Overview

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Design Summary

- The world’s thinnest laptop-style computer
- 31.1mm at its thickest point, 24% thinner than 11-inch MacBook Air
- Apple’s most compact logic board ever in a Mac, 67% smaller than 11-inch MacBook Air logic board
- Fanless

Image Copyright The Verge
Display

- 12-inch LED backlit display
- IPS technology
- 2304 x 1440 at 226 ppi (slightly over 2K)
- 16:10 aspect ratio
- 0.8mm thin
- 30% less energy than previous retina displays, with same brightness

Image Copyright AnandTech
Nikko can you see if you can take this photo and edit the dimensional lines onto the screen of the MacBook? And a diagonal line saying 12 inches. I think it'll look cooler like that.

Mathew Mullen-Mechtly,
## Specification Overview

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>OS X El Capitan</td>
</tr>
<tr>
<td>Processor</td>
<td>Intel Core M</td>
</tr>
<tr>
<td>Memory</td>
<td>8GB RAM</td>
</tr>
<tr>
<td>Storage</td>
<td>256GB or 512GB, Flash Storage</td>
</tr>
<tr>
<td>Physical Size and Weight</td>
<td>11.04in x 7.74in x 0.52in, 2.03lbs</td>
</tr>
<tr>
<td>Graphics and Video</td>
<td>Intel HD Graphics 5300 (Integrated)</td>
</tr>
<tr>
<td>Wireless</td>
<td>802.11ac Wi-Fi, Bluetooth 4.0</td>
</tr>
<tr>
<td>Connection and Ports</td>
<td>One USB-C, One 3.5mm headphone jack</td>
</tr>
<tr>
<td>Battery</td>
<td>39.7 watt-hour lithium-polymer battery</td>
</tr>
</tbody>
</table>
## CPU

**Intel Core M-5Y71 (Broadwell)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Rate</td>
<td>1.2-2.9 GHz</td>
</tr>
<tr>
<td>Data Width</td>
<td>64 bits</td>
</tr>
<tr>
<td>Number of cores / threads</td>
<td>2 / 4</td>
</tr>
<tr>
<td>Level 1 cache</td>
<td>64 KB per core, 128 KB total</td>
</tr>
<tr>
<td>Level 2 cache</td>
<td>256 KB per core, 512 KB total</td>
</tr>
<tr>
<td>Level 3 cache</td>
<td>4 MB total (shared)</td>
</tr>
<tr>
<td><strong>CPU (con’t)</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td><strong>Lithography</strong></td>
<td>14nm</td>
</tr>
<tr>
<td><strong>Total transistor count</strong></td>
<td>1.3 billion</td>
</tr>
<tr>
<td><strong>Die size</strong></td>
<td>82 mm$^2$</td>
</tr>
<tr>
<td><strong>Maximum operating temperature</strong></td>
<td>95 °C (203 °F)</td>
</tr>
<tr>
<td><strong>Maximum Power Consumption</strong></td>
<td>4.5 Watt</td>
</tr>
</tbody>
</table>
Intel® Core™ M Processor Die Map
14nm 2nd Generation Tri-Gate 3-D Transistors

Dual Core Die Shown Above | Transistor Count: 1.3 Billion | Die Size: 82mm²
4th Gen Core Processor (Y series): .96B
4th Gen Core Processor (Y series): 131mm²

Memory Controller I/O

Processor Graphics
Core
Core
System Agent, Display Engine & Memory Controller
Shared L3 Cache**
GPU

- Intel HD Graphics 5300 (integrated graphics, on-chip)
- Dual display: simultaneous support for built-in display (2304x1440) and up to 3840x2160 external display
- H.265 decoding
- 800-900 MHz (depending on specific CPU)
- 4.5 W TDP (thermal design power)
- Slightly better performance than older HD Graphics 4000 or 4200, but uses much less power
Memory

- 8GB RAM
- 1600 MHz
- LPDDR3
- RAM is shown outlined in red on the right side of logic board
Storage

- PCIe-based onboard flash storage
- 256 or 512 GB options
- Toshiba SSD is outlined in orange on the left side of the logic board
Chassis
Battery

- 39.7 Watt-hour lithium-polymer battery
- Apple claims: up to 9 hours wireless web, 10 hours movie playback, 30 days standby time.
- New “terraced” battery design maximizes volume the batteries occupy

Image Copyright Wired

Image Copyright MacWorld
Moore’s law: batteries not included

iPhone 6 to scale

MacBook 2015

http://andrewwhitby.com/2015/03/10/macbook-2015/
Wireless

- 802.11ac Wi-Fi, backwards compatible with IEEE 802.11 a, b, g, n older standards
- Bluetooth 4.0

Image copyright Forbes
Connection and Ports

- This slide was very close to reading “Port” instead of “Ports”
- MacBook has two: 3.5mm audio jack and USB-C
USB Type C: One Port for Everything

- USB-C supports: charging, USB 3.1-speed data transfer, and video
- Similar in size to Micro USB-Type B (found on most Android devices)
- Reversible
Advantages of USB-C

- Slim and sleek for mobile, robust enough for laptops
- Reversible plug and cable direction
- Scalable power and performance
- Top Speed 10 Gbps
- Max power 20 V, 5 A
- Bi-directional power
- Backwards compatible (with adapters)

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Disadvantages of USB-C

- For now, lots of adapters needed
- Power can be an issue when using adapters or other USB-type cables
- Data speed slower with older cables or adapters
- Has good potential, but will be up to companies to implement
## Configuration Options/Price

<table>
<thead>
<tr>
<th></th>
<th>Price 1</th>
<th>Price 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>$1299</td>
<td>$1599</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>1.1GHz Intel Core M, Configurable to 1.3GHz (+$250)</td>
<td>1.2GHz Intel Core M, Configurable to 1.3GHz (+$150)</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>8GB RAM</td>
<td>8GB RAM</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>256GB</td>
<td>512GB</td>
</tr>
</tbody>
</table>

- All configurations can come in silver, gold, or space grey finish
Environment

- Mercury-free display
- Arsenic-free display glass
- Does not contain BFR, PVC or Beryllium
- Aluminum body is very recyclable
- ENERGY STAR version 6.1
- EPEAT Gold rated
Summary

- Apple MacBook is interesting machine
- One of the thinnest laptop-style computers on the market
- Fanless
- Very small component architecture
- Very power efficient processor
- Great for portability, could be underpowered?
Works Cited

8. http://www.notebookcheck.net/Intel-Core-M-5Y71-SoC.129324.0.html