



# iMac Intel 21.5" Retina 4K Display 2017 Teardown

Teardown of the 21.5" Retina 4K iMac on June 8, 2017.

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## INTRODUCTION

500 nits, 1 [billion](#) colors, and two Thunderbolt ports—that's everything, right? Not so fast. Apple already told you about the updated iMac 4K's fancy specs, but we're here to reveal what wasn't in the press release. It's time to take this all-in-one and split it into a whole lotta pieces—join us for a teardown of the mid-2017 iMac 4K.

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[video: <https://www.youtube.com/watch?v=APPTejhw8F8>]

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### TOOLS:

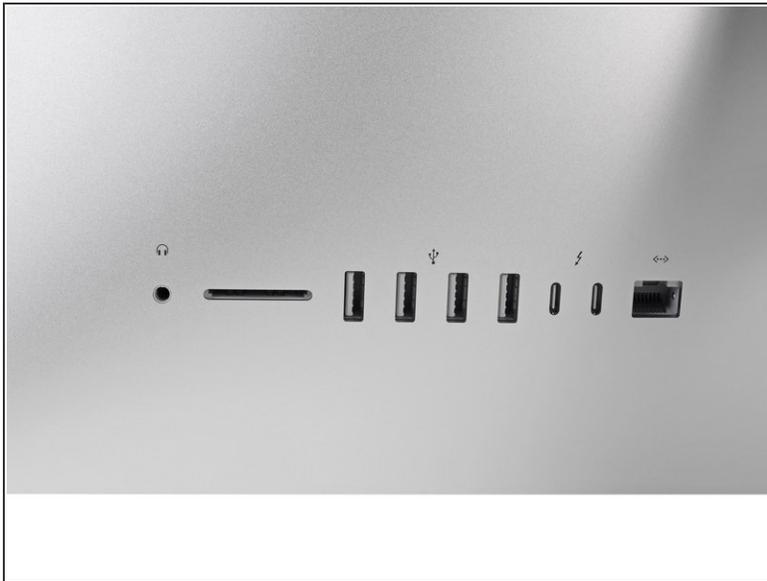
- [iMac Opening Tool](#) (1)
- [Spudger](#) (1)
- [Plastic Cards](#) (1)
- [Tweezers](#) (1)
- [iMac Service Wedge](#) (1)
- [T5 Torx Screwdriver](#) (1)
- [T8 Torx Screwdriver](#) (1)
- [T10 Torx Screwdriver](#) (1)
- [Phillips #00 Screwdriver](#) (1)
- [Phillips #1 Screwdriver](#) (1)

## Step 1 — iMac Intel 21.5" Retina 4K Display 2017 Teardown



- Well this exterior certainly isn't giving much away, but you can't always judge a book by the aluminum-and-glass shell of the iMac that you're reading it on. Let's start with what we know:
  - 3.0 GHz quad-core Intel Core i5 (Turbo Boost up to 3.5 GHz)
  - 8 GB of 2400 MHz DDR4 memory
  - Radeon Pro 555 GPU with 2 GB of VRAM
  - 1 TB (5400-rpm) hard drive
  - 802.11ac Wi-Fi and Bluetooth 4.2
  - 43% brighter display (500 nits) with 4096 × 2304 resolution and P3 wide color gamut

## Step 2



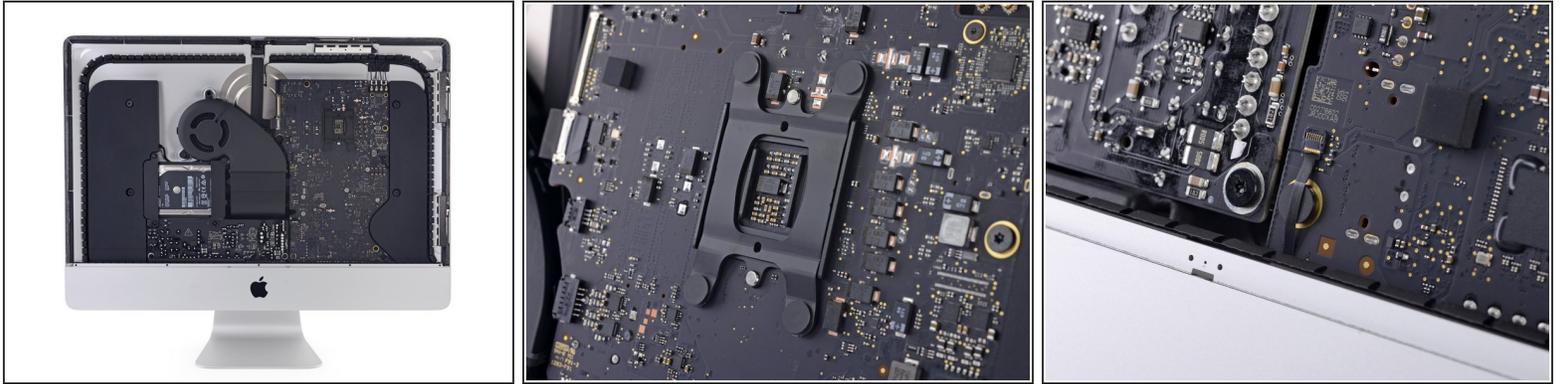
- A peek at the back reveals a bevy of ports. First, the usual suspects: a headphone jack, SD card reader, four USB ports, and an ethernet jack.
- The *un*-usual suspects? This iMac's sporting two Thunderbolt 3 ports. These support double the bandwidth of the previous generation—each of these ports can push data at 40 Gbps.
- That's enough throughput to drive *four* 4K external monitors—although with this hardware configuration, [Apple says](#) we're limited to two.
- How are we supposed to get by with a total of just three 4K displays? *How?*
- Confirming our suspicion that this is mostly a 2015 iMac with a facelift, this unit sports the same model number (A1418), but with a new EMC: 3069.

## Step 3



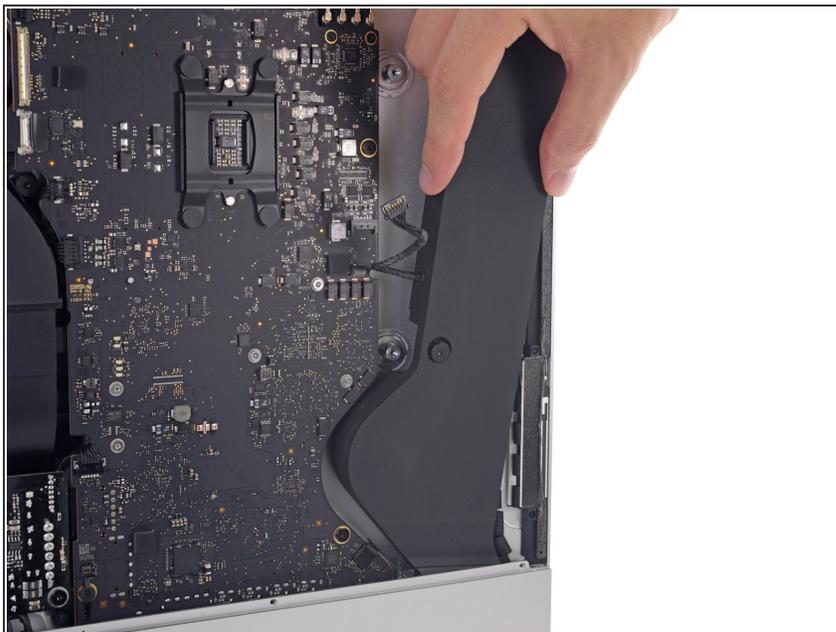
- We grab our ~~pizza cutter~~ [iMac Opening Wheel](#) and go to town. Then, we bring it back home and use it to split open our fancy new iMac.
- 'Round and 'round we go, and the adhesive securing the display perimeter goes kaput.
  - When Apple introduced this form factor in [2012](#), replacing the much-loved [magnets](#), we were sad and confused. Since then we've learned its secrets, and now we're on board with how easy this adhesive is to slice through.
    - ⓘ We'd love to see Apple implement something like this in their [other](#) product lines.
- After a [familiar opening procedure](#), we get our first peek inside.

## Step 4



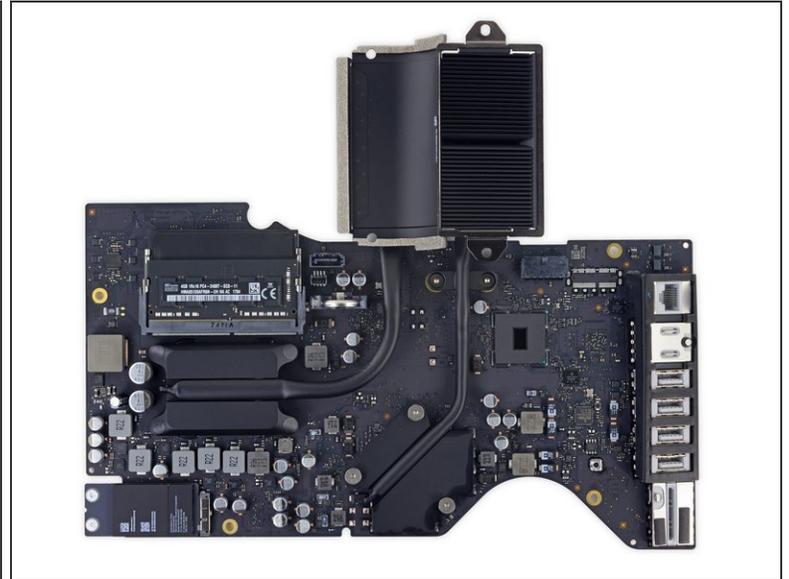
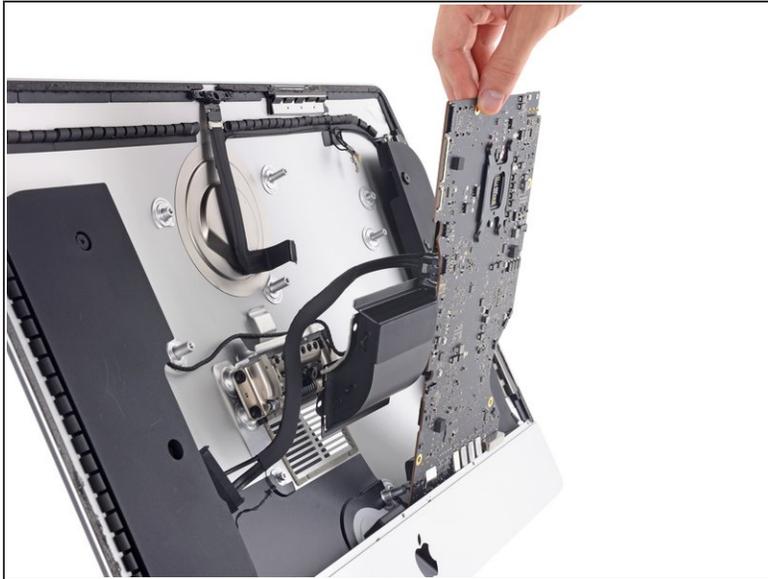
- With all the glass and pixels out of the way, we immediately pick out some subtle updates.
- First, the logic board has grown—encroaching on territory [formerly held down by the right speaker](#), and even expanding towards the fan a bit.
- ⓘ Even more notable, there's a conspicuous heat sink mounting plate sprawled out in the middle of the board. Funny, the old heat sink didn't need one of those...
- Lastly, near the center of the bottom display bezel, just beneath the glass, there's a microphone! Whose ribbon cable routes right over the top of a screw, which is pretty weird.

## Step 5



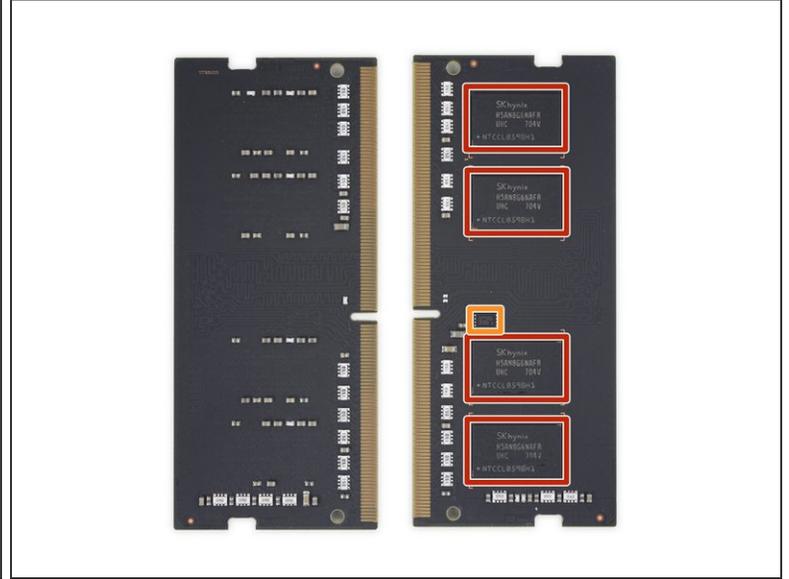
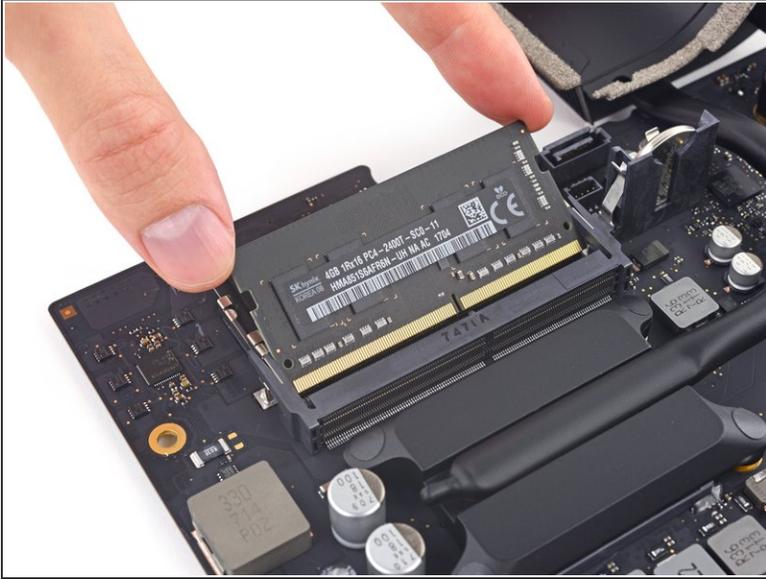
- Well, this part of the refresh is less refreshing than we'd like—the right speaker is no longer immediately removable. It's trapped pretty solidly by the new logic board contours.
- No big deal; it just means your favorite set of [iMac repair guides](#) won't fully apply to this model. We'll get to work on that for you.

## Step 6



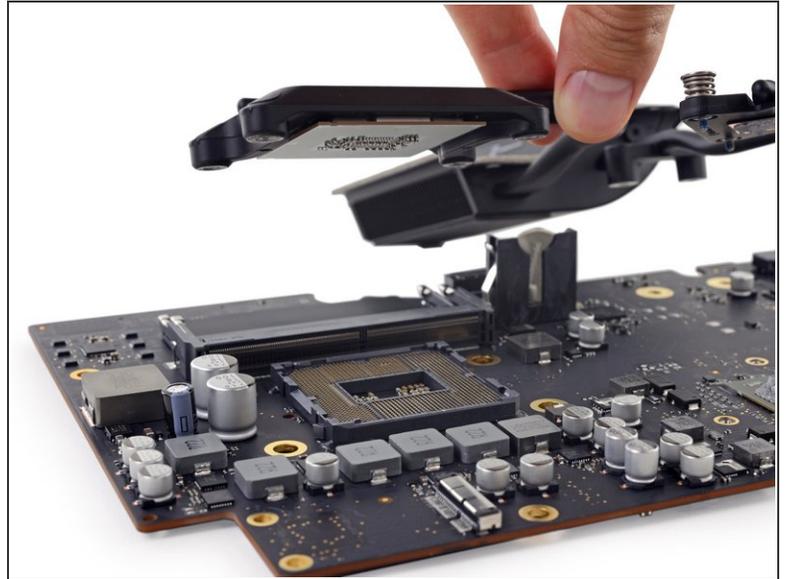
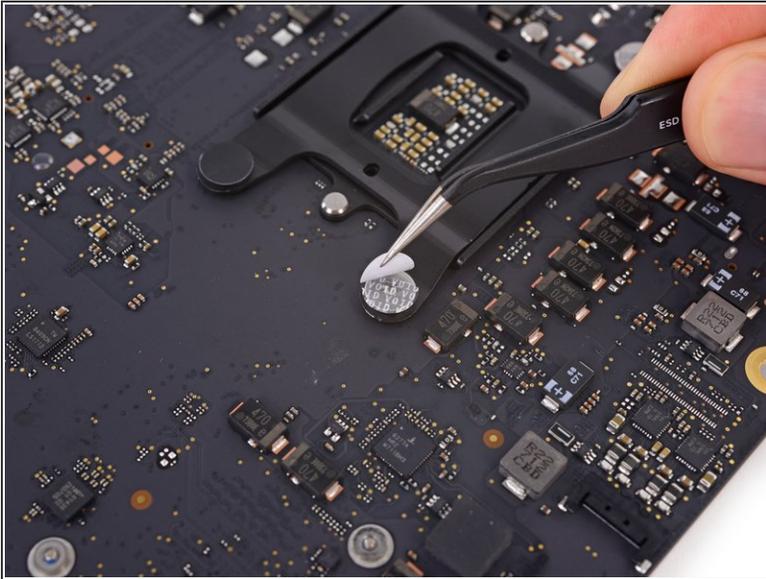
- The rest of this iMac comes apart pretty much the way we expect, and we dispense with the power supply, hard drive, and fan without fuss.
- And with a bit more elbow grease, we shimmy the logic board out of its slot to reveal ... removable RAM? We can hardly believe our eyes.
  - Yep, those are SO-DIMMs. Two of them.
- Slightly less excitingly, there's also an exciting split heat sink. But seriously, look at that RAM!

## Step 7



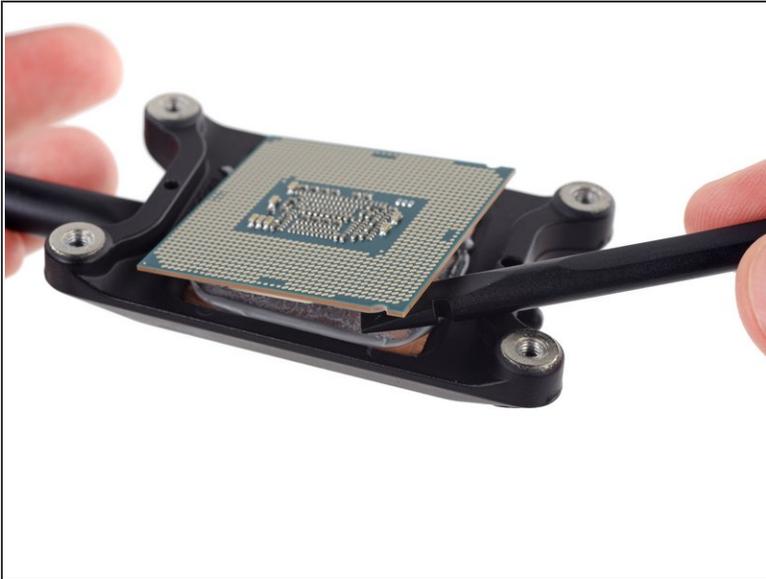
- It may not be as accessible as the (dead simple) RAM hatch found in the 27" iMacs—but still, this is a *major* win for upgradability over all the 21.5" iMacs with soldered RAM that we've encountered in recent years.
- Before moving on, we take a moment to scope out the silicon these memory modules have to offer:
  - SK Hynix [H5AN8G6NAFR-UHC](#) 8 Gb DDR4 SDRAM (4 × 8 Gb = 4 GB per DIMM, 8 GB total)
  - Ablic (formerly Seiko Instruments) [S-24C04A](#) 4 Kb Serial EEPROM Memory

## Step 8



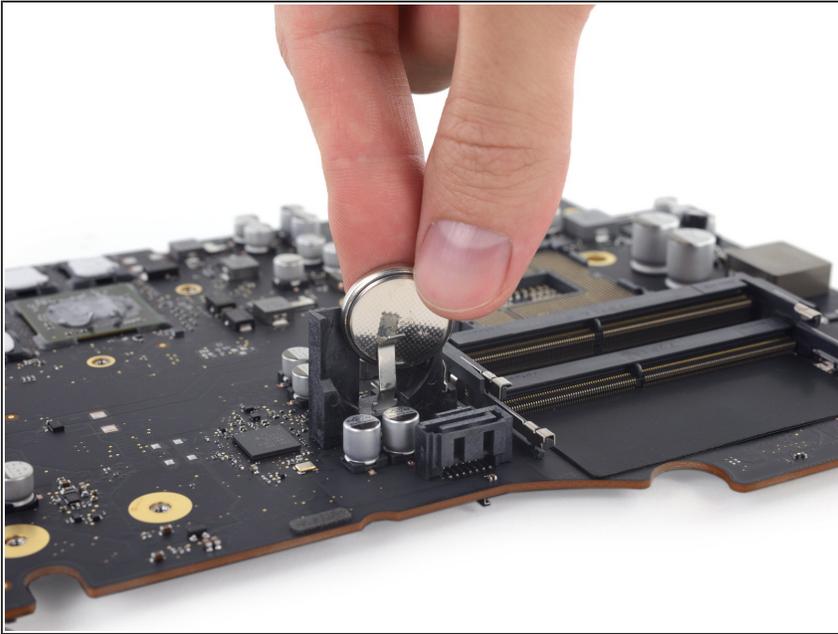
- This new heat sink design has us intrigued. What's hiding under there?
  - Warranty voiding stickers on the heat sink screws? That's odd. Could that mean...
  - Yes! The CPU is modular, too! It lifts right off with the heat sink, revealing a standard LGA 1151 CPU socket.
- i** Again, this isn't the most accessible thing in the world—it's flipped onto the backside of the logic board, trapped behind a lot of other components, and buried under a glued-down pane of glass—but for the first time in years it's *possible* to replace or upgrade the CPU without a reflow station, and that's a big win.

## Step 9



- This CPU is quite well thermally-*pasted* into its heat sink; prying it out was surprisingly tough. Someone wants this processor to keep cool.
- Finally, we're face-to-face with the star of this teardown: an Intel [SR32W](#) Core i5-7400 Kaby Lake CPU, 6M Cache, up to 3.50 GHz.
- ⓘ Looking at the rest of the [Kaby Lake lineup](#), we're actually not seeing *any* desktop-class CPUs in a BGA package. Maybe Apple reverted to a socketed CPU because that's all Intel is offering at the moment.
- But with Apple's clout and famous negotiating skills, you'd think they *could* get a soldered CPU if they wanted. Plus there's that mysterious modular RAM...
  - Have you been hearing our pleas, Apple?

## Step 10

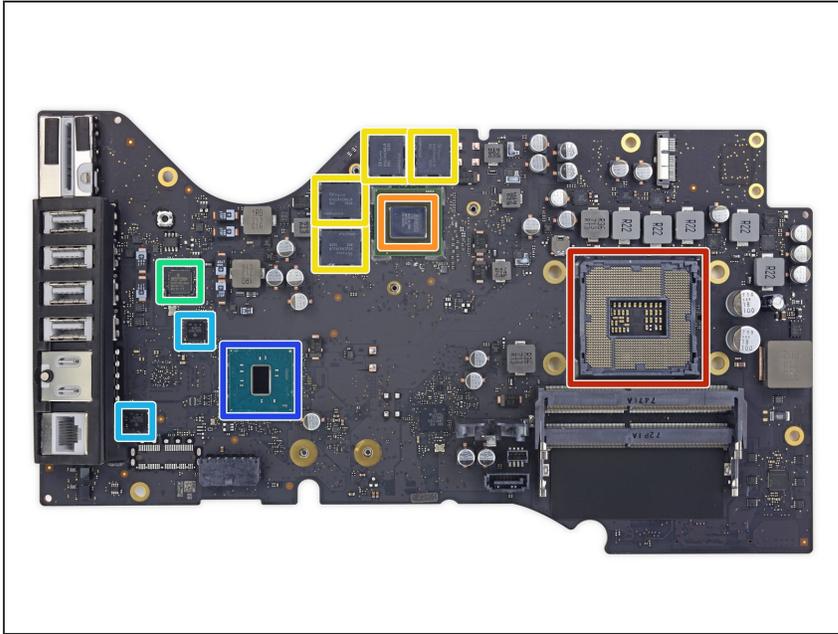


- The final bit of interesting modularity on this board: a CMOS battery.
- With all this new modular hardware, it almost looks like they ran out of space for this guy. It's hilariously placed vertically in this cute little battery toaster slot.

⚠ Side note: please do not put batteries in the toaster.

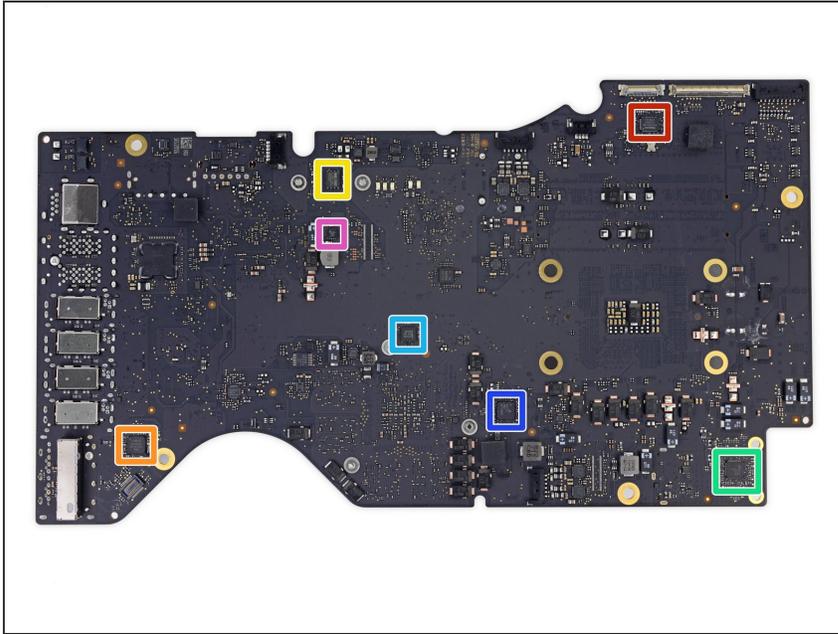
- Or [toast](#) in your iMac for that matter...

## Step 11



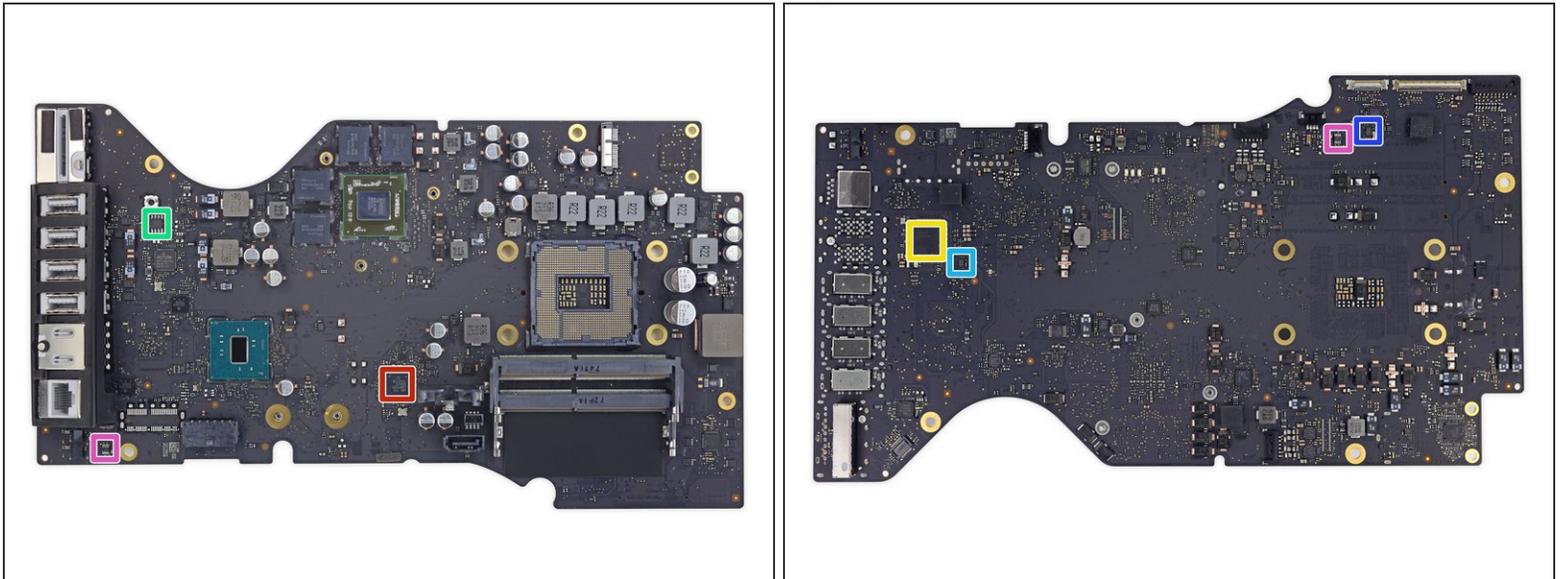
- Now that it's stripped of all accoutrements, we can ID this logic board's silicon:
  - Intel [LGA 1151](#) CPU socket
  - AMD [Radeon Pro 555](#) GPU
  - SK hynix [H5GC4H24AJR-ROC](#) 4 GB GDDR5 2400 MHz SDRAM (4 GB × 4 for a total of 2 GB VRAM)
  - Broadcom BCM5776 Gigabit Ethernet controller
  - Texas Instruments CD3215C00 (also seen recently in the [15" MacBook Pro](#)) USB type-C controller
  - Intel [SR2C9](#) platform controller hub

## Step 12



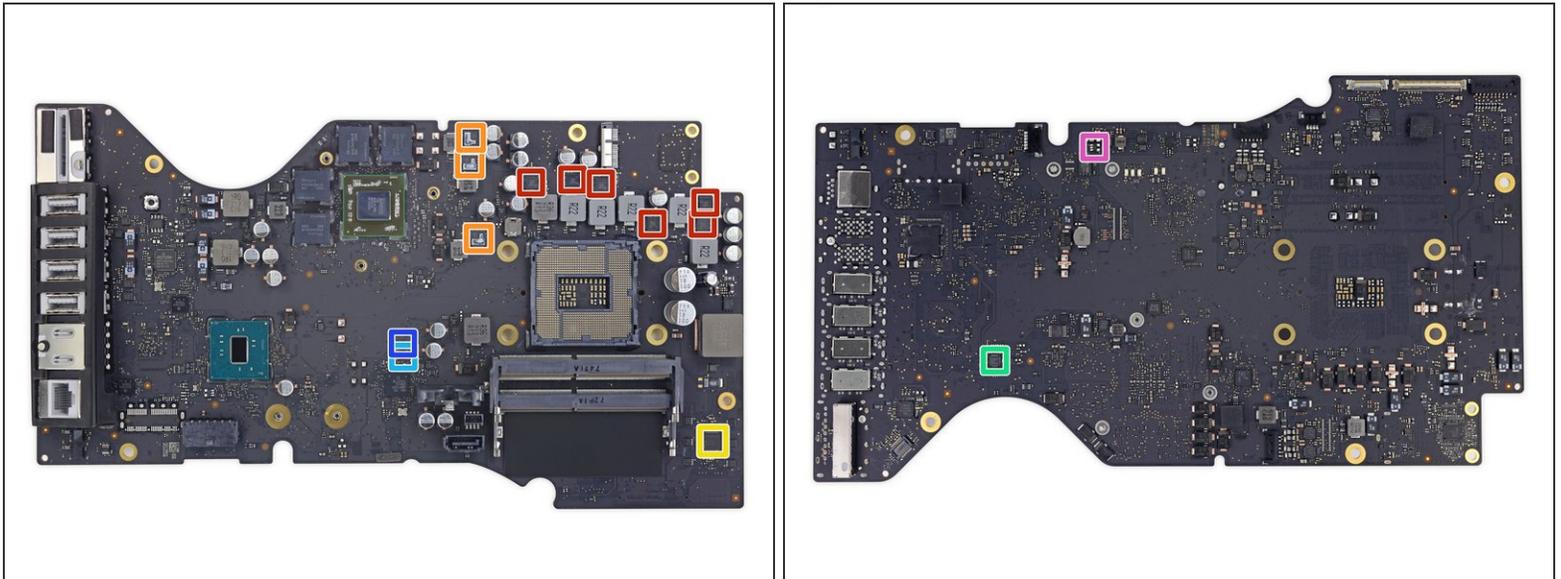
- Flip the board for more chips? Don't mind if we do:
  - Vimicro [VC0359](#) camera processor
  - Cirrus Logic CS42L83 audio codec
  - MXIC [MX25L6473E](#) 64 MB serial flash memory
  - Intersil ISL95828 Intel CPU PWM controller
  - NXP Semiconductor CBTL06142E display port multiplexer (likely)
  - Intersil [ISL6277A](#) multiphase PWM regulator
  - Fairchild FDH10CJ MOSFET

## Step 13



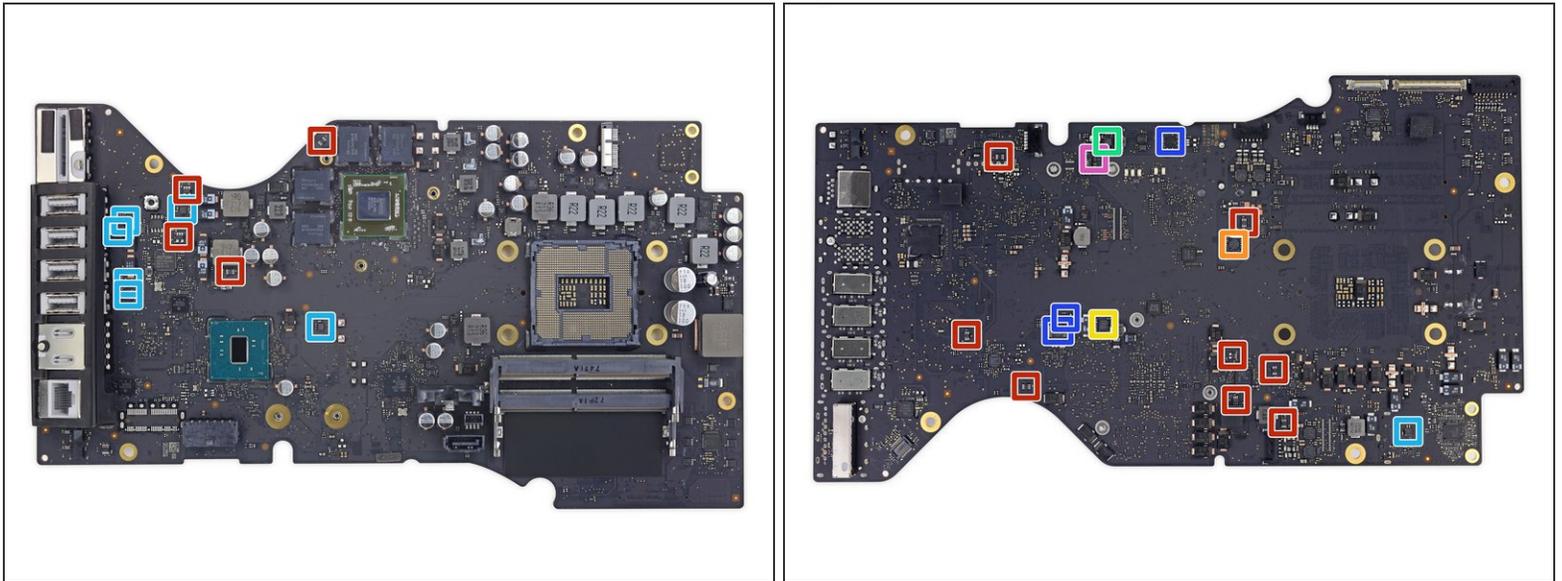
- Chip identification, continued:
  - Texas Instruments LM4FS1EH system management controller
  - Texas Instruments TAS5764L audio amplifier
  - Intel [JHL6540](#) Thunderbolt 3 controller (likely)
  - Dialog Semiconductor (formerly Adesto) AT45DB021E 2 MB serial flash memory
  - Winbond [W25Q80DW](#) 8 MB serial NOR flash memory
  - Macronix [MX25L1006E](#) 1 MB serial NOR flash memory
  - Texas Instruments [TMP423](#) triple remote/local temperature sensor

## Step 14



- Chip identification, continued:
  - Fairchild FDMF5804 smart power stage
  - International Rectifier IRF3575 60 A synchronous buck controller
  - Texas Instruments LP8565A128 MOSFET driver
  - Renesas (formerly Intersil) [ISL62383C](#) notebook power supply controller
  - Texas Instruments [REF3330](#) 3.0 V voltage reference
  - Texas Instruments [TPS3897](#) 1-channel voltage supervisor
  - Texas Instruments [TPS3847108](#) 380 nA voltage monitor

## Step 15



- Chip identification, continued:

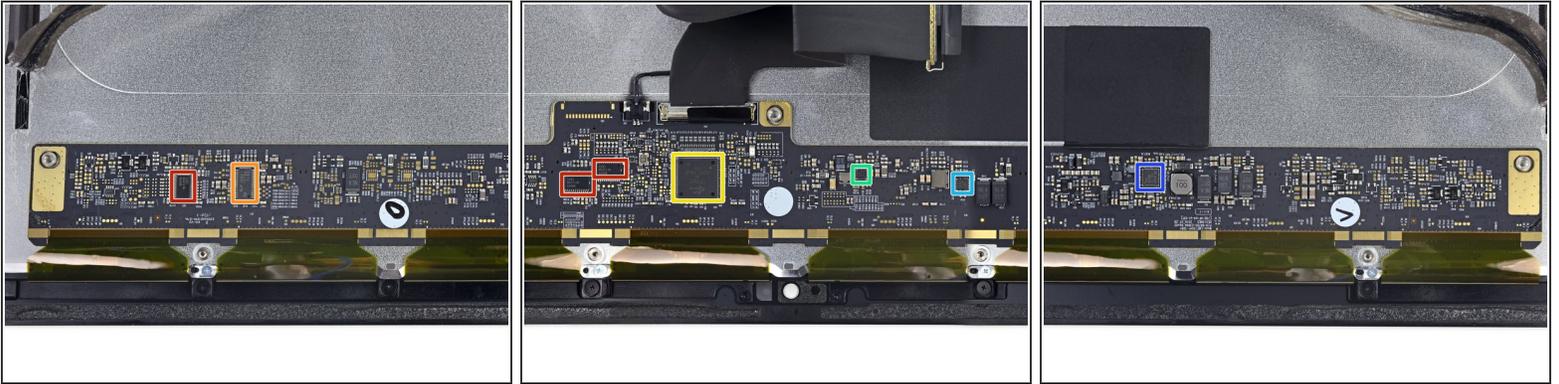
- Texas Instruments [INA210/INA213/INA214](#) current sense amplifier, [OPA348](#) operational amplifier, and [TLV3701](#) high-voltage comparator
- Texas Instruments [TPS51916](#) memory power supply
- Texas Instruments [TPS54622](#) 6 A synchronous buck converter
- Texas Instruments [TPS62130B](#) 3 A step-down converter
- Texas Instruments [TPS2557/TPS22990/TPS22966](#) Load Switches
- Texas Instruments [SN74LVC08A](#) and Nexperia (formerly NXP Semiconductor) [74LVC08A](#) 4-channel, 2 input AND gate
- Nexperia (formerly NXP Semiconductor) [74LVC1G99](#) 3-state configurable function gate

## Step 16



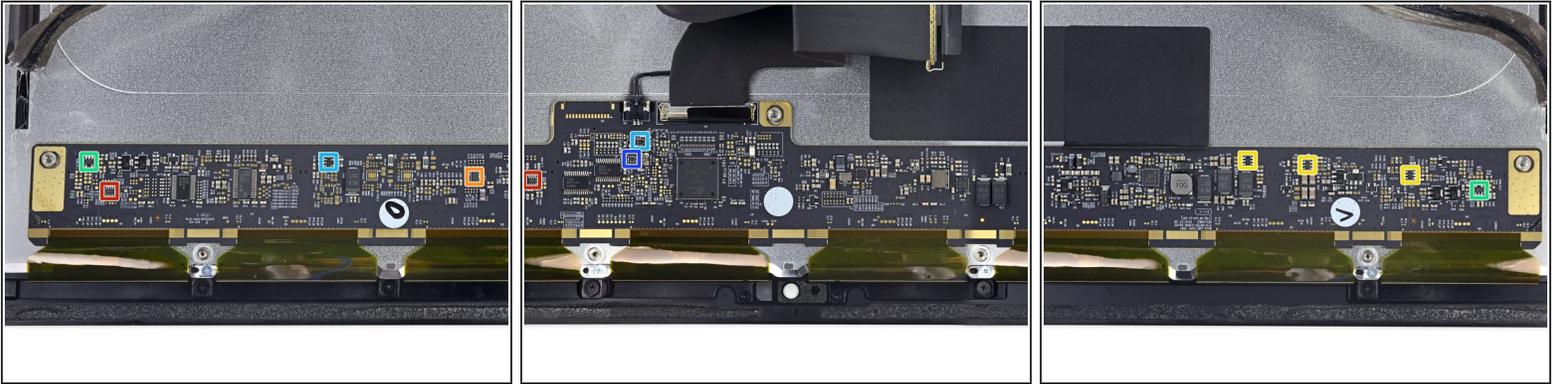
- Turning our attention back to the display: the fancy new panel comes courtesy of LG (who also made the [fancy old panel](#)).
- And that famously [W-Fi allergic external monitor](#)...
- ⓘ This particular ultra-high def beauty is model LM215UH1-SDB1.
- Now moving to the display chips, read on!

## Step 17



- Take a peek at what powers those popping pixels:
  - Texas Instruments [SN74LVC8T245](#) 8-bit dual-supply bus transceiver
  - Texas Instruments [BUF16821](#) programmable gamma-voltage generator and Vcom calibrator
  - Parade Technologies DP665 LCD timing controller (the same found in the last generation iMac 4K)
    - ⓘ We assume this is an Apple modified version of the [DP663](#)
  - Texas Instruments [TPS54218](#) 4.5 V to 17 V input, 2 A synchronous step-down SWIFT converter
  - Texas Instruments [TPS54320](#) 4.5 V to 17 V input, 3 A synchronous Step-Down SWIFT converter
  - Texas Instruments [TPS65168](#) high resolution, fully programmable LCD bias

## Step 18



- Display controller board chip identification, continued:
  - Texas Instruments [TMP423](#) triple remote/local temperature sensor
  - Winbond [W25Q40CL](#) 4 MB serial NOR flash memory
  - Texas Instruments [TPS3808](#) current supervisor
  - Ricoh [R1154N065B](#) 150 mA LDO regulator
  - Texas Instruments [SN74AHC1G08](#) single 2-input AND gate and [SN74LVC1G04](#) dual inverters
  - Texas Instruments [SN74LVC1G98](#) configurable multiple-function gate

## Step 19



- Previous [iMacs](#) featured a dual-mic setup, with two microphones hiding behind the front-facing camera. Two microphones allows the device to filter out ambient noise and produce a cleaner signal.
- This year, it seems Apple switched to a single microphone—and moved it to the bottom of the display, behind the glass.
  - ⓘ Perhaps they've improved their signal processing enough to make do with one and save some pennies.
  - ⓘ We'll wait to hear from the early adopters if the new setup is any better or worse.

## Step 20



- And that's that!

## Step 21 — Final Thoughts

### REPAIRABILITY SCORE:



- iMac Intel 21.5" Retina 4K Display 2017 Repairability Score: **3 out of 10** (10 is easiest to repair)
  - The CPU and RAM—two of the components you are most likely to upgrade at some point—are both modular.
  - The standard 2.5" SATA hard drive is fully upgradable—though you can't add a blade SSD thanks to an empty pad on the logic board.
  - Cutting the tape to open the iMac isn't too hard (with the right tools), but it must then be replaced to complete any repair.
  - Most replaceable components (like the RAM) are buried behind the logic board, meaning you'll have to take apart most of the iMac just to gain access to them.
  - The glass and Retina Display are fused together, increasing the cost of replacement.