



Huawei Mate 20 Pro Teardown

Teardown of the Huawei Mate 20 Pro done in October 2018.

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INTRODUCTION

Right in the middle of the grand finale of this year's flagship smartphone season, Huawei throws their last big fighter into the ring: the Mate 20 Pro! On paper, it looks more powerful than ever—but only a teardown will tell if it's a true champion or just a poser.

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TOOLS:

- [iFixit Opening Picks set of 6](#) (1)
 - [iOpener Kit](#) (1)
 - [Tweezers](#) (1)
 - [Phillips #00 Screwdriver](#) (1)
 - [Suction Handle](#) (1)
 - [Spudger](#) (1)
 - [Halberd Spudger](#) (1)
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Step 1 — Huawei Mate 20 Pro Teardown



- Here's what the Mate 20 Pro brings to the ring:
 - 6.39" AMOLED display with a resolution of 3120 × 1440 (~538 ppi)
 - Huawei [Kirin 980](#) chipset: Mali-G76 MP10 GPU and an octa-core CPU (2x 2.6 GHz Cortex-A76 cores, 2x 1.92 GHz Cortex-A76 cores, and 4x 1.8 GHz Cortex-A55 cores)
 - *Triple* rear cameras: 40 MP *f*/1.8, 20 MP *f*/2.2, and 8 MP *f*/2.4 lens with 5x optical zoom
 - 24 MP *f*/2.0 selfie cam
 - IP68 dust/water ingress rating
 - Android 9.0 (PIE)
 - Facial recognition hardware, and an under-display fingerprint sensor

Step 2



- Face to face with Huawei's [champion from last season](#), the Mate 20 Pro sports a newly notched, curved display.
 - ❗ This notch grew a little compared to that of the [P20 Pro](#), making space for the new sensors needed for the 3D face unlock feature.
- The Mate 20 Pro swaps out the rear fingerprint sensor for a third camera. But is three enough to keep up with [the competition](#)?
- Our Mate 20 Pro is dressed up in the [industry-standard](#) glass sandwich, but the rear glass isn't quite as standard as it looks. Huawei applied a non-slip, fingerprint-resistant coating to help prevent [slippery accidents](#).
- The Mate 10 Pro's loudspeaker holes give way to the [the SIM and NM](#) card tray in the Mate 20 Pro.

Step 3



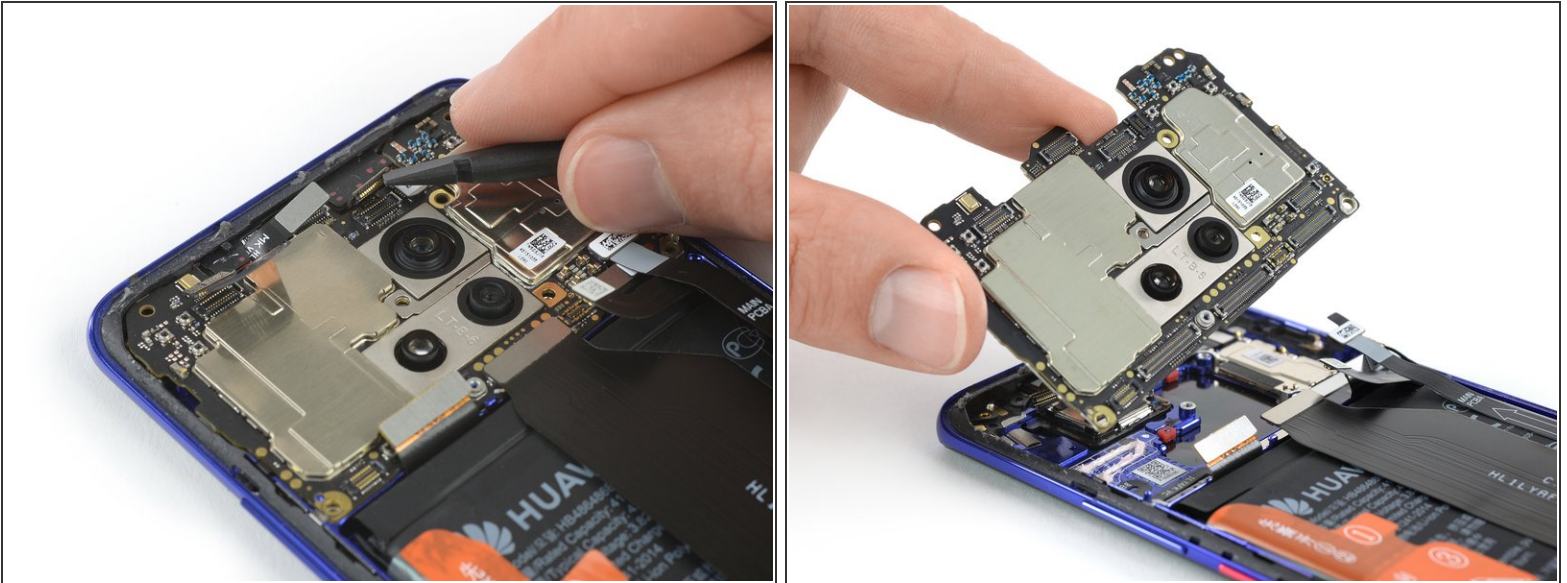
- Undaunted by a fragile rear glass panel thanks to recent teardowns of glue-filled [competitors](#), we grab our heat gun and get to work.
- Some heat helps the Mate 20 Pro to relax before our [standard tools](#) finish the job!
- Thanks to the relocated fingerprint reader, there's no danger of [tearing delicate flex cables](#) while removing the rear cover.

Step 4



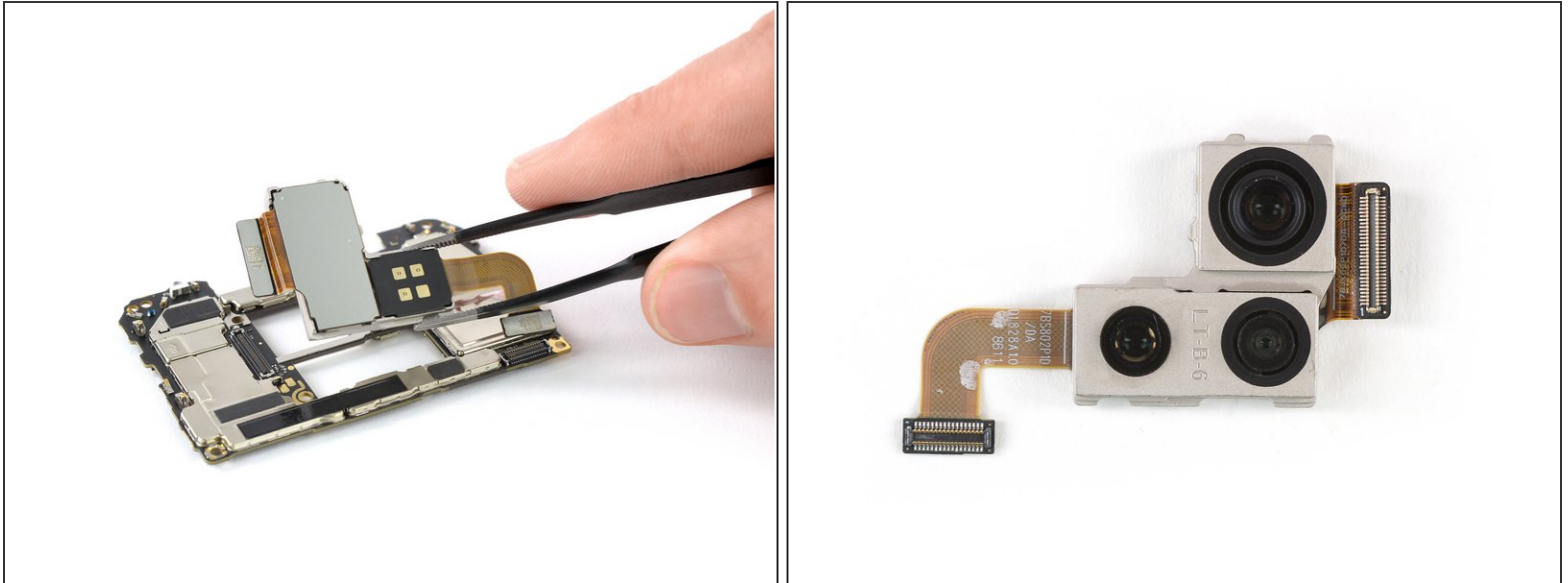
- We just got here and we're already facing one of the Mate 20 Pro's new features—the bi-directional wireless charging coil.
- ① The Mate 20 Pro's charging coil is both a transmitter and a receiver. [Huawei wants you to use it to charge their AirPods competitor, FreePods.](#)
- Eight screws later, we remove the midframe assembly, which is home to the wireless charging coil, the NFC antenna and the dual-LED dual-tone flash.

Step 5



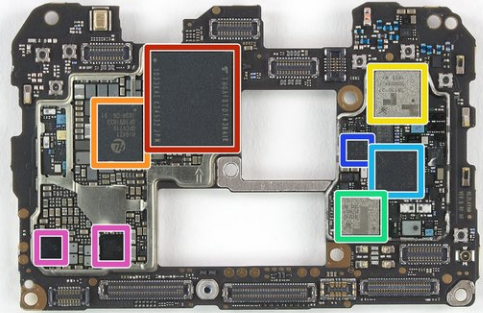
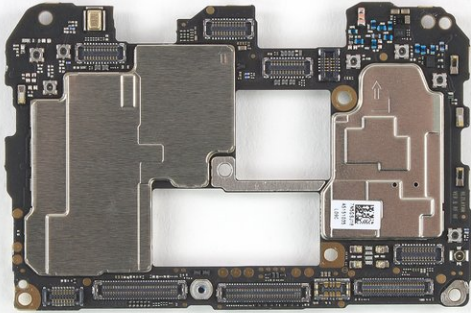
- At first glance, the motherboard looks free to jump right out, but a closer look reveals **nine** flex cables holding it in place, plus an antenna cable.
- [Like the P20 Pro](#), the Mate 20 Pro sticks to a relatively small motherboard, leaving room for a wider battery.
- With the 3D face unlock hardware and the triple rear camera taking up more motherboard space than usual, Huawei had to cut some camera holes and change the layout a bit.
- After prying away some ~~loving arms~~ flex cables, we manage to remove the motherboard along with the rear cameras.

Step 6



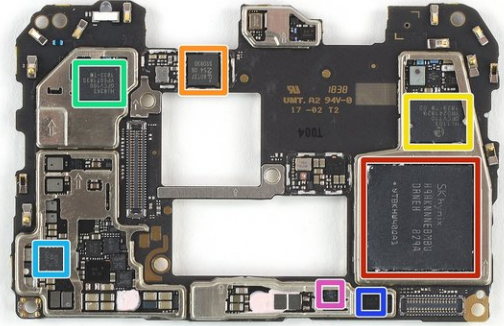
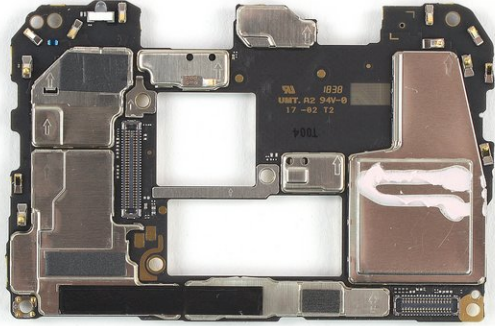
- ...which are easily removed after disconnecting *two additional* flex cables. Praise our good old friend the [spudger](#)!
- The Mate 20 Pro has three rear cameras:
 - Top right: 40 MP, $f/1.8$, 27 mm-equivalent wide angle lens
 - Bottom right: 20 MP, $f/2.2$, 16 mm-equivalent ultra wide angle lens
 - Bottom left: 8 MP, $f/2.4$, 80 mm-equivalent telephoto lens with 5x optical zoom
- The P20 Pro's [monochromatic camera](#) is ditched for an ultra wide angle lens, ideal for landscape and macro shots (at a minimum focal distance of 2.5 cm).
- ① Even with three cameras, Huawei says the brains behind this hardware is what will really make your images shine.

Step 7



- With the cameras out of the way, the motherboard takes center stage. Here's what it has to offer:
 - Toshiba [THGAF8T0T43BAIR](#) 128 GB Universal Flash Storage
 - HiSilicon Hi6421 power management IC
 - Skyworks SKY78130-21 [front-end module](#) for WCDMA/LTE bands 8/12/13/20/26/27
 - Skyworks SKY78132-52 [front-end module](#) for WCDMA/LTE bands 7/30/40/41
 - Skyworks SKY78131-21 [front-end module](#) for WCDMA/LTE bands 1/2/3/4/25/34/39
 - Skyworks 7360-2A 04115.1 1821 MX RF module
 - HiSilicon Hi6422 envelope tracker

Step 8



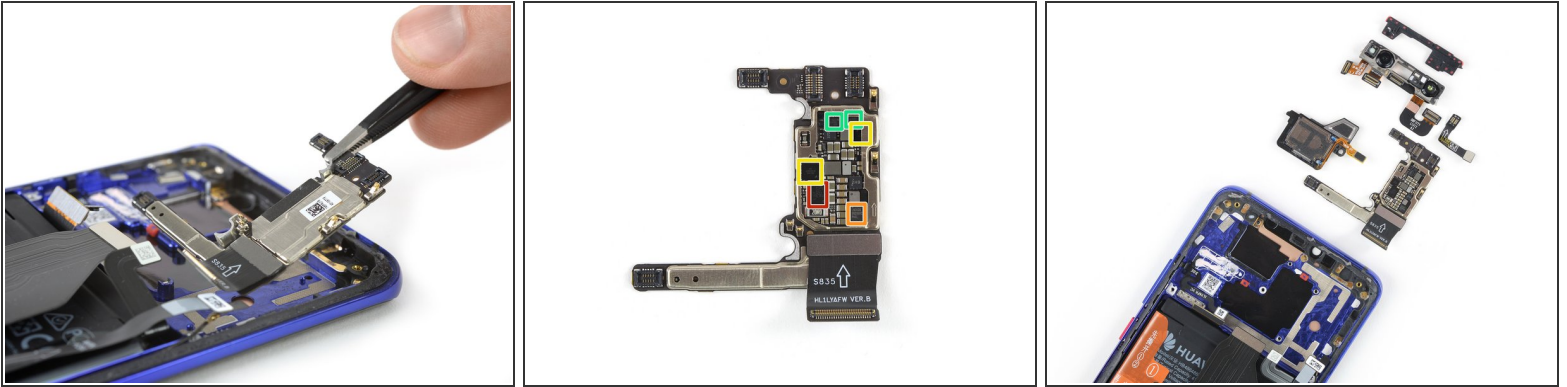
- On the backside we found:
 - SKhynix H9HKNNNEBMBUDR-NEH [LPDDR4](#) (likely with Huawei [Kirin 980](#) layered underneath)
 - NXP Semiconductor [PN80T](#) NFC controller w/ secure element
 - HiSilicon Hi1103 Wi-Fi chipset
 - HiSilicon Hi6363 RF transceiver
 - Texas Instruments TPS1879C1 display power management (likely)
 - ON Semiconductor [FSA4476](#) USB type-C analog switch
 - ON Semiconductor [NLAS2750](#) dual DPDT analog switch

Step 9



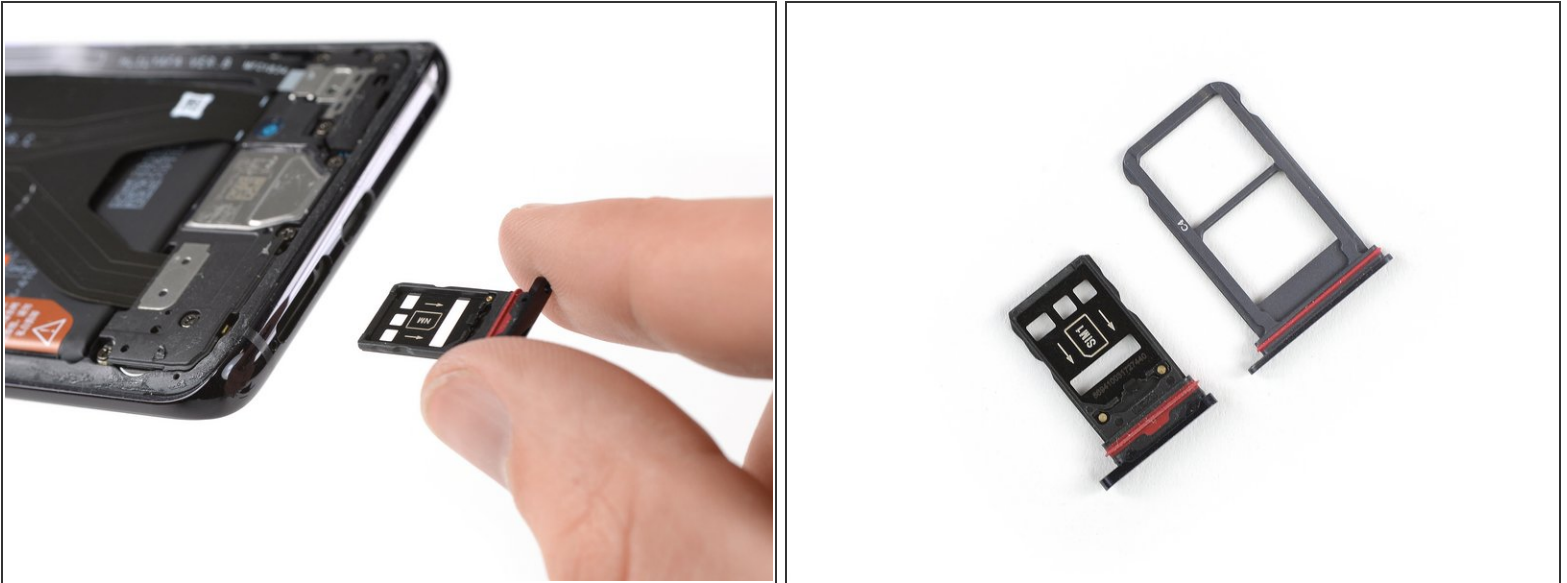
- We snoop around the notch area and pull out the [familiar-looking](#) front camera / [3D face unlock assembly](#). It doesn't seem to completely mate up with what Huawei [showed during their launch event](#), but our best guesses include:
 - Dot projector
 - 24 MP, $f/2.0$, 26 mm-equivalent lens, borrowed from the P20 series
 - Rangefinder / proximity sensor
 - Flood illuminator
 - Ambient light sensor
 - IR camera
 - Rectangle of mystery

Step 10



- We use a [pair of tweezers](#) to dig out the last bits behind the motherboard.
- The missing piece: a small interconnect board for the power and volume buttons. We find the following chips:
 - IDT [P9221](#) wireless power receiver
 - Lattice Semiconductor [iCE40LM1K-CM36](#) iCE40 FPGA
 - Cirrus Logic CS35L35A audio amplifier
 - Texas Instruments [LM3644](#) 1.5 A camera flash LED driver
- With the Mate's brains dissected, it's time to head towards the other end of the phone and check out its fancy footwork.

Step 11



- SIM trays aren't ordinarily exciting, but this tray happens to support a new memory card format called nano memory (NM).
- The [new NM cards](#) are nano-SIM sized expandable memory (45% smaller than a normal SD card) and can offer a maximum read speed of 95 MB/s.
- ① Huawei makes the NM cards themselves, eliminating potential phone slowdown due to low-quality SD cards.
- The smaller format also allows this SIM/NM tray to be smaller than a traditional dual-card tray.

Step 12



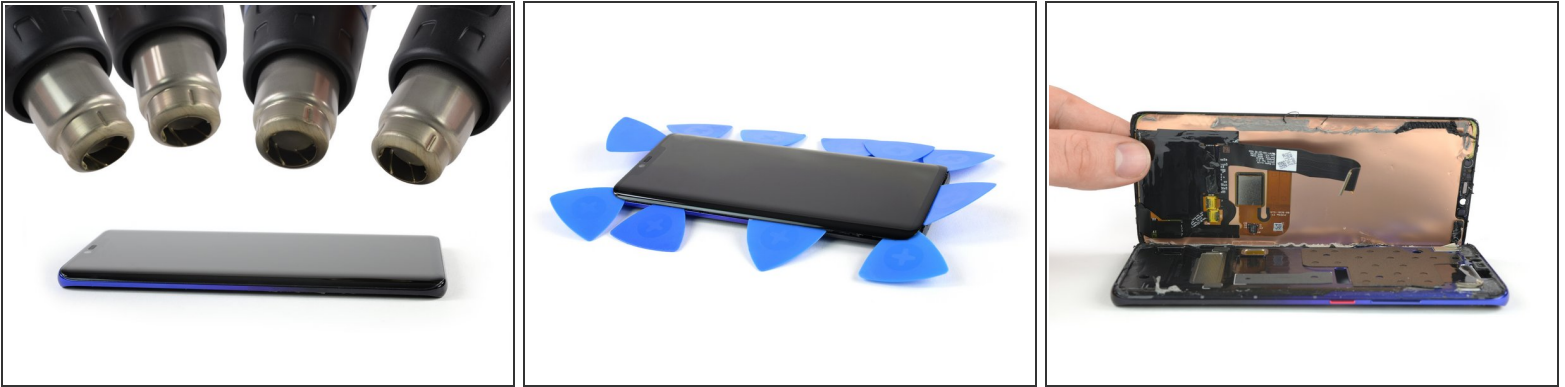
- [Just like in the P20 Pro](#), the USB-C charging port is mounted to a large flex cable. This means if the charging port fails, you'll only have to replace the main cable—instead of a more expensive daughterboard, as in the [Google Pixel 3 XL](#).
- Another similarity to the P-Series: no 3.5 mm headphone jack. USB-C headphones are included along with a 3.5 mm adapter.
- ❗ Yet, the Mate 20 and Mate 20 Lite both still have a headphone jack. Maybe Huawei [isn't quite sure](#) if USB-C alone is the future.
- The other port, a SIM reader, is mounted to a small board, and planted near the coin-style vibration motor.

Step 13



- Moving swiftly along, we take a closer look at the Mate's power plant.
 - To our surprise, we find some orange pull tabs on the left side of the battery, containing a short guide how to remove it—[we love guides](#)!
 - We're happy whenever we can extract a battery without having to break out our iFixit Adhesive Remover—in this case, we just needed a little help from an [iOpener](#) to unseat it.
 - The battery weighs in at an unprecedented 16.04 Wh (4,200 mAh at 3.82 V).
- ❗ In terms of raw capacity, that beats just about everyone—including [its predecessor](#) (15.28 Wh), the [iPhone XS Max](#) (12.08 Wh), and even heavyweight [Samsung Galaxy Note9](#) (15.4 Wh).

Step 14



- We unleash a multi-headed heat-gun serpent—we named it Pat—which blasts through the curved display's IP68-rated adhesive.
- There is one last big secret we need to explore to give Huawei's newest fighter a ranking—the 3120 x 1440 pixel, 19.5:9 ratio (~538 ppi density) display!
- ① For the numbers fans: the iPhone XS has 2436 x 1125 pixels (~458 ppi), the XS Max has 2688 x 1242 pixels (~458 ppi), the Pixel 3 XL has 2960 x 1440 pixels (~523 ppi), and the S9+ has 2960 x 1440 pixels (~529 ppi).
- An [opening pick](#) or eleven dramatically improves this smartphone's aerodynamics, and helps us pry up the display.

Step 15



- Thought we were done already? Not yet! Last, but certainly not least, let's take a closer look at Huawei's new finger-reading tech.
- The [fingerprint sensor](#) is made by [Goodix](#) and sits *under* the AMOLED panel, though Goodix markets the tech as an "in-display fingerprint sensor™".
 - The fingerprint flex cable contains a Goodix GM181 fingerprint controller.
- The sensor isn't capacitive (like most familiar sensors such as Touch ID), but optical. This is reportedly similar to the sensor found in the new [OnePlus 6T](#).
- ① The sensor looks at your finger, which is illuminated by light from the display. Then the sensor uses the information it captures to create an image of the distinctive valleys and ridges of your fingerprint.
- And underneath the display: a Synaptics S3718 touchscreen controller.

Step 16



- That's it! The fight is finished, and we retreat to our corner. There will always be new challengers in the smartphone market, but this round is now at an end.
- If you would like a nifty wallpaper as a souvenir, [you can find one here!](#)
- ① Wanna be the first to break the teardown news? Sign up for our [press list](#) and get the inside scoop!

Step 17 — Final Thoughts

REPAIRABILITY SCORE:



- The Huawei Mate 20 Pro earns a **4 out of 10** on our repairability scale (10 is the easiest to repair):
 - Many components are modular and can be replaced independently.
 - Battery replacement requires removing only the back panel and midframe.
 - Only standard Phillips screws are used along with an average amount of adhesive.
 - Because of the sandwich build around the motherboard, there are more flex connectors than average and repairs will consume more time.
 - Glued-down front and back glass means greater risk of breakage while making repairs difficult to start.
 - Screen repairs require a lot of disassembly while battling tough adhesive.
 - A broken screen probably means you need to replace the fingerprint reader as well, or vice versa.