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Summary of Changes

This section describes the technical changes made in this edition.
This edition might also include minor corrections and editorial changes which are not identified.

May 15, 2019 - Version 542

Additions in this update

► New product(s)
  ThinkPad E495 models announced April 2019
  ThinkPad E595 models announced April 2019

► New model(s)
  ThinkPad T490 models announced April 2019

► Others
  None

Withdrawals in this update

► Withdrawn product(s)
  None
## ThinkPad 11e (5th Gen) Platform Specifications

### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Burst Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
<th>Graphics</th>
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</thead>
<tbody>
<tr>
<td>m3-7Y30</td>
<td>2</td>
<td>4</td>
<td>1.0 GHz</td>
<td>2.6 GHz</td>
<td>4MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 615</td>
<td>Intel HD Graphics 615, Intel UHD Graphics 600, supports external digital monitor via HDMI or USB Type-C, supports dual independent display: Max resolution: 3840x2160@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)</td>
</tr>
<tr>
<td>i5-7Y54</td>
<td>4</td>
<td>4</td>
<td>1.2 GHz</td>
<td>3.2 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 600</td>
<td>Intel UHD Graphics 605</td>
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<td>Celeron N4100</td>
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<td>1</td>
<td>1.1 GHz</td>
<td>2.4 GHz</td>
<td>4MB</td>
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<td></td>
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<tr>
<td>Pentium Silver N5000</td>
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<td>1</td>
<td>1.1 GHz</td>
<td>2.7 GHz</td>
<td>4MB</td>
<td></td>
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</tbody>
</table>

### Chipset

Intel SoC (System on Chip) platform 4GB or 8GB / 1866MHz LPDDR3 or 2400MHz DDR4 / soldered to systemboard, no sockets

### Display

Some: 11.6" (295mm) HD (1366x768), anti-glare, LED backlight, 250 nits, 16:9 aspect ratio, 400:1 or 500:1 contrast ratio;

Some: 11.6" (295mm) HD (1366x768), anti-glare, LED backlight, IPS, multi-touch, 250 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle;

Capacitive-type multi-touch, supports 10-finger gesture (HD IPS only)

### Multi-touch

### Storage

eMMC flash memory on board or M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s

### Optical

Realtek RTL8111GUS Gigabit Network Connection

### WLAN + Bluetooth™

* Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card
* Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card (US only)

### WWAN

None

### Dimensions

WxDxH: 11.81" x 8.27" x 0.86"; 300mm x 210mm x 21.9mm

### Weight

Starting at 2.99 lb (1.36 kg)

### Case color

Black

### Case material

Display cover: PC/ABS+GF; Bottom: PC/ABS plastic

### Media reader

MicroSD card reader

### Ports

Two USB 3.1 Gen 1, one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), headphone / microphone combo jack, microSD card reader, security keyhole

* Depending on many factors, actual data transfer speed may be lower than theoretical speed

### Camera

HD720p camera, fixed focus

Audio support

HD Audio, Realtek ALC3287 codec, stereo speakers, 2W x 2, Dolby Audio™, monaural digital microphone, combo audio/microphone jack

### Keyboard

6-row, spill-resistant, multimedia Fn keys

### Touchpad

Buttonless Mylar surface touchpad below keyboard, multi-touch

### Security chip

vPro

### Fingerprint reader

None

### NFC

None

### Battery

Integrated Li-ion 42Wh battery

Max battery life

MobileMark® 2014: 13.9 hr

* Battery life varies significantly with settings, usage, & other factors

### AC adapter

45W or 65W slim tip AC adapter

### Preload

Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty

One of the following, configurable by model:

* 1-year depot repair service
* 3-year/1-yr battery depot repair service

### Mil-Spec test

MIL-STD-810G military certification

### Environment

EPEAT™ Silver; ENERGY STAR® 6.1; RoHS-compliant

---

Lenovo

April 2019
# ThinkPad A275 Platform Specifications

**Product Specifications Reference (PSREF)**

## ThinkPad A275 Specifications

### Processor AMD PRO A-Series APUs

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
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<th>Cache</th>
<th>Memory</th>
<th>Processor Graphics</th>
<th>AMD Radeon™ R5 Graphics</th>
<th>AMD Radeon R7 Graphics</th>
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</thead>
<tbody>
<tr>
<td>PRO A10-8730B</td>
<td>4</td>
<td>4</td>
<td>2.4 GHz</td>
<td>3.3 GHz</td>
<td>2MB</td>
<td>DDR4-1866</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRO A12-8830B</td>
<td>4</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td>2MB</td>
<td>DDR4-1866</td>
<td></td>
<td></td>
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<tr>
<td>PRO A10-9700B</td>
<td>4</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td>2MB</td>
<td>DDR4-1866</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PRO A12-9800B</td>
<td>2.7 GHz</td>
<td>4</td>
<td>3.6 GHz</td>
<td></td>
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</tr>
</tbody>
</table>

* Windows 7 is only supported by PRO A10-8730B and PRO A12-8830B

### Graphics
- AMD Radeon R5 or R7 Graphics in processor only;
- supports external digital monitor via HDMI or USB Type-C;
- supports three independent displays;
- Max resolution: 4096x2160@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

### Chipset
- AMD SoC (System on Chip) platform
- Memory: 16GB max / 1866MHz DDR4, one DDR4 SO-DIMM socket

### Display
- **12.5" (317.5mm) HD (1366x768)**, anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
- **12.5" (317.5mm) FHD (1920x1080)**, anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

### Multi-touch (opt)
- On-cell touch, supports 10-finger gesture (FHD only, US only)

### Storage
- System has one HDD slot or one M.2 slot exclusively for storage;
- Some: HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s

### Optical
- None

### Ethernet
- Realtek® RTL8111EPV Gigabit Ethernet connection

### WLAN
- Realtek RT8822BE, Wi-Fi 2x2 802.11ac + BT 4.1, M.2 card
- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional)
- Wireless WAN upgradable
- Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455)
- For non-WWAN model, it means the model is NOT WWAN upgradable
- Micro-SIM card slot, opt Verizon LTE (US) SIM card

### Dimensions
- **WxDxH**: 12.03" x 8.21" x 0.80"; 305.5mm x 208.5mm x 20.3mm

<table>
<thead>
<tr>
<th>Models</th>
<th>No + 3-cell</th>
<th>3-cell + 3-cell</th>
<th>3 + 6-cell</th>
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</thead>
<tbody>
<tr>
<td>Weight</td>
<td>2.79 lb / 1.27 kg</td>
<td>2.98 lb / 1.36 kg</td>
<td>3.33 lb / 1.52 kg</td>
</tr>
</tbody>
</table>

### Limited warranty
- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-yr battery depot repair service
  - 3-year/1-yr battery limited onsite service

### Environment
- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

### Note:
The specifications above may not be available in all regions.
### ThinkPad A285 Platform Specifications

#### Processor

<table>
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<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 PRO 2300U</td>
<td>4</td>
<td>4</td>
<td>2.0 GHz</td>
<td>3.4 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 6 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 PRO 2500U</td>
<td>8</td>
<td>8</td>
<td>2.0 GHz</td>
<td>3.6 GHz</td>
<td></td>
<td></td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 PRO 2700U</td>
<td>8</td>
<td>8</td>
<td>2.2 GHz</td>
<td>3.8 GHz</td>
<td></td>
<td></td>
<td>Radeon Vega 10 Graphics</td>
</tr>
</tbody>
</table>

#### Graphics
- AMD Radeon Vega 6, Vega 8, or Vega 10 Graphics in processor only.
- Supports external digital monitor via HDMI or USB Type-C.
- Supports four independent displays.
- Max resolution: 5120x2880 @ 60Hz (USB Type-C); 4096x2160 @ 60Hz (HDMI)

#### Chipset Memory
- AMD SoC (System on Chip) platform
- 8GB or 16GB / 2400MHz DDR4, soldered to systemboard, no sockets

#### Display
- **Some:** 12.5" (317.5mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- **Some:** 12.5" (317.5mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle

#### Multi-touch (opt)
- On-cell touch, supports 10-finger gesture (FHD only)

#### Storage
- One of the following, configurable by model:
  - M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)

#### Optical
- None

#### Ethernet
- Gigabit Ethernet connection via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2

#### WLAN
- Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
- Bluetooth 4.2 wireless, integrated in Wi-Fi + Bluetooth combo adapter

#### WWAN (optional)
- Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7390 (Fibocom L850-GL), M.2 card
  - *For non-WWAN model, it means the model is NOT WWAN upgradable

#### SIM card (opt)
- Nano-SIM card slot, in the combo slot with microSD card reader, optional Verizon LTE (US) SIM card

#### Dimensions
- WxDxH (HD & FHD multi-touch):
  - 12.11" * 8.26" * 0.69"; 307.7mm x 209.8mm x 17.4mm
- WxDxH (FHD non-touch):
  - 12.11" * 8.26" * 0.70"; 307.7mm x 209.8mm x 17.8mm

#### Weight
- FHD non-touch model: 2.48 lb / 1.13 kg
- HD non-touch model: 2.78 lb / 1.26 kg
- FHD multi-touch model: 2.79 lb / 1.27 kg

#### Case color
- Black

#### Case material
- Display cover: Carbon Fiber (FHD non-touch model) or PPS (HD & FHD multi-touch model)
- Bottom: Magnesium/Aluminum

### Smart card reader
- Optional: Smart card reader

### Media reader
- MicroSD card reader, in the combo slot with nano-SIM card

### Ports
- One USB 3.1 Gen 1 (Always On), one USB 3.1 Gen 2, two USB 3.1 Type-C Gen 2 (with the function of Power Delivery and DisplayPort), HDMI 2.0, Ethernet extension connector, combo slot of nano-SIM card (WWAN models) and microSD card reader, headphone / microphone combo jack, optional smart card reader, side docking connector, security keyhole

### Monitor cable (optional)
- HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter
- USB-C to VGA: Lenovo USB-C to VGA Adapter
- USB-C to DP: Lenovo USB-C to DisplayPort Adapter

### Bundled Accy
- Optional: ThinkPad Ethernet Extension Adapter Gen 2

### Camera (optional)
- One of the following, configurable by model:
  - HD720p camera with ThinkShutter camera privacy, fixed focus
  - IR camera and HD720p camera, fixed focus

### Audio support
- HD Audio, Realtek ALC3287 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

### Keyboard
- 6-row, spill-resistant, multimedia Fn keys, optional LED backlight
- TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

### Security
- Power-on password, hard disk password, supervisor password, security keyhole
- Optional: Touch style match on chip fingerprint reader on the palm rest
  - None

### Battery
- Integrated Li-ion 48Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

### Max battery life
- MobileMark® 2014: *10.55 hr
  - *Battery life varies significantly with settings, usage, & other factors

### AC adapter
- 45W or 65W USB Type-C AC adapter

### Preload
- Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty
- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-year battery depot repair service
  - 3-year/1-year battery limited onsite service

### Environment
- MIL-Spec test MIL-STD-810G military certification
- None

Note: The specifications above may not be available in all regions.
### ThinkPad A475 Platform Specifications

#### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO A10-8730B</td>
<td>4</td>
<td>2.4 GHz</td>
<td>3.3 GHz</td>
<td>2MB</td>
<td>DDR4-1866</td>
<td>AMD Radeon™ R5 Graphics</td>
</tr>
<tr>
<td>PRO A12-8830B</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td></td>
<td></td>
<td>AMD Radeon™ R7 Graphics</td>
</tr>
<tr>
<td>PRO A10-9700B</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td></td>
<td></td>
<td>AMD Radeon™ R5 Graphics</td>
</tr>
<tr>
<td>PRO A12-9800B</td>
<td>2</td>
<td>2.7 GHz</td>
<td>3.6 GHz</td>
<td></td>
<td></td>
<td>AMD Radeon™ R7 Graphics</td>
</tr>
</tbody>
</table>

* Windows 7 is only supported by PRO A10-8730B and PRO A12-8830B

#### Graphics

- AMD Radeon R5 or R7 Graphics in processor only;
- Supports external digital monitor via HDMI or USB Type-C;
- Supports three independent displays;
- Max resolution: 4096x2160@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

#### Chipset

- AMD SoC (System on Chip) platform

#### Memory

- 32GB max / 1866MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

#### Display

- **On-cell touch, supports 10-finger gesture (FHD only, US only)**
- **Some:** 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 350:1 contrast ratio
- **Some:** 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

#### Multi-touch (opt)

- **Some:** 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 350:1 contrast ratio
- **Some:** 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

#### Storage

- System has one HDD slot or one M.2 2280 slot exclusively for storage
- **Some:** SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- **Some:** SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
- **Some:** M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s

#### Optical

- None

#### Ethernet

- Realtek® RTL8111EPV Gigabit Ethernet connection

#### WLAN

- Realtek RTL8822BE, Wi-Fi 2x2 802.11ac + BT 4.1, M.2 card
- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

#### WWAN (optional)

- Wireless WAN upgradable
- Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455)

#### SIM card (opt)

- Micro-SIM card slot, opt Verizon LTE (US) SIM card

#### Dimensions and Weight

<table>
<thead>
<tr>
<th>Weight</th>
<th>Models</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WxDxH:</strong></td>
<td>3-cell or 3 + 3-cell</td>
<td>13.25&quot; x 9.15&quot; x 0.79&quot;; 336.6mm x 232.5mm x 19.95mm</td>
</tr>
<tr>
<td><strong>Magnesium</strong></td>
<td>3.49 lb / 1.58 kg</td>
<td>3.92 lb / 1.78 kg</td>
</tr>
<tr>
<td><strong>PPS</strong></td>
<td>3.63 lb / 1.65 kg</td>
<td>4.35 lb / 1.85 kg</td>
</tr>
</tbody>
</table>

#### Case color

- Black
- Display cover: Magnesium Hybrid or PPS (Magnesium Hybrid for US only);
- Bottom: Glass-Fiber Reinforced Plastic

---

**Note:** The specifications above may not be available in all regions.
**ThinkPad A485 Platform Specifications**

### Processor

<table>
<thead>
<tr>
<th>Number</th>
<th># of Cores</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 PRO 2300U</td>
<td>4</td>
<td>2.0 GHz</td>
<td>3.4 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 6 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 PRO 2500U</td>
<td>8</td>
<td>2.0 GHz</td>
<td>3.6 GHz</td>
<td>8</td>
<td>Radeon Vega 8 Graphics</td>
<td></td>
</tr>
<tr>
<td>Ryzen 7 PRO 2700U</td>
<td>8</td>
<td>2.2 GHz</td>
<td>3.8 GHz</td>
<td>16</td>
<td>Radeon Vega 10 Graphics</td>
<td></td>
</tr>
</tbody>
</table>

Note: The specifications above may not be available in all regions.

### Graphics

- AMD Radeon Vega 6, Vega 8, or Vega 10 Graphics in processor only;
- supports external digital monitor via HDMI or USB Type-C;
- supports four independent displays;
- Max resolution: 5120x2880@60Hz (USB Type-C); 4096x2160@60Hz (HDMI)

### Chipset Memory

- AMD SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- Installed DIMMs are actually 2666MHz but run at 2400MHz due to AMD imitation

### Display

- Some: 14.0” (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- Some: 14.0” (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

### Multi-touch (opt)

- On-cell touch, supports 10-finger gesture (FHD only)

### Storage

- System has one HDD slot or one M.2 2280 slot exclusively for storage
- Some: SSD / SATA 6.0Gb/s, 2.5” wide, 7mm high, Active Protection System™
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
- Some: 128GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

### Optical

- None

### Ethernet

- Realtek® RTL8111GUL Gigabit Ethernet connection

### WLAN Bluetooth™

- Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card
- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional)

- Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
- For non-WWAN model, it means the model is NOT WWAN upgradable

### SIM card (opt)

- Nano-SIM card slot, optional Verizon LTE (US) SIM card

### Dimensions

<table>
<thead>
<tr>
<th>Weight</th>
<th>13.25” x 9.15” x 0.79”; 336.6mm x 232.5mm x 19.95mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models</td>
<td>24Wh or 24Wh + 48Wh, 72Wh, 48Wh + 48Wh / 72Wh</td>
</tr>
<tr>
<td>Magnesium</td>
<td>3.49 lb / 1.58 kg</td>
</tr>
<tr>
<td>PPS</td>
<td>3.63 lb / 1.65 kg</td>
</tr>
</tbody>
</table>

### Case color

- Black
- Display cover: Magnesium Hybrid or PPS;
- Bottom: Glass-Fiber Reinforced Plastic

### Preload

- Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty

- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-yr battery depot repair service
  - 3-year/1-yr battery limited onsite service

### Environment

- EPEAT™ Gold (US only); ENERGY STAR® 6.1, RoHS-compliant
### ThinkPad E480 Platform Specifications

#### Processor

<table>
<thead>
<tr>
<th>Processor</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-7020U</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz</td>
<td>3.2 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i3-7130U</td>
<td>2</td>
<td>4</td>
<td>2.7 GHz</td>
<td>3.7 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i5-7200U</td>
<td>4</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

8th Generation Intel Core i3 / i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8130U</td>
<td>2</td>
<td>4</td>
<td>2.2 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8550U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.0 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

#### Graphics

Integrates Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and AMD Radeon RX 550 Graphics, 2GB DDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports dual independent display; Max resolution: 1920x1080 (HDMI) @60Hz.

#### Chipset

Intel SoC (System on Chip) platform

#### Memory

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

#### Display

- Some: 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- Some: 15.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 400:1 contrast ratio
- All: Max battery life varies significantly with settings, usage, & other factors
- Battery life varies significantly with settings, usage, & other factors
- *Battery life varies significantly with settings, usage, & other factors

#### Storage

Up to 2 drives (one M.2 SSD and one HDD)

#### Optical

Some: M.2 SSD / PCle NVMe

#### Ethernet

Gigabit Ethernet Connection, Realtek 8111GUS

#### WLAN + Bluetooth™

- One of the following, configurable by model:
  - Realtek® RTL8822CE, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M.2 card
  - Realtek RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card
  - Intel Dual Band Wireless-AC 3165, 1x1, Wi-Fi + Bluetooth 4.1, M.2 Card
  - *Intel 3165ac card supports BT4.2 but is limited to BT4.1 by Windows OS

#### WWAN

None

#### SIM card

None

---

**Note:** The specifications above may not be available in all regions.
### ThinkPad E485 Platform Specifications

#### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Controller</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 2200U</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td>1MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 3 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 2500U</td>
<td>4</td>
<td>8</td>
<td>2.0 GHz</td>
<td>3.6 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td></td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 2700U</td>
<td>4</td>
<td>8</td>
<td>2.2 GHz</td>
<td>3.8 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td></td>
<td>Radeon RX Vega 10 Graphics</td>
</tr>
</tbody>
</table>

#### Graphics

- AMD Radeon Vega 3, Vega 8, or RX Vega 10 Graphics in processor;
- supports external digital monitor via HDMI or USB Type-C;
- supports dual independent display;
- Max resolution: 1920x1080 (HDMI)@60Hz

#### Chipset

- AMD SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

#### Display

- **Some:** 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16.9 aspect ratio, 400:1 contrast ratio
- **Some:** 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16.9 aspect ratio, 400:1 contrast ratio

#### Multi-touch

- None

#### Storage

- Up to 2 drives (one M.2 SSD and one HDD)
- **Some:** HDD / SATA 6.0Gb/s, 2.5" wide, removable, upgradable, Active Protection System™
- **Some:** M.2 SSD / PCIe NVMe

#### Optical

- None

#### Ethernet

- Gigabit Ethernet Connection, Realtek RTL8111GUS

#### WLAN + Bluetooth™

- One of the following, configurable by model: Qualcomm QCNFA435, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M.2 card
- Realtek® RTL8821CE, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M.2 card
- Realtek RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

#### WWAN

- None

#### SIM card

- None

#### Dimensions

- **Aluminum (WxDxH):** 12.96" x 9.53" x 0.78";
- **329mm x 242mm x 19.9mm**
- **Weight:** Starting at 3.87 lb / 1.75kg
- **Chipset:** AMD SoC (System on Chip) platform
- **Memory:** 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- **Display:** Multi-touch
- **Some:** 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- **Some:** 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 400:1 contrast ratio
- **None**

#### Storage

- Up to 2 drives (one M.2 SSD and one HDD)
- **Some:** HDD / SATA 6.0Gb/s, 2.5" wide, removable, upgradable, Active Protection System™
- **Some:** M.2 SSD / PCIe NVMe

#### Security

- Fingerprint reader
- **Security chip:** None
- **Battery:** Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter
- **Max battery life:** MobileMark® 2014: 9.37 hr
- **AC adapter:** 45W or 65W USB Type-C AC adapter

#### Preload (optional)

- Windows® 10 Home 64 or Windows 10 Pro 64

#### Limited warranty

- 1-year depot repair service

#### Mil-Spec test

- None

#### Environment

- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

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**Note:** The specifications above may not be available in all regions.
## ThinkPad E490 Platform Specifications

<table>
<thead>
<tr>
<th>Processor 8th Generation Intel® Core™ i3 / i5 / i7 Processor</th>
<th>Dimensions</th>
<th>Power</th>
<th>Weight</th>
<th>Case color</th>
<th>Graphics</th>
<th>Case material</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td>Processor</td>
<td># of # of</td>
<td>Base Max Turbo</td>
<td>Cache</td>
<td>Memory Types</td>
<td>Number of</td>
<td>Cores</td>
</tr>
<tr>
<td>3-8145U</td>
<td>2</td>
<td>4</td>
<td>2.1 GHz</td>
<td>3.9 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>5-8265U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>6MB</td>
<td>Intel UHD Graphics 620</td>
<td></td>
</tr>
<tr>
<td>7-8565U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>Intel UHD Graphics 620</td>
<td></td>
</tr>
</tbody>
</table>

**Graphics**
- Intel UHD Graphics 620 in processor only or Intel UHD Graphics 620 in processor and AMD Radeon RX 550X Graphics, 2GB DDR5 memory;
- supports external digital monitor via HDMI or USB Type-C;
- supports dual independent display;
- Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

**Chipset**
- Intel SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
  * Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

**Memory**
- 4GB or 8GB or 16GB or 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
  * Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

**Display**
- 14.0” HD (1366x768) Anti-glare TN 220 nits 16:9 400:1 90° Non-touch
- 14.0” FHD (1920x1080) Anti-glare IPS 250 nits 16:9 600:1 170° Non-touch

**Storage**
- Up to two drives (one M.2 SSD and one HDD)
  - HDD / SATA 6.0Gb/s, 2.5” wide, 7mm high, Active Protection System™
  - M.2 SSD / SATA 6.0Gb/s
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 2

**Optane™ memory**
- Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

**Optical**
- None

**Ethernet**
- Gigabit Ethernet Connection, Realtek RTL8111GUS

**WLAN + Bluetooth™**
- One of the following, configurable by model:
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
  - Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

**WWAN**
- None

**Camera**
- HD720p camera, fixed focus

**Audio support**
- HD Audio, Conexant® CX11880 codec / stereo speakers, 1.5W x 2, Dolby® Advanced Audio / dual array microphone, headphone / microphone combo jack

**Keyboard**
- UltraNav™ 6-row, spill-resistant, multimedia Fn keys, optional LED backlight
- TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

**Security**
- Power-on password, hard disk password, supervisor password, security keyhole
- Security chip Integrated model: discrete TPM 2.0, TCG Certified
  - Discrete model: firmware TPM 2.0 integrated in chipset
- System Mgt None
- Fingerprint reader Optional: Touch style fingerprint reader on the palm rest
  - Touch style fingerprint reader on the palm rest
  - NFC None
- Battery Integrated 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

**Max battery life**
- MobileMark® 2014: 13 hr
  * Battery life varies significantly with settings, usage, & other factors
  - 45W or 65W USB Type-C AC adapter

**Preload (optional)**
- Windows® 10 Home 64 or Windows 10 Pro 64

**Limited warranty**
- 1-year depot repair service

**Mil-Spec test**
- MIL-STD-810G military certification

**Environment**
- EPEAT™ Bronze; ENERGY STAR® 7.0; RoHS-compliant

### Note:
The specifications above may not be available in all regions.

Lenovo
May 2019
### ThinkPad E490s Platform Specifications

**Processor** 8th Generation Intel® Core™ i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8265U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>1</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.5 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphics** Intel UHD Graphics 620 in processor only or Intel UHD Graphics 620 in processor and AMD Radeon RX 540 Graphics, 2GB DDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

**Chipset** Intel SoC (System on Chip) platform

**Memory** 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

* Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

**Display**

<table>
<thead>
<tr>
<th>Size / Resolution</th>
<th>Surface</th>
<th>Type</th>
<th>Brightness</th>
<th>Aspect Ratio</th>
<th>Contrast Ratio</th>
<th>Viewing Angle</th>
<th>Multi-touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0&quot; FHD (1920x1080)</td>
<td>Anti-glare</td>
<td>TN</td>
<td>220 nits</td>
<td>16:9</td>
<td>400:1</td>
<td>90°</td>
<td>Non-touch</td>
</tr>
<tr>
<td>14.0&quot; FHD (1920x1080)</td>
<td>Anti-glare</td>
<td>IPS</td>
<td>250 nits</td>
<td>16:9</td>
<td>600:1</td>
<td>170°</td>
<td>Non-touch</td>
</tr>
</tbody>
</table>

**Multi-touch** None

**Storage** One of the following, configurable by model:

- M.2 2280 SSD / SATA 6.0Gb/s
- M.2 2242 SSD / PCIe NVM, PCIe 3.0 x 2

**Optane™ memory** None

**Ethernet** Gigabit Ethernet Connection, Realtek R8111GUS

**WLAN + Bluetooth™** One of the following, configurable by model:

- Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
- Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

**WWAN** None

**Dimensions** Wx Dx H: 12.96" x 9.13" x 0.70"; 329mm x 232mm x 17.9mm

**Weight** Starting at 3.68 lb / 1.67 kg

**Case color** Black or silver

**Case material** Aluminum

**Smart card reader** None

**Media reader** MicroSD card reader

**Ports** One USB 2.0, two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 2 (with the power of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), headphone / microphone combo jack, microSD card reader, security keyhole

* Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Camera** HD720p camera, fixed focus

**Audio support** HD Audio, Conexant® CX11880 codec, stereo speakers, 2W x 2, Dolby® Audio™ Premium, dual array microphone, headphone / microphone combo jack

**Keyboard** 6-row, spill-resistant, multimedia Fn keys, optional LED backlight

**Security chip** Power-on password, hard disk password, supervisor password, security keyhole

**Integrated model:** discrete TPM 2.0, TCG Certified

**Discrete model:** firmware TPM 2.0 integrated in chipset

**System Mgt** None

**Battery** Integrated Li-ion 42Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

**Max battery life** MobileMark® 2014: 11.5 hr

**AC adapter** 45W or 65W USB Type-C AC adapter

**WLAN** One of the following, configurable by model:

- Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
- Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

**Preload (optional)** Windows® 10 Home 64 or Windows 10 Pro 64

**Limited warranty** 1-year depot repair service

**Environments** EPEAT™ Bronze; ENERGY STAR® 7.0; RoHS-compliant

Note: The specifications above may not be available in all regions.
### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Controller</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 3200U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>1MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 3 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 3500U</td>
<td>4</td>
<td>8</td>
<td>2.1 GHz</td>
<td>3.7 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 3700U</td>
<td>8</td>
<td>2</td>
<td>2.3 GHz</td>
<td>4.0 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon RX Vega 10 Graphics</td>
</tr>
</tbody>
</table>

### Graphics

AMD Radeon Vega 3, Vega 8, or RX Vega 10 Graphics in processor; supports external digital monitor via HDMI or USB Type-C; supports dual independent display; Max resolution: 3840x2160@60Hz (USB Type-C); 3840x2160@30Hz (HDMI)

### Chipset

AMD SoC (System on Chip) platform

### Memory

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

*Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation*

### Display

<table>
<thead>
<tr>
<th>Size / Resolution</th>
<th>Surface</th>
<th>Brightness</th>
<th>Aspect Ratio</th>
<th>Contrast Ratio</th>
<th>Viewing Angle</th>
<th>Multi-touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0&quot; HD (1366x768)</td>
<td>Anti-glare</td>
<td>TN</td>
<td>16:9</td>
<td>400:1</td>
<td>90°</td>
<td>Non-touch</td>
</tr>
<tr>
<td>14.0&quot; FHD (1920x1080)</td>
<td>Anti-glare</td>
<td>IPS</td>
<td>16:9</td>
<td>600:1</td>
<td>170°</td>
<td>Non-touch</td>
</tr>
</tbody>
</table>

### Multi-touch

None

### Storage

Up to two drives (one M.2 SSD and one HDD)

- HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 2 or PCIe 3.0 x 4

### Optane™ memory

None

### Optical

None

### Ethernet

Gigabit Ethernet Connection, Realtek R8111GUS

### WLAN + Bluetooth™

One of the following, configurable by model:
- Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
- Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

### WWAN

None

---

**Note:** The specifications above may not be available in all regions.
ThinkPad E580 Platform Specifications

Product Specifications Reference (PSREF)

Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-7020U</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz</td>
<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i3-7130U</td>
<td>4</td>
<td>4</td>
<td>2.7 GHz</td>
<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i5-7200U</td>
<td>4</td>
<td></td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

8th Generation Intel Core i3 / i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8130U</td>
<td>2</td>
<td>4</td>
<td>2.2 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8250U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.4 GHz</td>
<td>6MB</td>
<td>DDR4-2133</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8550U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2133</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

* i3-7130U is NOT available in US and EMEA

Graphics

Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and AMD Radeon RX 550 Graphics, 2GB DDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports dual independent display.
Max resolution: 1920x1080 (HDMI)@60Hz

Chipset

Intel SoC (System on Chip) platform
System clocks down for processors with lower memory controller

Memory

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

Display

Some: 15.6" (396mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
Some: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 600:1 contrast ratio

Multi-touch

None

Storage

Up to 2 drives (one M.2 SSD and one HDD)
Some: HDD / SATA 6.0Gb/s, 2.5" wide, removable, upgradable, Active Protection System™
Some: M.2 SSD / PCIe NVMe

Optical

None

Ethernet

Gigabit Ethernet, Realtek 8811GUS

Audio

HD Audio, Conexant CX11852 codec / Advanced Audio / Realtek RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

Camera

HD720p camera, fixed focus

Security

Power-on password, hard disk password, supervisor password, security keyhole
Firmware TPM 2.0 integrated in chipset or discrete TPM 2.0 TCG Certified

Security chip

Fingerprint reader
Optional: Touch style fingerprint reader on the palm rest

Battery

Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter
Max battery life
MobileMark 2014: 12.23 hr
* Battery life varies significantly with settings, usage, & other factors

AC adapter

45W or 65W USB Type-C AC adapter

Preload

Windows 10 Home 64 or Windows 10 Pro 64

Limited warranty
1-year depot repair service

Mil-Spec test
MIL-STD-810G military certification

Environment

EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.
## ThinkPad E585 Platform Specifications

### Processor
- **AMD Ryzen Mobile Processors with Radeon Vega Graphics**
  - **Processor Number**
    - **Ryzen 3 2200U**
    - **Ryzen 5 2500U**
    - **Ryzen 7 2700U**
  - **# of Cores**: 2, 4, 8
  - **# of Threads**: 4, 8
  - **Base Frequency**: 2.5 GHz, 2.0 GHz, 2.2 GHz
  - **Max Turbo Frequency**: 3.4 GHz, 3.6 GHz, 3.8 GHz
  - **1MB L2 / 4MB L3**
  - **DDR4-2400**
  - **Cache Memory Controller**: Radeon Vega 3 Graphics
  - **Memory Controller**: Radeon Vega 8 Graphics
  - **Graphics Controller**: Radeon RX Vega 10 Graphics

### Graphics
- **AMD Radeon Vega 3, Vega 8, or RX Vega 10 Graphics in processor only; supports external digital monitor via HDMI or USB Type-C; supports dual independent display; Max resolution: 1920x1080 (HDMI)@60Hz**

### Chipset
- **AMD SoC (System on Chip) platform**

### Memory
- **32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets**

### Display
- **Some**: 15.6" (396mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio (NOT available in EMEA)
- **Some**: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 600:1 contrast ratio

### Multi-touch
- **None**

### Storage
- **Up to 2 drives (one M.2 SSD and one HDD)**
- **Some**: M.2 SSD / PCIe NVMe
- **None**

### Optical
- **None**

### Ethernet
- **Gigabit Ethernet Connection, Realtek RTL8111GUS**

### WLAN + Bluetooth™
- **One of the following, configurable by model:**
  - Qualcomm QCNFA435, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M.2 card
  - Realtek® RTL8821CE, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M.2 card
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

### WWAN
- **SIM card**: None

### Dimensions
- **WxDxH**: 14.53" x 9.92" x 0.79";
- **Weight**: Starting at 4.7 lb / 2.1kg
- **369mm x 252mm x 19.95mm**

### Smart card reader
- **None**

### Media reader
- **MicroSD card reader**
- **One USB 2.0, two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 2 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), headphone / microphone combo jack, microSD card reader, security keyhole**

### Camera
- **HD720p camera, fixed focus**

### Audio support
- **HD Audio, Conexant CX11852 codec / stereo speakers, 1.5W x 2, Dolby Advanced Audio / dual array microphone, headphone / microphone combo jack**

### Security
- **Power-on password, hard disk password, supervisor password, security keyhole**
  - **Discrete TPM 2.0, TCG Certified**

### Battery
- **Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr)**

### AC adapter
- **MobileMark® 2014: 8.63 hr**
  - **Battery life varies significantly with settings, usage, & other factors**
- **45W or 65W USB Type-C AC adapter**

### Preload (optional)
- **Windows® 10 Home 64 or Windows 10 Pro 64**

### Limited warranty
- **1-year depot repair service**

### Environment
- **EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant**

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*Note: The specifications above may not be available in all regions.*
## ThinkPad E590 Platform Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8145U</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2.1 GHz</td>
<td>3.9 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8265U</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>1.8 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

### Graphics
- Intel UHD Graphics 620 in processor only or AMD Radeon RX 550X Graphics, 2GB DDR5 memory;
- supports external digital monitor via HDMI or USB Type-C;
- supports independent display:
  - Max resolution: 4096x2160@24Hz (HDMI);
  - *Depending on many factors, actual data transfer speed may be lower than theoretical speed*

### Chipset & Memory
- Intel SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- *Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation*

### Display
- 15.6” HD (1366x768) Anti-glare TN 220 nits 16:9 400:1 90° Non-touch
- 15.6” FHD (1920x1080) Anti-glare IPS 250 nits 16:9 600:1 170° Non-touch

### Multi-touch
- None

### Storage
- Up to two drives (one M.2 SSD and one HDD)
  - HDD / SATA 6.0Gb/s, 2.5” wide, 7mm high, Active Protection System™
  - M.2 SSD / SATA 6.0Gb/s
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 2

### Optane™ memory
- Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

### Optical Drive
- None

### Ethernet
- Gigabit Ethernet Connection, Realtek R8111GUS

### WLAN + Bluetooth™
- One of the following, configurable by model:
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
  - Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

### WWAN
- None

### Processor
- 8th Generation Intel® Core™ i3 / i5 / i7 Processor

### Dimensions
- WxDxH: 14.53” x 9.94” x 0.78”;
- 369mm x 252.5mm x 19.9mm

### Weight
- Starting at 4.68 lb / 2.12 kg

### Case color
- Black or silver

### Case material
- Display cover: Aluminum;
- Bottom: PC/ABS plastic

### Smart card reader
- None

### Media reader
- MicroSD card reader

### Ports
- One USB 2.0, two USB 3.1 Gen 1 (one Always On),
- one USB 3.1 Type-C Gen 2 (with the function of Power Delivery and DisplayPort),
- HDMI 1.4b, Ethernet (RJ-45), headphone / microphone combo jack,
- microSD card reader, security keyhole

### Monitor cable
- Bundled Accy

### Camera
- HD720p camera, fixed focus

### Audio support
- HD Audio, Conexant CX11880 codec / stereo speakers, 2W x 2, Dolby® Advanced Audio / dual array microphone, headphone / microphone combo jack

### Keyboard
- UltraNav™
  - 6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight
  - TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

### Security
- Power-on password, hard disk password, supervisor password, security keyhole
- Security chip
  - Integrated model: discrete TPM 2.0, TCG Certified
  - Discrete model: firmware TPM 2.0 integrated in chipset

### System Mgt
- None

### Fingerprint reader
- Optional: Touch style fingerprint reader on the palm rest

### Battery
- Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter
- MobileMark® 2014: 11 hr

### Max battery life
- *Battery life varies significantly with settings, usage, & other factors

### AC adapter
- 45W or 65W USB Type-C AC adapter

### Preload (optional)
- Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty
- 1-year depot repair service

### Mil-Spec test
- MIL-STD-810G military certification

### Environment
- EPEAT™ Bronze; ENERGY STAR® 7.0; RoHS-compliant

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*Note: The specifications above may not be available in all regions.*

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Lenovo
May 2019
## ThinkPad E595 Platform Specifications

### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Controller</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 3200U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>1MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 3 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 3500U</td>
<td>4</td>
<td>8</td>
<td>2.1 GHz</td>
<td>3.7 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 3700U</td>
<td>4</td>
<td>8</td>
<td>2.3 GHz</td>
<td>4.0 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon RX Vega 10 Graphics</td>
</tr>
</tbody>
</table>

### Graphics

- AMD Radeon Vega 3, Vega 8, or RX Vega 10 Graphics in processor;
- Supports external digital monitor via HDMI or USB Type-C;
- Supports dual independent display;
- Max resolution: 3840x2160@60Hz (USB Type-C); 3840x2160@30Hz (HDMI)

### Chipset

- AMD SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
  * Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

### Memory

- AMD SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
  * Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

### Display

- Size / Resolution: 15.6" HD (1366x768) Anti-glare TN 220 nits 16:9 400:1 90° Non-touch
- Size / Resolution: 15.6" FHD (1920x1080) Anti-glare IPS 250 nits 16:9 600:1 170° Non-touch
- Multi-touch: None

### Storage

- Up to two drives (one M.2 SSD and one HDD)
  - HDD / SATA 6.0Gbps, 2.5" wide, 7mm high, Active Protection System™
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 2 or PCIe 3.0 x 4

### Optane™ memory

- None

### Optical

- None

### Ethernet

- Gigabit Ethernet Connection, Realtek R8111GUS

### WLAN + Bluetooth™

- One of the following, configurable by model:
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card
  - Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

### WWAN

- None

### Power

- Dimensions: WxDxH: 14.53" x 9.92" x 0.78"; 369mm x 252mm x 19.9mm
- Weight: Starting at 4.7 lb / 2.1kg
- Case color: Black
- Case material: Display cover: Aluminum; Bottom: PC/ABS plastic
- Smart card reader: None
- Media reader: MicroSD card reader
- Ports: One USB 2.0, two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), headphone / microphone combo jack, microSD card reader, secure keyhole
- Monitor cable: None
- Bundled Accy: None
- Camera: HD720p camera, fixed focus
- Audio support: HD Audio, Conexant CX11880 codec / stereo speakers, 2W x 2, Dolby® Advanced Audio / dual array microphone, headphone / microphone combo jack
- Keyboard: 6-row, spill-resistant, multimedia Fn keys
- UltraNav™ pointing device and buttonless Mylar surface multi-touch touchpad
- Security chip: Power-on password, hard disk password, supervisor password, security keyhole
- Security chip: Discrete TPM 2.0, TCG Certified
- Security chip: None
- Security chip: None
- Battery: Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter
- Max battery life: MobileMark® 2014: 10.3 hr
- AC adapter: 45W or 65W USB Type-C AC adapter
- Preload (optional): Windows® 10 Home 64 or Windows 10 Pro 64
- Limited warranty: 1-year depot repair service
- Mil-Spec test: None
- Environment: EPEAT™ Bronze; ENERGY STAR® 7.0; RoHS-compliant

### Note

The specifications above may not be available in all regions.
**ThinkPad L380 Platform Specifications**

<table>
<thead>
<tr>
<th>Processor</th>
<th>Intel® Celeron® Processor, 7th Generation Intel Core™ i3 / i5 Processor or</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>Cel 3965U</td>
<td>2</td>
</tr>
<tr>
<td>i3-7130U</td>
<td>4</td>
</tr>
<tr>
<td>i5-7200U</td>
<td>4</td>
</tr>
</tbody>
</table>

**8th Generation Intel Core i5 / i7 Processor**

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8250U</td>
<td>4</td>
<td>4</td>
<td>1.6 GHz</td>
<td>4</td>
<td>6MB</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8520U</td>
<td>4</td>
<td>4</td>
<td>1.8 GHz</td>
<td>4</td>
<td>6MB</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8550U</td>
<td>4</td>
<td>4</td>
<td>1.9 GHz</td>
<td>4</td>
<td>6MB</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

**Graphics**

Intel HD Graphics 610, 620 or Intel UHD Graphics 620 in processor; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

**Chipset**

Intel SoC (System on Chip) platform

**Memory**

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

**Display**

Some: 13.3" (338mm) HD (1366x768), anti-glare, LED backlight, 250 nits, 16:9 aspect ratio, 500:1 contrast ratio
Some: 13.3" (338mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle, on-cell touch
Some: 13.3" (338mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle, on-cell touch

**Storage**

One of the following, configurable by model:
- M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32GB/s (e.g. xxxGB SSD M.2 PCIe NVMe)

**Optane™ Memory**

None

**Optical**

None

**Ethernet**

Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via optional ThinkPad Ethernet Extension Cable

**WLAN + Bluetooth™**

Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

**WWAN**

SIM card

**Processor Specifications Reference (PSREF)**

Note: The specifications above may not be available in all regions.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>WxDxH: 12.67 x 8.83 x 0.74&quot;; 321.8mm x 224.2mm x 18.8mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Starting at 3.22 lb / 1.46 kg</td>
</tr>
<tr>
<td>Case color</td>
<td>Black or Silver</td>
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<tr>
<td>Case material</td>
<td>Display cover: Aluminum</td>
</tr>
<tr>
<td>Bottom</td>
<td>GFRP</td>
</tr>
<tr>
<td>Smart card reader</td>
<td>None</td>
</tr>
<tr>
<td>Media reader</td>
<td>MicroSD card reader</td>
</tr>
<tr>
<td>Ports</td>
<td>Two USB 3.1 Gen 1 (one Always On), two USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet extension connector, headphone / microphone combo jack, microSD card reader, security keyhole</td>
</tr>
<tr>
<td>Monitor cable (optional)</td>
<td>* Depending on many factors, actual data transfer speed may be lower than theoretical speed</td>
</tr>
<tr>
<td>Battery</td>
<td>Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter</td>
</tr>
<tr>
<td>Max battery life</td>
<td>MobileMark® 2014: 16.1 hr</td>
</tr>
<tr>
<td>AC adapter</td>
<td>45W or 65W USB Type-C AC adapter</td>
</tr>
<tr>
<td>Preload</td>
<td>Windows® 10 Home 64 or Windows 10 Pro 64</td>
</tr>
<tr>
<td>Limited warranty</td>
<td>One of the following, configurable by model:</td>
</tr>
<tr>
<td>- 1-year depot repair service</td>
<td></td>
</tr>
<tr>
<td>- 3-year/1-yr battery depot repair service</td>
<td></td>
</tr>
<tr>
<td>- 3-year/1-yr battery limited onsite service</td>
<td></td>
</tr>
<tr>
<td>Mil-Spec test</td>
<td>MIL-STD-810G military certification</td>
</tr>
<tr>
<td>Environment</td>
<td>EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant</td>
</tr>
</tbody>
</table>

**Lenovo April 2019**
**ThinkPad L390 Platform Specifications**

<table>
<thead>
<tr>
<th>Processor 8th Generation Intel® Core™ i3 / i5 / i7 Processor</th>
<th>Smart card reader</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td>Media reader</td>
<td>MicroSD card reader</td>
</tr>
<tr>
<td>i3-8145U</td>
<td>Ports</td>
<td>Two USB 3.1 Gen 1 (one Always On), two USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet extension connector, headphone / microphone combo jack, microSD card reader, security keyhole</td>
</tr>
<tr>
<td>2</td>
<td>Monitor cable (optional)</td>
<td>* Depending on many factors, actual data transfer speed may be lower than theoretical speed.</td>
</tr>
<tr>
<td>i5-8265U</td>
<td>USB-C to VGA + Power Adapter:</td>
<td>Lenovo USB-C to VGA Adapter</td>
</tr>
<tr>
<td>4</td>
<td>USB-C to VGA:</td>
<td>Lenovo USB-C to VGA + Power Adapter</td>
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<tr>
<td>i5-8365U</td>
<td>USB-C to HDMI:</td>
<td>Lenovo USB-C to HDMI Adapter</td>
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<td>4</td>
<td>USB-C to HDMI + Power Adapter:</td>
<td>Lenovo USB-C to HDMI + Power Adapter</td>
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<tr>
<td>i7-8565U</td>
<td>USB-C to DP:</td>
<td>Lenovo USB-C to DisplayPort Adapter</td>
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<tr>
<td>8</td>
<td>USB-C to RJ45:</td>
<td>Lenovo USB-C to Ethernet Adapter</td>
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<tr>
<td></td>
<td>Bundled Accessories (optional)</td>
<td>Lenovo USB-C to RJ45 Adapter</td>
</tr>
<tr>
<td></td>
<td>USB-C to USB-A:</td>
<td>Lenovo USB-C to USB-A Adapter</td>
</tr>
<tr>
<td></td>
<td>USB-C to USB-C:</td>
<td>Lenovo USB-C to USB-C Cable 2M</td>
</tr>
</tbody>
</table>

**Graphics**

Intel UHD Graphics 620 in processor; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304 @60Hz (USB Type-C); 4096x2160 @30Hz (HDMI)

**Chipset**

Intel SoC (System on Chip) platform

**Memory**

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

* Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

**Display**

- **Size**: 13.3" HD (1366x768) Anti-glare TN 250 nits 16:9 500:1 90°
- **Size**: 13.3" FHD (1920x1080) Anti-glare IPS 250 nits 16:9 700:1 (non-touch) 800:1 (multi-touch) 170°

**Multi-touch (opt)**

On-cell touch, supports 10-finger gesture (FHD only)

**Optane™ memory**

None

**Optical**

None

**Ethernet**

Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via optional ThinkPad Ethernet Extension Cable or Lenovo USB-C to Ethernet Adapter

**WLAN**

Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

**Bluetooth™**

Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

**WWAN**

None

**Dimensions**

WxDxH: 12.67" x 8.83" x 0.74"; 321.8mm x 224.2mm x 18.8mm

**Weight**

Starting at 3.22 lb / 1.46 kg

**Case color**

Black or Silver

**Case material**

Display cover: Aluminum

**Limited warranty**

One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

**Environment**

EPEAT™ Bronze; ENERGY STAR® 7.0; RoHS-compliant

Note: The specifications above may not be available in all regions.

Lenovo
May 2019
ThinkPad L470 Platform Specifications

Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>3600U</td>
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<td>4</td>
<td>2.0 GHz</td>
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<td>3MB</td>
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<td>Intel HD Graphics 520</td>
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<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
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<td>3620U</td>
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<td>4</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>3630U</td>
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<td>4</td>
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<td>3.0 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
</tbody>
</table>

* i7 processor is NOT available in EMEA

Chipset

Intel SoC (System on Chip) platform
32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
* System clocks down for processors with lower memory controller

Display

Some: 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

Multi-touch

None

Storage

System has one HDD slot or one M.2 2280 slot exclusively for storage
Some: HDD / SATA 6.0Gb/s, 2.5" wide, 7mm or 9.5mm high, Active Protection System™
Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
Some: 128GB M.2 SSD / SATA 6.0Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

Optical

None

Ethernet

Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

WLAN

One of the following, configurable by model:
* Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
* Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
* Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
* Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

Bluetooth®

* Intel 8260ac / 8265ac card support BT4.2 but is limited to BT4.1 by Windows OS

WWAN (optional)

One of the following, configurable by model:
* Wireless WAN upgradable
* Integrated Mobile Broadband 4G LTE-A
* Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
* Integrated Mobile Broadband 4G LTE
* Intel XMM™ 7160 (Fibocom L831-EAU), M.2 card (EMEA only)

SIM card (opt)

Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

Dimensions

WxDxH: 13.35" x 9.25" x 0.94"; 339mm x 235mm x 23.9mm

Weight

Models 3-cell 6-cell
Integrated model 4.13 lb / 1.87 kg 4.45 lb / 2.02 kg
Discrete model 4.16 lb / 1.89 kg 4.48 lb / 2.03 kg

Camera (optional)

HD720p resolution, fixed focus

Audio support

HD Audio, Realtek ALC3268 codec / stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack

Security

Security chip

vPro (optional)

Fingerprint reader

Optional:

Swipe style fingerprint reader on the keyboard bezel

AC adapter

45W or 65W slim tip AC adapter

Media reader

4-in-1 reader (MMC, SD, SDHC, SDXC)

Ports

Three USB 3.1 Gen 1 (USB 3.0, one Always On), VGA, Mini DisplayPort, Ethernet (RJ-45), Dock connector

Battery

Li-ion 3-cell (24Wh) or 6-cell (48Wh or 72Wh)

Max battery life (MobileMark® 2014)

Models 3-cell 6-cell 48Wh 6-cell 72Wh
Integrated model 7.24 hr 14.48 hr 21.72 hr
Discrete model 4.34 hr 8.68 hr 13.02 hr

Environment

EPEAT Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.

Lenovo

September 2018
ThinkPad L480 Platform Specifications

Processor 7th Generation Intel® Core™ i3 / i5 Processor or

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
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</thead>
<tbody>
<tr>
<td>3-7130U</td>
<td>1</td>
<td>2</td>
<td>2.7 GHz</td>
<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
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<td>5-7200U</td>
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<td>4</td>
<td>2.5 GHz</td>
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<td>3.3 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

8th Generation Intel Core i3 / i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-8130U</td>
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<td>4</td>
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<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
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<tr>
<td>5-8250U</td>
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<td>8</td>
<td>1.6 GHz</td>
<td>3.4 GHz</td>
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<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
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<tr>
<td>5-8350U</td>
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<td>3.6 GHz</td>
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<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
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<tr>
<td>5-8550U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

* 3-7130U is NOT available in US and EMEA

Graphics

- Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and AMD Radeon 530, 2GB GDDR5 memory (discrete models are NOT available in EMEA), supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

Chipset

- Intel SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
  * System clocks down for processors with lower memory controller

Display

- Some: 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
- Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle

Multi-touch (opt)

- On-cells touch, supports 10-finger gesture (FHD only)

Storage

- System has one HDD slot or one M.2 2280 slot exclusively for storage
  * HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
  * SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
  * M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
  * M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
  * M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s

- In WWAN slot as 2nd Storage, mutually exclusive with WWAN

Optical

- None

Ethernet

- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

WLAN + Bluetooth™ (optional)

- One of the following, configurable by model:
  * Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card (US only)
  * Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card
  * Intel 8265ac card supports BT4.2 but is limited to BT4.1 by Windows OS

WWAN (optional)

- One of the following, configurable by model:
  * Integrated Mobile Broadband 4G LTE, Intel XMM™ 7626 (Fibocom L830-EB), M.2 card (EMEA only)
  * Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
  * For non-WWAN model, it means the model is NOT WWAN upgradable

SIM card (opt)

- Nano-SIM card slot, optional Verizon LTE (US) SIM card

Dimensions

- Weight: Starting at 3.71 lb / 1.68 kg

Camera (optional)

- One of the following, configurable by model:
  * HD720p camera, fixed focus
  * IR camera and HD720p camera, fixed focus

Audio support

- HD Audio, Realtek ALC3287 codec
  * stereo speakers, 2W x 2, Dolby® Audio™ / dual array microphone, headphone / microphone combo jack

Keyboard

- UltraNav™ 6-row, spill-resistant, multimedia Fn keys, optional LED backlight
  * TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

Security

- Power-on password, hard disk password, supervisor password, security keyhole

Security chip

- Security chip
  * Discrete TPM 2.0, TCG Certified

Fingerprint reader

- Optional: Touch style match on chip fingerprint reader on the keyboard bezel, anti-spoofing technology

NFIC (optional)

- Near Field Communication

Battery

- Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

Max battery life

- MobileMark® 2014: 12.2 hr

AC adapter

- Battery life varies significantly with settings, usage, & other factors
  * 45W or 65W USB Type-C AC adapter

Preload

- Windows® 10 Home 64 or Windows 10 Pro 64

Limited warranty

- One of the following, configurable by model:
  * 1-year depot repair service
  * 3-year/1-yr battery depot repair service
  * 3-year/1-yr battery limited onsite service

Mil-Spec test

- MIL-STD-810G military certification

Environment

- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.

April 2019
### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-6006U</td>
<td>2</td>
<td>4</td>
<td>2.0 GHz</td>
<td>-</td>
<td>3MB</td>
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<td>4</td>
<td>2.3 GHz</td>
<td>-</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
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<tr>
<td>i5-6200U</td>
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<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
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<td>i5-6300U</td>
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<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
</tbody>
</table>

**Note:** The processor is NOT available in EMEA.

### Graphics

- Intel HD Graphics 520, 610, or 620 in processor only;
- Supports external analog monitor via VGA and digital monitor via Mini DisplayPort;
- Supports three independent displays;
- Max resolution: 3840x2160@60Hz (DP via mDP cable); 1920x1080@60Hz (VGA)

### Chipset/Memory

- Intel SoC (System on Chip) platform
- Memory: 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

### Display

- Some: 15.6" (396mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 350:1 contrast ratio
- Some: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 or 500:1 contrast ratio
- Some: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 600:1 contrast ratio, 160° viewing angle

### Multi-touch

- None

### Storage

- Some: HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xC26 SSD)
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 16Gb/s
- Some: 128GB M.2 SSD / SATA 6.0Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

### Optical (optional)

- DVD-ROM or DVD burner, 9mm high, fixed, not removable, tray-in

### Ethernet

- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

### WLAN

- One of the following, configurable by model:
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card (US only)
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Bluetooth® 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

- * Intel 8260ac / 8265ac card support BT4.2 but is limited to BT4.1 by Windows OS

### WWAN (optional)

- One of the following, configurable by model:
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A
  - Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
  - Integrated Mobile Broadband 4G LTE: Intel XMM™ 7610 (Fibocom L831-EAU), M.2 card (EMEA only)

### SIM card (optional)

- Micro-SIM card slot, opt Verizon LTE (US) or Lenovo™ Connect (EMEA) SIM card

### Dimensions

- WxDxH: 14.84" x 10.04" x 1.81-1.21"
- Weight: 377mm x 255mm x 27.6-30.85mm

### Weight

- Starting at 5.25 lb / 2.38 kg

### Case color

- Black

### Case material

- PC/ABS plastic

### ExpressCard (optional)

- One slot (ExpressCard/34)

### Smart card reader

- Optional: Smart card reader

### Media reader

- 4-in-1 reader (MMC, SD, SDHC, SDXC)

### Ports

- Four USB 3.1 Gen 1 (USB 3.0, one Always On), VGA, Mini DisplayPort, Ethernet (RJ-45), Dock connector

### Monitor cable

- Depending on many factors, actual data transfer speed may be lower than theoretical speed

### Camera (optional)

- HD720p resolution, fixed focus

### Audio support

- HD Audio, Realtek® ALC3245 codec / stereo speakers, 1.5W x 2 / dual array microphone, combo audio/microphone jack

### Keyboard

- 6-row, spill-resistant, multimedia Fn keys, numeric keypad

### Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Discrete TPM 2.0, TCG Certified

### Fingerprint reader

- Optional: Swipe style fingerprint reader on the palm rest

### Battery

- Liion 6-cell (48Wh)

### Max battery life

- MobileMark® 2014: 14.8 hr
- *Battery life varies significantly with settings, usage, & other factors

### AC adapter

- 45W slim tip AC adapter

### Preload

- Windows® 7 Professional 64 preinstalled
- Some: Windows 10 Home 64
- Lenovo Solution Center
- Microsoft Office preloaded; purchase a product key to activate

### Warranty

- 1-year depot repair service
- Lenovo Companion
- Lenovo Setting
- Microsoft Office preloaded; purchase a product key to activate
- McAfee® LiveSafe™ (30-day trial)

### disclaimer

Note: The specifications above may not be available in all regions.
# ThinkPad L580 Platform Specifications

## Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cel 3965U</td>
<td>2</td>
<td>2</td>
<td>2.2 GHz</td>
<td>-</td>
<td>2MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 610</td>
</tr>
<tr>
<td>i3-7130U</td>
<td>4</td>
<td>4</td>
<td>2.7 GHz</td>
<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i5-7200U</td>
<td>4</td>
<td>8</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td></td>
</tr>
<tr>
<td>i5-7300U</td>
<td>4</td>
<td>8</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td></td>
</tr>
</tbody>
</table>

### 8th Generation Intel Core i3 / i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8130U</td>
<td>2</td>
<td>4</td>
<td>2.2 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8250U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.4 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td></td>
</tr>
<tr>
<td>i5-8350U</td>
<td>4</td>
<td>8</td>
<td>1.7 GHz</td>
<td>3.6 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td></td>
</tr>
<tr>
<td>i7-8550U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td></td>
</tr>
</tbody>
</table>

### Note
- i3-7130U is NOT available in US and EMEA

## Graphics

- Intel HD Graphics 610, 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and AMD Radeon 530, 2GB GDDR5 memory (discrete models are NOT available in EMEA); supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304 @60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

## Chipset Memory

- Intel SoC (System on Chip) platform (optional)
- Supports dual-channel capable, two DDR4 SO-DIMM sockets
- System clocks down for processors with lower memory controller

## Display

- Some: 15.6" (396mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
- Some: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle

## Multi-touch

- None

## Storage

- System has one HDD slot or one M.2 2280 slot exclusively for storage
- Some: HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
- Some: 128GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

## Optical

- None

## Ethernet

- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

## WLAN + Bluetooth™

- One of the following, configurable by model:
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card (US only)
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

## Preload

- Windows® 10 Home 64 or Windows 10 Pro 64

## Warranty

- Limited warranty: One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-year battery depot repair service
  - 3-year/1-year battery limited onsite service

## Environment

- MIL-STD-810G military certification
- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.

Lenovo April 2019
### ThinkPad P1 Platform Specifications

**Processor**

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS-8400H</td>
<td>4</td>
<td>8</td>
<td>2.5 GHz</td>
<td>4.2 GHz</td>
<td>8MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>7E-8750H</td>
<td>6</td>
<td>12</td>
<td>2.8 GHz</td>
<td>4.3 GHz</td>
<td>9MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphics**

- Intel UHD Graphics 630 in processor and NVIDIA® Quadro® P1000 or P2000, 4GB GDDR5 memory; supports external digital monitor via HDMI or Thunderbolt®.
- Supports four independent displays.
- Max resolution: 5120x2880@30Hz (Thunderbolt); 4096x2160@60Hz (HDMI)

**Chipset & Memory**

- Mobile Intel CM246 Chipset
- ECC or non-ECC (ECC function supported only on Xeon processor), dual-channel capable, two DDR4 SO-DIMM sockets

**Display**

- Some: 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 170° viewing angle
- Some: 15.6" (396mm) UHD (3840x2160), anti-glare, LED backlight, IPS, 400 nits, 16:9 aspect ratio, 1200:1 contrast ratio, 100% gamut, 170° viewing angle, multi-touch, anti-reflection (AR)

**Multi-touch (opt)**

- Capacitive-type multi-touch, supports 10-finger gesture (4K only)
- Supports pen accessory, please see the accessory compatibility for details

**Storage**

- Up to 2 drives (two M.2 SSD)
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s

**Optane™ memory**

- None

**RAID (optional)**

- RAID 0/1 support

**Optical**

- None

**Ethernet**

- Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via bundled or optional ThinkPad Ethernet Extension Cable

**WLAN & Bluetooth™**

- Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card
- Bluetooth 5.0, integrated in Wi-Fi + Bluetooth combo adapter

**WWAN**

- None

**Dimensions**

- WxDxH (non-touch): 14.24" x 9.67" x 0.74"
- WxDxH (multi-touch): 14.24" x 9.67" x 0.74"
- Weight (non-touch): starting at 3.76 lb (1.7 kg)
- Weight (multi-touch): starting at 4.06 lb (1.8 kg)

**Case color**

- Black

**Case material**

- Display cover: CFRP/GFRP hybrid
- Bottom: Aluminum alloy

**Power**

- Max battery life (MobileMark 2014): 7.36 hr; Hybrid mode: 13.87 hr

**Battery**

- Integrated Li-ion 80Wh battery, supports Rapid Charge (charge up to 80% in 1hr)

**AC adapter**

- 135W slim tip AC adapter

**Preload**

- Windows® 10 Home 64
- Windows 10 Pro 64
- Windows 10 Pro 64 for Workstations

**Limited warranty**

- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

**Mil-Spec test**

- MIL-STD-810G military certification

**Environmental**

- EPEAT™ Gold; ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.
# ThinkPad P51 Platform Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>6th or 7th Generation Intel® Core™ i7 Processor or Intel Xeon® Processor E3 v5 or v6 Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Model Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>7-6820HQ</td>
<td>6th Generation Intel Core i7-6820HQ (2.7 GHz) 6-core, 8MB Cache, Intel HD Graphics 530</td>
</tr>
<tr>
<td>E3-1505M v6</td>
<td>6th Generation Intel Core i7-6820HQ (2.7 GHz) 4-core, 8MB Cache, Intel HD Graphics 530</td>
</tr>
<tr>
<td>7-7700HQ</td>
<td>6th Generation Intel Core i7-7700HQ (2.8 GHz) 4-core, 8MB Cache, Intel HD Graphics 630</td>
</tr>
<tr>
<td>E3-1505M v6</td>
<td>7th Generation Intel Core i7-7700HQ (2.8 GHz) 4-core, 8MB Cache, Intel HD Graphics 630</td>
</tr>
<tr>
<td>7-7820HQ</td>
<td>7th Generation Intel Core i7-7820HQ (2.9 GHz) 4-core, 8MB Cache, Intel HD Graphics 630</td>
</tr>
<tr>
<td>E3-1505M v6</td>
<td>7th Generation Intel Core i7-7820HQ (2.9 GHz) 4-core, 8MB Cache, Intel HD Graphics 630</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graphics</th>
<th>Intel HD Graphics 530, 630, P530, or P630 in processor and NVIDIA Quadro® M1200 or M2200, 4GB memory; supports external digital monitor via HDMI, Mini DisplayPort, or Thunderbolt™; supports four independent displays; Max resolution: 3840x2160@60Hz (DisplayPort via Mini DisplayPort cable);</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Some: 15.6&quot; (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 160° viewing angle. Some: 15.6&quot; (396mm) 4K (3840x2160), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 170° viewing angle.</td>
</tr>
<tr>
<td>Multi-touch (optional) Pen</td>
<td>Optional: Capacitive-type multi-touch, supports 10-finger gesture, 220 nits (FHD only) ThinkPad Pen Pro, active pen for multi-touch display.</td>
</tr>
<tr>
<td>Storage</td>
<td>Up to 3 drives (two M.2 SSD and one HDD) Some: HDD / SATA 6.0Gb/s, 2.5&quot; wide, 7mm high, Active Protection System™</td>
</tr>
<tr>
<td>RAID (optional) Optical</td>
<td>RAID 0/1 support</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville) vPro model: Intel Ethernet Connection I219-LM (Jacksonville)</td>
</tr>
<tr>
<td>WLAN</td>
<td>One of the following, configurable by model: Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card</td>
</tr>
<tr>
<td>Bluetooth™</td>
<td>Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter</td>
</tr>
<tr>
<td>WWAN</td>
<td>One of the following, configurable by model: Wireless WAN upgradeable Integrated Mobile Broadband 4G LTE-A, Qualcomm Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card</td>
</tr>
<tr>
<td>SIM card (optional)</td>
<td>Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>WxDxH: 14.86&quot; x 9.93&quot; x 0.96-1.16&quot;; 377.4mm x 252.3mm x 24.5-29.4mm WxDxH(Touch): 14.86&quot; x 9.93&quot; x 1.02-1.21&quot;; 377.4mm x 252.3mm x 25.8-30.7mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Models</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
</tr>
<tr>
<td>Case color</td>
<td>Black</td>
</tr>
<tr>
<td>Case material</td>
<td>Optional: Smart card reader</td>
</tr>
<tr>
<td>Camera (optional)</td>
<td>HD720p resolution, fixed focus</td>
</tr>
<tr>
<td>Audio support</td>
<td>HD Audio, Realtek ALC3268 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack</td>
</tr>
<tr>
<td>Security</td>
<td>Power-on password, hard disk password, supervisor password, security keyhole</td>
</tr>
<tr>
<td>Security chip</td>
<td>Intel vPro Technology</td>
</tr>
<tr>
<td>Finger print reader</td>
<td>Touch style match on chip fingerprint reader on the palm rest</td>
</tr>
<tr>
<td>Color calibration</td>
<td>Optional: Pantone® color calibrator by X-Rite® color calibration sensor in palm rest None</td>
</tr>
<tr>
<td>Battery</td>
<td>Lithium Polymer 4-cell (66Wh) or 6-cell (90Wh)</td>
</tr>
<tr>
<td>Max battery life</td>
<td>MobileMark® 2014</td>
</tr>
<tr>
<td>10 Home 64</td>
<td>Discrete Graphics</td>
</tr>
<tr>
<td>Hybrid Graphics</td>
<td>6.5 hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC adapter</th>
<th>AC adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preload</td>
<td>One of the following, configurable by model: Windows® 7 Professional 64 preinstalled through downgrade rights in Windows 10 Pro 64</td>
</tr>
<tr>
<td>Limited warranty</td>
<td>One of the following, configurable by model: 1-year depot repair service</td>
</tr>
<tr>
<td>Mi-Spec test</td>
<td>MIL-STD-810G military certification</td>
</tr>
<tr>
<td>Environment</td>
<td>EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant</td>
</tr>
</tbody>
</table>

Note: The specifications above may not be available in all regions.
### Processor

<table>
<thead>
<tr>
<th>Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-6500U</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>7-6600U</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
</tbody>
</table>

or 7th Generation Intel Core i5 / i7 Processor

<table>
<thead>
<tr>
<th>Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7300U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>7-7500U</td>
<td>2</td>
<td>4</td>
<td>2.7 GHz</td>
<td>3.5 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>7-7600U</td>
<td>2</td>
<td>4</td>
<td>2.8 GHz</td>
<td>3.9 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

### Graphics

Intel HD Graphics 520 or 620 in processor and NVIDIA Quadro® M520, 2GB 2.5GHz GDDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays:

- Max resolution: 4096x2304@60Hz (USB Type-C); 3840x2160@30Hz (HDMI)

### Chipset

Intel SoC (System on Chip) platform

### Memory

32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

- * System clocks down for processors with lower memory controller

### Display

- **Some:** 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
- **Some:** 15.6" (396mm) 4K (3840x2160), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 72% gamut, 170° viewing angle

### Multi-touch (opt)

On-cell touch, supports 10-finger gesture (FHD only)

### Storage

- **System has one HDD slot or one M.2 2280 slot exclusively for storage**

#### SSD / SATA 6.0Gb/s
- **Some:** SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- **Some:** M.2 SSD / PCie NVMe, PCIe 3.0 x 2, 16Gb/s
- **Some:** 128GB M.2 SSD / SATA 6.0Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN and WiGig

### Optical

None

### Audio support

- **HD Audio, Realtek ALC3268 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack**

### Security

- **Power-on password, hard disk password, supervisor password, security keyhole**
- **Intel vPro Technology**
- **Discrete TPM 2.0, TCG Certified**
- **Near Field Communication**

### Ethernet

- **Non-vPro model: Intel Ethernet Connetction X117V (Jacksonville)**
- **vPro model: Intel Ethernet Connetction X119-LM (Jacksonville)**

### WLAN

- **One of the following, configurable by model (WiGig can coexist with WWAN):**
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Tri-Band Wireless-AC 18265, WiGig 802.11ad + Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional)

- **One of the following, configurable by model (WWAN can coexist with WiGig):**
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7160 (Fibocom L831-EAU), M.2 card (EMEA only)
  - Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

### NIST Test and Results

Lenovo

March 2018
# ThinkPad P52 Platform Specifications

**Processor**

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processors Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8750H</td>
<td>6</td>
<td>2.2 GHz</td>
<td>4.1 GHz</td>
<td>9MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>7-8850H</td>
<td>6</td>
<td>2.6 GHz</td>
<td>4.3 GHz</td>
<td>9MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>9-8950NH</td>
<td>6</td>
<td>2.9 GHz</td>
<td>4.8 GHz</td>
<td>12MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>E-2176M</td>
<td>6</td>
<td>2.7 GHz</td>
<td>4.4 GHz</td>
<td>12MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
</tbody>
</table>

**Graphics**

- Intel UHD Graphics 630 or P630 in processor and NVIDIA Quadro P1000 (4GB memory), P2000 (4GB memory), or P3200 (6GB memory, VR ready); supports external digital monitor via HDMI, Mini DisplayPort, or Thunderbolt; supports four independent displays.
- Max resolution: 3840x2160@60Hz (DisplayPort via Mini DisplayPort cable); 5120x2880@30Hz (Thunderbolt); 4096x2160@60Hz (HDMI).

**Chipset**

- Mobile Intel CM246 Chipset

**Memory**

- 128GB non-ECC or 64GB ECC max / 2400MHz DDR4 (ECC function supported only on Xeon processor), dual-channel capable, four DDR4 SO-DIMM sockets
- *Installed DIMMs are actually 2666MHz but run at 2400MHz due to Intel limitation
- *128GB non-ECC memory for special bid only

**Chipset Information**

- Mobile Intel CM246 Chipset

**Display**

- Some: 15.6” (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 160° viewing angle
- Some: 15.6” (396mm) 4K (3840x2160), anti-glare, LED backlight, IPS, 400 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 100% gamut, 170° viewing angle, multi-touch

**Optane™ memory**

- Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

**RAID (optional)**

- RAID 0/1 support
- Optical
- None

**Ethernet**

- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

**WLAN**

- Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card
- Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

**WWAN (optional)**

- Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7380 (Fibocom L890-GL), M.2 card

**SIM card (optional)**

- Nano-SIM card slot, optional Verizon LTE (US) SIM card

**Dimensions**

| Dimensions | WxDxH: 14.86” x 9.93” x 0.96-1.16” | Weight: 7.744 kg (17.09 lbs) |

**Camera (optional)**

- One of the following, configurable by model:
  - HD720p camera with ThinkShutter camera privacy, fixed focus
  - IR camera and HD720p camera, fixed focus

**Audio support**

- HD Audio, Realtek ALC3286 codec / stereo speakers, 2W x 2, Dolby Audio Premium / dual array microphone, headphone / microphone combo jack, Dolby Atmos headphone

**Keyboard**

- 6-row, spill-resistant, multimedia Fn keys, LED backlight
- 3-button TrackPoint pointing device and 3-button Mylar surface multi-touch touchpad

**Security chip**

- Intel vPro Technology
- Discrete TPM 2.0, TCG Certified

**Fingerprint reader**

- Touch style match on chip fingerprint reader on the palm rest

**Color calibration**

- None

**NFC (optional)**

- Near Field Communication

**Battery**

- Discrete mode: 6.1 hr
- Hybrid mode: 8.9 hr
- *Battery life varies significantly with settings, usage, & other factors

**AC adapter**

- 170W slim tip AC adapter

**Display cover**

- PPS
- Bottom: Magnesium/Aluminum

**Smart card reader**

- Optional: Smart card reader

**Media reader**

- 4-in-1 reader (MMC, SD, SDHC, SDXC), supports UHS-II SD card

**Ports**

- Three USB 3.1 Gen 1 (one Always On), two USB Type-C / Thunderbolt 3 (with the function of Power Delivery and DP), Mini DisplayPort 1.4, HDMI 2.0, Ethernet (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), security keyhole

**Camera**

- Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Security**

- Power-on password, hard disk password, supervisor password, security keyhole

**Audio**

- HD Audio, Realtek ALC3286 codec / stereo speakers, 2W x 2, Dolby Audio Premium / dual array microphone, headphone / microphone combo jack, Dolby Atmos headphone

**Near Field Communication**

- None

**Battery**

- Li-ion 90Wh battery

**Max battery life**

- Discrete mode: 6.1 hr
  - Hybrid mode: 8.9 hr
  - *Battery life varies significantly with settings, usage, & other factors

**Weight**

- 377.44mm x 252.3mm x 24.5-29.4mm

**Product Specifications Reference (PSREF)**

- Lenovo April 2019
## ThinkPad P52s Platform Specifications

Product Specifications Reference (PSREF)

### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8250U</td>
<td>4</td>
<td>8</td>
<td>1.67 GHz</td>
<td>3.70 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>7-8550U</td>
<td></td>
<td></td>
<td>1.60 GHz</td>
<td>4.00 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-8650U</td>
<td></td>
<td></td>
<td>1.90 GHz</td>
<td>4.20 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphics**: Intel UHD Graphics 620 in processor and NVIDIA Quadro P500, 2GB GDDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@@60Hz (USB Type-C); 4096x2160@@30Hz (HDMI)

### Memory

- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- Intel SoC (System on Chip) platform

### Chipset

Intel Ethernet Connection I219-LM (Jacksonville)

### Display

- **Some**: 15.6” (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
- **Some**: 15.6” (396mm) UHD (3840x2160), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 72% gamut, 170° viewing angle
- **On-cell touch, supports 10-finger gesture (FHD only)**

### Storage

- System has one HDD slot or one M.2 2280 slot exclusively for storage
- SSD / SATA 6.0Gb/s, 2.5” wide, 7mm high, Active Protection System™
- Some: SSD / SATA 6.0Gb/s, 2.5” wide, 7mm high (e.g. xxxGB SSD)
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16GB/s
- Some: 128GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16GB/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

### Optane™ memory

Optane™ memory Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

### Ethernet

- Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card
- Intel vPro Technology
- Intel 8265ac card supports BT4.2 but is limited to BT4.1 by Windows OS

### TTL Bluetooth

- Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1

### WWAN (optional)

- One of the following, configurable by model:
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
  - Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
- * For non-WWAN model, it means the model is NOT WWAN upgradable

### SIM card (optional)

- Nano-SIM card slot, optional Verizon LTE (US) SIM card

### Dimensions

- WxDxH: 14.40” x 9.95” x 0.79-0.80”, 365.8mm x 252.8mm x 19.95-20.2mm
- Weight: starting at 4.39 lb / 1.99 kg

### Case material

- Display cover: Glass-Fiber Reinforced Plastic (PPS);
- Bottom: Glass-Fiber Reinforced Plastic

**Smart card reader**: Optional: Smart card reader

### Media reader

- 4-in-1 reader (MMC, SD, SDHC, SDXC)

### Ports

- Two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), one USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP), HDMI 1.4b, Ethernet (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), side docking connector, security keyhole

**Monitor cable (optional)**

- USB-C to DP: Lenovo USB-C to DisplayPort Adapter

### Camera (optional)

- One of the following, configurable by model:
  - HD720p camera with ThinkShutter camera privacy, fixed focus
  - HD Audio, Realtek ALC3287 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

### Audio support

- 6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight
- HD Audio, Realtek ALC3287 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack
- Intel vPro Technology
- Intel vPro Technology
- Intel vPro Technology

### Keyboard

- TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad
- Optional integrated Li-ion 32Wh battery and external Li-ion 24Wh, 48Wh, or 72Wh battery

### Security chip

- Power-on password, hard disk password, supervisor password, security keyhole
- Discrete TPM 2.0, TCG Certified
- Intel vPro Technology
- Intel vPro Technology

### Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Discrete TPM 2.0, TCG Certified
- Intel vPro Technology
- Intel vPro Technology

### Fingerprint reader

- Optional: Touch style match on chip fingerprint reader on the palm rest
- anti-spoofing technology
- Near Field Communication

### NFC (optional)

Near Field Communication

### Battery

- Optional integrated Li-ion 32Wh battery and external Li-ion 24Wh, 48Wh, or 72Wh battery

### Max battery life

- (MobileMark® 2014)
- Models: 48Wh, 72Wh, 32Wh + 24Wh, 32Wh + 48Wh, 32Wh + 72Wh
- Max battery life: 12.0 hr, 18.5 hr, 13.5 hr, 20.1 hr, 26.3 hr

### AC adapter

- 65W USB Type-C AC adapter

### Preload

- Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty

One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

### MIL-Spec test

MIL-STD-810G military certification

### Environment

- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Lenovo
May 2019
# ThinkPad P72 Platform Specifications

## Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8750H</td>
<td>6</td>
<td>12</td>
<td>2.2 GHz</td>
<td>4.1 GHz</td>
<td>9MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
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<tr>
<td>7-8850H</td>
<td>6</td>
<td>12</td>
<td>2.6 GHz</td>
<td>4.3 GHz</td>
<td>9MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
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<td>E-2176M</td>
<td>6</td>
<td>12</td>
<td>2.7 GHz</td>
<td>4.4 GHz</td>
<td>12MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
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<tr>
<td>E-2186M</td>
<td>6</td>
<td>12</td>
<td>2.9 GHz</td>
<td>4.8 GHz</td>
<td>12MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
</tbody>
</table>

## Graphics

- Intel UHD Graphics 630 or P630 in processor and NVIDIA Quadro P600 (4GB memory), P2000 (4GB memory), P3200 (6GB memory), P4200 (8GB memory), or P5200 (16GB memory);
- supports external digital monitor via HDMI, Mini DisplayPort, or Thunderbolt; supports four independent displays;
- Max resolution: 3840x2160@60Hz (DisplayPort via Mini DisplayPort cable); 5120x2880@30Hz (Thunderbolt); 4096x2160@60Hz (HDMI)

## Chipset

Mobile Intel CM246 Chipset

## Memory

128GB non-ECC or 64GB ECC max / 2400MHz DDR4 (ECC function supported only on Xeon processor), dual-channel capable, four DDR4 SO-DIMM sockets

## Display

- **Some:** 17.3" (439mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 800:1 contrast ratio, 72% gamut, 170° viewing angle
- **Some:** 17.3" (439mm) 4K (3840x2160), anti-glare, LED backlight, IPS, 400 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 100% Adobe CG, 170° viewing angle

## Multi-touch

None

## Pen

None

## Storage

- Up to 3 drives (two M.2 SSD and one HDD)
- **Some:** HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- **Some:** M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s

## Optane™ memory (optional)

Intel Optane memory, PCle NVMe, PCle 3.0 x 2

## Optical

None

## Ethernet

- **Non-vPro model:** Intel Ethernet Connection I219-V (Jacksonville)
- **vPro model:** Intel Ethernet Connection I219-LM (Jacksonville)

## WLAN

Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card

## Bluetooth™

Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

## WWAN

None

## SIM card

None

---

**Note:** The specifications above may not be available in all regions.

**Dimensions:** WxHxD: 16.38" x 11.06" x 0.96-1.16"; 416mm x 281mm x 24.5-29.4mm

**Weight:** Starting at 7.5 lb (3.4kg)

**Case color:** Black

**Case material:**
- Display cover: GFRP + PPS:
- Bottom: Magnesium/Aluminum

**Smart card reader:** Optional: Smart card reader

**ExpressCard:** None

**Media reader:** 4-in-1 reader (MMC, SD, SDHC, SDXC), supports UHS-II SD card

**Ports:**
- Four USB 3.1 Gen 1 (one Always On), two USB Type-C / Thunderbolt 3 (with the function of Power Delivery and DP), Mini DisplayPort 1.4, HDMI 2.0, Ethernet (RJ-45), headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), security keyhole
- * Power Delivery only supports power-out for charging peripherals
- * Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Optional:** Lenovo Mini-DisplayPort to DisplayPort Monitor Cable

**Camera (optional):** IR camera and HD720p camera, fixed focus

**Audio support:** HD Audio, Realtek ALC3286 codec / stereo speakers, 2W x 2, Dolby Audio™ Premium / dual array microphone, headphone / microphone combo jack, Dolby Atmos® headphone

**Keyboard:**
- 6-row, spill-resistant, multimedia Fn keys, numeric keypad, LED backlight
- 3-button TrackPoint® pointing device and 3-button Mylar surface multi-touch touchpad

**UltraNav™:**
- Touch style match on chip fingerprint reader on the palm rest

**Security chip:**
- Intel vPro Technology
- Discrete TPM 2.0, TCG Certified
- Fingerprint reader Touch style match on chip fingerprint reader on the palm rest

**Color calibration:** None

**NFC (optional):** Near Field Communication

**Battery:**
- Li-ion 99Wh battery, supports Rapid Charge (charge up to 80% in 1hr)
- Max battery life: MobileMark® 2014: 18 hr
- *Battery life varies significantly with settings, usage, & other factors

**AC adapter:** 230W slim tip AC adapter

**Preload:** One of the following, configurable by model:
- Windows® 10 Home 64
- Windows 10 Pro 64
- Windows 10 Pro 64 for Workstations

**Limited warranty:** One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

**Mil-Spec test:** MIL-STD-810G military certification

**Environment:** EPEAT™ Gold (US only); ENERGY STAR® 7.0; RoHS-compliant

**Lenovo May 2019**
## ThinkPad T470 Platform Specifications

### Processor

<table>
<thead>
<tr>
<th>Processor</th>
<th>Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>6th Gen Intel® Core™ i5 / i7</td>
<td>6-200U</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>7th Gen Intel Core i3 / i5 / i7</td>
<td>7-100U</td>
<td>2</td>
<td>4</td>
<td>2.4 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

### Graphics

- Intel HD Graphics 520 or 620 in processor only.
- Intel HD Graphics 620 in processor and NVIDIA GeForce® 940MX, 2GB 2.5GHz GDDR5 memory (discrete models are NOT available in EMEA).
- Supports external digital monitor via HDMI or USB Type-C.
- Supports three independent displays.
- Max resolution: 4096x2304 @60Hz (USB Type-C); 4096x2160 @24Hz (HDMI)

### Chipset

- Intel SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- *System clocks down for processors with lower memory controller

### Display

- Some: 14.0" (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
- Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
- On-cell touch, supports 10-finger gesture (FHD IPS panel with PPS cover only)

### Storage

- System has one SSD or slot and one M.2 2280 slot exclusively for storage
- Some: HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high (e.g. xxxGB SSD)
- Some: M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
- Some: 128GB M.2 SSD / SATA 6.0Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN and WiGig

### Optical

- None

### Ethernet

- Non-vPro model: Intel Ethernet Connection 2129-V (Jacksonville)
- vPro model: Intel Ethernet Connection 2129-LM (Jacksonville)

### WLAN

- One of the following, configurable by model (WiGig can coexist with WWAN):
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Tri-Band Wireless-AC 18265, WiGig 802.11ad + Wi-Fi 2x2 802.11ac + BT4.1, M.2 card

### Bluetooth

- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter
- *Intel 8265ac / 18265ac card support BT4.2 but is limited to BT4.1 by Windows OS

### WWAN (optional)

- One of the following, configurable by model (WWAN can coexist with WiGig):
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A
  - Qualcomm™ Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
  - Integrated Mobile Broadband 4G LTE
  - Intel XMM™ 7160 (Fibocom L831-EAU), M.2 card (EMEA only)

### SIM card (optional)

- Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

---

### Dimensions

<table>
<thead>
<tr>
<th>WxDxH:</th>
<th>13.25&quot; x 9.15&quot; x 0.79&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>336.6mm x 232.5mm x 19.95mm</td>
<td></td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Models</th>
<th>3-cell or 3-cell</th>
<th>6-cell or 6-cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium</td>
<td>3.49 lb / 1.58 kg</td>
<td>3.92 lb / 1.78 kg</td>
</tr>
<tr>
<td>PPS</td>
<td>3.63 lb / 1.65 kg</td>
<td>4.35 lb / 1.85 kg</td>
</tr>
</tbody>
</table>

### Case color

- Black

### Case material

- Display cover: Magnesium Hybrid or PPS;
- Glass-Fiber Reinforced Plastic

### Smart card reader

- Optional: Smart card reader

### Media reader

- 4-in-1 reader (MMC, SD, SDHC, SDXC), supports SD 3.0, UHS-I
- Three USB 3.1 Gen 1 (USB 3.0, one Always On), USB 3.1 Type-C Gen 2 / Thunderbolt 3 (w/ the function of Power Delivery and DP), HDMI 1.4b, Ethernet (RJ-45), Dock connector

### WiGig dock (optional)

- ThinkPad WiGig dock
- Optional: Lenovo USB-C to VGA Adapter

### Camera (optional)

- 720p / HD720p resolution, fixed focus

### Audio support

- HD Audio, Realtek ALC3268 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack

### Keyboard

- 6-row, spill-resistant, multimedia Fn keys, optional LED backlight
- TouchPoint® pointing device and buttonless Mylar surface multi-touchpad

### Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Discrete TPM 2.0, TCG Certified

### Security chip

- Intel vPro Technology
- Finger-print reader
- NFC (optional)
- Optional: Touch style match on chip fingerprint reader on the keyboard bezel
- Near Field Communication

### Internal battery

- Optional: Integrated Li-Polymer 3-cell (24Wh)
- Li-Polymer 3-cell (24Wh) or Li-ion 6-cell (48Wh or 72Wh)

### Preload

- Microsoft Office preloaded; purchase a product key to activate

### Limited warranty

- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-yr battery depot repair service
  - 3-year/1-yr battery limited onsite service

### MIL-Spec test

- MIL-STD-810G military certification

### Environment

- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

---

Lenovo
April 2019
## ThinkPad T470s Platform Specifications

**Product Specifications Reference (PSREF)**

### Processor

<table>
<thead>
<tr>
<th>Processor</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel 6th Generation Core™ i5/ i7</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>Intel 7th Generation Core™ i5/ i7</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

or 7th Generation Intel Core® i5 / i7 Processor

### Graphics

- Intel HD Graphics 520 or 620 in processor;
- DDR4-2133 Intel HD Graphics

### Memory

- 4GB or 8GB memory soldered to systemboard, one DDR4 SO-DIMM socket
- Max resolution: 4096x2304 @ 60Hz (USB Type-C);
- 4096x2160 @ 24Hz (HDMI)

### WWAN

- Qualcomm® Snapdragon™ X7 LTE-A
- ThinkPad WiGig dock, mutually exclusive with WWAN

### Bluetooth

- WiFi 2x2 802.11ac + BT4.1
- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### Display

- Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 160° viewing angle
- Some: 14.0" (355mm) QHD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 160° viewing angle

### Optical Storage

- One of the following, configurable by model:
  - M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)
- None

### Audio

- HD Audio, Realtek ALC3268 codec / stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack
- HD Audio, Realtek ALC3268 codec / stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack

### Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Intel vPro Technology
- Discrete TPM 2.0, TCG Certified
- HD Audio, Realtek ALC3268 codec / stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack
- HD Audio, Realtek ALC3268 codec / stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack

### Preload

- Windows® 7 Professional 64 preinstalled; Lenovo Companion
- Lenovo Solution Center
- Lenovo PowerEngage
- ThinkVantage Product Recovery
- ThinkVantage System Update
- Adobe® Reader®
- Microsoft® Office preloaded; purchase a product key to activate
- McAfee® LiveSafe™ (30-day trial)

### Environment

- EPEAT Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

### Warranty

- Limited warranty
- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-year battery depot repair service
  - 3-year/1-year battery limited onsite service

### Other

- Optional:
  - Smart card reader
  - WiGig dock (opt)
  - Monitor cable (optional)

### Dimensions

- WxDxH: 13.03" x 8.93" x 0.67-0.74"; 331mm x 226.8mm x 16.9-18.8mm

### Weight

- Starting at 2.9 lb (1.32kg)

### Case color

- Black or Silver

### Case material

- CFPR Hybrid; Magnesium
### ThinkPad T480 Platform Specifications

**Product Specifications Reference (PSREF)**

#### Processor

<table>
<thead>
<tr>
<th>Number</th>
<th>Processor</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>7th Gen</td>
<td>Intel Core™ i5</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td></td>
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<td>7th Gen 7</td>
<td></td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8th Gen 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Graphics

| 7th Gen  | Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and NVIDIA® GeForce® MX150, 2GB GDDR5 memory (discrete graphics is available only on i7 models in EMEA); supports external digital monitor via HDMI or USB Type-C; supports three independent displays, Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@30Hz (HDMI) |

#### Chipset

<table>
<thead>
<tr>
<th>Intel SoC (System on Chip) platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets</td>
</tr>
<tr>
<td>* System clocks down for processors with lower memory controller</td>
</tr>
</tbody>
</table>

#### Display

| 14.0” (355mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio |
| 355mm (892mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle |
| 355mm (892mm) WQHD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 170° viewing angle |

#### Storage

| System has one HDD slot or one M.2 2280 slot exclusively for storage |
| SSD / SATA 6.0Gb/s, 2.5” wide, 7mm high, Active Protection System™ |
| SSD / SATA 6.0Gb/s, 2.5” wide, 7mm high (e.g. x800 SSD) |
| M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gbps |
| 128GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s, in WWAN slot as 2nd Storage, mutually exclusive with WWAN |

#### Optane™ memory

| Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2 |
| None |

#### Ethernet

| Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville) vPro model: Intel Ethernet Connection I219-LM (Jacksonville) |

#### WWAN (optional)

| One of the following, configurable by model (mutually exclusive with Intel Optane memory): |
| Integrated Mobile Broadband 4G LTE, pXMM™ 7262 (Fibocom L830-EB), M.2 card (EAME only) |
| Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card |
| * For non-WWAN model, it means the model is NOT WWAN upgradable |

#### SIM card (optional)

| Nano-SIM card slot, optional Verizon LTE (US) SIM card |

### Dimensions

| WxDxH: 13.25” x 9.15” x 0.79”; 336.8mm x 232.5mm x 19.95mm |

### Weight

<table>
<thead>
<tr>
<th>Models</th>
<th>24Wh or 24Wh + 48Wh</th>
<th>48Wh, 72Wh, or 24Wh + 48Wh / 72Wh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Magnesium</td>
<td>3.49 lb / 1.58 kg</td>
<td>3.92 lb / 1.78 kg</td>
</tr>
<tr>
<td>Integrated PPS</td>
<td>3.63 lb / 1.65 kg</td>
<td>4.08 lb / 1.85 kg</td>
</tr>
<tr>
<td>Discrete Magnesium</td>
<td>3.53 lb / 1.60 kg</td>
<td>3.97 lb / 1.80 kg</td>
</tr>
<tr>
<td>Discrete PPS</td>
<td>3.68 lb / 1.67 kg</td>
<td>4.12 lb / 1.87 kg</td>
</tr>
</tbody>
</table>

### Case color

- Black
- Display cover: Magnesium Hybrid or PPS; Bottom: Glass-Fiber Reinforced Plastic

### Smart card reader

- Optional: Smart card reader
- 4-in-1 reader (MMC, SD, SDHC, SDXC)
- Two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), one USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP), HDMI 1.4b, Ethernet (RJ-45), nano-SIM card slot (WWAN models), "headphone / microphone combo jack, optional smart card reader, 4-in-1 media reader (MMC, SD, SDHC, SDXC), side docking connector, security keyhole *Depending on many factors, actual data transfer speed may be lower than theoretical speed |

### Media reader

- 4-in-1 reader (MMC, SD, SDHC, SDXC)

### Ports

- Optional integrated Li-ion 24Wh battery and external Li-ion 24Wh, 48Wh, or 72Wh battery

### Fingerprint reader

- Optional: Touch style match on chip fingerprint reader on the keyboard bezel, anti-spoofing technology

### NFC (optional)

- Near Field Communication

### Battery

- Optional: Battery life varies significantly with settings, usage, & other factors

### AC adapter

- 45W or 65W USB Type-C AC adapter

### Preload

- Windows® 10 Home 64 or Windows 10 Pro 64

### Limited warranty

- One of the following, configurable by model: 1-year depot repair service |
- 3-year/1-yr battery depot repair service |
- 3-year/1-yr battery limited onsite service |

### Mil-Spec test

- MIL-STD-810G military certification

### Environment

- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

### Lenovo

- May 2019
ThinkPad T480s Platform Specifications

Product Specifications Reference (PSREF)

ThinkPad T480s Platform Specifications

Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-7200U</td>
<td>2</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i5-7300U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

or 8th Generation Intel Core i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8250U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.4 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8350U</td>
<td>4</td>
<td>8</td>
<td>1.7 GHz</td>
<td>3.6 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>7-8550U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>7-8650U</td>
<td>4</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.2 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

Graphics

Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel UHD Graphics 620 in processor and NVIDIA® GeForce® MX150, 2GB GDDR5 memory (discrete models are NOT available in EMEA); supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

Chipset

Intel SoC (System on Chip) platform 20GB or 24GB max / 2400MHz DDR4, dual-channel capable, 4GB or 8GB memory soldered to systemboard, one DDR4 SO-DIMM socket

* System clocks down for processors with lower memory controller

Display

Some: 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle, supports ThinkPad Privacy Guard on some models

Some: 14.0" (355mm) QHD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 170° viewing angle

Multi-touch (opt)

On-cell touch, supports 10-finger gesture, 250 nits (FHD only)

Storage

One of the following, configurable by model:
- M.2 SSD / SATA 6.0Gb/s
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s

Optane™ memory

None

Optical

None

Ethernet

Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

WLAN + Bluetooth™

Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card * Intel 8265ac card supports BT4.2 but is limited to BT4.1 by Windows OS

WWAN (optional)

One of the following, configurable by model:
- Wireless WAN upgradable
- Integrated Mobile Broadband 4G LTE, Intel XMM™ 7262 (Fibocom L830-EB), M.2 card (EMEA only)
- Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card

SIM card (opt)

Nano-SIM card slot, optional Verizon LTE (US) SIM card

Note: The specifications above may not be available in all regions.

Dimensions

Wx Dx H: 13.03" x 8.93" x 0.73"; 331mm x 226.8mm x 18.45mm

Weight

Starting at 2.9 lb (1.32kg)

Case color

Black or Silver

Case material

Display cover: CFRP Hybrid; Bottom: Magnesium

Smart card reader

Optional: Smart card reader

Media reader

4-in-1 reader (MMC, SD, SDHC, SDXC)

Ports

Two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), one USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP), HDMI 1.4b, Ethernet (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), side docking connector, security keyhole

* Depending on many factors, actual data transfer speed may be lower than theoretical speed

USB-C to VGA: Lenovo USB-C to VGA Adapter

USB-C to DP: Lenovo USB-C to DisplayPort Adapter

Monitor cable (optional)

Camera

One of the following, configurable by model:
- HD720p camera with ThinkShutter camera privacy, fixed focus
- IR camera and HD720p camera, fixed focus

Audio support

HD Audio, Realtek® ALC3287 codec / stereo speakers, 1W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

Keyboard

6-row, spill-resistant, multimedia Fn keys, optional LED backlight

TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

Security

Power-on password, hard disk password, supervisor password, security keyhole

Security chip

Discrete TPM 2.0, TCG Certified

Intel vPro Technology

Fingerprint reader

Optional: Touch style match on chip fingerprint reader on the palm rest, anti-spoofing technology

NFC (optional)

Near Field Communication

Battery

Integrated Li-ion 57Wh battery, supports Rapid Charge (0-80% in 60 mins) with 65W USB Type-C AC adapter

Max battery life

MobileMark® 2014: 15.6 hr

* Battery life varies significantly with settings, usage, & other factors

AC adapter

45W or 65W USB Type-C AC adapter

Operating system

Windows® 10 Home 64 or Windows 10 Pro 64

Limited warranty

One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

Mil-Spec test

MIL-STD-810G military certification

Environmental

EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant
ThinkPad T490 Platform Specifications

### Processor

<table>
<thead>
<tr>
<th>Model</th>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency (GHz)</th>
<th>Max Turbo Frequency (GHz)</th>
<th>Cache (MB)</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8265U</td>
<td>1.6</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8365U</td>
<td>1.6</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>1.6</td>
<td>8</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8665U</td>
<td>1.9</td>
<td>8</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

### Graphics
- Intel UHD Graphics 620 in processor only or
- Intel UHD Graphics 620 in processor and NVIDIA® GeForce® MX250, 2GB GDDR5 memory; supports external digital monitor via HDMI or Thunderbolt; supports three independent displays; Max resolution: 4096x2304 @60Hz (Thunderbolt); 4096x2160 @24Hz (HDMI)

### Chipset
- Intel SoC (System on Chip) platform
- Memory: 4GB max / 2400MHz DDR4, dual-channel capable, 8GB or 16GB memory soldered to system board, one DDR4 SO-DIMM socket
- Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation

### Display
- 14.0" HD (1366x768) TN Anti-glare 220 nits 16:9 45% 90°
- 14.0" FHD (1920x1080) IPS Anti-glare 250 nits (non-touch) 300 nits (multi-touch) 16:9 700:1 45% 100°
- 14.0" FHD (1920x1080) Low Power IPS Anti-glare 400 nits 16:9 800:1 72% 100°
- 14.0" FHD (1920x1080) ThinkPad Privacy Guard IPS Anti-glare 400 nits 16:9 1000:1 72% 100°
- 14.0" WQHD (2560x1440) Dolby Vision™ HDR IPS Glossy 500 nits 16:9 1500:1 100% Adobe 170°

### Multi-touch (optional)
- On-cell touch, supports 10-finger gesture (FHD only)

### Storage
- M.2 2280 SSD / SATA 6.0Gb/s
- M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
- M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2

### WWAN (optional)
- * Wireless WAN upgradeable
- * Integrated Mobile Broadband 4G LTE, Fibocom L830-EB, M.2 card (EMEA only)

### WLAN (optional)
- Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0
- Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional) Note:
- * For non-WWAN model, it means the model is NOT WWAN upgradeable

---

Note: The specifications above may not be available in all regions.

Lenovo

May 2019
### ThinkPad T490s Platform Specifications

**Processor**

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8265U</td>
<td>4</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>8 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8365U</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>8 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i5-8565U</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i7-8665U</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8 MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphics**

Intel UHD Graphics 620 in processor only; supports external digital monitor via HDMI or Thunderbolt; supports three independent displays.

Max resolution: 4096x2304 @60Hz (Thunderbolt); 4096x2160 @24Hz (HDMI).

**Chipset**

Intel SoC (System on Chip) platform.

8GB, 16GB or 32GB / 2400MHz DDR4 / soldered to system board, no sockets.

* Installed memory is actually 2966MHz but run at 2400MHz due to Intel limitation.

**Memory**

8th Generation Intel® Core™ i5 / i7 Processor

**Base Frequency**

- **12.94° x 8.90° x 0.66°:** 328.8mm x 226.15mm x 16.7mm
- **12.96° x 8.92° x 0.68°:** 329.15mm x 226.45mm x 17.2mm

**Weight**

- **Models**: Black with FHD / Black with FHD Low Power / WWHD / Privacy Guard
- **Weight**: 2.98 lb / 1.35 kg

**Display**

Size | Resolution Type | Surface Brightness | Aspect Ratio | Contrast Ratio | Color Gamut | Viewing Angle |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0&quot;</td>
<td>IPS Anti-glare</td>
<td>250 nits (non-touch) 300 nits (multi-touch)</td>
<td>16:9</td>
<td>700:1</td>
<td>45%</td>
<td>170°</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>IPS Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>800:1</td>
<td>72%</td>
<td>170°</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>IPS Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>1000:1</td>
<td>72%</td>
<td>170°</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>IPS Glossy</td>
<td>500 nits</td>
<td>16:9</td>
<td>1500:1</td>
<td>100% Adobe</td>
<td>170°</td>
</tr>
</tbody>
</table>

- **IPS Anti-glare**: Low Power IPS Anti-glare 400 nits 16:9 1000:1 72% 170°
- **IPS Glossy**: Dolby Vision™ HDR 500 nits 16:9 1500:1 100% Adobe 170°

**Storage**

- **M.2 2280 SSD / SATA 6.0Gb/s**
- **M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4**
- **M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2**
- **Intel Optane memory**: Optional (Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2)
- **Optane™ memory**: Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

**Ethernet**

Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2.

**WLAN (optional)**

One of the following, configurable by model:

- **Wi-Fi 2x2**: 802.11ac + Bluetooth 5.0
- **Wireless-AX 22260**: Wi-Fi 2x2 802.11ax + Bluetooth 5.0
- **Intel Wireless-AC 9560**: Wi-Fi 2x2 802.11ac + Bluetooth 5.0
- **Intel Wireless-AX 22260**: Wi-Fi 2x2 802.11ax + Bluetooth 5.0

**Bluetooth**

- **Intel Wireless-AX 22260**: Wi-Fi 2x2 802.11ax + Bluetooth 5.0

**WWAN (optional)**

One of the following, configurable by model:

- **Wireless WAN upgradable**
- **Integrated Mobile Broadband 4G LTE, Fibocom L830-EB, M.2 card (EMEA only)**
- **Integrated Mobile Broadband 4G LTE-A, Fibocom L850-GL, M.2 card**
- **For non-WWAN model, it means the model is NOT WWAN upgradable**

**Dimensions**

- **Dimensions**: WxHxD (black with FHD / Privacy Guard): 12.94° x 8.90° x 0.66°; 328.8mm x 226.15mm x 16.7mm
- **WxHxD (black with FHD Low Power / WWHD):** 12.96° x 8.92° x 0.68°; 329.15mm x 226.45mm x 17.2mm
- **WxHxD (silver):** 12.96° x 8.92° x 0.68°; 329.15mm x 226.45mm x 17.2mm

**Weight**

- **Models**: Black with FHD / Black with FHD Low Power / WWHD / Privacy Guard
- **Weight**: 2.98 lb / 1.35 kg

**Case material**

- **Black or Silver**

**Display cover**

- **CFRP Hybrid (black) or Aluminum (silver)**
- **Bottom**: Magnesium

**Smart card reader**

- **Optional**: Smart card reader

**Media reader**

- **MicroSD card reader**

**Ports**

- **Two USB 3.1 Gen 1 (Always On)**
- **One USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort)**
- **One USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP)**
- **HDMI 1.4b, Ethernet extension connector, nano-SIM card slot (WWAN models)**
- **Optional**: Intel Wireless-AX 22260, Wi-Fi 2x2 802.11ax + Bluetooth 5.0

**Camera**

- **One of the following, configurable by model**
  - HD720p camera with ThinkShutter camera privacy, fixed focus
  - HD720p camera with ThinkShutter camera privacy, fixed focus
  - HD Audio, Realtek ALC3287 codec / stereo speakers, 1W x 2, Dolby Audio® Premium / dual array far-field microphone, headphone / microphone combo jack

**Audio support**

- **MicroSD card reader**

**Bundled Accy**

- **MicroSD card reader**

**Keyboard**

- **6-row, spill-resistant, multimedia Fn keys, optional LED backlight**

**TrackPoint®**

- **pointing device and buttonless Mylar surface multi-touch touchpad**

**Security**

- **Power-on password, hard disk password, supervisor password, security keyhole**

**Security chip**

- **Discrete TPM 2.0, TCG Certified**

**System Mfg (optional)**

- **Intel vPro Technology**

**Fingerprint reader**

- **Optional**: Touch style match on chip fingerprint reader on the palm rest

**FingerReader**

- **Optional**: FingerReader, black with FHD / WQHD / Privacy Guard Silver

**Battery**

- **Integrated Li-ion 57Wh battery, supports Rapid Charge (charge up to 80% in 1hr)**

**Max battery life**

- **MobileMark® 2014**: 20 hr

**AC adapter**

- **45W or 65W USB Type-C AC adapter**

**Preload**

- **Windows® 10 Home 64 or Windows 10 Pro 64**

**Limited warranty**

- **1-year depot repair service**
- **3-year/1-yr battery depot repair service**
- **3-year/1-yr battery limited onsite service**

**Mil-Spec test**

- **MIL-STD-810G military certification**

**Environment**

- **EPEAT® Bronze; ENERGY STAR® 7.0; RoHS-compliant**

**Lenovo May 2019**

Note: The specifications above may not be available in all regions.
## ThinkPad T570 Platform Specifications

### Processor
- **6th Generation Intel® Core™ i5 / i7 Processor**
  - 
    | Processor Number | # of Cores | # of Threads | Base Frequency | Max Turbo Frequency | Cache | Memory Types | Processor Graphics |
    |-----------------|------------|--------------|----------------|---------------------|-------|--------------|-------------------|
    | i5-6200U       | 2          | 4            | 2.3 GHz        | 2.8 GHz             | 3MB   | DDR4-2133    | Intel HD Graphics 520 |
    | i5-6300U       | 2          | 4            | 2.4 GHz        | 3.0 GHz             | 3MB   | DDR4-2133    | Intel HD Graphics 520 |
    | 7-6600U        | 2          | 4            | 2.6 GHz        | 3.4 GHz             | 4MB   | DDR4-2133    | Intel HD Graphics 520 |

- **or 7th Generation Intel Core i5 / i7 Processor**
  - 
    | Processor Number | # of Cores | # of Threads | Base Frequency | Max Turbo Frequency | Cache | Memory Types | Processor Graphics |
    |-----------------|------------|--------------|----------------|---------------------|-------|--------------|-------------------|
    | i5-7200U       | 2          | 4            | 2.5 GHz        | 3.1 GHz             | 3MB   | DDR4-2133    | Intel HD Graphics 620 |
    | i5-7300U       | 2          | 4            | 2.6 GHz        | 3.5 GHz             | 3MB   | DDR4-2133    | Intel HD Graphics 620 |
    | 7-7600U        | 2          | 4            | 2.6 GHz        | 3.9 GHz             | 4MB   | DDR4-2133    | Intel HD Graphics 620 |

### Graphics
- Intel HD Graphics 520 or 620 in processor only, or Intel HD Graphics 520 or 620 in processor and NVIDIA GeForce® 940MX, 2GB 2.5GHz GDDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

### Chipset
- Intel SoC (System on Chip) platform

### Memory
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets

### Display
- **Some:** 15.6" (396mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- **Some:** 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
- **Some:** 15.6" (396mm) 4K (3840x2160), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 72% gamut, 170° viewing angle

### Multi-touch (opt)
- On-cell touch, supports 10-finger gesture (FHD only)

### Storage
- System has one HDD slot or one M.2 2280 slot exclusively for storage

### Optical
- None

### Ethernet
- Non-vPro model: Intel Ethernet ConneCtion i219-V (Jacksonville)
  
- vPro model: Intel Ethernet ConneCtion i219-LM (Jacksonville)

### WLAN
- One of the following, configurable by model (WWAN can coexist with WWAN):
  - Realtek® RTL8822BE, Wi-Fi-Fi 2x2 802.11ac + BT4.1, M.2 card (US only)
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Tri-Band Wireless-AC 18265, WiGig 802.11ad + Wi-Fi 2x2 802.11ac + BT4.1, M.2 card

### Bluetooth®
- Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional)
- One of the following, configurable by model (WWAN can coexist with WiGig):
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7160 (Fibocom L831-EAU), M.2 card (EMEA only)
  
- SIM card (opt)
  - Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

### Dimensions
- WxDxH: 14.40" x 9.95" x 0.79-0.80"; 365.8mm x 252.8mm x 19.95-20.2mm

### Weight
- Starting at 4.34 lb / 1.97 kg

### Case color
- Black

### Case material
- **Display cover:** Glass-Fiber Reinforced Plastic (PPS);
  - **Bottom:** Glass-Fiber Reinforced Plastic

### Smart card reader
- Optional: Smart card reader

### Media reader
- 4-in-1 reader (MMC, SD, SDHC, SDXC), supports SD 3.0, UHS-I

### Ports
- Three USB 3.1 Gen 1 (USB 3.0, one Always On),
  - USB 3.1 Type-C Gen 2 / Thunderbolt 3 (w/ the function of Power Delivery and DP),
  - HDMI 1.4b, Ethernet (RJ-45), Dock connector

### WiGig dock (opt)
- ThinkPad WiGig dock (US only)

### Monitor cable (optional)
- HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter
  - USB-C to VGA: Lenovo USB-C to VGA Adapter

### Camera (optional)
- 720p: HD720p resolution, fixed focus

### Audio support
- HD Audio, Realtek ALC3268 codec / stereo speakers, 2W x 2 /
dual array microphone, combo audio/microphone jack

### Keyboard
- 6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight

### UltraNav™
- TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

### Security
- Power-on password, hard disk password, supervisor password, security keyhole

### Security chip
- Security chip

### vPro (optional)
- Intel vPro Technology

### Fingerprint reader (optional)
- Touch style match on chip fingerprint reader on the palm rest

### NFC (optional)
- Near Field Communication

### Internal battery
- Optional: Integrated Li-Polymer 4-cell (32Wh)

### External battery
- Li-Polymer 3-cell (24Wh) or Li-ion 6-cell (48Wh or 72Wh)

### Battery life
- | Model | 4 + 3-cell | 6-cell 48Wh | 6-cell 72Wh | 4 + 6-cell 48Wh | 4 + 6-cell 72Wh |
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13.8 hr</td>
<td>12.5 hr</td>
<td>18.5 hr</td>
<td>20.3 hr</td>
<td>27.1 hr</td>
</tr>
<tr>
<td></td>
<td>13.8 hr</td>
<td>12.5 hr</td>
<td>18.5 hr</td>
<td>20.3 hr</td>
<td>27.1 hr</td>
</tr>
</tbody>
</table>

### Preload
- Windows® 7 Professional 64 preinstalled
- Lenovo Solution Center
- Lenovo PowerEngage
- ThinkVantage Product Recovery
- ThinkVantage System Update
- Adobe® Reader®
- Microsoft® Office preloaded; purchase a product key to activate
- Lenovo Companion
- Lenovo Setting
- Microsoft Office preloaded
- purchase a product key to activate

### Warranty
- **Limited warranty**
  - One of the following, configurable by model:
    - 1-year depot repair service
    - 3-year/1-yr battery depot repair service
    - 3-year/1-yr battery limited onsite service

### Environment
- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

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Lenovo  
April 2019
<table>
<thead>
<tr>
<th>Processor</th>
<th>7th Generation Intel® Core™ i5 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>7th Generation Intel® Core™ i5 Processor</td>
</tr>
<tr>
<td>Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>7-7200U</td>
<td>2</td>
</tr>
<tr>
<td>7-7300U</td>
<td>2</td>
</tr>
<tr>
<td>or 8th Generation Intel® Core® i5 / i7 Processor</td>
<td></td>
</tr>
<tr>
<td>Processor</td>
<td>8th Generation Intel® Core® i5 / i7 Processor</td>
</tr>
<tr>
<td>Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>8-8250U</td>
<td>4</td>
</tr>
<tr>
<td>8-8350U</td>
<td>4</td>
</tr>
<tr>
<td>8-8550U</td>
<td>4</td>
</tr>
<tr>
<td>8-8650U</td>
<td>4</td>
</tr>
</tbody>
</table>

**Graphics**
- Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD Graphics 620 or Intel UHD Graphics 620 in processor and NVIDIA® GeForce® MX150, 2GB GDDR5 memory, supports external digital monitor via HDMI or USB Type-C;
- supports three independent displays;
- Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

**Chipset**
- Intel SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- * System clocks down for processors with lower memory controller

**Display**
- System has one HDD slot or one M.2 2280 slot exclusively for storage
- Some: FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
- Some: UHD (3840x2160), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 1000:1 contrast ratio, 72% gamut, 170° viewing angle
- Multi-touch (opt)
  - On-cell touch, supports 10-finger gesture (FHD only)

**Storage**
- Some: SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- Some: 32GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, 16Gb/s
- Some: in WWAN slot as 2nd Storage, mutually exclusive with WWAN

**Optane™ memory**
- Optane: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2
- Optical: None

**Ethernet**
- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

**WWAN (optional)**
- One of the following, configurable by model:
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7360 (Fibocom L830-EB), M.2 card (EMEA only)
  - Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
- * For non-WWAN model, it means the model is NOT WWAN upgradeable

**SIM card (opt)**
- Nano-SIM card slot, optional Verizon LTE (US) SIM card

**Smart card reader**
- Optional: Smart card reader

**Media reader**
- 4-in-1 reader (MMC, SD, SDHC, SDXC)

**Ports**
- Two USB 3.1 Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), one USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP), HDMI 1.4b, Ethernet (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), side docking connector, security keyhole

**Monitor cable (optional)**
- One of the following, configurable by model:
  - Lenovo HDMI to VGA Monitor Adapter
  - Lenovo USB-C to DisplayPort Adapter

**Camera (optional)**
- HD Audio, Realtek® ALC3287 codec / stereo speakers, 2x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

**Audio support**
- UltraNav™
- 6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight

**Keyboard**
- 10 Home 64 or Windows 10 Pro 64

**Security**
- Security chip: Intel vPro Technology
- Security keyhole: Discrete TPM 2.0, TCG Certified

**Fingerprint reader**
- Optional: Touch style match on chip fingerprint reader on the palm rest, anti-spoofing technology

**NFC (optional)**
- Near Field Communication

**Battery**
- Optional integrated Li-ion 32Wh battery and external Li-ion 24Wh, 48Wh, or 72Wh battery

**Max battery life**
- (MobileMark® 2014)
  - Models: 24Wh, 48Wh, 72Wh
  - 32Wh + 24Wh, 32Wh + 48Wh, 32Wh + 72Wh

**AC adapter**
- * Battery life varies significantly with settings, usage, & other factors

**Preload**
- Windows® 10 Home 64 or Windows 10 Pro 64

**Limited warranty**
- One of the following, configurable by model:
  - 1-year depot repair service
  - 3-year/1-year battery depot repair service
  - 3-year/1-year battery limited onsite service

**MI-Spec test**
- MIL-STD-810G military certification

**Environment**
- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.
ThinkPad T590 Platform Specifications

Processor

8th Generation Intel® Core™ i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-8265U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8365U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.3 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

Graphics

Intel UHD Graphics 620 in processor only or Intel UHD Graphics 620 in processor and NVIDIA® GeForce® MX250, 2GB GDDR5 memory; supports external digital monitor via HDMI or Thunderbolt; supports three independent displays; Max resolution: 4096x2304@60Hz (Thunderbolt); 4096x2160@24Hz (HDMI)

Chipset

Intel SoC (System on Chip) platform

Memory

4GB max / 2400MHz DDR4, dual-channel capable, 8GB or 16GB memory soldered to system board, one DDR4 SO-DIMM socket

*Installed memory is actually 2966MHz but run at 2400MHz due to Intel limitation

Display

<table>
<thead>
<tr>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Brightness</th>
<th>Aspect Ratio</th>
<th>Contrast Ratio</th>
<th>Color Gamut</th>
<th>Viewing Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.6&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS Anti-glare</td>
<td>250 nits</td>
<td>16:9</td>
<td>700:1</td>
<td>45%</td>
<td>170°</td>
</tr>
<tr>
<td>15.6&quot;</td>
<td>UHD (3840x2160)</td>
<td>IPS Anti-glare</td>
<td>500 nits</td>
<td>16:9</td>
<td>1200:1</td>
<td>100%</td>
<td>170°</td>
</tr>
</tbody>
</table>

Audio

HD Audio, Realtek® ALC3287 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array far-field microphone, headphone / microphone combo jack

Camera (optional)

One of the following, configurable by model:

- HD720p camera with ThinkShutter camera privacy, fixed focus
- IR camera and HD720p camera with ThinkShutter camera privacy, fixed focus
- HD720p camera with ThinkShutter camera privacy, fixed focus
- HD Audio, Realtek® ALC3287 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array far-field microphone, headphone / microphone combo jack

Keyboard

6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad

Security

Power-on password, hard disk password, supervisor password, security keyhole

Security chip

Discrete TPM 2.0, TCG Certified

System Mgl (optional)

Intel vPro Technology

Fingerprint reader

Optional: Touch style match on chip fingerprint reader on the palm rest

Battery

Integrated Li-ion 57Wh battery, supports Rapid Charge (charge up to 80% in 1hr)

AC adapter

45W or 65W USB Type-C AC adapter

Preload

Windows® 10 Home 64 or Windows 10 Pro 64

Limited warranty

One of the following, configurable by model:

- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

Mil-Spec test

MIL-STD-810G military certification

Environment

EPEAT® Bronze; ENERGY STAR® 7.0; RoHS-compliant

Note: The specifications above may not be available in all regions.
### ThinkPad X1 Carbon (5th Gen) Platform Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>6th Generation Intel® Core™ i5 / i7 Processor (EMEA has only i5-6300U and i7-6600U)</th>
<th>Smart card reader</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Media reader</td>
<td>MicroSD card reader, supports UHS-II microSD card</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ports</td>
<td>Two USB 3.1 Gen 1 (USB 3.0, one Always On), two USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet extension connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Depending on many factors, actual data transfer speed may be lower than theoretical speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WIgig dock (opt)</td>
<td>* Intel HD Graphics 520</td>
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<tr>
<td></td>
<td></td>
<td>Monitor cable (optional)</td>
<td>Lenovo ThinkPad WiGig dock</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lenovo HDi to VGA Monitor Adapter</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>USB-C to VGA: Lenovo USB-C to VGA Adapter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>USB-C to DP: Lenovo USB-C to DisplayPort Adapter</td>
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<tr>
<td></td>
<td></td>
<td>Bundled Accy</td>
<td>Optional: ThinkPad Ethernet Extension Cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Connected to</strong>: HD720p resolution, fixed focus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Audio support</td>
<td>HD Audio, Conexant® CX11871 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keyboard</td>
<td>6-row, spill-resistant, multimedia Fn keys, LED backlight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TrackPoint® pointing device and buttonless Glass surface multi-touch touchpad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Security</td>
<td>Power-on password, hard disk password, supervisor password, security keyhole</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Discrete TPM 2.0, TCG Certified</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Intel vPro Technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fingerprint reader</td>
<td>Touch style match on chip fingerprint reader on the palm rest</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Near Field Communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RapidCharge</td>
<td><strong>Integrated Li-Polymer 3-cell (57Wh) RapidCharge battery</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>MobileMark® 2014: 15.5 hr</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Battery life varies significantly with settings, usage, &amp; other factors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>45W or 65W USB Type-C AC adapter</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preload</td>
<td>Windows® 7 Professional 64 preinstalled through downgrade rights in Windows 10 Pro 64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lenovo Companion</td>
</tr>
<tr>
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<td>Lenovo Setting</td>
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<td>Microsoft Office preloaded; purchase a product key to activate</td>
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<td>McAfeeLiveSafe™ (30-day trial)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited warranty</td>
<td>One of the following, configurable by model:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* 1-year depot repair service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* 3-year/1-year battery depot repair service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* 3-year/1-year battery limited onsite service</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Near Field Communication</strong></td>
</tr>
<tr>
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<td></td>
<td>** Maths Mark (57Wh)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Lenovo HD Graphics 620</strong></td>
</tr>
</tbody>
</table>

### Processor Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>6th Generation Intel® Core™ i5 / i7 Processor (EMEA has only i5-6300U and i7-6600U)</th>
<th>Number of Cores</th>
<th>Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-6200U</td>
<td></td>
<td>2</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>i5-6300U</td>
<td></td>
<td>2</td>
<td>2.4 GHz</td>
<td>3.0 GHz</td>
<td>3MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 520</td>
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<tr>
<td>i7-6500U</td>
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<td>2</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>4MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 520</td>
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<tr>
<td>i7-6600U</td>
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<td>2</td>
<td>2.6 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 520</td>
</tr>
</tbody>
</table>

### Graphics

- Intel HD Graphics 520 or 620 in processor;
- supports external digital monitor via HDMI or USB Type-C;
- supports three independent displays;
- Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI) - **Please note: resolutions greater than 1920x1080 require third-party software.**

### Chipset

- Intel SoC (System on Chip) platform

### Memory

- 8GB or 16GB / 1866MHz LPDDR3 / soldered to systemboard, no sockets

### Display

- **ThinkPad X1 Carbon (5th Gen):**
  - 14.0” (355mm) WQHD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle
  - Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

### Multi-touch

- None

### Optical

- None

### Ethernet

- Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro)
- via bundled or optional ThinkPad Ethernet Extension Cable

### WLAN

- One of the following, configurable by model (WWAN can coexist with WiGig):
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Intel Tri-Band Wireless-AC 18265, WiGig 802.11ad + Wi-Fi 2x2 802.11ac + BT4.1, M.2 card
  - Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter
  - * Intel 8265ac / 18265ac card support BT4.2 but is limited to BT4.1 by Windows OS

### WWAN (optional)

- Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455)

### SIM card (optional)

- Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

### Dimensions & Weight

- **ThinkPad X1 Carbon (5th Gen):**
  - 12.74” x 8.55” x 0.63”; 323.5mm x 217.1mm x 15.95mm
  - Starting at 2.49 lb / 1.13 kg

### Case color

- Black or Silver (silver is NOT available in EMEA)

### Case material

- **Display cover:** CFRP/GFRP hybrid
  - **Bottom:** magnesium alloy hybrid

---

**Lenovo**

April 2019
ThinkPad X1 Carbon (6th Gen) Platform Specifications

Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
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</thead>
<tbody>
<tr>
<td>i5-7300U</td>
<td>2</td>
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<td>1.6 GHz</td>
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or 8th Generation Intel Core i5 / i7 Processor

<table>
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<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
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<td>i7-8650U</td>
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<td>1.6 GHz</td>
<td>3.0 GHz</td>
<td>8MB</td>
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</table>

Graphics

Intel HD Graphics 620 or Intel UHD Graphics 620 in processor; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 5120x2880@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

Chipset

Intel SoC (System on Chip) platform

Memory

8GB or 16GB / 2133MHz LPDDR3 / soldered to systemboard, no sockets * System clocks down for processors with lower memory controller

Display

One of the following, configurable by model:
- 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 170° viewing angle
- 14.0" (355mm) QHD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 72% gamut, 170° viewing angle
- 14.0" (355mm) HDR QHD (2560x1440) with Dolby Vision™, glossy, LED backlight, IPS, 500 nits, 16:9 aspect ratio, 1500:1 contrast ratio, 100% gamut, 170° viewing angle

Multi-touch (opt)

On-cell touch, supports 10-finger gesture (FHD only)

Storage

One of the following, configurable by model:
- M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)
- None

Optane™ memory

None

Optical

None

Ethernet

Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via bundled or optional ThinkPad Ethernet Adapter Extension Gen 2

WLAN + Bluetooth

Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card

WWAN (optional)

Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card

SIM card (opt)

Nano-SIM card slot, optional Verizon LTE (US) SIM card

Dimensions

WxDxH: 12.74" x 8.55" x 0.63"; 323.5mm x 217.1mm x 15.95mm

Weight

Starting at 2.49 lb / 1.13 kg

Case color

Black or Silver (silver case is NOT available in EMEA)

Case material

Display cover: CFRP/GFRP hybrid;
Bottom: magnesium alloy / PPS hybrid

Smart card reader

None

Media reader

MicroSD card reader, supports UHS-II

Ports

Two USB 3.1 Gen 1 (one Always On), two USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet extension connector, nano-SIM card slot (WWAN models), headphone / microphone combo jack, microSD card reader, side docking connector, security keyhole

* Depending on many factors, actual data transfer speed may be lower than theoretical speed

Monitor cable

HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter

Bundled Accy

Optional: ThinkPad Ethernet Extension Adapter Gen 2

Camera (optional)

One of the following, configurable by model:
- HD720p camera with ThinkShutter camera privacy, fixed focus
- IR camera and HD720p camera, fixed focus

Audio support

HD Audio, Realtek ALC3286 codec / stereo speakers, 1W x 2, Dolby Audio™ Premium / dual array microphone, headphone / microphone combo jack, Dolby Atmos™ via headphones

Audio via headphones

0 Audio support

Integrated Li-ion 57Wh battery, supports Rapid Charge (charge up to 80% in 1hr), MobileMark® 2014: 19.3 hr

Max battery life

Battery life varies significantly with settings, usage, & other factors

AC adapter

MobileMark® 2014: 19.3 hr

Preload

Windows® 10 Home 64 or Windows 10 Pro 64

Limited warranty

One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

Mil-Spec test

MIL-STD-810G military certification

Environment

EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Lenovo

April 2019
### ThinkPad X1 Extreme Platform Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>8th Generation Intel® Core™ i5 / i7 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor Number</strong></td>
<td><strong># of Cores</strong></td>
</tr>
<tr>
<td>i5-8300H</td>
<td>4</td>
</tr>
<tr>
<td>i5-8400H</td>
<td>6</td>
</tr>
</tbody>
</table>

| Graphics | Intel UHD Graphics 630 in processor and NVIDIA® GeForce® GTX 1050 Ti Max-Q, 4GB GDDR5 memory; supports external digital monitor via HDMI or Thunderbolt™; supports four independent displays; Max resolution: 5120x2880@30Hz (Thunderbolt); 4096x2160@60Hz (HDMI) |

<table>
<thead>
<tr>
<th>Chipset Memory</th>
<th>Mobile Intel CM246 Chipset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>64GB max / 2666MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets</td>
</tr>
</tbody>
</table>

| Display | 15.6" (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 100% gamut, 170° viewing angle, multi-touch, anti-reflection (AR) |

| Multi-touch (opt) | Capacitive-type multi-touch, supports 10-finger gesture (4K only) |

| Pen | Supports pen accessory, please see the accessory compatibility for details |

| Storage | Up to 2 drives (two M.2 SSD)
- M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)

| Optane™ memory | None |
| Optical | None |

| Ethernet | Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro)) via bundled or optional ThinkPad Ethernet Extension Cable |

| WLAN Bluetooth™ | Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0, M.2 card |
| WWAN | None |

| Dimensions Weight | WxHxD (non-touch): 14.24" x 9.67" x 0.72"; 381.8mm x 245.7mm x 18.4mm; starting at 3.76 lb (1.7 kg)
- WxHxD (multi-touch): 14.24" x 9.67" x 0.74"; 381.8mm x 245.7mm x 18.7mm; starting at 4.06 lb (1.8 kg) |

| Case color | Black |
| Case material | Display cover: CFRP/GFRP hybrid; Bottom: Aluminum alloy |

| Smart card reader | Optional: Smart card reader |
| Media reader | SD Card reader (SD, SDHC, SDXC), supports UHS-II SD card |
| Ports | Two USB 3.1 Gen 1 (one Always On), two USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of Power Delivery and DisplayPort), HDMI 2.0, Ethernet extension connector, headphone / microphone combo jack, optional smart card reader, 4-in-1 reader (MMC, SD, SDHC, SDXC), security keyhole |
| Monitor cable (optional) | USB-C to DP: Lenovo USB-C to DisplayPort Adapter |
| Bundled Accy | Optional: ThinkPad Ethernet Extension Cable |
| Camera (optional) | One of the following, configurable by model:
- HD720p camera with ThinkShutter camera privacy, fixed focus
- IR camera and HD720p camera, fixed focus |
| Audio support | HD Audio, Realtek® ALC3286 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack, Dolby Atmos® headphone |
| Keyboard | UltraNav™ 6-row, spill-resistant, multimedia Fn keys, LED backlight |
| TrackPoint® pointing device and buttonless glass surface multi-touch touchpad |
| Security | Power-on password, hard disk password, supervisor password, security keyhole |
| Security chip | Discrete TPM 2.0, TCG Certified |
| vPro Technology | Intel vPro Technology |
| Fingerprint reader | Touch style match on chip fingerprint reader on the keyboard bezel |
| Color calibration | None |
| NFC | None |
| Battery | Integrated Li-ion 80Wh battery, supports Rapid Charge (charge up to 80% in 1hr) |
| Max battery life (MobileMark 2014) | 9.5 hr; Hybrid mode: 14.9 hr |
| AC adapter | 135W slim tip AC adapter |
| Preload | Windows® 10 Home 64 or Windows 10 Pro 64 |
| Limited warranty | One of the following, configurable by model:
- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service |
| Mil-Spec test | MIL-STD-810G military certification |
| Environment | EPEAT™ Gold (US only); ENERGY STAR® 7.0; RoHS-compliant |

Lenovo April 2019

Note: The specifications above may not be available in all regions.
### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Graphics</th>
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</thead>
<tbody>
<tr>
<td>i3-6006U</td>
<td>2</td>
<td>4</td>
<td>2.0 GHz</td>
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<tr>
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<tr>
<td>i7-6600U</td>
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<td>2.6 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

or 7th Generation Intel Core™ i3 / i5 / i7 Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Graphics</th>
</tr>
</thead>
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<td>4MB</td>
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<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i5-7300U</td>
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<td>3.5 GHz</td>
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<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

### Graphics

- Intel HD Graphics 520 or 620 in processor:
  - supports external digital monitor via HDMI or USB Type-C;
  - supports three independent displays;
  - Max resolution: 4096x2160 @ 60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

### Chipset Memory

- Intel SoC (System on Chip) platform
  - 16GB max / 2400MHz DDR4, one DDR4 SO-DIMM socket
  - * System clocks down for processors with lower memory controller

### Display

- Internal battery life: 6.52 hr for 3-cell, 13.04 hr for 6-cell, 20.1 hr for 48Wh or 72Wh
- External battery life: 26.9 hr
- Models No + 3-cell 3-cell + 3-cell 3-cell + 6-cell 48Wh 3-cell + 6-cell 72Wh

### Optical

- None

### Ethernet

- Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville)
- vPro model: Intel Ethernet Connection I219-LM (Jacksonville)

### WLAN

- One of the following, configurable by model (WiGig is mutually exclusive with WWAN):
  - Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + BT4.1
  - Intel Dual Band Wireless-AC 8260, Wi-Fi 2x2 802.11ac + BT4.1
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + BT4.1
  - Intel Tri-Band Wireless-AC 18265, WiGig 2.11ad + Wi-Fi 2x2 802.11ac + BT4.1

- Bluetooth™
  - Bluetooth 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter
  - * Intel 8265ac/18265ac card support BT4.2 but is limited to BT4.1 by Windows OS

### WWAN (optional)

- One of the following, configurable by model (mutually exclusive with WiGig):
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455)
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7160 (Fibocom L831-EAU) (EMEA only)

### SIM card (optional)

- Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

### Security

- Power-on password, hard disk password, supervisor password, security keyhole

### Power

- Lenovo Solution Center
- Lenovo Companion
- Lenovo PowerEngage
- ThinkVantage Product Recovery
- ThinkVantage System Update
- Adobe Reader®
- Microsoft Office preloaded; purchase a product key to activate
- McAfee® LiveSafe® (30-day trial)

### Environment

- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

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**Product Specifications Reference (PSREF)**

*Lenovo*

*April 2019*
## Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
<th>Base Frequency</th>
<th>Max Turbo Frequency</th>
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<th>Memory Types</th>
<th>Processor Graphics</th>
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<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

## Graphics

- Intel HD Graphics 620 or Intel UHD Graphics 620 in processor; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304 @ 60Hz (USB Type-C); 4096x2160 @ 30Hz (HDMI)

## Chipset

- Intel SoC (System on Chip) platform
- *4GB memory is NOT available in US and EMEA
- *System clocks down for processors with lower memory controller

## Display

- *12.5" (317.5mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio
- *12.5" (317.5mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

## Multi-touch (opt)

- On-cell touch, supports 10-finger gesture (FHD only)
- *FHD non-touch model is NOT available in US

## Storage

- One of the following, configurable by model:
  - M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
  - M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)

## Optane™ memory

- None

## Ethernet

- Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro)
- via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2

## WWAN (optional)

- One of the following, configurable by model:
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card (EMEA only)
  - Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7360 (Fibocom L850-GL), M.2 card
  - *For non-WWAN model, it means the model is NOT WWAN upgradable

## SIM card (opt)

- Nano-SIM card slot, in the combo slot with microSD card reader, optional Verizon LTE (US) SIM card

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Note: The specifications above may not be available in all regions.

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Lenovo
April 2019
**ThinkPad X390 Platform Specifications**

**Processor**

<table>
<thead>
<tr>
<th>Processor Number</th>
<th># of Cores</th>
<th># of Threads</th>
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</table>

**Graphics**

Intel UHD Graphics 620 in processor; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 4096x2304@60Hz (Thunderbolt); 4096x2160@24Hz (HDMI)

**Chipset Memory**

Intel SoC (System on Chip) platform

8GB, 16GB or 32GB / 2400MHz DDR4 / soldered to systemboard, no sockets

* Installed memory is actually 2666MHz but run at 2400MHz due to Intel limitation.

**Display**

<table>
<thead>
<tr>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Brightness</th>
<th>Aspect Ratio</th>
<th>Contrast Ratio</th>
<th>Color Gamut</th>
<th>Viewing Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.3&quot;</td>
<td>HD (1366x768)</td>
<td>TN</td>
<td>Anti-glare</td>
<td>250 nits</td>
<td>16:9</td>
<td>300:1</td>
<td>45% 170°</td>
</tr>
<tr>
<td>13.3&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>300 nits</td>
<td>16:9</td>
<td>1200:1</td>
<td>72% 170°</td>
</tr>
<tr>
<td>13.3&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>1000:1</td>
<td>72% 178°</td>
</tr>
</tbody>
</table>

**Multi-touch (opt)**

On-cell touch, supports 10-finger gesture (FHD only)

**Storage**

- M.2 2280 SSD / SATA 6.0Gb/s
- M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
- M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2

**Optane™ memory**

Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2

**Ethernet**

Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro)

**WLAN (optional)**

One of the following, configurable by model:

- Intel Wireless-AX200, Wi-Fi 2x2 802.11ax + Bluetooth 5.0
- Intel Wi-Fi 6 AX200, Wi-Fi 2x2 802.11ax + Bluetooth 5.0
- Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

**WWAN (optional)**

One of the following, configurable by model:

- Integrated Mobile Broadband 4G LTE, Fibocom L830-EB, M.2 card (EMEA only)
- Integrated Mobile Broadband 4G LTE-A, Fibocom L850-GL, M.2 card

* For non-WWAN model, it means the model is NOT WWAN upgradable

**Dimensions**

<table>
<thead>
<tr>
<th>Models</th>
<th>FHD Non-touch</th>
<th>HD / FHD Multi-touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Fiber</td>
<td>311.9mm x 217.0mm x 16.5mm</td>
<td>12.28&quot; x 8.54&quot; x 0.65&quot;</td>
</tr>
<tr>
<td>PPS</td>
<td>312.0mm x 217.2mm x 16.9mm</td>
<td>12.28&quot; x 8.55&quot; x 0.67&quot;</td>
</tr>
</tbody>
</table>

**Weight**

<table>
<thead>
<tr>
<th>Models</th>
<th>FHD Non-touch</th>
<th>HD / FHD Multi-touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Fiber</td>
<td>2.70 lb / 1.22 kg</td>
<td>2.93 lb / 1.33 kg</td>
</tr>
<tr>
<td>PPS</td>
<td>2.85 lb / 1.29 kg</td>
<td>2.64 lb / 1.28 kg</td>
</tr>
</tbody>
</table>

**Case color**

Black

**Case material**

Display cover: Carbon Fiber (FHD non-touch only) or PPS;
Bottom: Magnesium/Aluminum

**Smart card reader**

Optional: Smart card reader

**Media reader**

MicroSD card reader, in the combo slot with nano-SIM card

**Ports**

Two USB 3.1 Type-C Gen 1 (one Always On), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort),
one USB 3.1 Type-C Gen 2 / Thunderbolt 3 (with the function of PD and DP),
HDMI 4.4, Ethernet extension connector, combo slot of nano-SIM card (WWAN models) and microSD card reader,
headphone / microphone combo jack, optional smart card reader,
side docking connector, security keyhole

* Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Monitor cable**

HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter
USB-C to VGA: Lenovo USB-C to VGA Adapter
USB-C to DP: Lenovo USB-C to DisplayPort Adapter
Optional: ThinkPad Ethernet Extension Adapter Gen 2

**Bundled Accy**

- 3-year/1-yr battery limited onsite service
- 1-year depot repair service
- Intel vPro Technology
- Discrete TPM 2.0, TCG Certified
- Power-on password, hard disk password, supervisor password, security keyhole

**Camera (optional)**

One of the following, configurable by model:

- HD720p camera with ThinkShutter camera privacy, fixed focus
- HD camera and HD720p camera with ThinkShutter camera privacy, fixed focus

**Audio support**

HD Audio, Realtek ALC3287 codec / stereo speakers, 1W x 2. Dolby Audio Premium / dual array far-field microphone, headphone / microphone combo jack

**Keyboard**

6-row, spill-resistant, multimedia Fn keys, optional LED backlight

**UltraNav™**

TrackPoint pointing device and buttonless Mylar surface multi-touch touchpad

**Security**

Power-on password, hard disk password, supervisor password, security keyhole

**Security chip**

Discrete TPM 2.0, TCG Certified

**Fingerprint reader**

Optional: Touch style match on chip fingerprint reader on the palm rest

**NFC (optional)**

Near Field Communication

**Battery**

Integrated Li-ion 48Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

**Max battery life**

MobileMark 2014: 17.6 hr

* Battery life varies significantly with settings, usage, & other factors

**AC adapter**

45W or 65W USB Type-C AC adapter

**Preload**

Windows 10 Home 64 or Windows 10 Pro 64

**Limited warranty**

One of the following, configurable by model:

- 1-year depot repair service
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

**Mil-Spec test**

MIL-STD-810G military certification

**Environment**

EPEAT® Bronze; ENERGY STAR® 7.0; RoHS-compliant

*Note: The specifications above may not be available in all regions.*

Lenovo
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Expedited Depot: Parts and labor coverage with expedited turnaround. Shipping (including packaging) or delivery to the repair center is paid for by Lenovo.

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If Lenovo determines your product problem is covered by the product warranty and cannot be resolved over the telephone, a technician will be dispatched to arrive onsite, typically the next day.


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Battery life: Battery life (and recharge times) will vary based on many factors including screen brightness, applications, features, power management, battery conditioning, and other customer preferences.