



Samsung Galaxy Note9 Teardown

Samsung Galaxy Note 9 teardown reveals new S Pen tech, and Samsung throws caution to the wind with a massive battery. Performed on August 23, 2018.

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INTRODUCTION

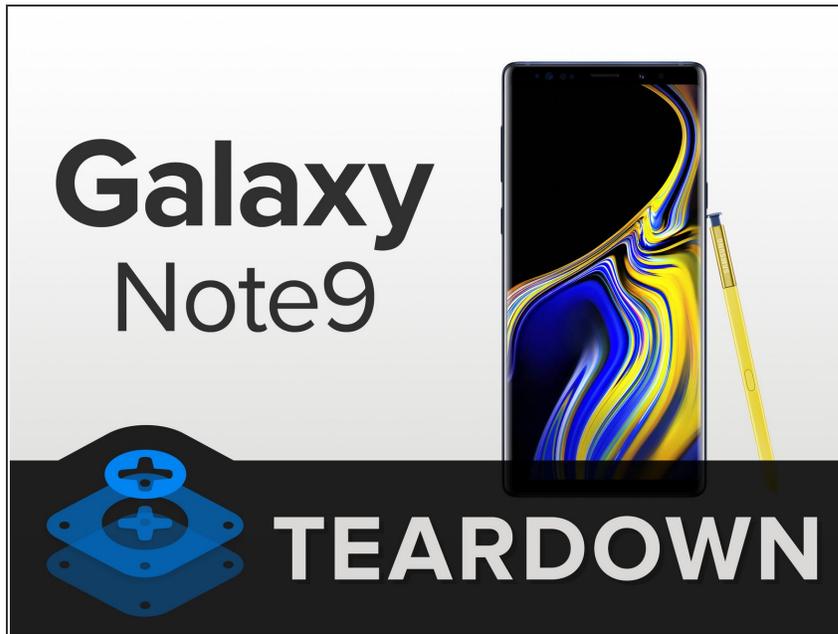
Samsung is at it again with the Note9, right on schedule. Amidst a brutal anti-Apple ad campaign, they're hoping a cool new S Pen is enough to carry the day. Could there be more waiting for us under the hood? We'll tear down to find out!

Phone in to our [Facebook](#), [Instagram](#), and [Twitter](#) to get on the teardown hotline!

TOOLS:

- [iOpener](#) (1)
 - [Suction Handle](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Spudger](#) (1)
 - [Tweezers](#) (1)
 - [Phillips #00 Screwdriver](#) (1)
 - [Ultrasonic Cutter](#) (1)
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Step 1 — Samsung Galaxy Note9 Teardown



- Here are some initial Notes on the 9:
 - Notchless edge-to-edge 6.4" Super AMOLED display with 2960 × 1440 resolution (516 ppi)
 - Octa-core Qualcomm Snapdragon 845 processor paired with 6 GB RAM (8 GB optional)
 - 4,000 mAh battery
 - 12 MP OIS dual rear camera system with dual-aperture $f/1.5$ - $f/2.4$ wide-angle and $f/2.4$ telephoto modules, plus an 8 MP selfie cam
 - 128 GB internal storage (512 GB internal storage optional), with additional 512 GB available via microSD expansion
 - S Pen stylus with Bluetooth connectivity
 - IP68 dust and water resistance rating

Step 2



- The Note9 looks very (very) similar to the Note8—and in principle at least, we're fine with that. Smartphone evolution has slowed, and even we don't think you should try to fix what isn't broken.
 - ✪ That said, we *would* like a fix for the Note series' history of low repairability.
- So what *is* new? Well, it's very slightly wider and shorter than the Note8, with an extra 0.1 inch of display—and it's a hair thicker at 8.8 mm versus 8.6 mm.
- In an increasingly rare (but welcome) move, Samsung has kept the analog headphone jack.
- ⓘ Not only does this reduce wear on the charging port, it prevents the scourge of [built-in-battery wireless earbuds](#).

Step 3



- Another subtle (but good) change: the fingerprint sensor has packed its things and moved to a happier location, south of the rear camera.
 - ⓘ Result: less time spent smearing the camera lens with wayward finger pokes.
- Spoiler alert: we got an early glimpse of the Note9's innards thanks to [Creative Electron](#)'s wallhack abilities.
- Now that we have a map, let's glide on into battle.

Step 4



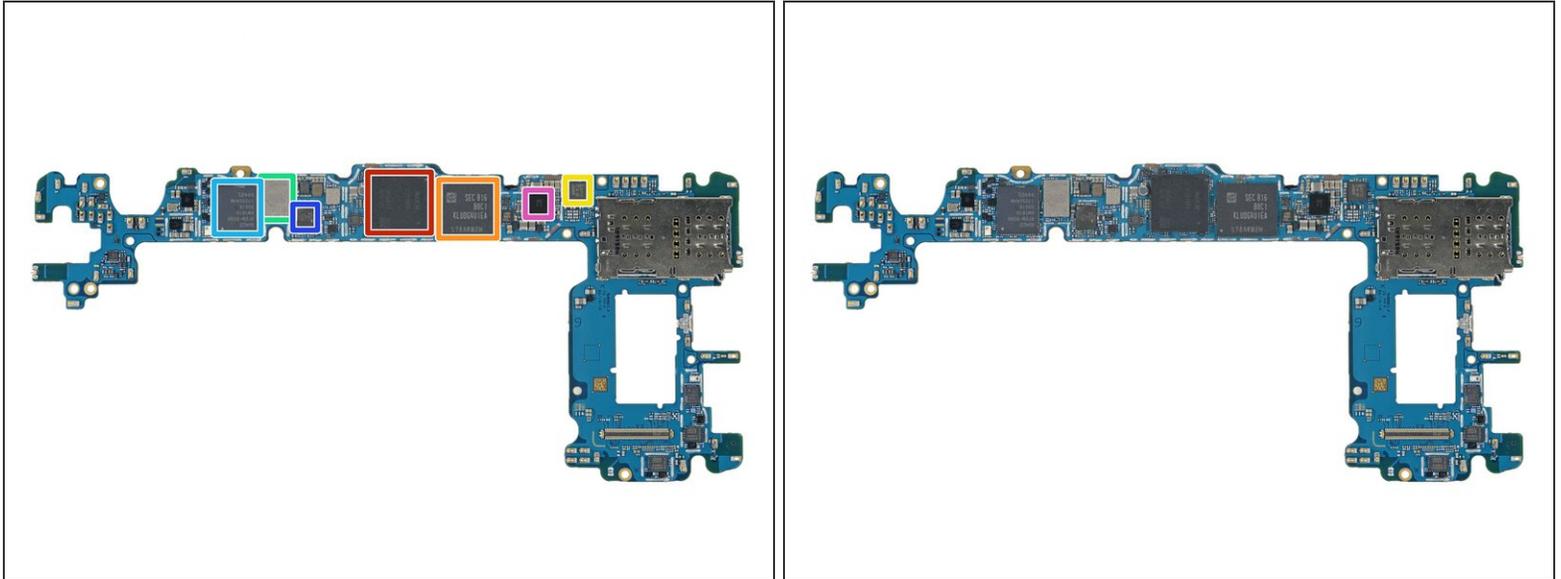
- We'd like to hit the ground running, but this back panel adhesive is still pretty OP. Nerf it please, Samsung?
- Our usual strat of heat, suction, and careful slicing does the trick eventually.
- The newly relocated fingerprint sensor is a welcome change here—that flex cable location is [much less vulnerable](#) to accidental slicing and dicing.
- That said, it's still too short. A few flappy folds like we saw on the [Surface Go](#) would make reassembly a happier affair.

Step 5



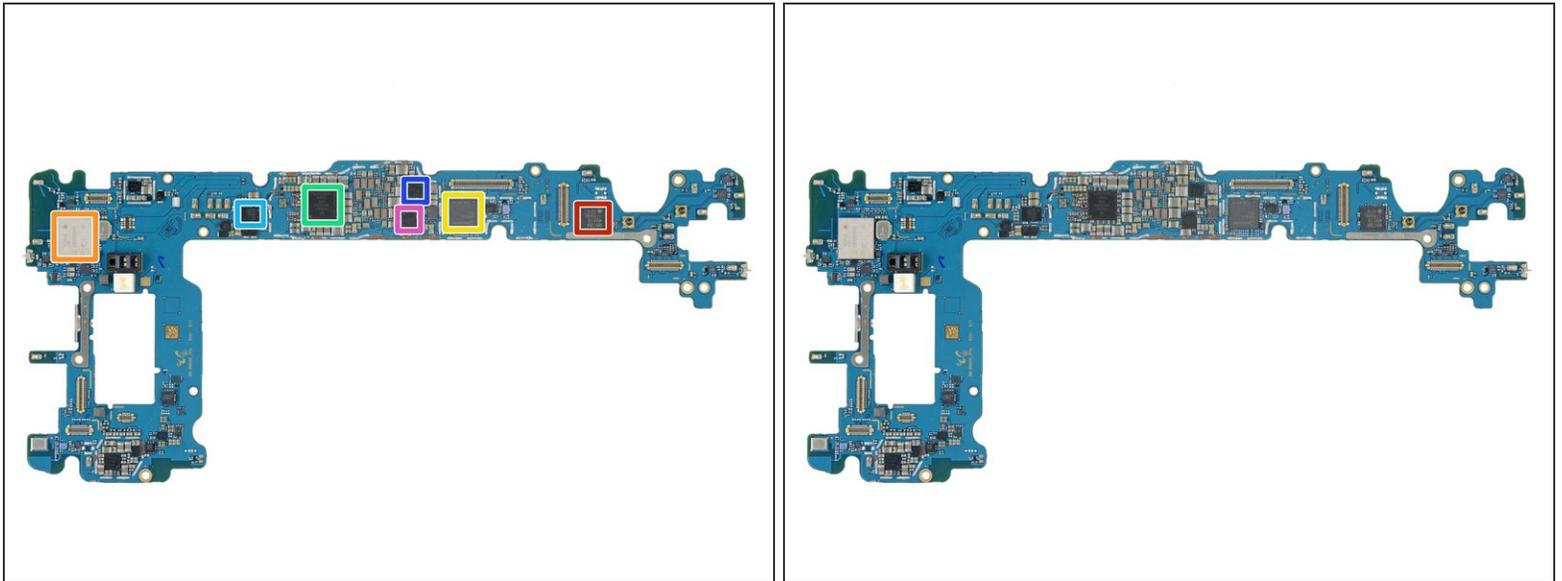
- The battery's still glued down in a miserable sticky well—but the Note8 didn't blow up so the design is justified, eh Samsung?
- The Note9 battery weighs in at a ludicrous **15.4 Wh**, eschewing the cautious 12.71 Wh [Note8 battery](#), and eclipsing both the infamous [Note7](#) (13.48 Wh) *and* the [iPhone X](#) (a "mere" 10.35 Wh).
- Since we know you'll ask, here are some dimensions: 87.7 mm x 41.5 mm x 6 mm. Weight: 54.7 g. Now go forth and calculate energy density! Or whatever it is you do.

Step 6



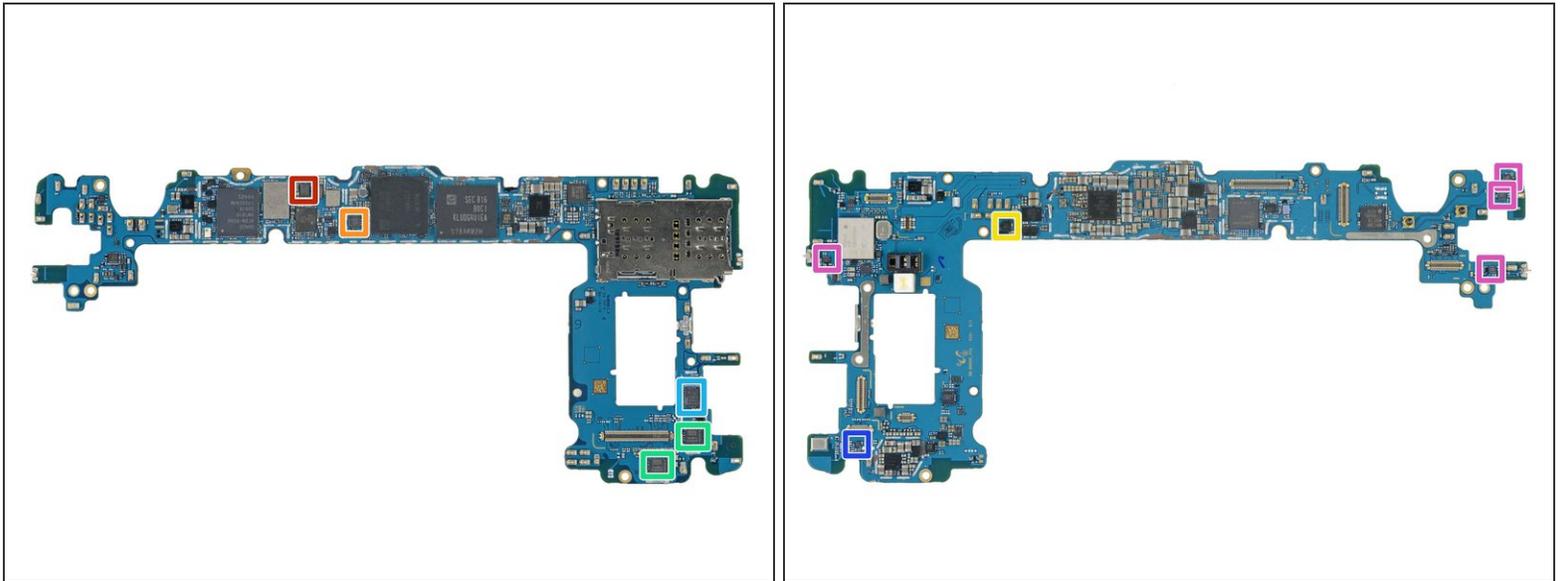
- The chips that move the bits and bytes:
 - Samsung [K3UH6H60AM-AGCJ](#) 6 GB LPDDR4X SDRAM, with [Qualcomm Snapdragon 845](#) layered underneath
 - Samsung [KLUDG4U1EA-B0C1](#) 128 GB eUFS storage
 - NXP Semiconductor [PN80T](#) NFC Controller
 - Skyworks [SKY78160-51](#) Front-End Module WLAN
 - Avago/Broadcom AFEM-9096 Front-End Module LTE
 - Qualcomm WCD9341 Audio Codec
 - Maxim MAX77705 PMIC

Step 7



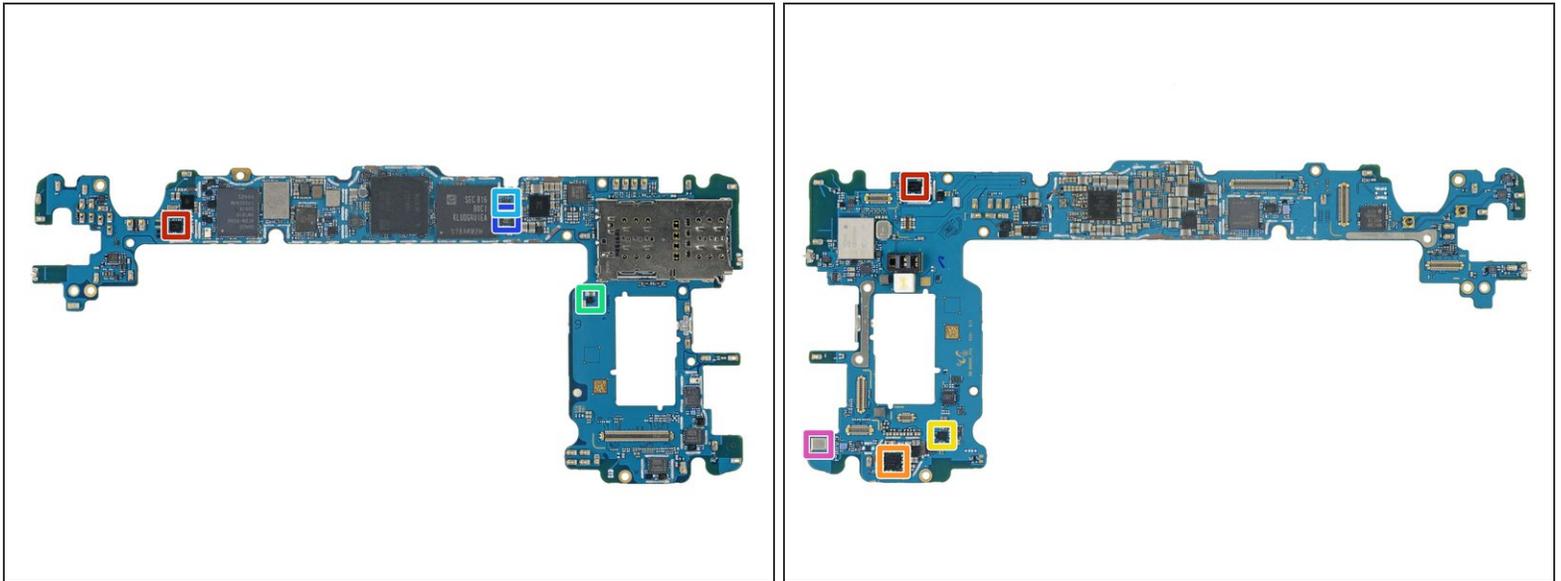
- More chips on the flip:
 - Wacom W9018 digitizer controller with S Pen capability
 - Murata KM8423057 Wi-Fi/Bluetooth module
 - Qualcomm SDR845 RF transceiver
 - Qualcomm PM845 PMIC
 - IDT P9320S wireless charging receiver
 - Samsung S2DOS05 display PMIC
 - Qualcomm PM8005 PMIC

Step 8



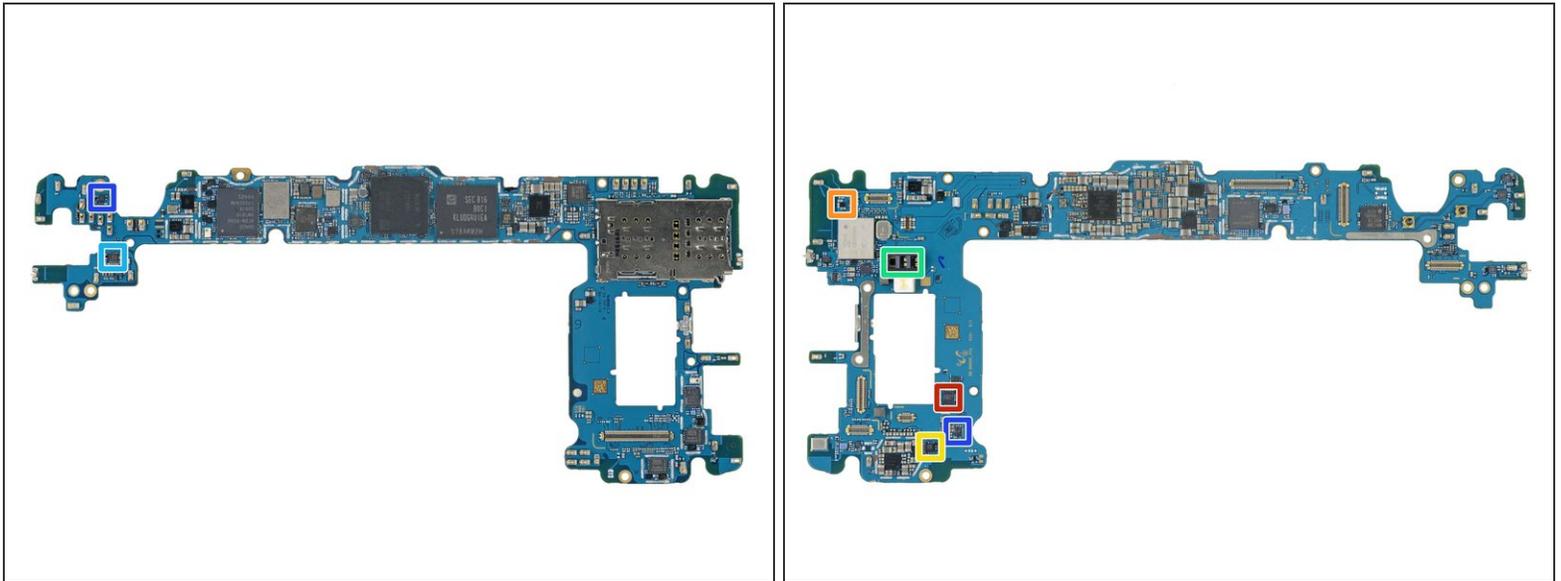
- IC Identification, pt. 2:
 - Qualcomm QET4100 Envelope Tracker
 - RDA Microelectronics RDA6213N FM transceiver (likely)
 - Samsung S2MIS01 [MST](#) Driver
 - Qualcomm QDM3870 high band diversity front end module
 - Skyworks [SKY13716-11](#) low-band LNA front-end module
 - NXP Semiconductor [BGU8103](#) GPS/GLONASS/Galileo/BeiDou low noise amplifier
 - Antenna Tuner

Step 9



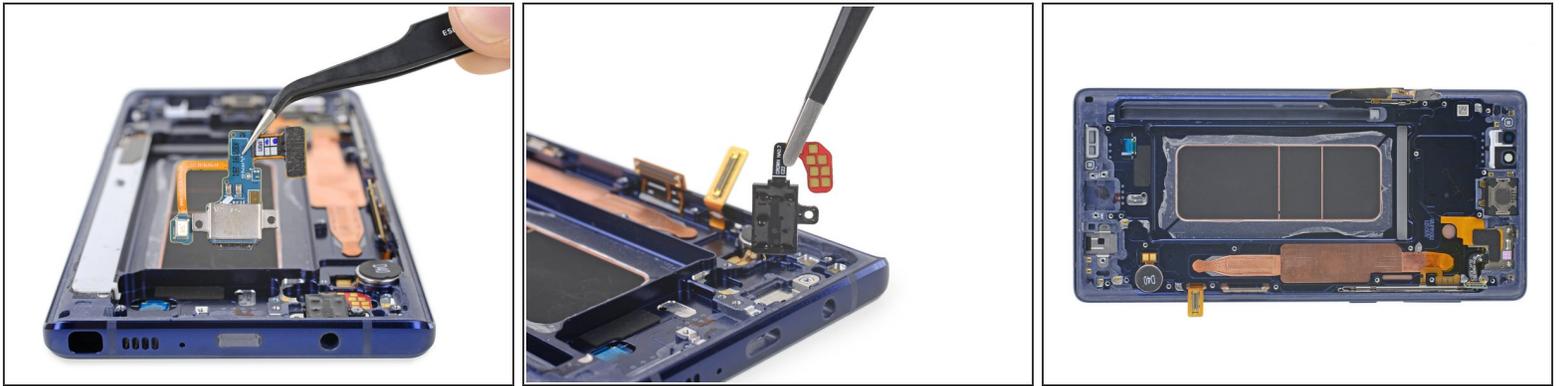
- IC Identifications, pt. 3:
 - Maxim Integrated MAX585128 audio Amplifier (likely)
 - Samsung S2MPB02 camera power management
 - Samsung S2MPB03 camera power management
 - ON Semiconductor [FAN48618BUC53X](#) 1 A Boost Regulator
 - Vishay [DG2730](#) 480 Mbps DPDT analog switch
 - NXP Semiconductor [PCAL6524](#) 24-bit I/O expander
 - Knowles MEMS microphone

Step 10



- IC Identifications, pt. 4 (sensors):
 - STMicroelectronics [LSM6DSL](#) 3-axis accelerometer/gyroscope
 - AKM Semiconductor [AK09918C](#) 3-axis electronic compass
 - STMicroelectronics [LPS22HB](#) pressure sensor
 - Maxim Integrated ? heart rate sensor
 - Semtech SX9320 ? proximity sensor
 - Diodes Incorporated hall sensor (likely)

Step 11



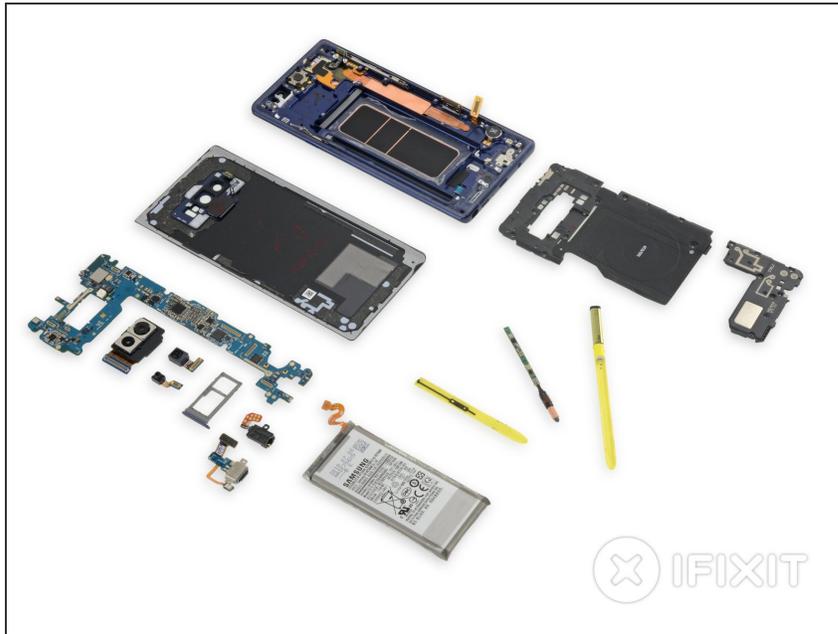
- The motherboard has absorbed yesteryear's daughterboard, leaving a modular USB-C port (with a Knowles hanger-on microphone) ripe for the picking.
- Samsung continues to provide sanctuary for the now endangered headphone jack, while saddling it with a super thin spring-contact-connected cable.
- The heat pipe has significantly more surface area than [prior generations](#). Perhaps those pipes proved the concept, or proved they needed to be that much beefier (because Fortnite).

Step 12



- Time for S Pen extraction. We couldn't find a non-destructive way to crack it open, so we swapped in the heavy weapons—the ultrasonic blaster cutter!
- Now that Fortnite is here we were prepared for a tomato update, but the S Pen [peels open like a banana](#).
- What's in this loot llama? How about a [DA14580](#) Dialog Semiconductor Bluetooth Smart SoC ...
- ... and a K8373 [Seiko Instruments supercapacitor](#).
- ⓘ We'd guess that the supercapacitor powers the Bluetooth radio, which is *only* used for the single button. Other stylus functions operate without built-in power.
- ⓘ We'd also conjecture that the S Pen charges via the sensing coils near the tip. We found a [grey pad](#) near where the coils reside when the stylus is stowed—possibly an inductive charging pad.

Step 13



- And that's all we *note!*
- The Samsung Galaxy Note9 isn't a radical redesign, but it's fresh enough to keep our teardown engineers happy. The Note line tends to evolve slowly—bigger motherboard, a different pen, nothing radical—except for a battery that just exploded in size.
- ☑ Sometimes it feels like watching paint dry. But sometimes you get to cut open a tiny pen! (Something we haven't done since the [Apple Pencil](#).)

Step 14 — Final Thoughts

REPAIRABILITY SCORE:



- The Samsung Galaxy Note9 earns a **4 out of 10** on our repairability scale (10 is the easiest to repair):
 - This Note's components are more modular than ever, thanks to subtle changes to the USB-C hardware, headphone jack, and the S Pen dock's flex cable.
 - The only screws used are standard Phillips screws.
 - You can replace the battery if you're determined—two extremely stubborn glue barriers make it unnecessarily difficult.
 - To service any component you must first painstakingly un-glue (and later re-glue) the glass rear panel.
 - All-too-common display repairs require replacing the entire chassis or tediously separating the gluey cracked glass.