Samsung Galaxy S7 Teardown

Teardown of the Galaxy S7 on March 8, 2016.

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INTRODUCTION

Okay, this phone may have been cracked open a *couple* times already, but we're eager to investigate the mysterious *thermal spreader* ourselves. Will the fancy new tech in the S7 be as *cool* as it's cracked up to be? Only a teardown will tell.

Stay up to date on the latest repair news, and get a behind the scenes look at where the teardown magic happens by following us on Instagram, Twitter, and Facebook.

[video: https://www.youtube.com/watch?v=ETEGRh_p7Ng]

TOOLS:

- iOpener (1)
- iFixit Opening Picks set of 6 (1)
- Tweezers (1)
- Phillips #00 Screwdriver (1)
- Spudger (1)
- iSclack (1)
- Suction Handle (1)

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Step 1 — Samsung Galaxy S7 Teardown

- While legend has it that the number 7 has magical qualities, there's no knowing what qualities the S7 has. If we were to guess completely at random:
  - 5.1-inch Super AMOLED display with 2560 × 1440 resolution (576 ppi)
  - Qualcomm Snapdragon 820 processor with 4 GB RAM + Adreno 530 GPU
  - 12-megapixel rear camera with dual pixel autofocus, 4K video capture; 5-megapixel selfie camera
  - 32 or 64 GB internal storage, expandable via MicroSD card (up to 200 GB additional)
  - IP68 water resistance rating
  - Android 6.0 Marshmallow
- Since the S7 has never been seen on the internet before, there's no way to know if these educated guesses are right.

Step 2

- Compared with its predecessor, the Galaxy S6, the all-new S7 is... uhhhh...

  - Sorry—which one's the S7 again? We have to flip them over to double-check.

- That's better. Unlike its predecessor, the S7's back panel curves gently on the sides, making it a more grabbable handset.

- ⓘ The S7 also shaves off roughly a millimeter from the S6's length and width, while packing on nearly a full extra mm in thickness. That said, at 7.9 mm, it's plenty thin—and even sports a reduced camera bump.

- After [tearing down the S6](#), we weren't exactly wowed by its glass-on-glue construction; it scored a 4 out of 10 and a big "meh" in the repairability department. Here's hoping that, appearances notwithstanding, the S7 will fare better...

Step 3

- Interestingly, Samsung chose to stay with a run-of-the-mill micro USB port, instead of the new USB Type-C standard.

  - (i) Many new flagship phones (Nexus 6P, LG G5, OnePlus 2) feature Type-C, though few fully utilize the power of the connector.

- For now, Samsung seems to think that the older, more widely compatible standard is good enough.

  - 📌 Or, they just thought it would be awkward if all those [free](#) Gear VR headsets weren't compatible with the phones they shipped with.

- Samsung has also made upgrading to a new phone incredibly easy, with an included USB adapter. It's almost like they expect you to buy a new phone before your current device is completely worn out beyond repair. Weird.

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Page 5 of 25

Step 4

- With no exterior screws to be found, there can only be one form of dark matter holding this Galaxy together. Yep, that'd be glue.
  - Fortunately, it's nothing a hot iOpener can't handle.
- We love any excuse to break out our trusty twin-suction-cupped iSclack tool, and the S7's front and rear glass panels make it a perfect target.
- With the rear glass lifted by a smidge, we attack with an opening pick and slice apart the adhesive.
- All in all, it's the same drill as last time—with maybe a slight increase in stickiness.

Step 5

- Where last year we found [gooey white adhesive](#), we now find gooey *black* adhesive. Possibly it was reformulated for waterproofing purposes—or, it could just be a matter of better color-matching.

- Removing the back cover hasn't given us access to anything useful—just a smooth surface for the glass to stick to.

- Fortunately, part of that surface consists of screws.

Step 6

- Actually, that smooth surface contains some useful bits, like the S7's antennas...

- ...and its speaker...

- ...and MY axe.

- ⭐ We'd rather see a user-replaceable battery, or at least an accessible connector for one, but these days we're not expecting much from Samsung. Its once-lofty repairability scores have fallen hard from the heady days of the Galaxy S4.

Step 7

- We line up the pieces for a closer look at the individual components, including the wireless charging coil.

  - (i) Last year's Galaxy flagship had a single [midframe](#) with a handful of aggressively adhered parts, so this separation is a welcome change in our book.

- All these modular components connect to the motherboard by way of tiny spring contacts, making removal and replacement a snap—once you've muscled your way past all the glue and glass, anyway.

Step 8

- Samsung got some flak from consumers for reducing battery capacity in <u>last year's S6</u>. It seems they took the hint and made up for it by including this 3000 mAh battery in the S7.

  - ⓘ That's a significant boost over the Galaxy S6's 2550 mAh battery, and it even beats the much larger <u>iPhone 6s Plus</u>'s 2750 mAh powerplant.

- ⚠ Sadly, as evidenced by this important warning label, the S7's battery does not work in the presence of puppies.

- Although the battery upgrade means more time to binge on apps and games, the battery itself is well wedged and adhered in place, making extraction a little tough.

- If it wasn't designed to be readily removed, then it wasn't intended to be repaired or replaced. Boo.

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Step 9

- Working our way to the motherboard, we pluck out a 5-megapixel front-facing camera.

- Unfortunately, you'll have to work almost as hard to get flawless selfies on the S7 as you did on the S6. The only front-facing camera upgrade here is the shiny new *ƒ*/1.7 aperture.

- With the front camera out of the way, we lift up the motherboard and find a familiar daughterboard connector on its underside.

Step 10

- Compared to the 16-megapixel rear camera on the S6, it seems the S7 got a downgrade with a 12-megapixel/4K rear camera .

  - (i) However, the sensor in the S7 sports Dual Pixel autofocus technology (a.k.a. phase detection) for every pixel.

- Additionally, these pixels measure in at 1.4 µm—a full 25% increase from last year's model. So, despite having fewer pixels, even photos taken in the worst lighting should come out clearer in a head-to-head comparison.

- Looking closely at the camera assembly, we find:

  - Sony IMX260 12 MP image sensor (likely)

  - Renesas OIS driver

  - STMicroelectronics L2G2IS 2-axis MEMS gyroscope

  - Winbond W25Q32FWXGIG 32 Mb flash memory
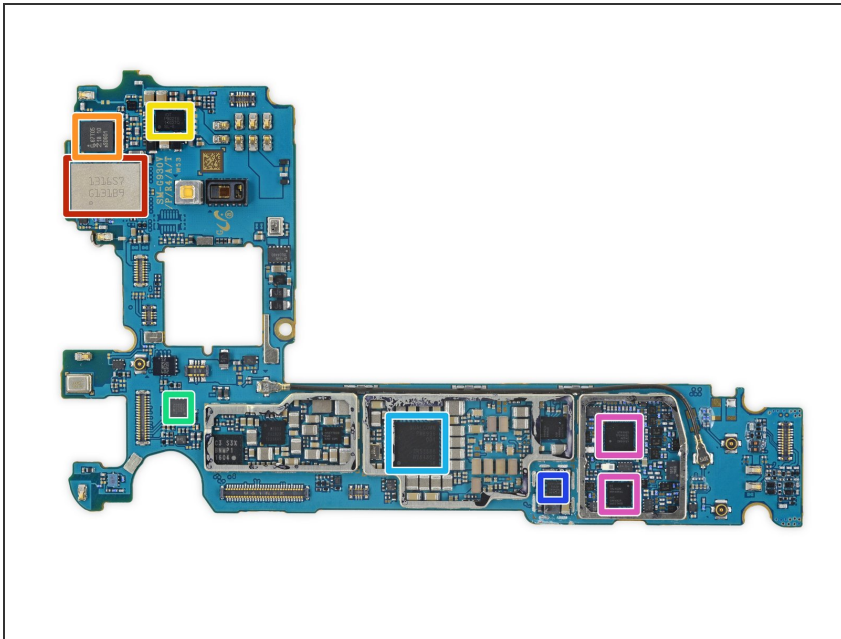
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Step 11
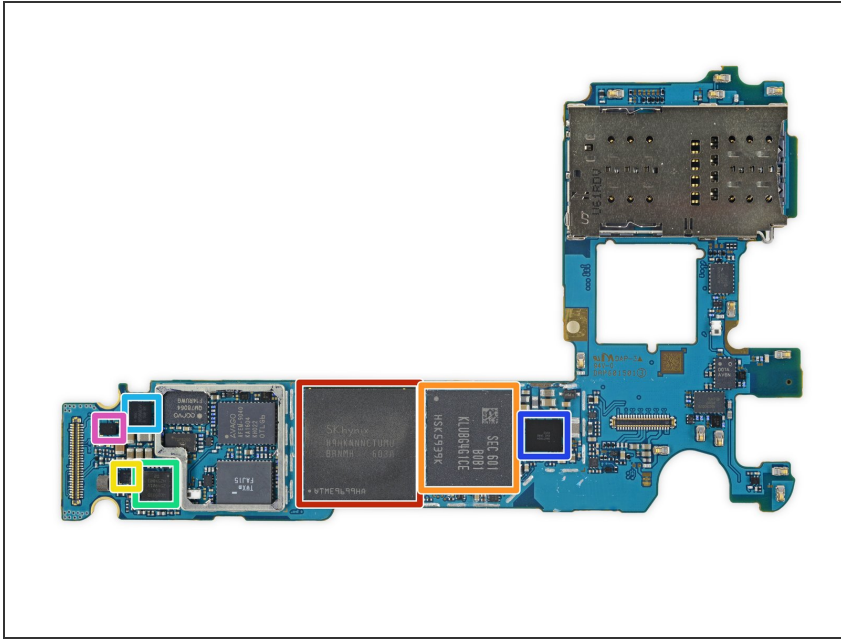
- Our friends at [Chipworks](#) may have beaten us to the punch, but that doesn't stop us from giving this board our due diligence. Squirreled away under the EMI shields, we find:

  - SK Hynix [H9KNNNCTUMU-BRNMH](#) 4 GB LPDDR4 memory layered over the Qualcomm [MSM8996](#) Snapdragon 820

  - Samsung [KLUBG4G1CE-B0B1](#) 32 GB MLC universal flash storage 2.0

  - DSP Group [DBMD4](#) audio/voice processor

  - Qualcomm [WCD9335](#) audio codec

  - Maxim Integrated MAX98506BEWV audio amplifier

  - Maxim Integrated MAX77854EWZ power management w/ li-ion battery charger

 - ON Semiconductor load switch

Step 12
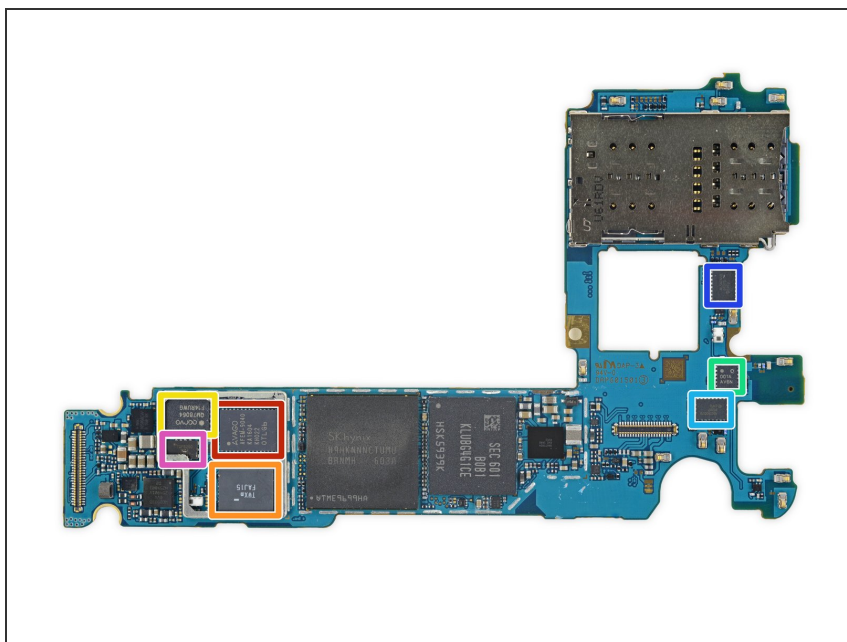
- And some more:
  - Avago AFEM-9040 multiband multimode module
  - Murata FAJ15 front end module
  - Qorvo [QM78064](#) high band RF fusion module
  - Qorvo [QM63001A](#) diversity receive module
  - TDK D5287 antenna switch module
  - TDK D5275 antenna switch module
  - Qorvo TQF6260 power amplifier duplexer

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Page 14 of 25

Step 13

- And on the flip side...
  - Samsung 1316S7 Wi-Fi Module (likely contains a Broadcom [BCM4359](#) WiFi/Bluetooth transceiver)
  - NXP Semiconductor 67T05 (PN67T) NFC controller
  - IDT P9221 wireless power receiver (likely an iteration of IDT [P9220](#))
  - STMicroelectronics [LSM6DS3](#) always-on 6-Axis IMU
  - Qualcomm PM8996 PMIC
  - Qualcomm [QFE3100](#) envelope tracker
  - Qualcomm [WTR4905](#) and [WTR3925](#) RF transceivers

Step 14
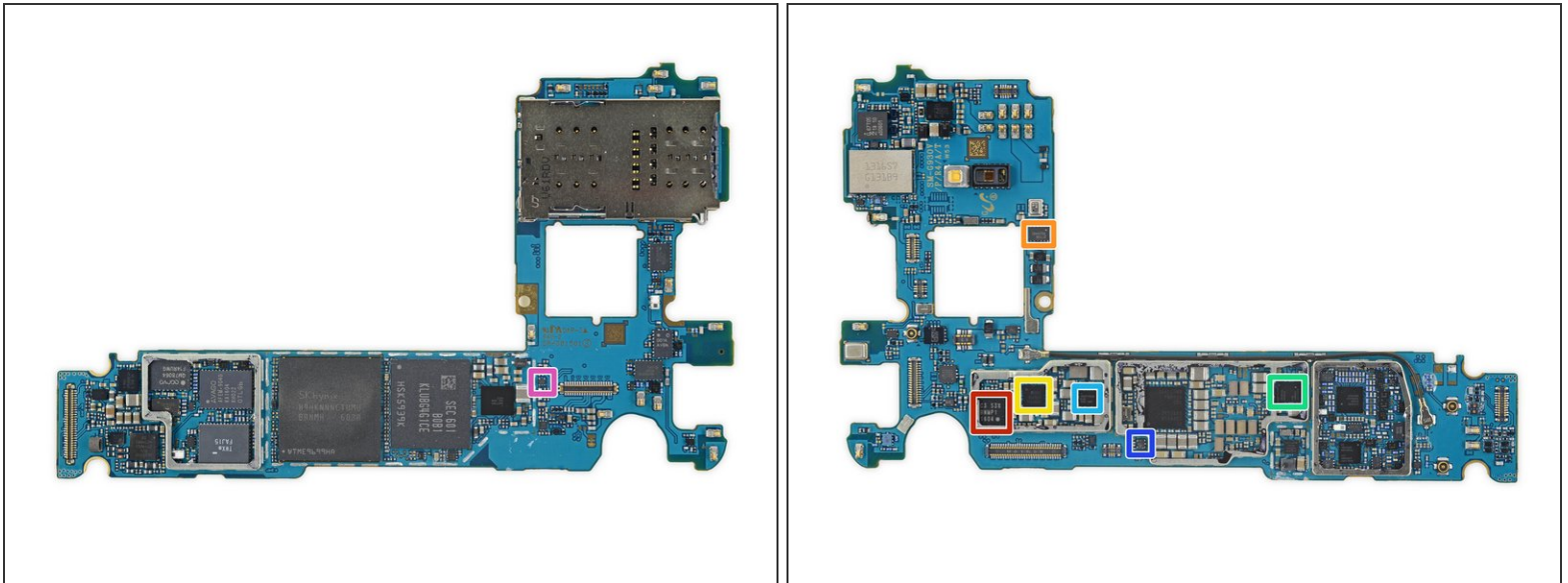
- IC identification, pt. 2:

  - Samsung camera processor (possibly)

  - Zinitix ZF115N haptic driver

  - Samsung S2MPB02 power management

  - Qualcomm PM8004 power management

  - Maxim Integrated MAX77838EWO power management

  - NXP Semiconductor NCX2200 comparator

 - Toshiba TC7SBD385FU bus switch

Step 15
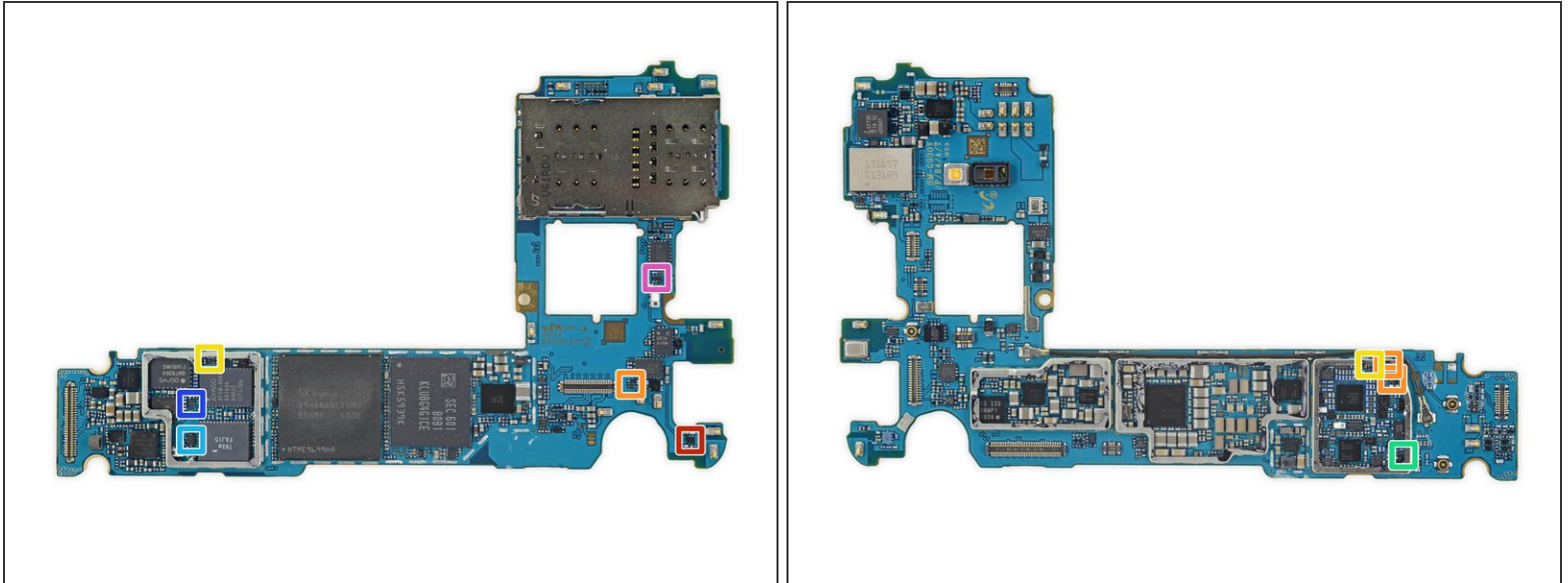
- IC identification, pt. 3:

  - NXP Semiconductor [BGU8103](#) GPS/GLONASS/Galileo/BeiDou low noise amplifier

  - NXP Semiconductor [BGS8M2](#) LTE low noise amplifier

  - NXP Semiconductor [BGS8H2](#) LTE low noise amplifier

  - NXP Semiconductor [BGS8L2](#) LTE low noise amplifier

  - Infineon BGSX22GN10 DPDT RF antenna switch

  - Infineon [BGS12SN6](#) RF switch

  - Infineon [BGS12PL6](#) RF switch
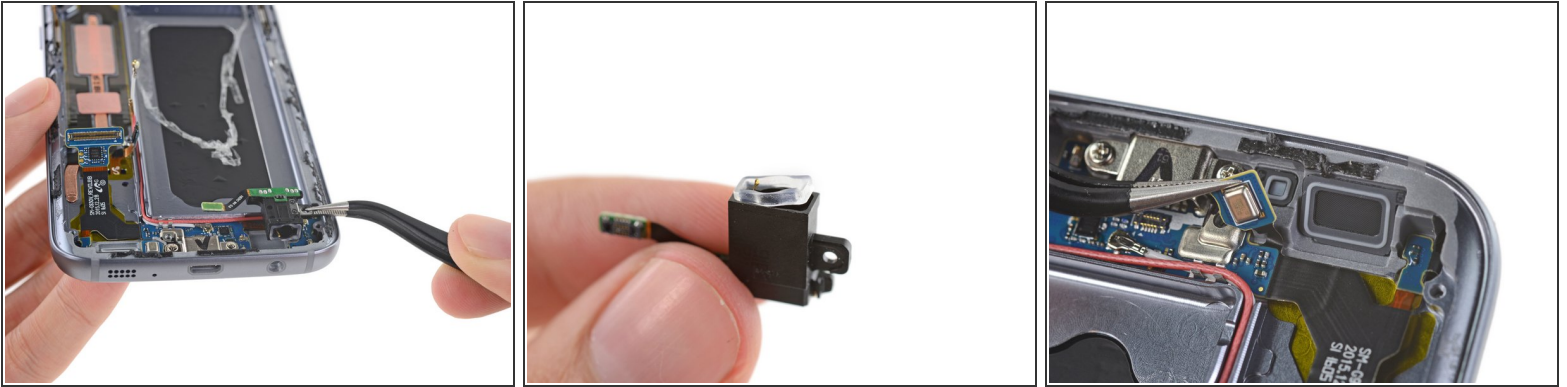
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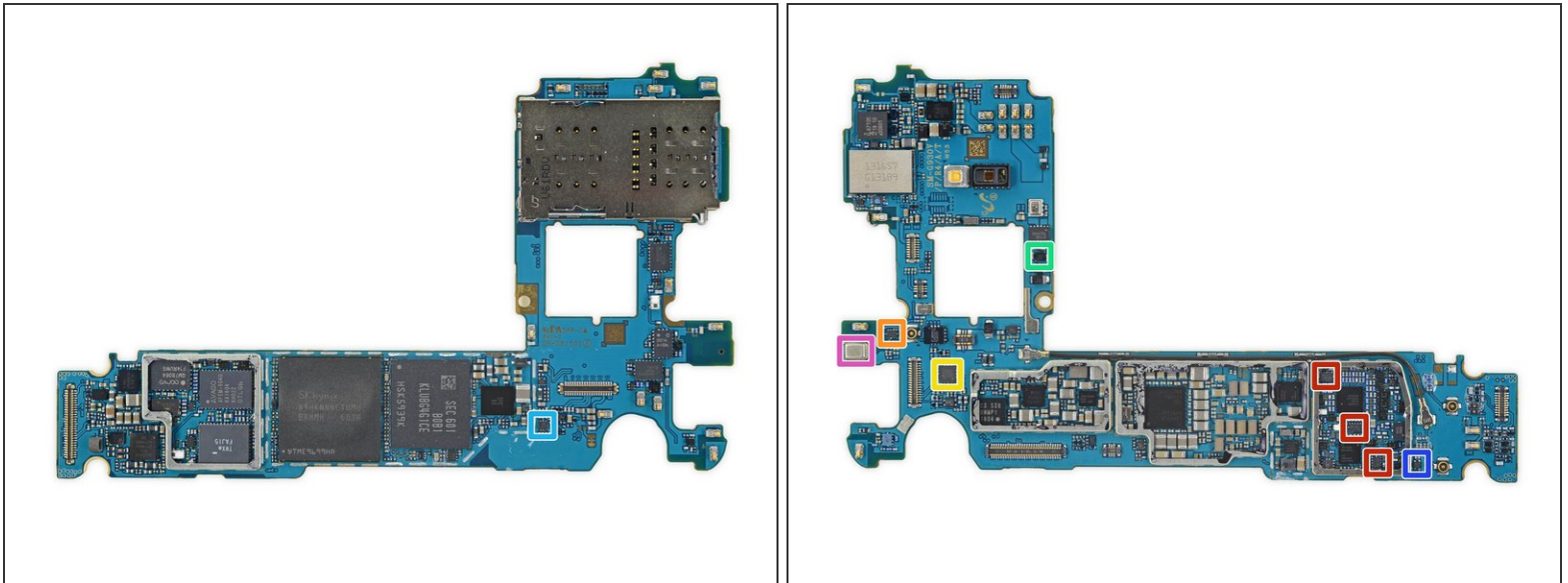
- IC identification, pt. 4:

  - Infineon RF switch

  - Infineon antenna tuning switch

  - RDA Microelectronics RDA6213N FM radio receiver

  - ON Semiconductor FPF2495B over-voltage/current protection load switch

  - Diodes Incorporated AP7346D-3318FS6-7 dual 3.3V & 1.8V LDO regulator

  - Diodes Incorporated AP7340D-18FS4-7 1.8 V LDO regulator

  - Knowles MEMS microphone

Step 17
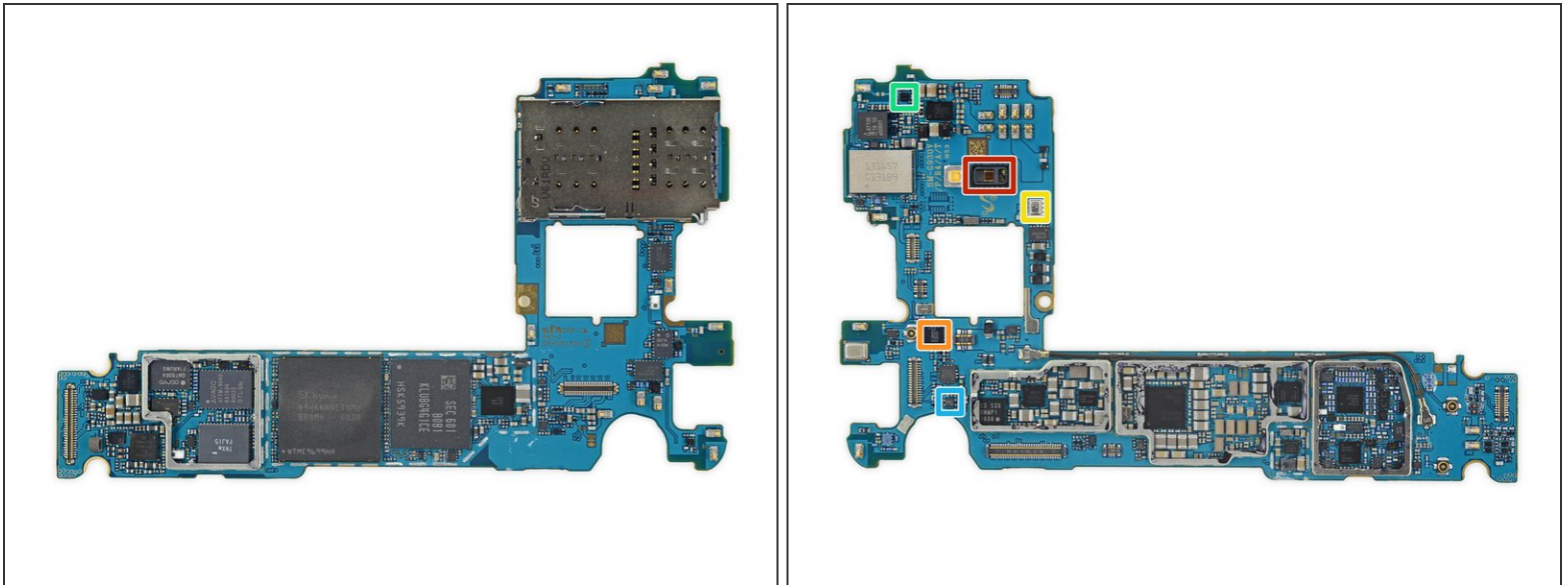
- IC identification, pt. 5 (sensors):

  - Maxim Integrated MAX86902 heart rate sensor/integrated pulse oximetry/UV sensor module (likely)

  - STMicroelectronics [LSM6DS3](#) 3-axis accelerometer/gyroscope

  - Bosch Sensortec [BMP280](#) pressure sensor

  - AKM Semiconductor AK09911 3-axis electronic compass

  - ABLIC, Inc. (Formerly Seiko Instruments) [S-5712CCDL1-I4T1U](#) Hall sensor

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Page 19 of 25

Step 18

- Next up is the S7's modular headphone jack.

  - Complete with cute rubber seal!

- Looks like Samsung decided to take its ruggedized "Sport" standards to their flagship, with a hefty IP68 rating (the highest level being IP69).

  - ⓘ Perhaps responding to a certain fruit company's recent [waterproofing efforts](#)?

- We find more rubber seals around the lower microphone and speaker making for some serious [ingress protection](#).

Step 19

- Just like its [predecessor](#), the cables for the S7's soft buttons are wrapped around the display-backing frame.

  - These sandwiched cables make a daughterboard replacement (including the charging port) next to impossible, since freeing these cables means removing the OLED screen.

- Undaunted, we bring back our iOpener to ease the ~~tension~~ adhesive.

- While we're at it, we grab a trusty opening pick and set to work on the terrible task of prying open the OLED.

Step 20

- Peeling up those pesky soft button LED cables lets us *finally* free the daughterboard.

- Just for those of you keeping score, this messy situation prevents easy replacement of: display and digitizer (of course), USB port, microphone, and soft button LEDs.

  - 📌 If you need to replace the charging port, unless you have some microsoldering skills, you have two options: sacrifice those soft button LEDs or replace your display in the process.

- ⓘ Remember that fake "midframe" made of antennas? Turns out the S7 just buried its midframe deeper, and adhered the display to it, rather than secure its display assembly to a midframe with screws.

  - This beefs up the S7's waterproofiness, but means more of a fight to repair the thing should you suffer non-water related troubles.

Step 21
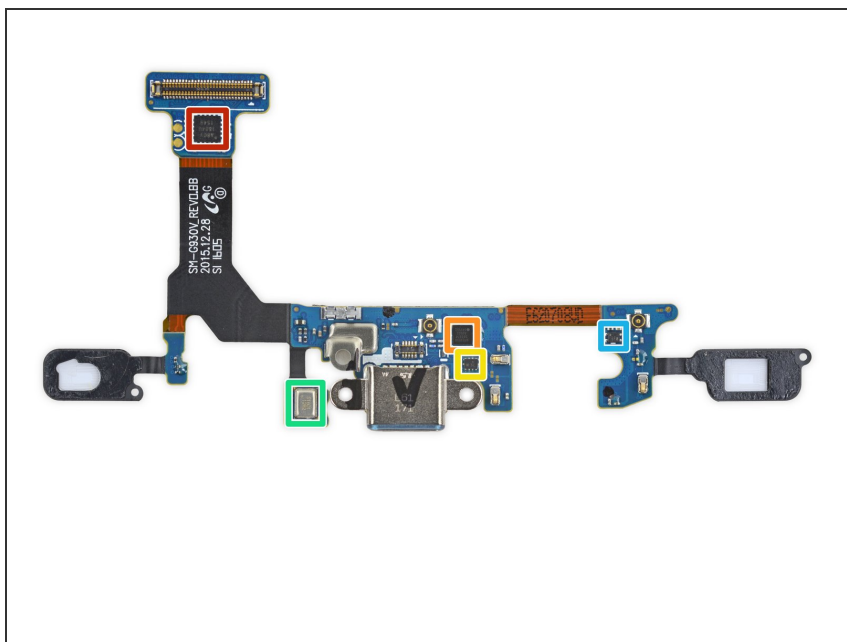
- Daughterboard IC identification:
  - ABOV Semiconductor MC80F1504M 8-Bit microcontroller w/ 8 Kb flash
  - Qualcomm QFE2550 antenna tuner
  - Infineon antenna tuning switch
  - Knowles MEMS microphone
  - ABLIC, Inc. (Formerly Seiko Instruments) S-5712CCDL1-I4T1U Hall sensor

Step 22
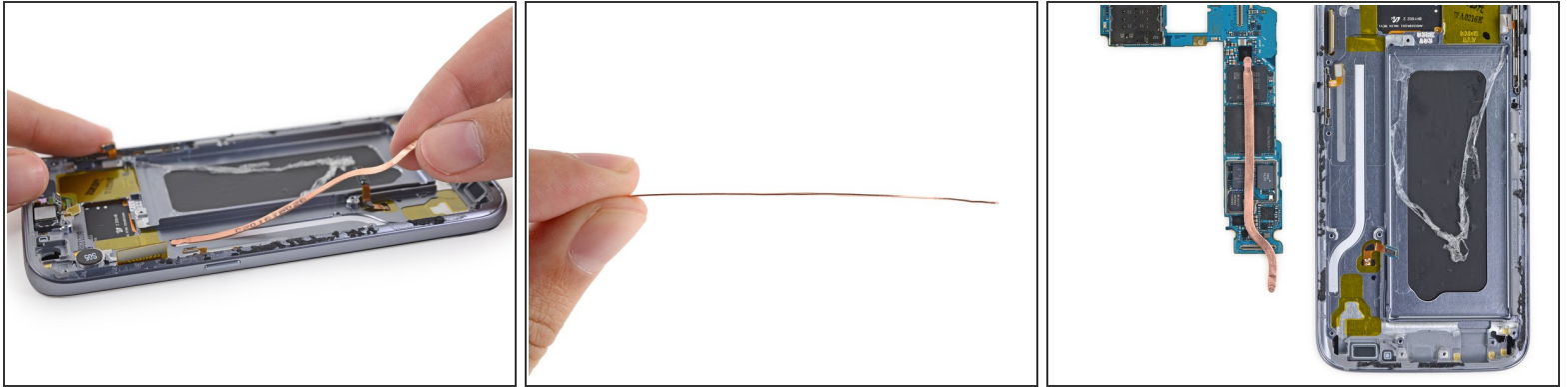
- Alright, the moment we've all been waiting for: the legendary " liquid cooling" system in the S7.

- It's a tiny copper twig.

  - ⓘ Actually, it's a *teeny* heat pipe (thin copper tube) with less than half a gram of material, measuring less than half a millimeter thick.

- This may not be as revolutionary as Samsung describes it, but most heat pipes *do* technically use liquid to transfer heat.

- In the case of the S7, we're guessing that the pipe transfers heat to the phone's metal midframe, where it can then radiate out to the side—*or directly into your hands*.

- We've seen heat pipes in phones before, but the growing need for them shows how phone processors are getting faster (and sometimes hotter) each year.

Step 23

- Samsung Galaxy S7 Repairability Score: **3 out of 10** (10 is easiest to repair).

  - Many components are modular and can be replaced independently.

  - Unlike the S6 Edge, the battery can be removed without first ousting the motherboard—but tough adhesive and a glued-on rear panel make replacement more difficult than necessary.

  - The display needs to be removed (and likely destroyed) if you want to replace the USB port.

  - Front and back glass make for double the crackability, and strong adhesive on the rear glass makes it very difficult to gain entry into the device.

  - Replacing the glass without destroying the display is probably impossible.