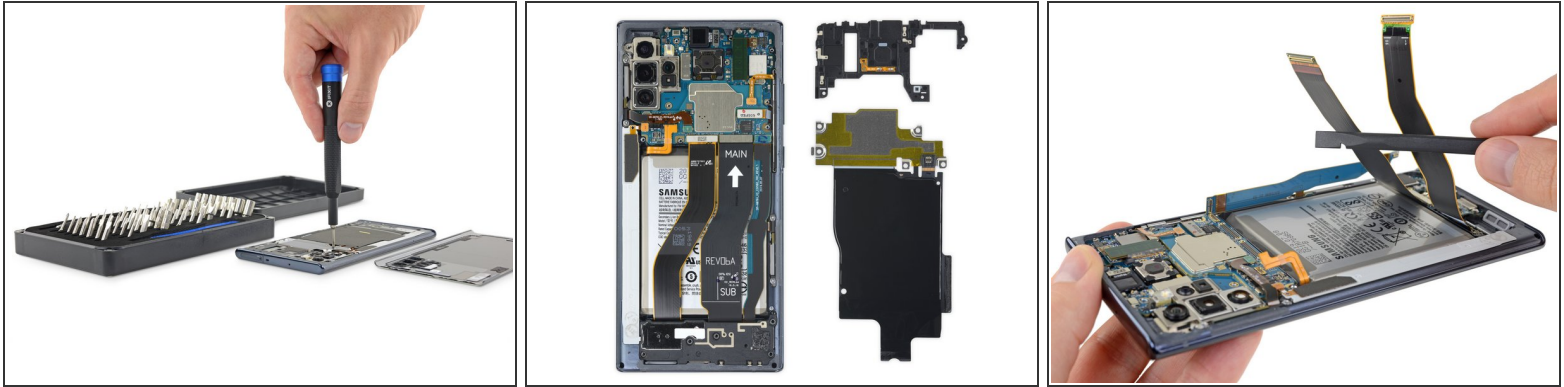
- Out comes the star of this show: the ~~magic wand~~ new and improved S Pen.
 - ❗ Now with gesture control, for [wizard-like](#) wireless control of your Note10.
- Cameras on all the newest Notes are vertically aligned, but the 10+ includes a [fancy new feature](#) alongside that stack of sensors.
 - ❗ 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



- Annnd 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.
 - ⓘ 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



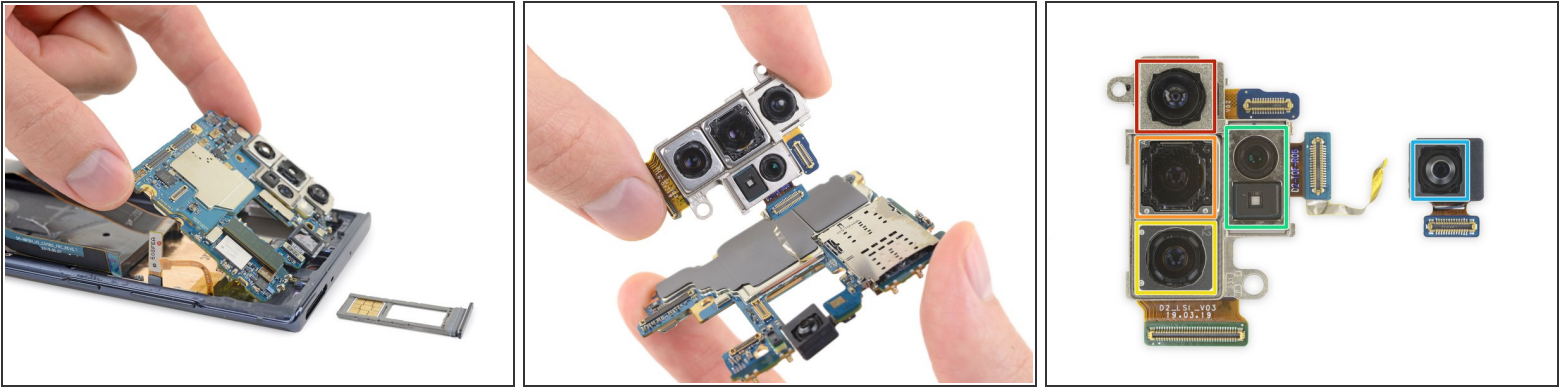
- A few Phillips screws hold down the midframe assembly—nothing our tried-and-true [Mako 64 bit kit](#) can't handle!
- With the midframe removed, we encounter a somewhat radical change: the motherboard is solely at the top of the device, [Pixel-style](#).
- ❗ While this allows for a wider battery, it 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



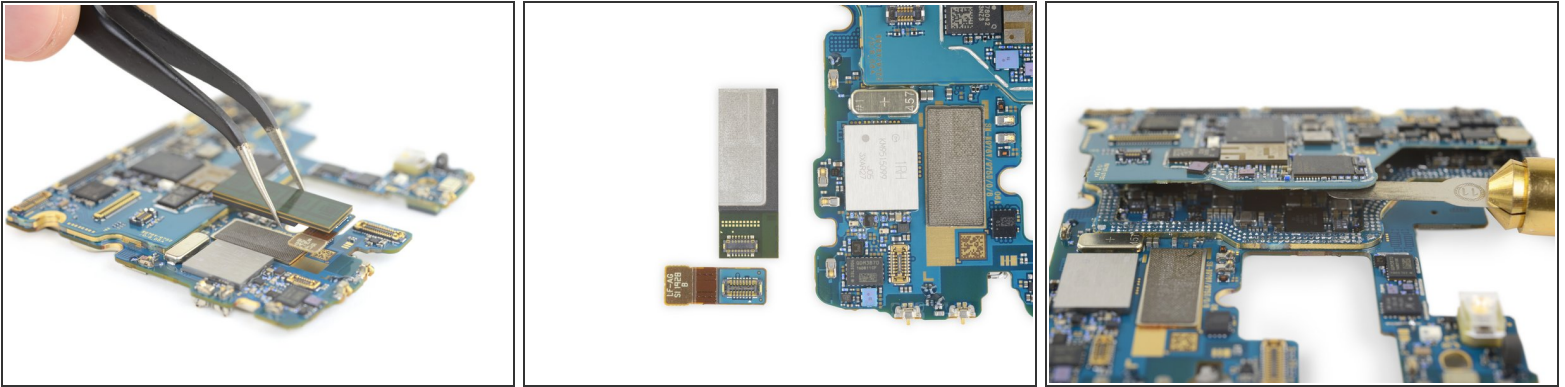
- Our trusty [iSclack](#) works so well on heavily-glued displays that we decide to try it on this glued-down battery.
- The iSclack gives us some solid leverage on the battery, but it still takes a *lot* of isopropyl alcohol—and even more patience—before the adhesive surrenders the battery (beware those 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



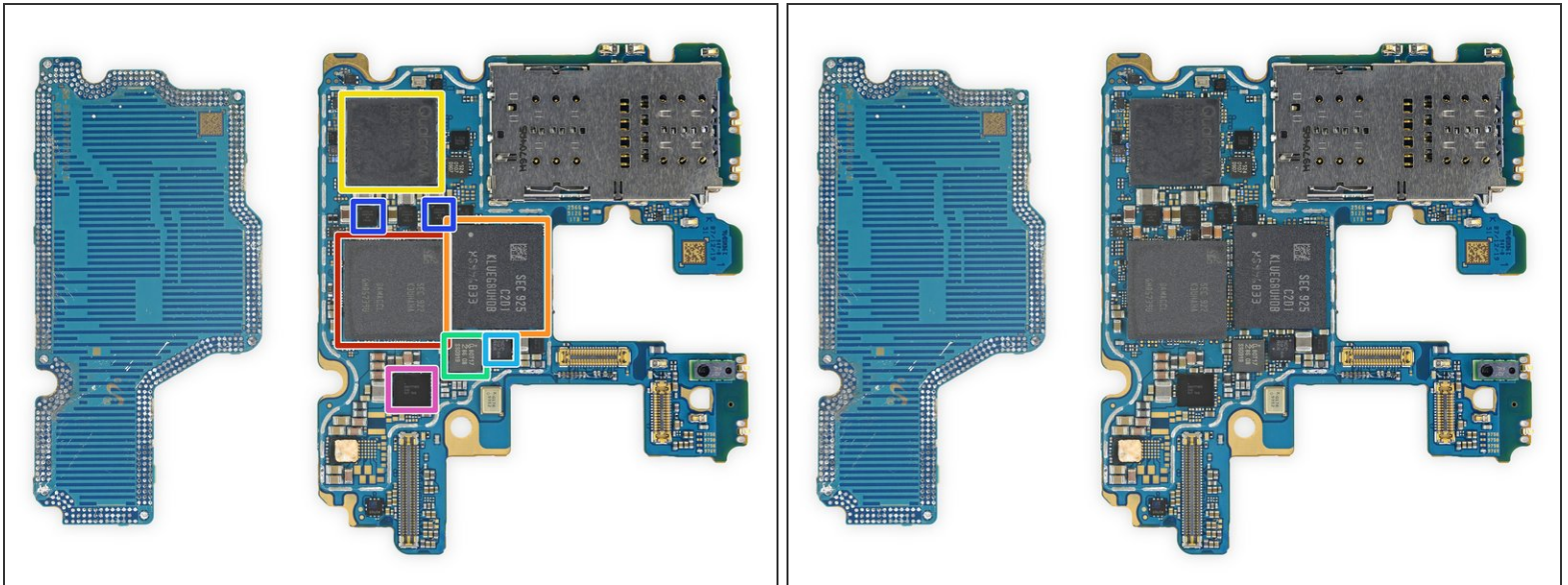
- We jettison the SIM + microSD tray—a luxury that the smaller 6.3" Note10 has [traded away](#)—and release the motherboard.
- Along for the ride are this Note's *five* cameras:
 - 16 MP ultra-wide (123° FoV)
 - 12 MP wide-angle with dual aperture ($f/1.5$ - $f/2.4$)
 - 12 MP telephoto (2x optical zoom)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

Step 8



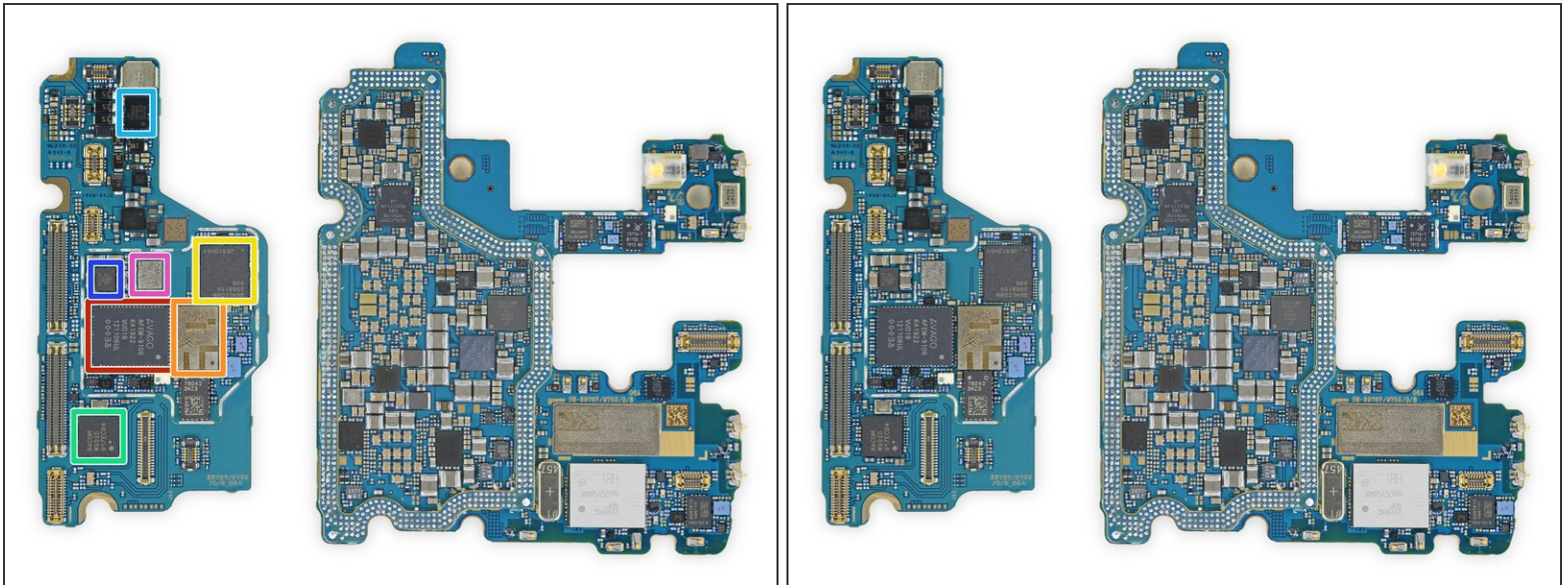
- Although relieved of its many cameras, this board still feels like it's carrying some extra weight.
- We pry off this mysterious green rectangle—which turns out to be a Qualcomm [QTM052](#) mmWave antenna module.
 - ❗ "Millimeter wave" refers to RF signals with wavelengths measured in millimeters (24 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



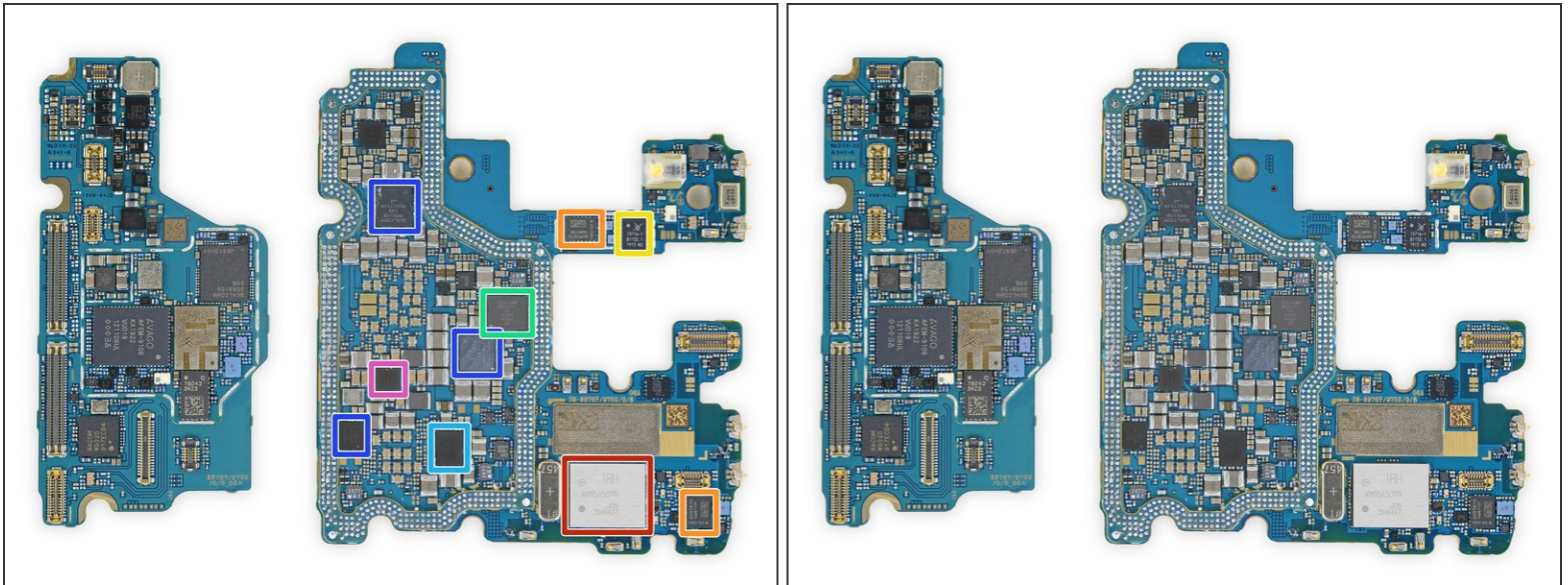
- Let's open this silicon sandwich and see what lies inside:
 - 12 GB Samsung K3UHAHADAM-AGCL LPDDR4X RAM layered over Qualcomm [Snapdragon 855](#) SoC
 - 256 GB Samsung KLUEG8UHDB-C2D1 eUFS 3.0 flash storage
 - Qualcomm [SDX50M](#) 5G modem
 - NXP [PN80T](#) NFC controller w/ Secure Element
 - ON Semiconductor [NCP59744](#) voltage regulator
 - Cirrus Logic CS35L40 audio amplifiers
 - Maxim MAX77705C PMIC

Step 10



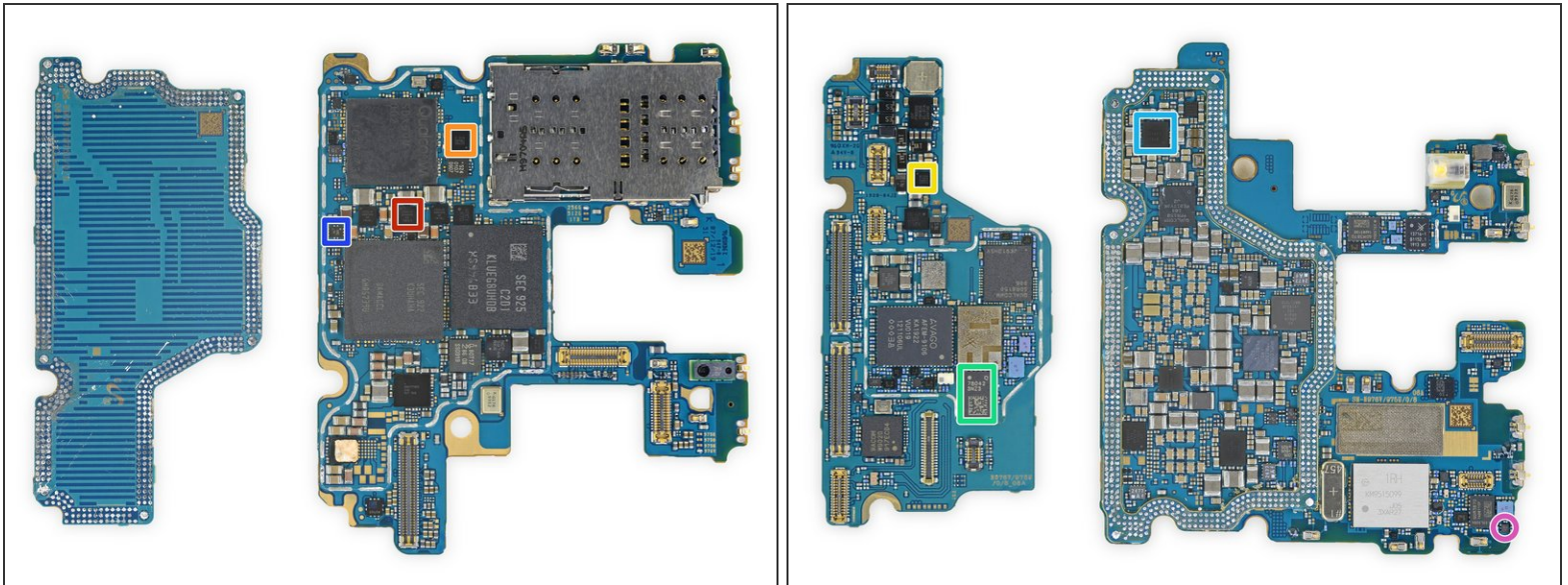
- Even more silicon filling:
 - Avago AFEM-9106 front end module
 - Skyworks [SKY78160-51](#) low noise amplifier
 - Qualcomm SDR8150 LTE RF transceiver
 - WACOM W9020 digitizer controller (likely)
 - IDT P9320S wireless power receiver
 - Qualcomm QET5100 envelope tracker
 - Skyworks [SKY77365-11](#) power amplifier module

Step 11



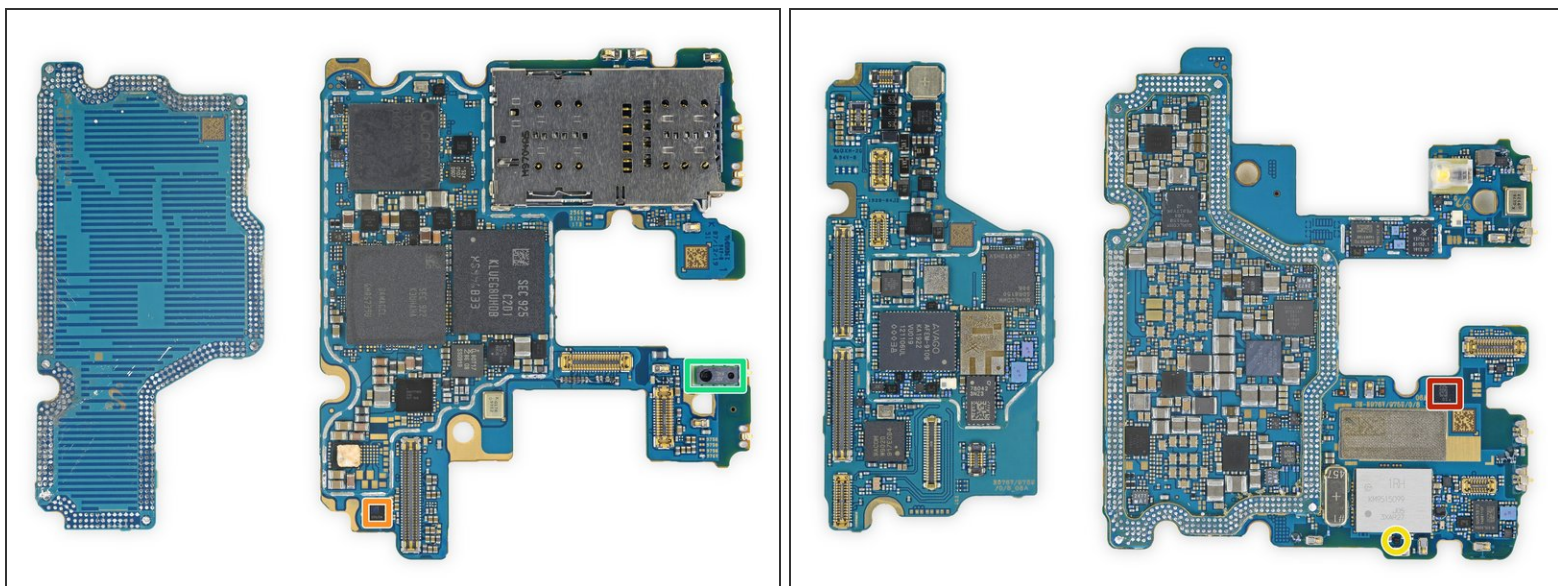
- And just a little more:
 - Murata KM9515099 Wi-Fi/Bluetooth module
 - Qualcomm QDM3870 LTE RF front end module
 - Skyworks [SKY13716-11](#) front-end module
 - Qualcomm [WCD9341](#) Aqstic audio codec
 - Qualcomm PMX50 PMIC for the X50 modem
 - Qualcomm PM8150, PM8150C, and PM8005 (likely PMICs)
 - Samsung S2DOS05 display power management

Step 12



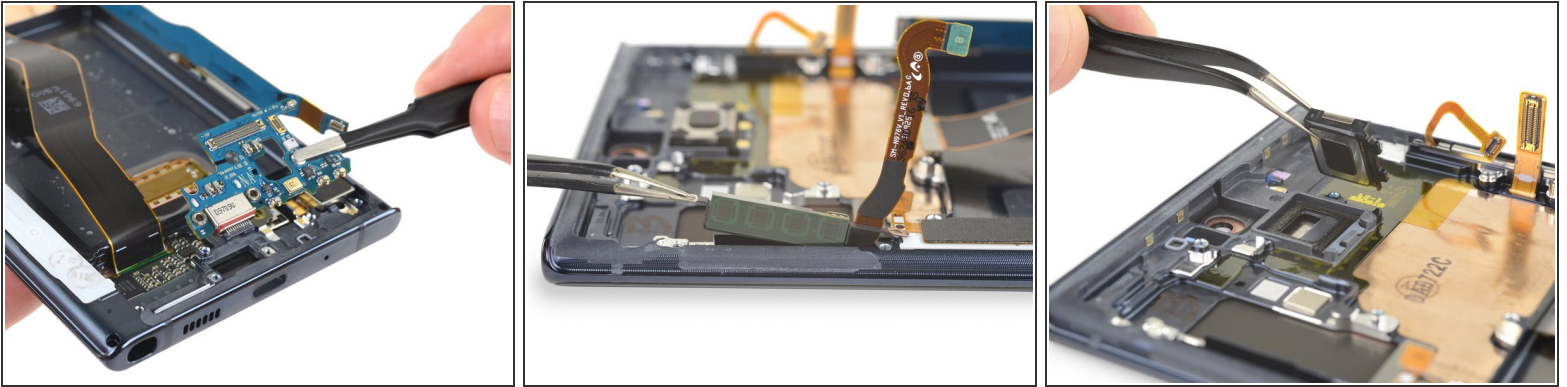
- IC Identification part 4 courtesy of user [Chunglin Chin](#):
 - Cirrus Logic [CS40L25](#) haptic driver
 - STMicroelectronics [STM32G071EB](#) 32-Bit ARM Cortex-M0 microcontroller w/ 128 Kb flash
 - Samsung S2MIS0A [MST](#) driver
 - Qorvo QM78042 power amplifier module
 - Samsung S2MPB02 camera power management
 - Vishay [DG2730](#) 2-Port USB 2.0 DPDT analog switch
 - NXP Semiconductor [BGU8103](#) GPS/GLONASS/Galileo/COMPASS low noise amplifier

Step 13



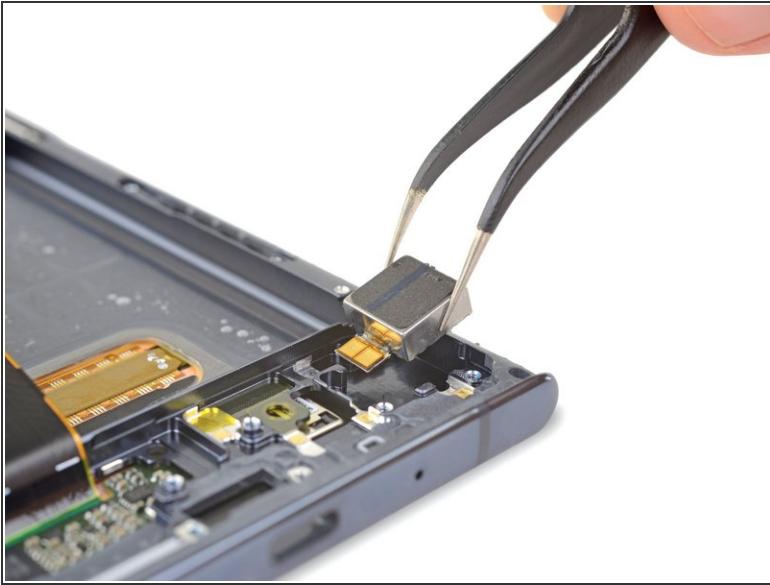
- Sensor ID:
 - STMicroelectronics [LSM6DSO](#) 3 DoF accelerometer/gyroscope
 - STMicroelectronics [LPS22HD](#) pressure sensor
 - AKM Semiconductor AK0991x electronic compass
 - AMS proximity sensor

Step 14



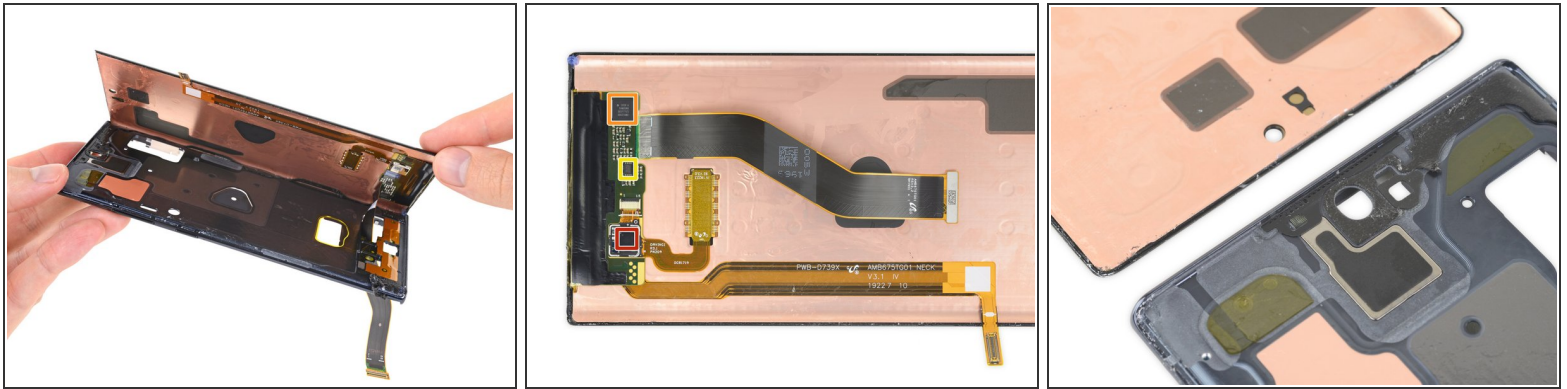
- The daughterboard comes out without a fuss, bringing the soldered-on USB-C port and lower microphone in tow.
- ❗ Soldered-on isn't our favorite flavor of USB-C port, but at least there isn't much on this board, so replacements shouldn't be too expensive.
- We frisk the edges of the phone to find ... 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 15



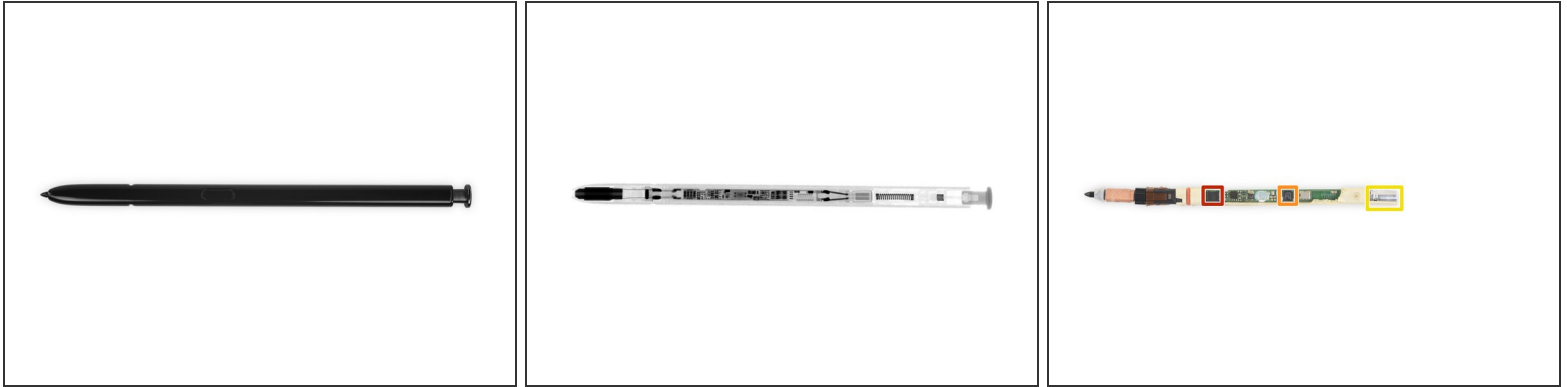
- Just a couple components separate this phone from emptiness:
 - First, a square-ish vibration motor! For as long as we can remember, Samsung has employed the same circular [LRA](#) motor for all its phones' buzzers.
 - ① This new, larger motor may be the first sign that Samsung is finally [taking haptic 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 16



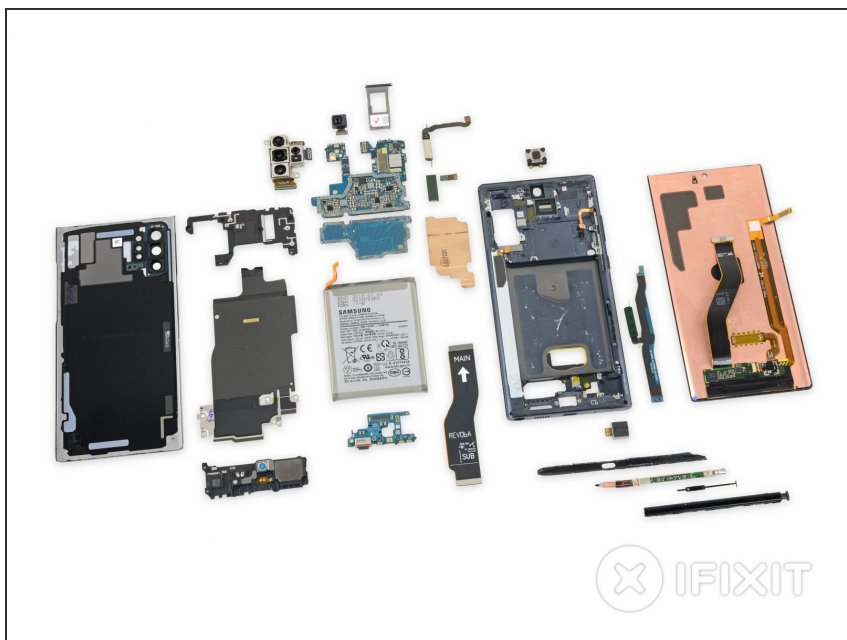
- After some tedious behind-the-scenes heating and prying, we are rewarded with a peek at the backside of this Samsung-made 6.8" Dynamic AMOLED Infinity-O display.
 - ⓘ This is the [biggest, brightest, most color-accurate display](#) ever on a Note phone—but we can't help but wonder what's keeping Samsung 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 it are some more ICs to ID:
 - Qualcomm [QBT2000](#) in-screen fingerprint sensor controller
 - Samsung S6SY771X touchscreen controller
 - Winbond [W25Q80EWUXIE](#) 8 Mb serial flash memory
- 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 17



- 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.
 - ⓘ STMicroelectronics Accelerometer
 - Dialog [DA14585](#) Bluetooth 5 SoC
 - Nichicon [2.4v SLB lithium-ion battery](#)

Step 18



- 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 19 — 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.