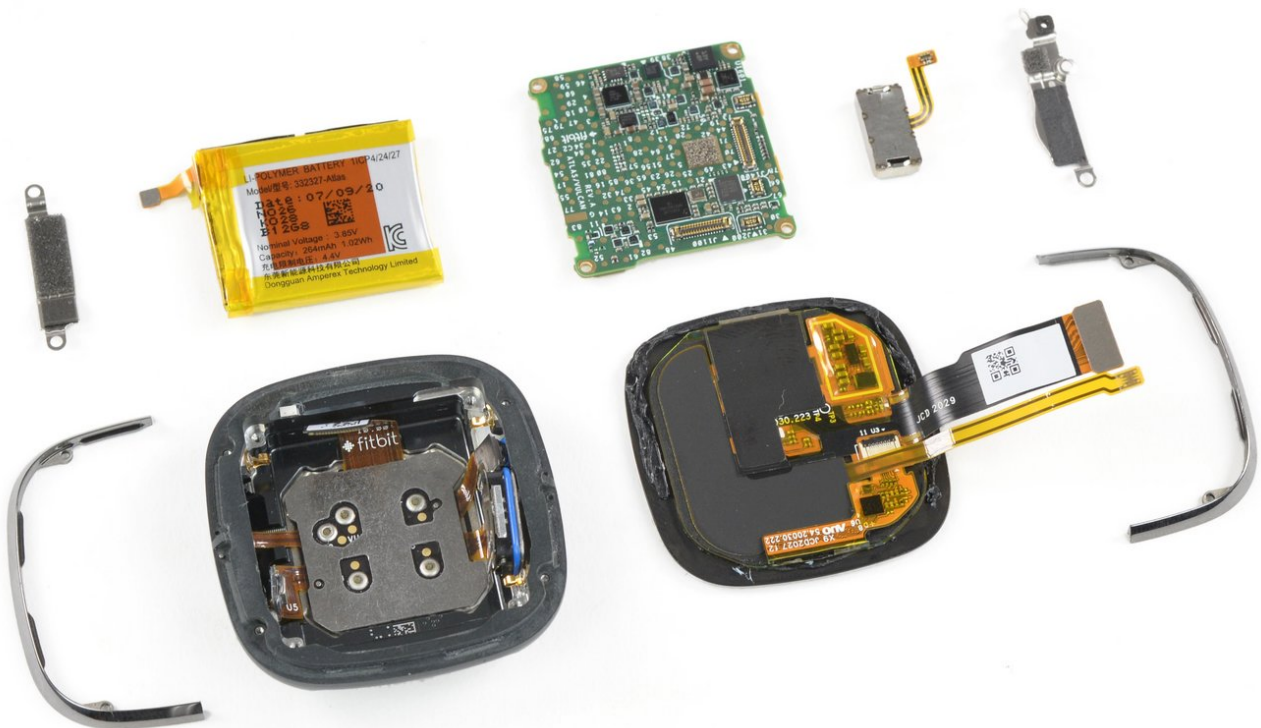




Fitbit Sense Teardown

Teardown of the Fitbit Sense smartwatch, performed in November 2020.

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INTRODUCTION

Riddled with sensors and health features, the new Fitbit Sense is poised to rival the Apple Watch Series 6 as a health-focused wearable device. But what happens when the Fitbit gets sick? Well, that's why we're here today—to determine how difficult the surgery will be. Doctor, pass the scalpel. It's time for a teardown.

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TOOLS:

- [iOpener](#) (1)
 - [Pro Tech Toolkit](#) (1)
 - [Spudger](#) (1)
 - [ESD Safe Tweezers Blunt Nose](#) (1)
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Step 1 — Fitbit Sense Teardown



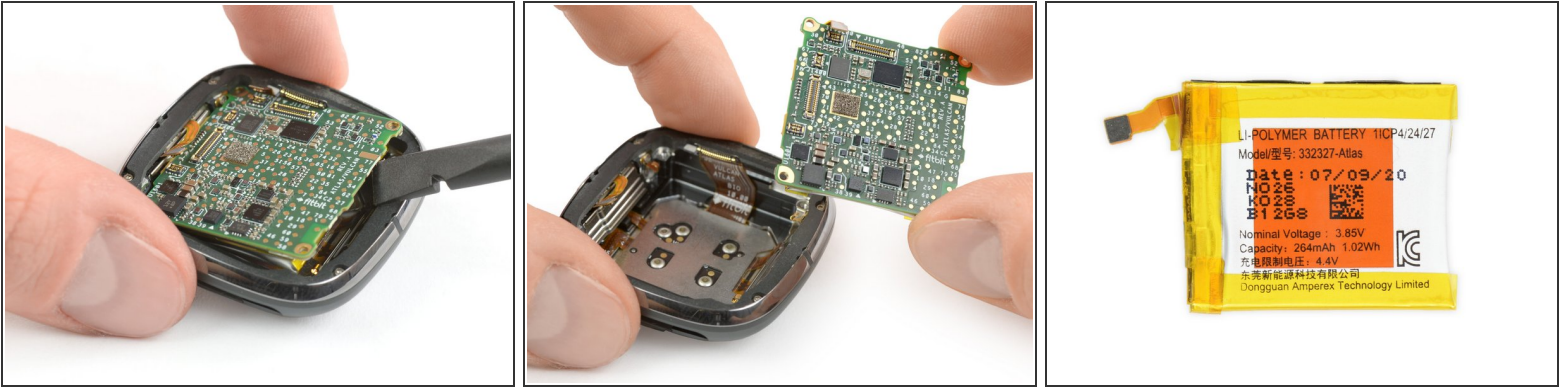
- Let's get a sense of what this Fitbit brings to the table:
 - 1.58 AMOLED screen
 - 4 GB internal storage
 - A new ECG function as well as a skin temperature sensor, and the standard optical heart rate sensor
 - Wi-Fi, NFC, Bluetooth 5.0 and Built-in GPS
 - Water resistant up to 50 meters
 - Also part of the package are a gyroscope, an altimeter, a 3-axis accelerometer, and an ambient light sensor
- For comparison: The Fitbit Ionic on the left and the Apple Watch Series 6 on the right.

Step 2



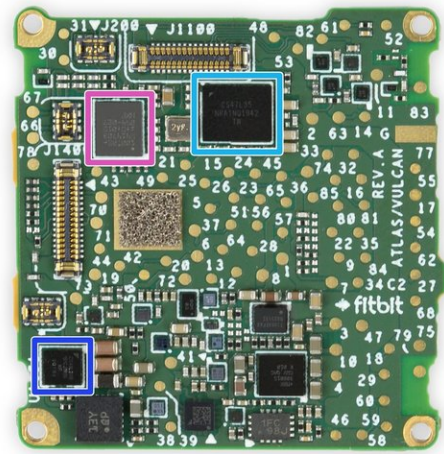
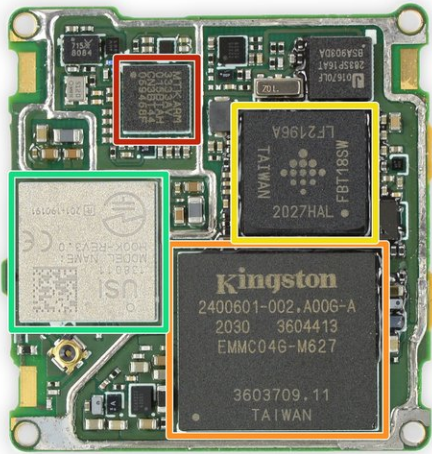
- Not shown here: lots of heat and careful prying. Like the Apple Watch, the Fitbit Sense's ingress protection means the very thin gap between the display and the housing of the watch is lined with adhesive.
- Even with a heat gun and extremely thin prying tools it is difficult to get the display to budge. A semi-protected OLED display underneath the glass and booby trap cables and near the edge where prying happens add to the challenge.
- ⓘ Though it is precariously placed, we're thankful the display cable is long enough to allow us to lift the screen with ease once the hard part is done.
- Underneath we're greeted by a small bracket fastened with tiny T2 Torx screws covering the connectors we're aiming to disconnect—no problem for our [Pro Tech Toolkit](#).

Step 3



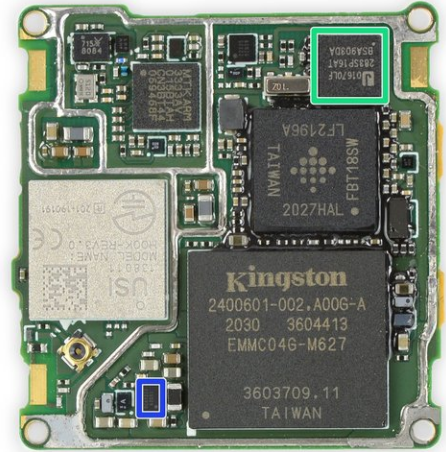
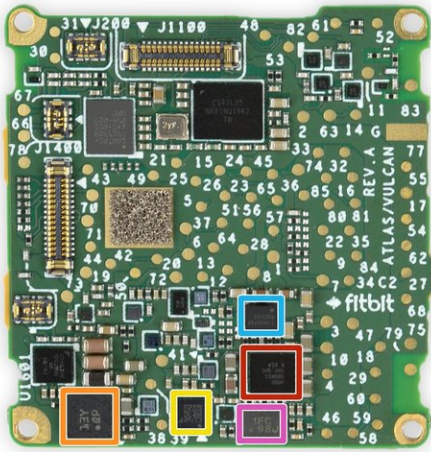
- A couple more Torx screws and some connectors hold down the green motherboard.
 - The board doesn't come out alone, though! The battery hitches a ride, lightly adhered to its underside.
 - The battery is a 1.02 Wh (266 mAh @ 3.85 V) cell, slightly less potent than the 1.17 Wh pack from the [Apple Watch Series 6](#) and a far cry from the 2.16 Wh cell in the [Xiaomi Watch](#).
- i** Despite the intense opening procedure, we're getting the Sense that this Fitbit is considerably less complex than any Apple Watch. That's good for these repairs—battery, board, and screen are all accessible within a few steps! (Even if the first one is a doozy.)

Step 4



- Unlike the resin-encased Apple Watches, this Fitbit wears its silicon on its sleeve, so to speak. Here's what we found:
 - [MediaTek MT3333](#) GPS SoC
 - [Kingston EMMC04G-M627](#) 4GB flash memory
 - Fitbit FBT18SW ARM application processor
 - USI chip (most likely WiFi module)
 - [Cirrus Logic CS47L35](#) Smart Codec with Low Power Audio DSP
 - [Cirrus Logic CS40L25B](#) boosted haptic driver
 - NXP SN100T Secure Element

Step 5



- The identification continues:
 - Maxim Integrated [MAX30001](#) Single-Channel Integrated Biopotential/Bioimpedance Analog Front End
 - Bosch Sensortec [BHI160](#) Accelerometer/Gyroscope w/ Sensor Hub
 - STMicroelectronics [LIS2DW12](#) MEMS 3-Axis Accelerometer (Likely)
 - Jeju Semiconductor [JSC283SP16ATDT-70LF](#) 128 Mb CDRAM (cellular RAM) memory
 - Texas Instruments BQ25152 power management IC (likely)
 - Texas Instruments [TPS63051](#) buck boost converter
 - Texas Instruments [TMUX1111](#) 4-ch. SPST analog switch

Step 6



- Two more brackets tucked up against the sides of the housing keep a few more key components in place: loudspeaker and pressure sensor on one side, and a microphone, vibration motor, and psuedo-button on the other.
- Minus the vibration motor, all of these components connect to the sensor board at the bottom of the housing and terminate in soldered connections.
- Even if you're handy with a soldering iron though, that sensor board lives under a metal plate and the whole affair is locked in with some serious permanent adhesive. It's unlikely you'll be able to remove it without damaging something.
- The edge around the display features two separated metal brackets for reading your EDA levels (electrodermal activity) and taking that ECG.

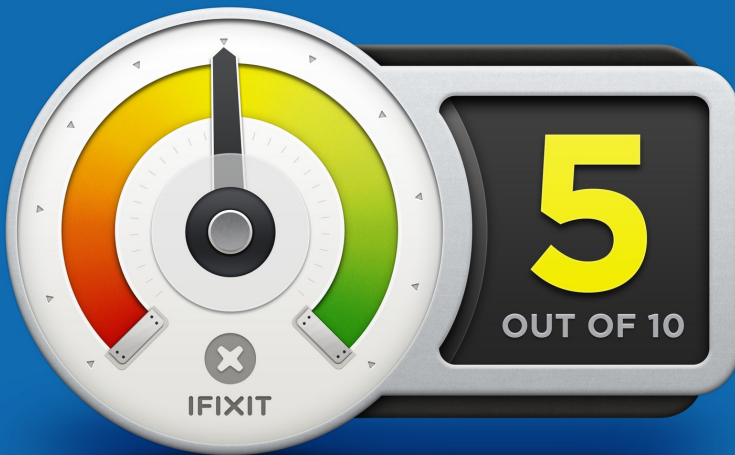
Step 7



- We've had our share of adhesive battles in 2020, so that's as far as we're going in this teardown!
- While the opening procedure is far from ideal, most of the critical components in this Fitbit are accessible and replaceable, and disassembly was very straightforward.
- Unfortunately, some components are integrated into the sensor board, which is fastened with permanent adhesive.
- Let's wrap up this quick teardown with a ~~low~~ score.

Step 8 — Final Thoughts

REPAIRABILITY SCORE:



- The Fitbit Sense earns a **5 out of 10** on our repairability scale (10 is the easiest to repair):
 - Watch bands are easily replaceable (though not standard issue).
 - Standard screws are used prudently throughout the device.
 - The display-first disassembly procedure means screen replacements require only a few steps, but those steps are difficult and can easily damage the display.
 - The battery is buried under the main board, but it can be disconnected immediately upon opening the watch and is easy to remove once you get to it.
 - Components underneath the battery aren't modular, and will be very difficult to remove due to their strong adhesive.