



# Microsoft Surface Pro 4 Teardown

Is anyone else getting sick of apples? Time to...

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## INTRODUCTION

Is anyone else getting sick of apples? Time to take a bite out of a juicy Microsoft offering, the Surface Pro 4, to see just what it's made of. Personally, we're hoping Microsoft spent this last year thinking about [what they've done](#) and opting for a more fixable laplet (laptop+tablet, eh? ehh?). There's only one way to see inside...okay two ways, we have [X-ray vision](#). It's teardown time!

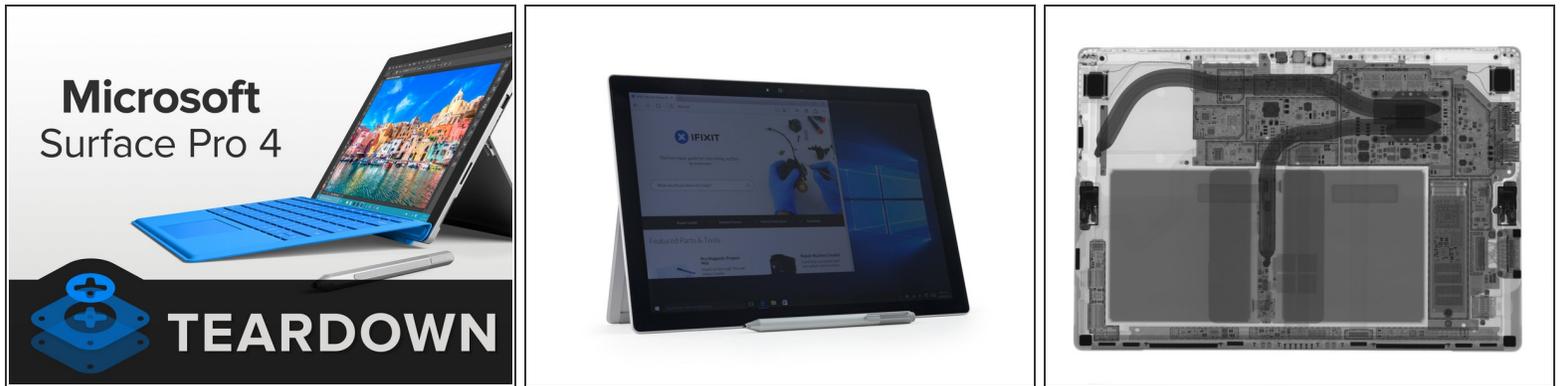
For the rest of our fall lineup, check out our [Facebook](#), [Twitter](#), and [Instagram](#) to be #first.

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## TOOLS:

- [iSlack](#) (1)
  - [iFixit Opening Picks \(Set of 6\)](#) (1)
  - [iOpener](#) (1)
  - [T5 Torx Screwdriver](#) (1)
  - [T3 Torx Screwdriver](#) (1)
  - [Plastic Cards](#) (1)
  - [Spudger](#) (1)
  - [Tweezers](#) (1)
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## Step 1 — Microsoft Surface Pro 4 Teardown



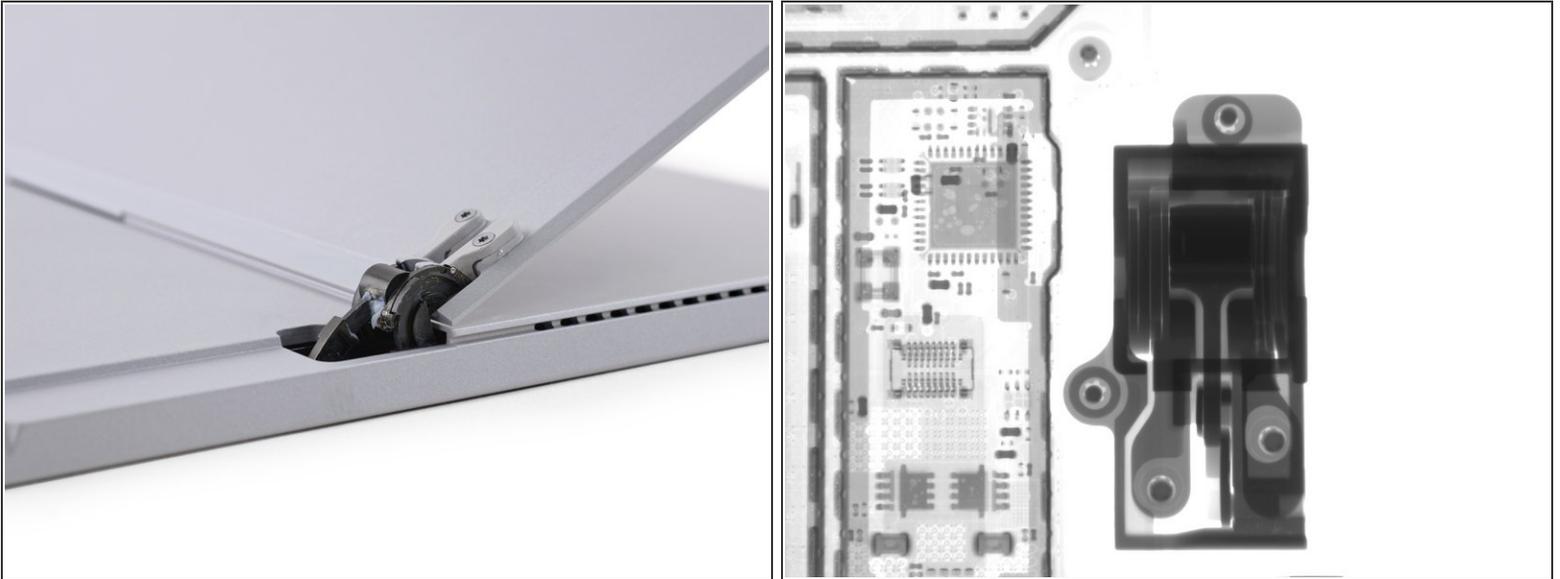
- With the top-of-the-line model coming in at over \$2600, the Surface Pro 4 had better be a cut above the rest—the spec sheet looks promising so far:
  - 12.3" PixelSense 2736 × 1824 (267 ppi) IPS LCD display
  - Intel Skylake Core m3 (4M Cache, 2.20 GHz) up to Core i7 (8M Cache, 3.80 GHz) CPU
  - 4 GB/8 GB/16 GB DDR3L 1600 MHz RAM
  - 128 GB/256 GB/512 GB/1 TB of PCIe solid state storage
  - 8 MP rear-facing 1080p camera, and 5 MP front-facing camera
  - USB 3.0 port, micro-SD slot, mini DisplayPort, and SurfaceConnect charging port
  - 802.11a/b/g/n/ac Dual Band Wi-Fi and Bluetooth 4.0

## Step 2



- At first glance, the Surface Pro 4 appears to outshine its predecessors with its forward sensor array.
  - We spy at least four nodes of interest. One's a camera, one's probably a microphone, but the rest?
- On the rear of the new Surface, we find a [familiar](#) arrangement of circles—the 8 MP rear-facing camera accompanied by a status LED and microphone.
- Anxious to see the camera array but too impatient to open the device? X-ray it.

## Step 3



- That's something we don't see too often—grease! The Pro 4's exposed kickstand hinges are lubricated to meet your transforming computational needs.
  - Just try not to get any lint, or pet hair, or sand in there...
- To get such a wide spread of kickstand angles, with the resistance required to support the tablet's weight, Microsoft's engineers probably spent a lot of time on these hinges. So we X-rayed them.

## Step 4



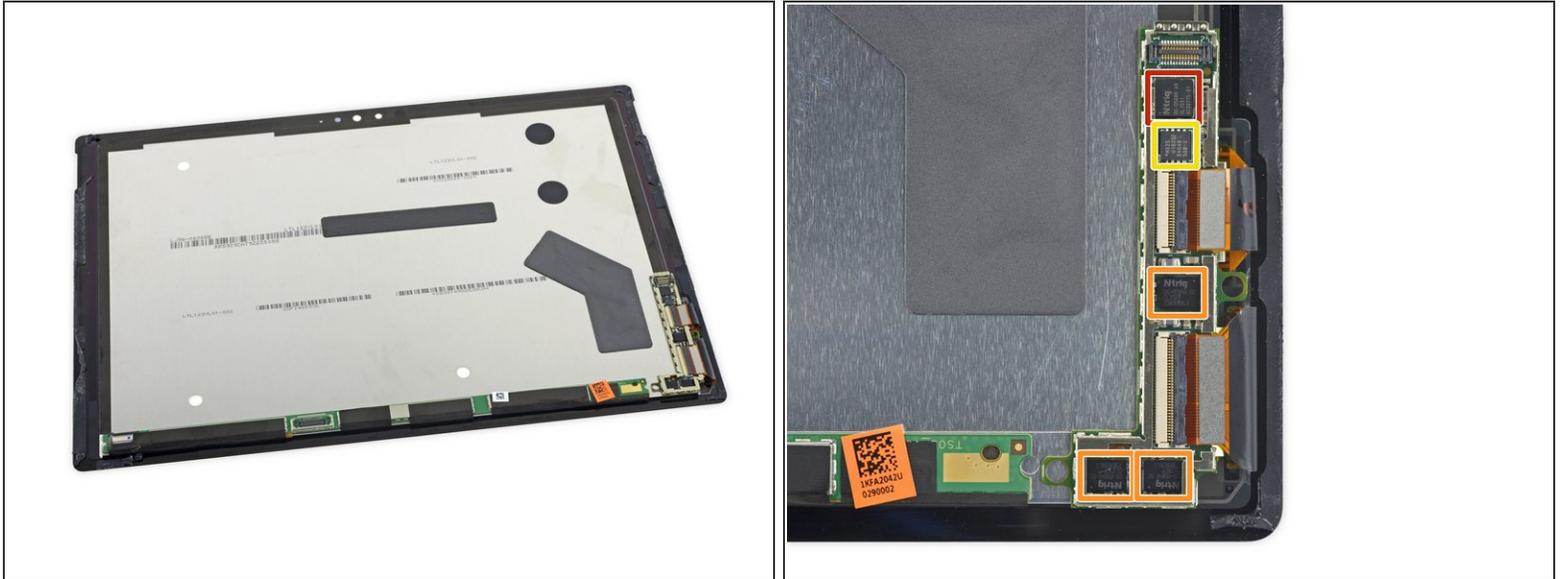
- Sticky nightmares still haunt our teardown engineers after the [harrowing Surface Pro 3 teardown](#), and this year we've prepared for the worst.
- Things start to heat up in the teardown room as the [iOpener](#) battles to weaken the display's adhesive.
- Our [iSclack](#) joins the fight to provide us the leverage we need to make our entrance, and dare we say it, things seem easier than before.
- Not even a Pro can keep *us* out. As soon as we get an [opening pick](#) underneath the edge of the display it's off to the races!
- ⓘ We strain our ears to listen for the telltale cracking of glass, but it seems like we're getting away with this opening procedure shard-free!

## Step 5



- Well, these are new. The [last time](#) we tore down a Surface Pro, we encountered a display connector trapped beneath a springy metal bracket.
  - This time around, there are *two* cables holding the display to the body, preventing it from being opened like a book on *any* hinge. Our only recourse: tackle those connectors.
  - And of course, Microsoft has modified their connector design. The display connectors are relatively common press-on connectors—similar to an [iPhone display](#)—but they're trapped under snap-on metal shields.
- ⓘ Luckily, we only have to juggle the display for the first connector, this display is nearly free!

## Step 6



- It's not exactly a greeting card, but the underside of the display is adorned with heartfelt-looking barcodes.
  - Maybe it's a congratulatory message! More likely, it's proof of some intense quality controls.
- ⓘ As a matter of curiosity, and bragging rights, we measure the display glass at a mere .4 mm. That's only *four* human hairs thick. And we didn't break it.
- Time for our favorite silicon-based snack—chips! Among them, a number of [N-trig](#) IC's, likely control hardware for the Surface Pen.
  - N-trig DS-D5000 touchscreen row driver (likely)
  - N-trig DS-A5048 touchscreen line driver (likely)
  - Macronix [MX25U1635F](#) 1.8V 16 Mb MXSMIO serial flash memory

## Step 7



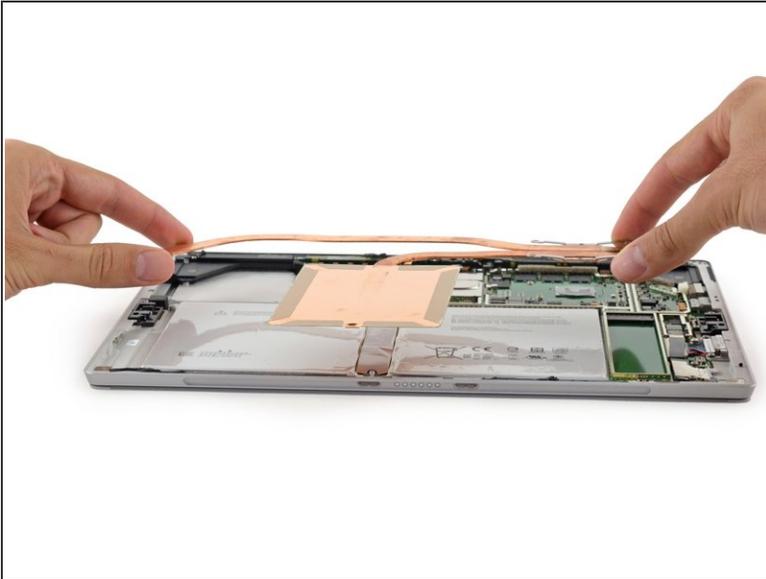
- Turning our attention to the rest of the Pro 4, we spy a *suspicious* blank space beside the motherboard (and heat sink tubing!).
- ⓘ Presumably, this is for the fan that drives the [hybrid cooling system](#), absent from our 4.5-watt Core m3 model.
- The motherboard is so close, yet so *far*. Unable to wait, we skip to dessert and pop off some shields to get a closer look.
- The rest of the motherboard is nestled too snugly to investigate, but that SSD looks ripe for the picking...

## Step 8



- Oh Surface, [look how you've grown!](#)
- The Surface 4's Samsung branded SSD is considerably larger than the little whipper snapper we saw in the [previous generation](#).
- Awww, they brought us more chips. The 128 GB Samsung [PM951](#) SSD is packing the following:
  - Samsung [S4LN058A01-8030](#) PCIe 3.0 x4 NVMe flash controller
  - Samsung K9CHGY8S5C-CCK0 64 GB NAND flash
  - Samsung [K4E4E324EE-SGCF](#) 4 Gb (512 MB) DRAM
  - Texas Instruments [TPS22966](#) 5.5V, 6A, 16mΩ, 2-channel load switch
  - Silergy power management (likely)

## Step 9



- The Surface Pro 4's heat sink shows off its impressive makeover, flaunting longer copper heat pipes and a large copper plate for added heat dissipation.
  - ⓘ Most likely, these changes were made to address the heat-related [throttling issues](#) observed in the Surface Pro 3.
- Designed with a [hybrid cooling system](#), the Pro 4 takes advantage of both passive and active cooling.
  - ⓘ Well, *some of them* do. Our unit uses a combination of passive cooling and...well, passive cooling. More powerful models include a fan that activates when temperatures get too high for passive cooling.

## Step 10



● Fittingly, the Surface has a pro line-up of cameras and sensors:

- Infrared emitter
- Infrared camera
- Front-facing camera
- "Privacy light" indicator LED (mounted on the rear-facing camera)
- Microphone
- Ambient light sensor

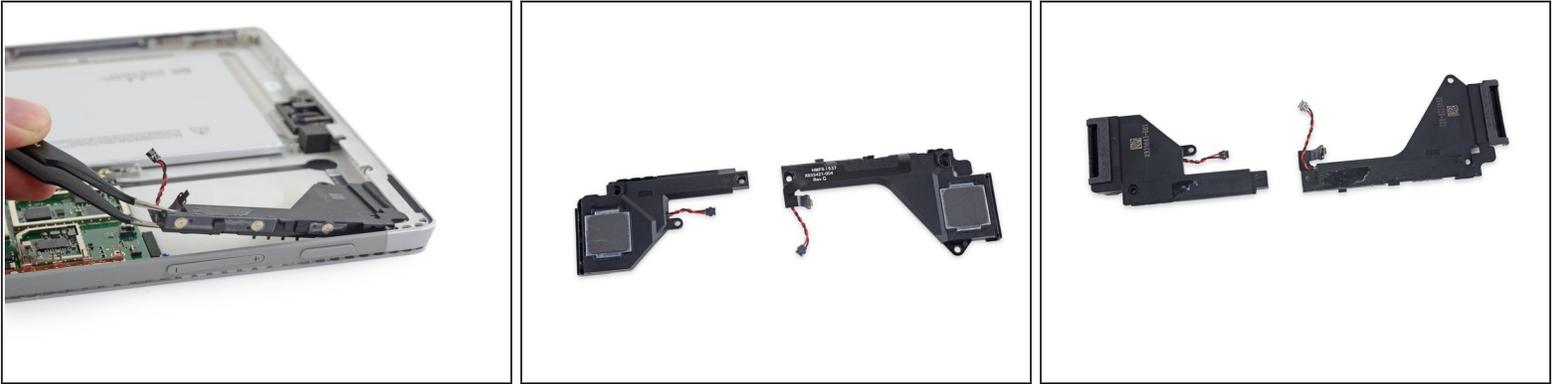
**i** We're pretty sure the lil' guy marked in red is an IR emitter, like the one found in [Project Tango](#). It should work with the IR camera to recognize your face and [unlock your computer](#). Aw, he knows his mummy.

## Step 11



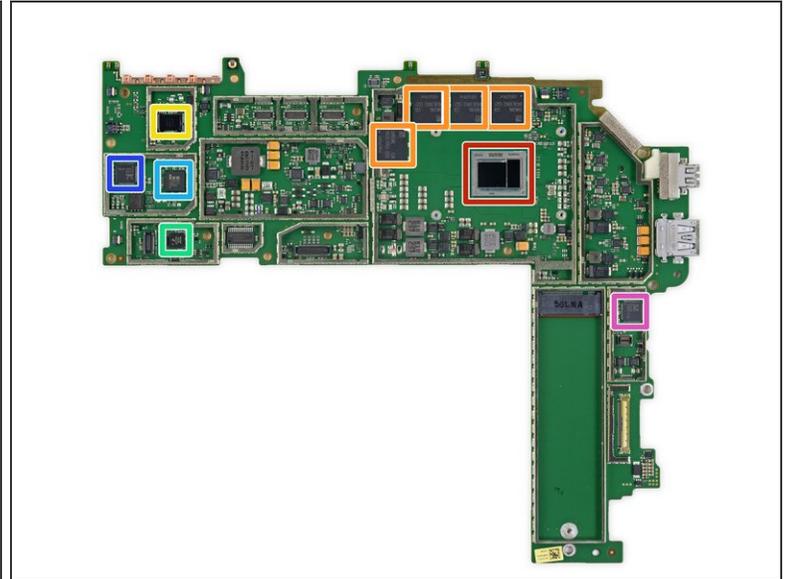
- Amidst this sea of tech, the tablet's three cameras all float to the *surface*.
- From left to right:
  - Infrared face-detection camera supporting [Windows Hello](#)
  - Front-facing 5 MP camera
  - Rear-facing 8 MP main camera

## Step 12



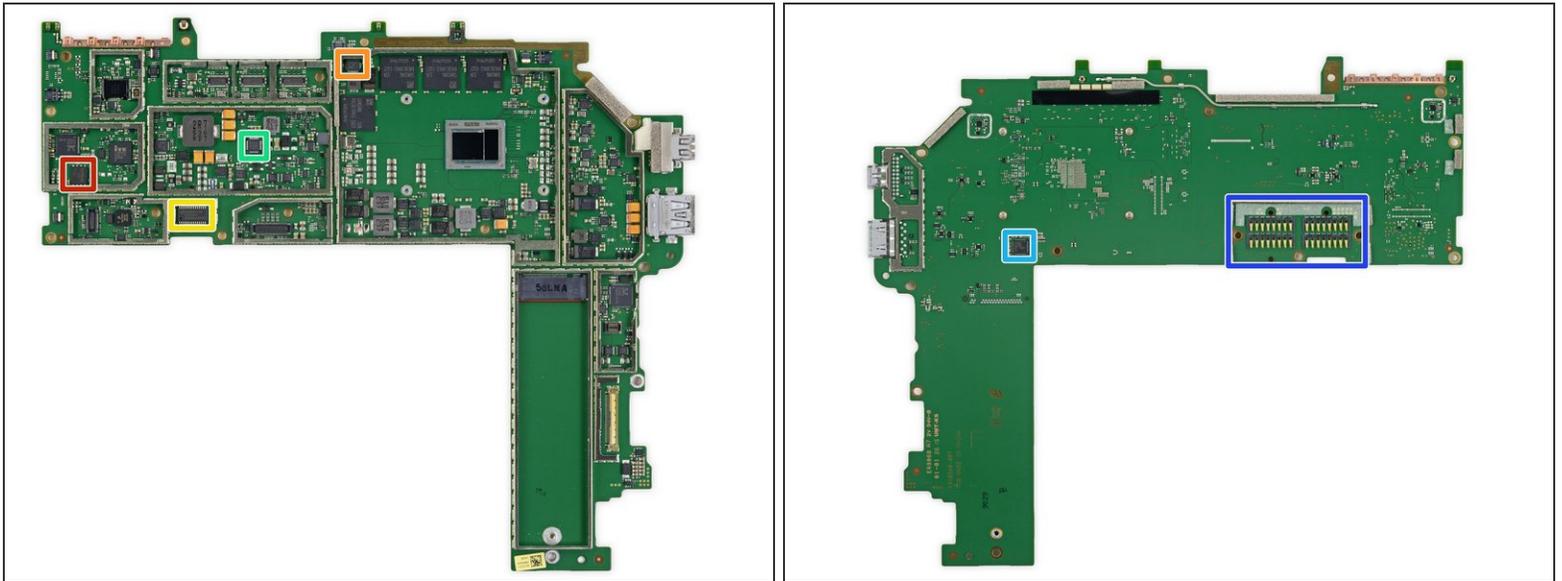
- We tweeze out the two stereo speakers from the corners of the case and make an interesting discovery...
- ⓘ It looks like the volume and power buttons are integrated directly into one of the speakers.
  - The Good: These integrated buttons are much less fidgety to replace as one piece than each button individually.
  - The Bad: The entire speaker will have to be replaced to replace one of the buttons, increasing the cost of repair.

## Step 13



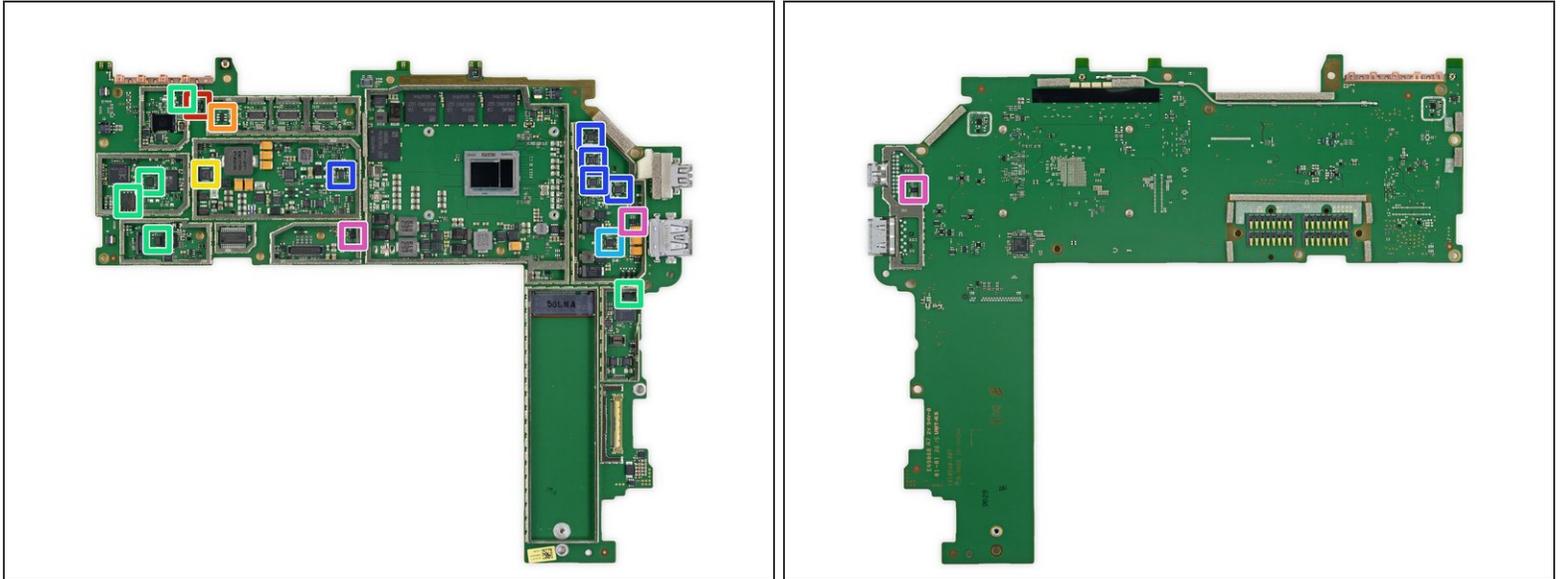
- With the peripherals deftly dissected, we can move on to the main event—the motherboard!
  - Intel [SR2EN](#) Core m3-6Y30 (4M Cache, up to 2.20 GHz)
  - Samsung K4E8E304EE-EGCF 8 Gb LPDDR3 (4 chips × 1 GB for a total of 4 GB)
  - Marvell Avastar [88W8897](#) 802.11ac, NFC and Bluetooth SoC
  - Freescale Kinetis KL17 [MKL17Z256VFM4](#) 48 MHz [ARM Cortex-M0+](#)
  - ITE Tech, Inc. IT8528VG Embedded Controller
  - Realtek ALC3269 Audio Codec
  - Realtek RTS5304 micro-SD Card Reader Controller

## Step 14



- Chip ID continued...
  - Winbond [W25Q128FV](#) Serial NOR Flash
  - Texas Instruments [TPS51367](#) Integrated FET Converter
  - Infineon Technologies [SLB96659TT20](#) Trusted Platform Module
  - Monolithic Power Systems [MP3388S](#) 50V, 8-String, Step-Up, White LED Driver
- And on the reverse...
  - Intersil [ISL95857](#) 1+2+1 Voltage Regulator for Intel IMVP8 CPUs
  - This huge array of spring contacts connects the motherboard to the battery and the keyboard dock cable.

## Step 15



- IC Identification—even more!
  - Bosch Sensortec [BMI160](#) 3-Axis Accelerometer/Gyroscope
  - Monolithic Power Systems [MP2370DGT](#) White LED Driver
  - Texas Instruments [BQ24770](#) Battery Charge Controller w/ System Power Monitor
  - ON Semiconductor and Winbond Serial Memory
  - Texas Instruments [TPS51285A](#) Dual-Synchronous Buck Controller
  - Texas Instruments [TPS62140](#), [TPS62175](#), [TPS62134A](#), [TPS62134C](#), and [TPS62134D](#) Step-Down Converter
  - ON Semiconductor [NCP380HMUAJAATBG](#) Adj. Current-Limiting Power-Distribution Switch

## Step 16



- The iOpener comes out for an encore performance, loosening the tough adhesive that holds the battery in place.
- The battery *finally* comes loose after a great deal of sweat, tears, and prying.
- ⓘ Not much has changed here—the adhesive is still extremely challenging to overcome, even with the proper tools.
  - :(

## Step 17



- This 38.2 Wh, 7.5 V battery is rated at 5087 mAh—a 9 percent decrease from the [5547 mAh](#) battery in the Surface Pro 3.
  - Despite the smaller battery capacity, the 4 generally [outperforms](#) the 3 in terms of battery life.
  - ⓘ We attribute the majority of this to improved efficiency in the design and size of the processor.
- Just to compare Apples to oranges, the [iPad Air 2](#) weighs in with a 27.62 Wh battery, however the upcoming iPad Pro is probably a more apt comparison, function-wise. We'll have to wait and see!

## Step 18



- Microsoft Surface Pro 4 Repairability Score: **2 out of 10** (10 is easiest to repair).
  - The SSD is replaceable.
  - The battery is not soldered to the motherboard, but very strong adhesive makes removal and replacement a hazardous chore.
  - Non-standard connectors make for tricky display removal.
  - The display removal procedure, while difficult, and required for any repair, is not as hard as in previous generations, due to less stubborn adhesive.
  - The display assembly consists of a fused glass panel and LCD, and is difficult to remove and replace.
  - Adhesive holds many components in place, including the display and battery.