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# INTRODUCTION

The future is now! Apple's once-neglected Mac mini is coming in hot with a brand new, cutting edge, long awaited ... processor upgrade? And a couple more ports? There has to be more, and we know how to find it—time for a teardown!

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## TOOLS:

- [iFixit Opening Tool](#) (1)
  - [TR6 Torx Security Screwdriver](#) (1)
  - [T5 Torx Screwdriver](#) (1)
  - [TR10 Torx Security Screwdriver](#) (1)
  - [Spudger](#) (1)
  - [Tweezers](#) (1)
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## Step 1 — Mac mini Late 2018 Teardown



- This Mac might be mini, but it's packing some big specs. Let's unpack some here:
  - 3.6 GHz quad-core Intel Core i3 with 6 MB shared L3 cache
  - 8 GB of 2666 MHz DDR4 SO-DIMM memory
  - 128 GB SSD
  - Intel UHD Graphics 630
  - 802.11ac Wi-Fi + Bluetooth 5.0
  - macOS Mojave

## Step 2



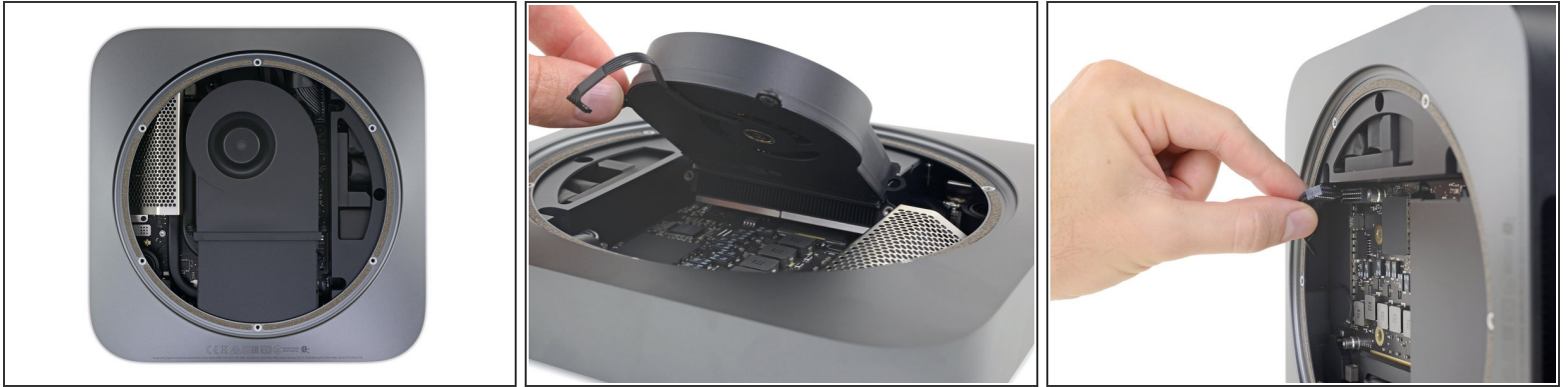
- Our first look at the 2018 mini's exterior gives us the warm and fuzzies—it's the same friendly form factor we remember.
- ① Some folks speculated that if Apple ever updated the mini, it'd look something like an [Apple TV](#). Thankfully, Apple didn't succumb to the urge to go thinner and lighter this time—this is no [Mac micro](#).
- Apart from the new color, we also have some new identifiers: model A1993 and EMC 3213.
- Despite controversial departures from a few [common ports](#), Apple has included plenty of them here! We spot two USB-A ports, four USB-C ports, a headphone jack, an ethernet port, and an HDMI port (which isn't available on *any* other recent Apple product).
- ① We'll see if any of these ports are modular. The latest [MacBook Air](#) certainly got our hopes up!

## Step 3



- We'd like to think we [know our way in](#)—but after four years without an update, we're not taking anything about this opening procedure for granted.
- With some trepidation, we point our tools at the [60%-recycled-plastic](#) bottom cover.
- Success! An [opening tool](#) takes care of the base, and six quick stabs with the [TR6 Torx security driver](#) loosens the familiar antenna plate underneath.
- So far so good. Fingers crossed that this keeps up!

## Step 4



- Just like the last [couple times](#) we did this, we're greeted first by a single fan standing watch over the mini's insides.
  - The fan unscrews with zero fuss, giving us a better view of the mini's depths.
  - Theoretically, we just need to unplug these cables from the logic board, and it'll be free to slide right out of the chassis.
- ✦ Theoretically.

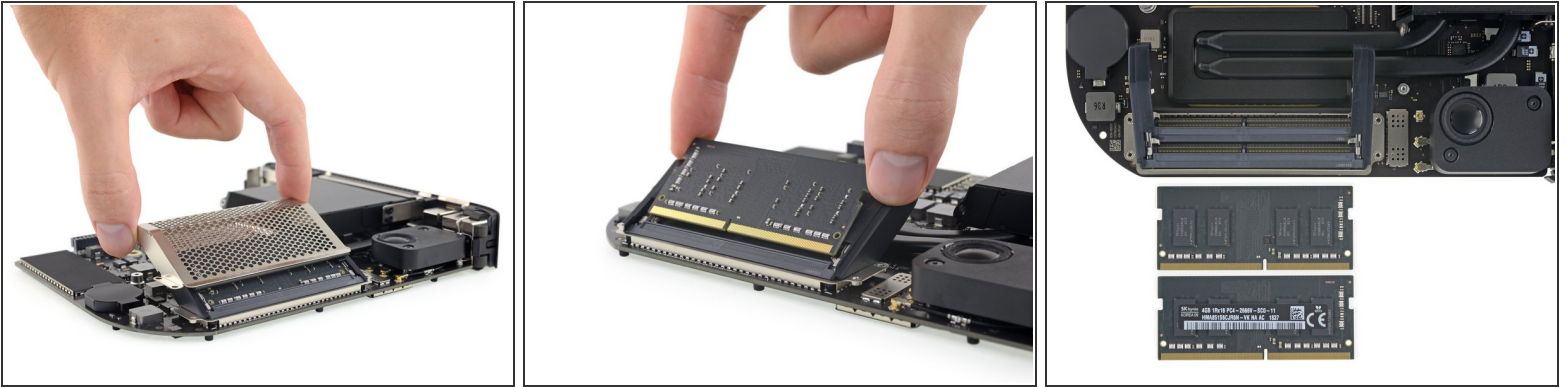
## Step 5



- It's time to improvise—our handy [Mac mini logic board removal tool](#) technically fits in the logic board's [screw holes](#), but it doesn't feel right. We're going to need more leverage.
- Could it be that some good old-fashioned thumb pressing does the trick? It does! A firm push on either side of the blower exhaust is all it takes, and the whole board unclips and slides out.
- ① As much as we love making great tools, nothing makes us happier than seeing something you can service with [no tools at all](#).
- Who knows, maybe Apple *does* have a tool to push without endangering those thin exhaust fins, but carefully aimed thumbs works for us!



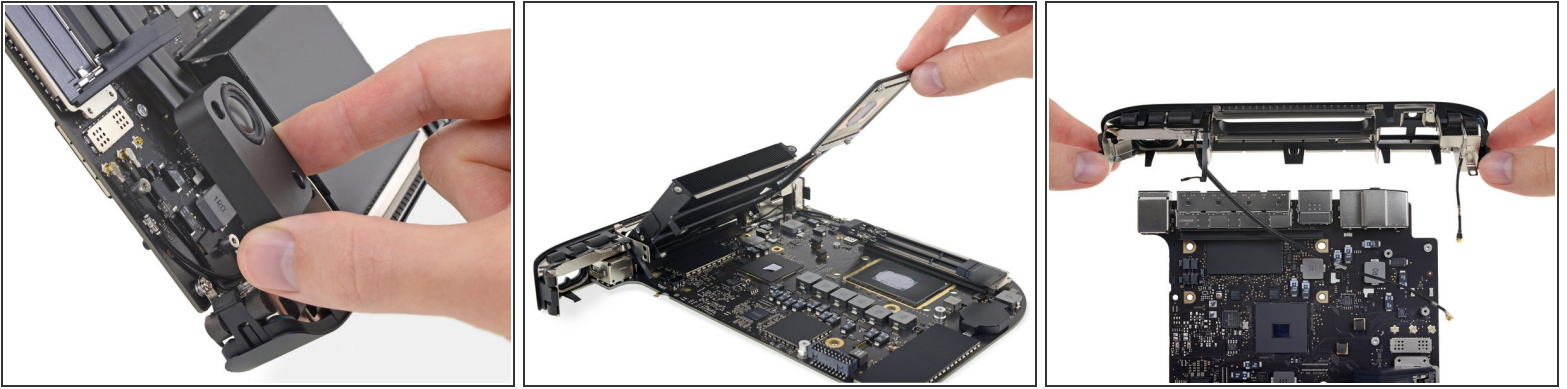
## Step 6



- With the board out, we're going straight for the RAM. Apple has trapped it in a heavy metal cage—almost as if they don't fully trust modular RAM to behave itself.
  - ★ Actually though, we've seen this in [iMacs of yore](#). The shield allows the RAM to operate at high frequency (2666 MHz) with no chance of accidentally interfering with other functions.
- Twirl away four Torx screws, and the cage slides right off. Has RAM replacement ever been easier?
  - [Sure it has](#)—but, the return to standard SO-DIMM RAM after the bitter disappointment of the [2014 mini's soldered-down chips](#) is a huge win. Upgrade now, or upgrade later—you have a choice again.
- ⓘ We pop out two SKhynix [HMA851S6CJR6N](#) 4 GB DDR4-2666 SDRAM modules, each with four 1 GB [H5AN8G6NCJR](#) DDR4 SDRAM ICs.

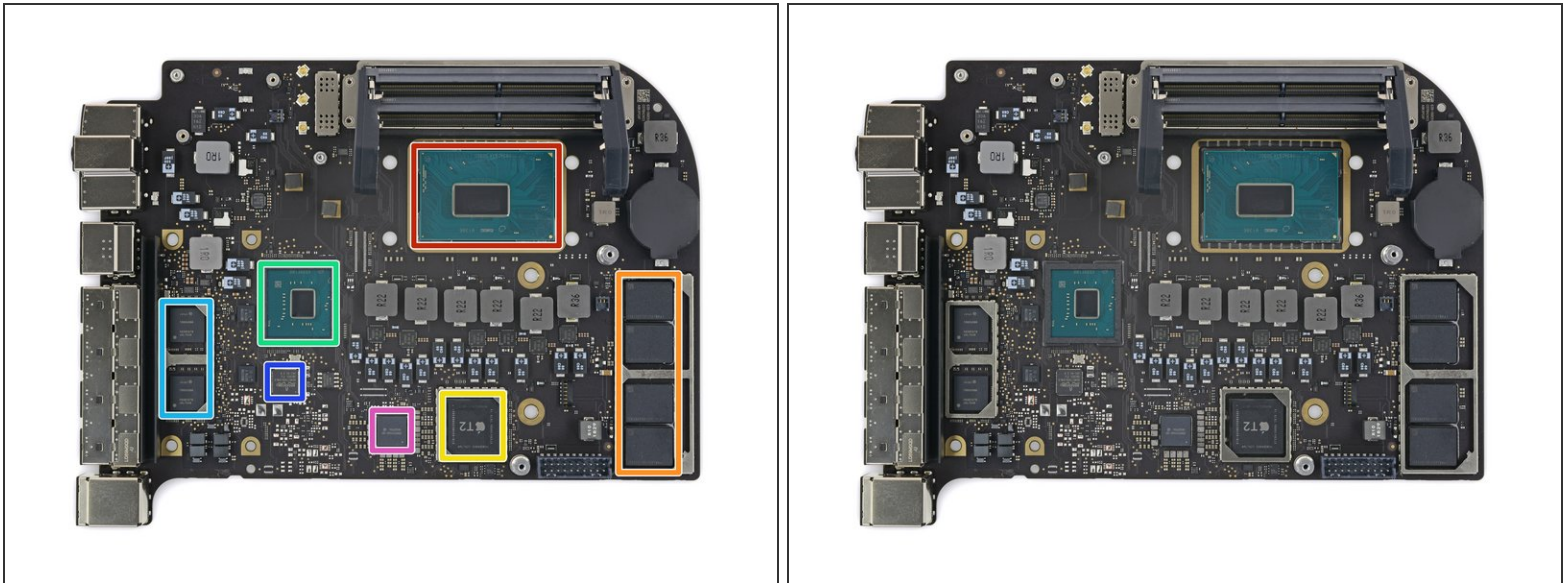


## Step 7



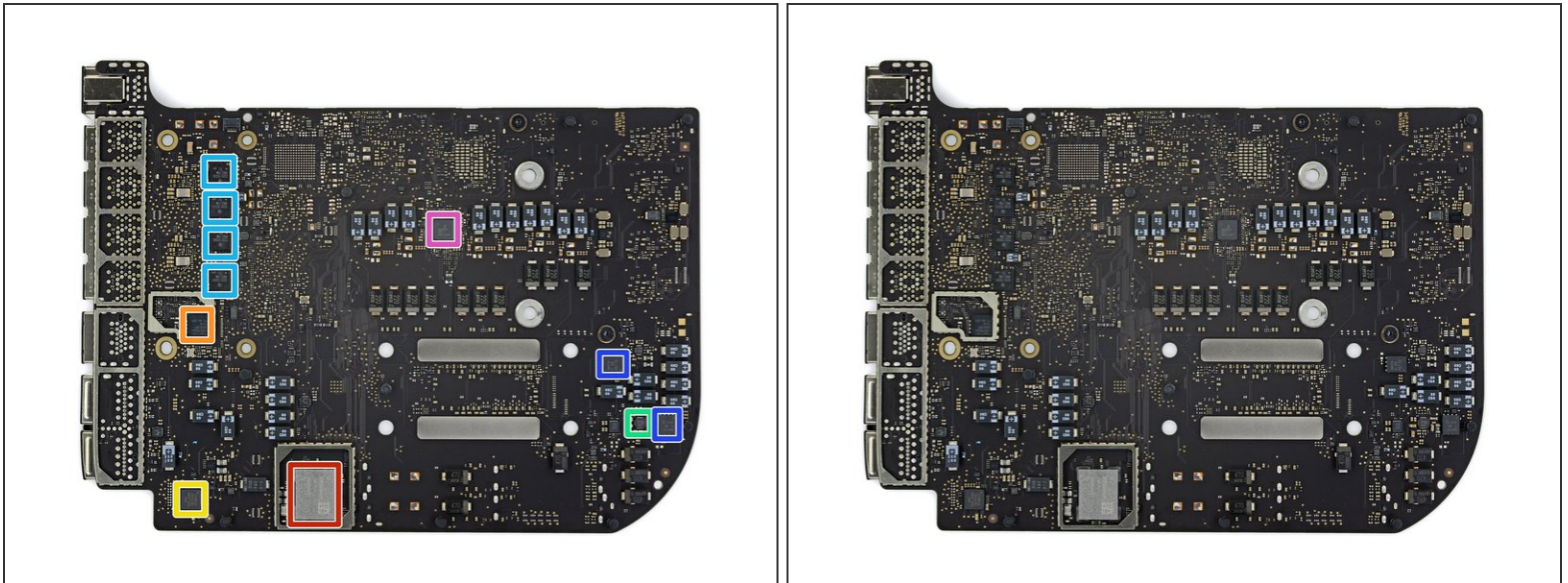
- Just one connector and two screws sets the little system speaker free.
  - ❗ [iMac](#) and [MacBook](#) speakers seem to be getting bigger all the time, but this one looks about the same size as in older Mac minis.
- Beneath the speaker, we find some antenna cables, but unfortunately no [modular AirPort card](#)—in what is [becoming a trend](#), these are socketed right to the main board.
  - Alas, AirPort cards are just a distant memory now that logic boards have [assimilated](#) all wireless functions.
- From here we set to work freeing the heatsink, twirling away Torx screws and exposing the paste-y (soldered) CPU.
- One last screw, and the port cover is free, uncovering ... the ports. As it departs, it takes some antenna hardware with it.

## Step 8



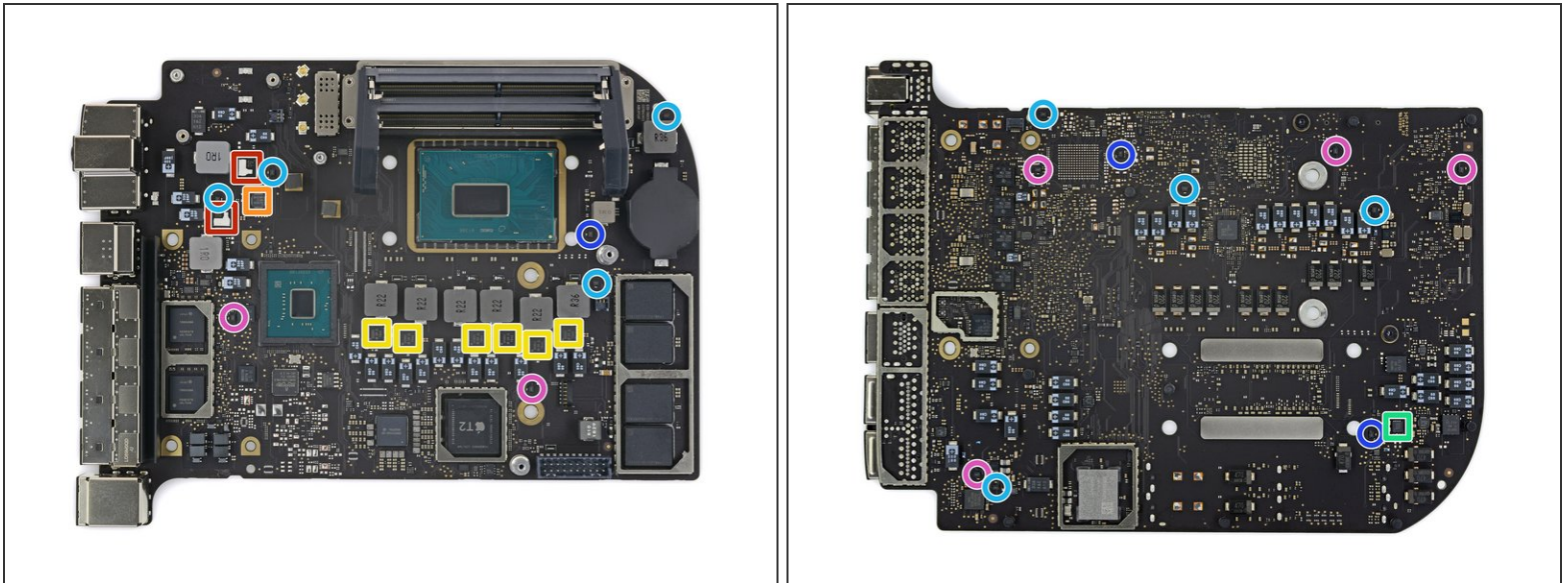
- This mini still holds a lot of silicon—let's take a look!
  - 3.6 GHz quad-core [Intel Core i3](#) CPU with Intel UHD Graphics 630
  - Toshiba TSB3225V81199TWNA1 flash storage (32 GB each, 128 GB total)
  - Apple APL1027 339S00604 T2 coprocessor
  - Intel [SR40E](#) CM246 platform controller hub
  - Intel [JHL7540](#) Thunderbolt 3 controller
  - Broadcom BCM57766 Gigabit Ethernet controller
  - 338S00342-A0 (likely an Apple PMIC)

## Step 9



- And the backside holds even more:
  - Murata 339S00458 Wi-Fi / Bluetooth module
  - MegaChips [MCDP2920A4](#) DisplayPort 1.4 to HDMI 2.0 converter
  - Cirrus Logic CS42L83 audio codec
  - Texas Instruments [TPS51916](#) memory power solution w/ synchronous buck controller
  - Texas Instruments CD3215C00 USB-C controller x4
  - Texas Instruments CSD58872Q5D NexFET synchronized buck power block
  - Intersil ISL95828AHRTZ CPU power controller

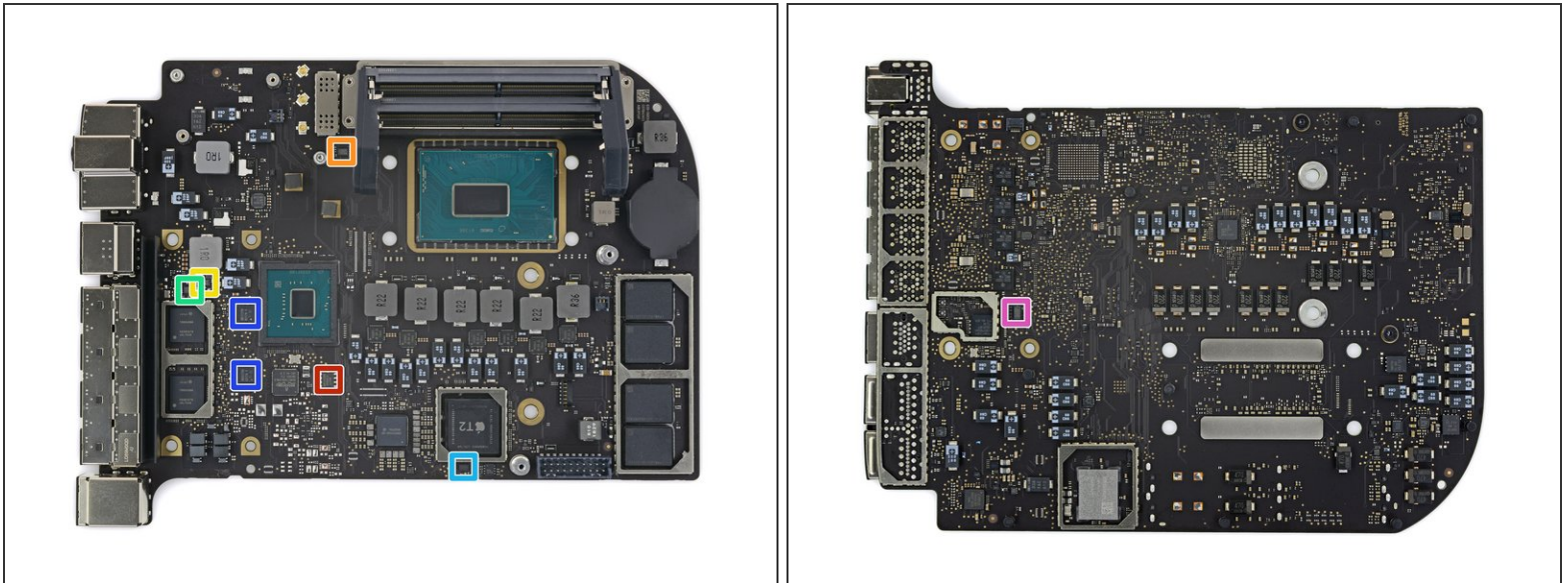
## Step 10



- Chip identification, continued:
  - Infineon (formerly International Rectifier) IRF3575 60 A synchronous buck converter
  - Renesas (formerly Intersil) [ISL62383C](#) power supply controller
  - Vishay [SIC621](#) 60 A integrated power stage
  - Renesas (formerly Intersil) [ISL80101A](#) 1 A LDO regulator
  - Texas Instruments [INA210](#) bi-directional current sense amplifier
  - Texas Instruments [INA211](#) bi-directional current sense amplifier
  - Texas Instruments [INA214](#) bi-directional current sense amplifier

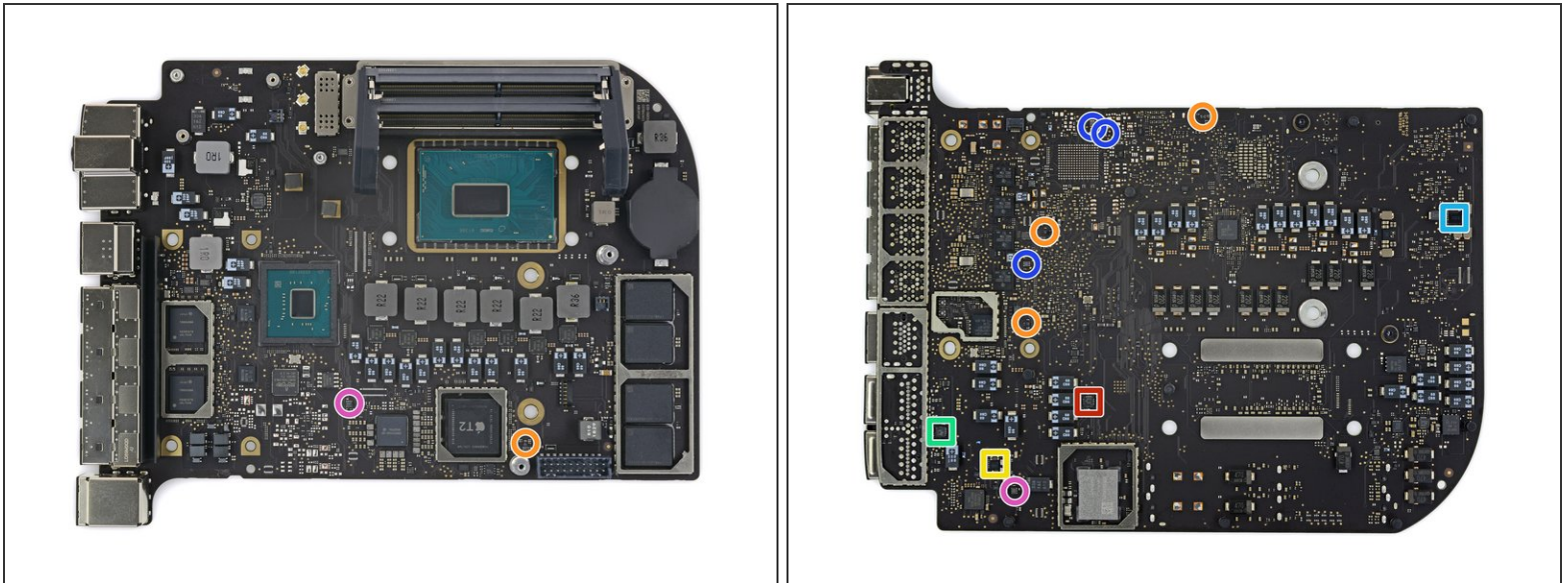


## Step 11



- Chip identification, continued:
  - Dialog Semiconductor (formerly Adesto) AT45DB021E 2 MB serial flash memory
  - Macronix [MX25R2035F](#) 2 MB serial NOR flash memory
  - Winbond [W25Q80EW](#) 8 MB serial NOR flash memory
  - Winbond [W25Q80DW](#) 8 MB serial NOR flash memory
  - ON Semiconductor [CAT24C128](#) 128 KB serial EEPROM memory
  - Texas Instruments [HD3SS215](#) 6.0 Gbps HDMI DisplayPort differential switch
  - Diodes Incorporated [PI3USB32](#) dual SPST USB 2.0 switch

## Step 12



- Chip identification, continued:
  - Texas Instruments [TMP464](#) 5-channel temperature sensor
  - Texas Instruments [TMP103](#) temperature sensor
  - Texas Instruments TAS5770 audio amplifier
  - Texas Instruments [TPS2561](#) 2-channel power switch
  - Apple 338S00410 power management IC
  - Texas Instruments [TPS62684](#) 1.6 A step-down converter
  - Dialog Semiconductor [SLG59M301V](#) 4 A load switch

## Step 13



- The last thing between us and an empty mini is the internal power supply!
- The linchpin holding this unit in place is a familiar one—so familiar that we follow [our own repair guide](#) to remove it.
- The power supply is a nice enclosed unit, making for safe, easy replacement.
  - ⓘ The only thing it's missing is a [cute label](#).
- The mini power supply gets an upgrade from [days past](#), jumping from 85 watts to 150.



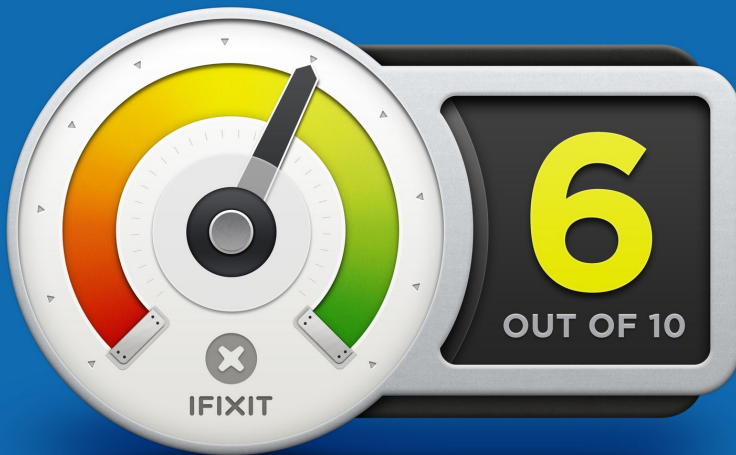
## Step 14



- It appears we've maxed out our mini, feast your eyes on these cool components!
- Back in the day, a Pro Mac meant a computer you could upgrade, configure, and connect as you pleased. This new mini aligns so well with that ideal that we're surprised it didn't earn itself a "Pro" title—especially compared to the increasingly closed-off MacBook Pro line.
- Perhaps the most exciting part of this mini is a return to upgradable RAM. In fact, our users are so excited they *already* made a [RAM replacement guide](#). **Stay tuned for the official guide and upgrade kits!**

## Step 15 — Final Thoughts

### REPAIRABILITY SCORE:



- Mac mini Late 2018 Repairability: **6 out of 10** (10 is easiest to repair).
  - No tough adhesive holds the Mac mini or its components hostage.
  - Using fairly common tools, disassembly is straight-forward.
  - The mini packs standard SO-DIMMs allowing both DIY upgrades and replacements.
  - The CPU and storage are both soldered to the logic board and not user-upgradeable.
  - If any of the many ports is damaged or worn, the entire logic board will need replacing.