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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.

July 17, 2019 - Version 545

Additions in this update

► New product(s)
  ThinkPad P1 (2nd Gen) announced July 2019
  ThinkPad X1 Extreme (2nd Gen) announced July 2019

► Others
  ThinkPad X395 - Ethernet corrected to Realtek RTL8153

Withdrawals in this update

► Withdrawn product(s)
  None
## 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>
</tr>
</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>
</tr>
<tr>
<td>i5-7Y54</td>
<td>2</td>
<td>4</td>
<td>1.2 GHz</td>
<td>3.2 GHz</td>
<td>4MB</td>
<td>LPDDR3-1866</td>
<td>Intel HD Graphics 615</td>
</tr>
<tr>
<td>Celeron N4100</td>
<td>1</td>
<td>2</td>
<td>1.1 GHz</td>
<td>2.4 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 600</td>
</tr>
<tr>
<td>Pentium Silver N5000</td>
<td>1</td>
<td>2</td>
<td>1.1 GHz</td>
<td>2.7 GHz</td>
<td>4MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 605</td>
</tr>
</tbody>
</table>

## Graphics
- Intel HD Graphics 615, Intel UHD Graphics 600 or 605 in processor, supports external digital monitor via HDMI or USB Type-C; supports dual independent display.
- Max resolution: 3840x2160@60Hz (USB Type-C); 4096x2160@30Hz (HDMI)

## 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
- None

## Optane™ memory
- None

## Ethernet
- Realtek RTL8111GUS Gigabit Network Connection
- One of the following, configurable by model:
  - 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)

## WLAN + Bluetooth™

## 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
- Security chip
  - Power-on password, supervisor password, security keyhole
  - Discrete TPM 2.0, TCG Certified
  - None

## Security chip
- None

## Battery
- Integrated Li-ion 42Wh battery
- MobileMark® 2014: 13.9 hr
- * Battery life varies significantly with settings, usage, & other factors

## AC adapter
- 45W or 65W slim tip 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

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

## Environment
- EPEAT™ Silver; ENERGY STAR® 6.1; RoHS-compliant
### ThinkPad A275 Platform Specifications

**Processor AMD PRO A-Series APUs**

<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>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>AMD Radeon R5 Graphics</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></td>
<td></td>
<td>AMD Radeon R7 Graphics</td>
</tr>
<tr>
<td>PRO A10-9700B</td>
<td>4</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRO A12-9800B</td>
<td>4</td>
<td>4</td>
<td>2.7 GHz</td>
<td>3.6 GHz</td>
<td></td>
<td></td>
<td></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 16GB max / 1866MHz DDR4, one DDR4 SO-DIMM socket

**Display**

Some: 12.5" (317.5mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
Some: 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 6.0Gbps, 2.5" wide, 7mm high, Active Protection System™ Some: SSD / SATA 6.0Gbps, 2.5" wide, 7mm high (e.g. 300GB 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)**

One of the following, configurable by model:
- 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

**SIM card (opt)**

None

**Dimensions**

Width: 12.03" x 8.21" x 0.80"; 305.5mm x 208.5mm x 20.3mm

**Weight**

<table>
<thead>
<tr>
<th>Models</th>
<th>3-cell + 3-cell</th>
<th>3-cell + 6-cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>2.79 lb / 1.27 kg</td>
<td>2.98 lb / 1.36 kg</td>
</tr>
</tbody>
</table>

**Case material**

Black Glass-Fiber Reinforced Plastic

**Note:** The specifications above may not be available in all regions.
<table>
<thead>
<tr>
<th>Processor</th>
<th>AMD Ryzen™ PRO Mobile Processors with Radeon™ Vega Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD Ryzen™ PRO Mobile Processors with Radeon™ Vega Graphics</td>
<td></td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td><strong># of Cores</strong></td>
</tr>
<tr>
<td>Ryzen 3 PRO 2300U</td>
<td>4</td>
</tr>
<tr>
<td>Ryzen 5 PRO 2500U</td>
<td>8</td>
</tr>
<tr>
<td>Ryzen 7 PRO 2700U</td>
<td>8</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; 120Hz (USB Type-C); 4096x2160@60Hz (HDMI) |

<table>
<thead>
<tr>
<th>Chipset Memory</th>
<th>AMD SoC (System on Chip) platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>8GB or 16GB / 2400MHz DDR4, soldered to systemboard, no sockets</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th>Some: 12.5&quot; (317.5mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 400:1 contrast ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-touch (opt)</td>
<td>On-cell touch, supports 10-finger gesture (FHD only)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage</th>
<th>One of the following, configurable by model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.2 SSD / SATA 6.0Gb/s</td>
<td></td>
</tr>
<tr>
<td>M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s</td>
<td></td>
</tr>
</tbody>
</table>

| Optical Ethernet | Gigabit Ethernet connection via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2 |

<table>
<thead>
<tr>
<th>WLAN Bluetooth™</th>
<th>Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWAN (optional)</td>
<td>Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7390 (Fibocom L850-GL), M.2 card</td>
</tr>
<tr>
<td>SIM card (opt)</td>
<td>Nano-SIM card slot, in the combo slot with microSD card reader, optional Verizon LTE (US) SIM card slot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>WxDxH (HD &amp; FHD multi-touch): 12.11&quot; x 8.26&quot; x 0.69&quot;, 307.7mm x 209.8mm x 17.4mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>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</td>
</tr>
<tr>
<td>Case color</td>
<td>Black</td>
</tr>
<tr>
<td>Case material</td>
<td>Display cover: Carbon Fiber (FHD non-touch model) or PPS (HD &amp; FHD multi-touch model); Bottom: Magnesium/Aluminum</td>
</tr>
</tbody>
</table>

| Smart card reader | Optional: Smart card reader |
| Media reader | MicroSD card reader, in the combo slot with nano-SIM card |
| Media reader | 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 | * 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 |
| Monitor cable | USB-C to VGA: Lenovo USB-C to VGA Adapter |
| Monitor cable | 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: |
| Camera (optional) | • HD720p camera with ThinkShutter camera privacy, fixed focus |
| Camera (optional) | • IR camera and HD720p camera, fixed focus |
| Camera (optional) | • 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 |
| Keyboard | TrackPoint® pointing device and buttonless Mylar surface multi-touch touchpad |
| Audio support | None |
| Security | Power-on password, hard disk password, supervisor password, security keyhole |
| Security | Discrete TPM 2.0, TCG Certified |
| Security | System Mgt | DASH Management |
| Security | Fingerprint reader | Optional: Touch style match on chip fingerprint reader on the palm rest |
| Security | None |
| Battery | Integrated Li-ion 48Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter |
| Battery life AC adapter | MobileMark® 2014: 10.55 hr |
| Battery life AC adapter | 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: |
| Limited warranty | • 1-year depot repair service |
| Limited warranty | • 3-year/1-yr battery depot repair service |
| Limited warranty | • 3-year/1-yr battery limited onsite service |
| Mil-Spec test | MIL-STD-810G military testing |
| Environment | EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant |

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># 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>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>AMD Radeon™ R5 Graphics</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></td>
<td></td>
<td>AMD Radeon R7 Graphics</td>
</tr>
<tr>
<td>PRO A10-9700B</td>
<td>4</td>
<td>4</td>
<td>2.5 GHz</td>
<td>3.4 GHz</td>
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<td></td>
<td>AMD Radeon R7 Graphics</td>
</tr>
<tr>
<td>PRO A12-9800B</td>
<td>4</td>
<td>4</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
- 32GB max / 1866MHz 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, 350.1 contrast ratio
  - 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, US 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™
  - 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)
- * For non-WWAN model, it means the model is NOT WWAN upgradable

#### SIM card (optional)

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

#### Dimensions

<table>
<thead>
<tr>
<th>Weight</th>
<th>Models</th>
<th>3-cell or 3 + 3-cell</th>
<th>6-cell or 3 + 6-cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Magnesium</td>
<td>3.49 lb / 1.58 kg</td>
<td>3.92 lb / 1.78 kg</td>
</tr>
<tr>
<td></td>
<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
- 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.

Lenovo

April 2019
## ThinkPad A485 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>Ryzen 3 PRO 2300U</td>
<td>4</td>
<td>2.0 GHz</td>
<td>3.4 GHz</td>
<td></td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
</tr>
<tr>
<td>Ryzen 5 PRO 2500U</td>
<td>4</td>
<td>2.0 GHz</td>
<td>3.8 GHz</td>
<td></td>
<td>8 GB 8 Graphics</td>
<td>Radeon Vega 6 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 PRO 2700U</td>
<td>8</td>
<td>2.2 GHz</td>
<td>4.0 GHz</td>
<td></td>
<td>8 GB 10 Graphics</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**

- AMD SoC (System on Chip) platform

**Memory**

- 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- *Installed DIMMs are actually 2666MHz but run at 2400MHz due to AMD limitation

**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
- *Installed M.2 SSD is PCIe 3.0 x 4 but run at PCIe 3.0 x 2 due to M.2 SSD adapter limitation

**Optical**

- No

**Ethernet**

- Realtek® RTL8111GUL Gigabit Ethernet connection

**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**

- Weight: WxDxH: 13.25” x 9.15” x 0.79”; 336.6mm x 232.5mm x 19.95mm
- Models:
  - 24Wh or 24Wh + 24Wh
  - 48Wh, 72Wh, or 24Wh + 48Wh + 72Wh
- Magnesium: 3.49 lb / 1.58 kg
- PPS: 3.63 lb / 1.65 kg

**Case color**

- Black

**Case material**

- Display cover: Magnesium Hybrid or 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**

- 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 (RJ-45), nano-SIM card slot (WWAN models), microphone / headphone combo jack, optional smart card reader, 4-in-1 media reader (MMC, SD, SDHC, SDXC), side docking connector, security keyhole

**Monitor cable (opt)**

- HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter
- USB-C to DP: Lenovo USB-C to DisplayPort Adapter

**Mounted Accy**

- None

**Camera (optional)**

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

**Security**

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

**Security chip**

- Discrete TPM 2.0, TCG Certified

**System Mgt**

- DASH Management

**BIOS**

- Security chip

**Fingerprint reader**

- Optional: Touch style match on chip fingerprint reader on the keyboard bezel

**NFC**

- None

**Battery**

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

**Max battery life (MobileMark® 2014)**

<table>
<thead>
<tr>
<th>Battery size</th>
<th>Max battery life</th>
</tr>
</thead>
<tbody>
<tr>
<td>24Wh</td>
<td>5.37 hr</td>
</tr>
<tr>
<td>48Wh</td>
<td>10.76 hr</td>
</tr>
<tr>
<td>72Wh</td>
<td>16.4 hr</td>
</tr>
<tr>
<td>24Wh + 24Wh</td>
<td>10.76 hr</td>
</tr>
<tr>
<td>48Wh + 48Wh</td>
<td>16.4 hr</td>
</tr>
<tr>
<td>72Wh + 72Wh</td>
<td>22.15 hr</td>
</tr>
</tbody>
</table>

**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 testing

**Environment**

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

**Note:** The specifications above may not be available in all regions.
# ThinkPad E480 Platform Specifications

## Processor

<table>
<thead>
<tr>
<th>7th Generation Intel® Core™ i3 / i5 Processor</th>
<th>8th Generation Intel Core i3 / i5 / i7 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor Number</strong></td>
<td><strong>Processor Number</strong></td>
</tr>
<tr>
<td>3-7020U</td>
<td>3-8130U</td>
</tr>
<tr>
<td>3-7130U</td>
<td>3-8250U</td>
</tr>
<tr>
<td>5-7200U</td>
<td>5-8550U</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Cores</strong></td>
<td><strong>Cores</strong></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Base Frequency</strong></td>
<td><strong>Base Frequency</strong></td>
</tr>
<tr>
<td>2.3 GHz</td>
<td>2.2 GHz</td>
</tr>
<tr>
<td>2.7 GHz</td>
<td>1.6 GHz</td>
</tr>
<tr>
<td>2.5 GHz</td>
<td>1.8 GHz</td>
</tr>
<tr>
<td><strong>Memory Types</strong></td>
<td><strong>Memory Types</strong></td>
</tr>
<tr>
<td>DDR4-2133</td>
<td>DDR4-2400</td>
</tr>
</tbody>
</table>

## Graphics

- Intel HD Graphics 620 or Intel UHD Graphics 620 in processor only or Intel HD 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 + Memory

- 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
- 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 400:1 contrast ratio

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

## Optane™ memory/ Optical

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

## Ethernet

- Gigabit Ethernet Connection, Realtek 88111GUS

## WLAN + Bluetooth™

- One of the following, configurable by model:
  - Realtek® RTL8821CESS, Wi-Fi 1x1 802.11ac + Bluetooth 4.1, M2 card
  - Realtek RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M2 card
  - Intel Dual Band Wireless-AC 3165, 1x1, Wi-Fi + Bluetooth 4.1, M2 Card
  - * Intel 3165ac card supports BT4.2 but is limited to BT4.1 by Windows OS

## WWAN

- SIM card: None

## Dimensions

- **Aluminum** (WxDxH): 12.96" x 9.53" x 0.78"; 329mm x 242mm x 19.9mm
- **PC/ABS** (WxDxH): 12.96" x 9.53" x 0.83"; 329mm x 242mm x 21.9mm

## Weight

- Starting at 3.87 lb / 1.75kg

## Case color

- Black or silver

## Case material

- Display cover: Aluminum or PC/ABS plastic;
- 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

## Camera

- HD720p camera, fixed focus

## Audio support

- HD Audio, Synaptic® CX11852 codec / Advanced Audio
- Dual array microphone, headphone / microphone combo jack

## Security

- Power-on password, hard disk password, supervisor password, security keyhole
- * Depending on many factors, actual data transfer speed may be lower than theoretical speed

## Security chip (opt)

- Firmware TPM 2.0 integrated in chipset or discrete TPM 2.0 TCG Certified

## Fingerprint reader (opt)

- Touch style fingerprint reader on the palm rest

## NFC

- None

## Battery

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

## Max battery life

- **MobileMark 2014**: 13.51 hr
- * 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 testing

## Environment

- EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant
### 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>DDR4-2400</td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 2700U</td>
<td>8</td>
<td>8</td>
<td>2.2 GHz</td>
<td>3.8 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: 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
- **PC/ABS (WxDxH):** 12.96" x 9.53" x 0.86": 329mm x 242mm x 21.9mm
- **Starting at:** 3.87 lb / 1.75kg

**Camera**

- HD720p camera, fixed focus

**Audio support**

- HD Audio, Synaptic® CX11852 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

**Security chip**

- Discrete TPM 2.0, TCG Certified

**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
- *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

**Environment**

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

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

Lenovo
June 2019
## ThinkPad E490 Platform Specifications

### Product Specifications Reference (PSREF)

<table>
<thead>
<tr>
<th>Processor</th>
<th>8th Generation Intel® Core™ i3 / i5 / i7 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>i3-815U</td>
<td>2</td>
</tr>
<tr>
<td>i5-8265U</td>
<td>4</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 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 |

<table>
<thead>
<tr>
<th>Display</th>
<th>Size / Resolution</th>
<th>Surface 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” HD (1366x768)</td>
<td>Anti-glare TN</td>
<td>220 nits</td>
<td>400:1</td>
<td>90°</td>
<td>Non-touch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0” FHD (1920x1080)</td>
<td>Anti-glare IPS</td>
<td>250 nits</td>
<td>600:1</td>
<td>170°</td>
<td>Non-touch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

| SIM card | None |

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>8th Generation Intel® Core™ i3 / i5 / i7 Processor</td>
</tr>
<tr>
<td>Number</td>
<td>329mm x 242mm x 19.9mm</td>
</tr>
<tr>
<td>Max Turbo Frequency</td>
<td>12.96” x 9.53” x 0.78”</td>
</tr>
<tr>
<td>Cache</td>
<td>329mm x 242mm x 21.9mm</td>
</tr>
<tr>
<td>Weight PC/ABS (WxDxH):</td>
<td>Starting at 3.87 lb / 1.75 kg</td>
</tr>
<tr>
<td>Case color</td>
<td>Black or silver</td>
</tr>
<tr>
<td>Case material</td>
<td>Display cover: Aluminum or PC/ABS plastic; Bottom: PC/ABS plastic</td>
</tr>
</tbody>
</table>

| 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 | None |
| 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 | Integrated model: discrete TPM 2.0, TCG Certified |
| System Mgt | Discrete model: firmware TPM 2.0 integrated in chipset |
| Fingerprint reader | Optional: Touch style fingerprint reader on the palm rest |

| Battery | None |
| Power-on password, hard disk password, supervisor password, security keyhole |

| Security chip | Integrated model: discrete TPM 2.0, TCG Certified |
| System Mgt | Discrete model: firmware TPM 2.0 integrated in chipset |
| 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: 13 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 | MIL-STD-810G military testing |
| Environment | EPEAT Silver; ENERGY STAR® 7.1; RoHS-compliant |

Note: The specifications above may not be available in all regions.
ThinkPad E490s 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>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>8</td>
<td>1.8 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
- 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
- Supports Intel UHD Graphics 620 in processor only
- Supports external digital monitor via HDMI or USB Type-C
- Supports three independent displays
- Max resolution: 4096x2304 @ 60Hz (USB Type-C); 4096x2160 @ 24Hz (HDMI)

### 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 / Resolution**
  - 14.0" FHD (1920x1080)
  - 14.0" FHD (1920x1080)
- **Surface Type**
  - Anti-glare TN
  - Anti-glare IPS
- **Brightness**
  - 220 nits
  - 250 nits
- **Aspect Ratio**
  - 16:9
- **Contrast Ratio**
  - 400:1
- **Viewing Angle**
  - 90°
  - 170°
- **Multi-touch**
  - Non-touch
  - Non-touch

### Storage

- One of the following, configurable by model:
  - M.2 2280 SSD / SATA 6.0Gb/s
  - M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2

### 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

- SIM card
  - None

- SIM card
  - None

### Dimensions

- **WxDxH:** 12.96" x 9.13" x 0.70"; 329mm x 232mm x 17.9mm

### Weight

- Starting at 3.68 lb / 1.67 kg

**Note:** The specifications above may not be available in all regions.
ThinkPad E495 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>8</td>
<td>16</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 AMD 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 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 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

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 2242 SSD / PCIe NVMe, PCIe 3.0 x 2 or PCIe 3.0 x 4

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 SIM card

None

Dimensions

Aluminum (WxDxH): 12.96" x 9.53" x 0.78"; 329mm x 242mm x 19.9mm
PC/ABS (WxDxH): 12.96" x 9.53" x 0.83"; 329mm x 242mm x 21.9mm
Starting at 3.87 lb / 1.75 kg

Weight

Case color

Black

Case material

Display cover: Aluminum or PC/ABS plastic;
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, security keyhole
* Depending on many factors, actual data transfer speed may be lower than theoretical speed

Monitor cable

None

Camera

HD720p camera, fixed focus

Audio support

HD Audio, Synaptic® 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

Security chip

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

Fingerprint reader

Discrete TPM 2.0, TCG Certified

Security

NFC

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: 11 hr
* 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

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

Environmental certifications

EPEAT Silver; ENERGY STAR® 7.1; RoHS-compliant

Lenovo

July 2019

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>7th Generation Intel Core i3 / i5 Processor or</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>7th Generation Intel Core i7-8550U</td>
<td>2</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>8th Generation Intel Core i3 / i5 / i7 Processor</td>
<td>3-8130U</td>
<td>2</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>3-8250U</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>7-8550U</td>
<td>4</td>
<td>8</td>
<td>1.6 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 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

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

* System clocks down for processors with lower memory controller

#### Memory

#### 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

#### Optane™ memory

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

#### Optical

None

#### Ethernet

Gigabit Ethernet Connection, Realtek R8111GUS

#### Networking

WLAN + Bluetooth™

One of the following, configurable by model:

- 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
- 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

#### Audio

- Speakers: Stereo speakers, 2W x 2, Dolby®️ Advanced Audio
- Codec: CX11852 codec / Advanced Audio / CX11852 codec / Advanced Audio
- Microphone: Dual array microphone, headphone / microphone combo jack

#### Security

- Security chip (opt): Firmware TPM 2.0 integrated in chipset or discrete TPM 2.0 TCG Certified

#### Security reader

Optional: Touch style fingerprint reader on the palm rest

#### Fingerprint reader

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: 12.23 hr

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

#### AC adapter

45W or 65W USB Type-C AC adapter

#### Operating System

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

#### Warranty

Limited warranty 1-year depot repair service

#### MIL-Spec test

MIL-STD-810G military testing

#### Environment

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

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

Lenovo
June 2019
## ThinkPad E585 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>DDR4-2400</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>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 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: 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**

WxDxH: 14.53" x 9.92" x 0.79"; 369mm x 252mm x 19.95mm

**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 2 (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, Synaptic® CX11852 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

**Security chip**

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

**Security**

Discrete TPM 2.0, TCG Certified

**Fingerprint reader**

No

**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: 8.63 hr

*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

**Mi-Spec test**

None

**Environment**

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

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

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Lenovo

June 2019
## ThinkPad E590 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>
<th>Graphics</th>
<th>Chipset</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8145U</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>
<td>Intel UHD Graphics 620 in processor only or</td>
<td>Intel SoC (System on Chip) platform</td>
</tr>
</tbody>
</table>
| i5-8265U         | 4          | 8            | 1.6 GHz        | 4.6 GHz             | 6MB   | DDR4-2400    | Intel UHD Graphics 620 | Intel UHD Graphics 620 in processor and | Up to two drives (one M.2 SSD and one HDD): 
|                  |            |              |                |                     |       |              | 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) | 2GB DDR4, dual-channel capable, two DDR4 SO-DIMM sockets | 32GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets |

### Display

<table>
<thead>
<tr>
<th>Size / Resolution</th>
<th>Surface 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>15.6&quot; HD (1366x768)</td>
<td>Anti-glare</td>
<td>220 nits</td>
<td>16:9</td>
<td>400:1</td>
<td>90°</td>
<td>Non-touch</td>
</tr>
<tr>
<td>15.6&quot; FHD (1920x1080)</td>
<td>Anti-glare IPS</td>
<td>250 nits</td>
<td>16:9</td>
<td>600:1</td>
<td>170°</td>
<td>Non-touch</td>
</tr>
</tbody>
</table>

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

- Gigabit Ethernet Connection, Realtek R8111GUS

### WLAN + Bluetooth™

- 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

### Ports

- 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

### 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

### Security chip

- 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

### 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

### Weight

- Black or silver

### Case material

- Top: Aluminum;
- Bottom: PC/ABS plastic

### Display cover

- None

### 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

- Multi-touch

### Display

- Size / Resolution
- Surface Type
- Brightness
- Aspect Ratio
- Contrast Ratio
- Viewing Angle
- Multi-touch

### Display

- None

### Camera

- HD720p camera, fixed focus

### Audio support

- HD Audio, Synaptic® 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, numeric keypad, optional LED backlight
- UltraNav™ pointing device and buttonless Mylar surface multi-touch touchpad

### Security chip

- Integrated model: discrete TPM 2.0, TCG Certified
- Discrete model: firmware TPM 2.0 integrated in chipset

### Chipset

- None

### Media reader

- None

### Memory

- None

### Multi-touch

- None

### 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

### Case color

- Top: Aluminum;
- Bottom: PC/ABS plastic

### Case material

- Display cover: Aluminum;
- Bottom: PC/ABS plastic

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

Lenovo
July 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></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></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 AMD limitation*

**Display**

- *Not available in all regions.

**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

**SIM card**

- None

**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

**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, security keyhole

**Monitor cable**

- None

**Bundled Accy**

- None

**Camera**

- HD720p camera, fixed focus

**Audio support**

- HD Audio, Synaptic® 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™**

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

**Security chip**

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

**Fingerprint reader**

- 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

**Environment**

- EPEAT™ Silver; ENERGY STAR® 7.1; 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 8th Generation Intel Core i5 / i7 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>3865U</td>
<td>2</td>
</tr>
<tr>
<td>3-7130U</td>
<td>4</td>
</tr>
<tr>
<td>5-7200U</td>
<td>2</td>
</tr>
<tr>
<td>Graphics</td>
<td>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)</td>
</tr>
<tr>
<td>Chipset</td>
<td>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</td>
</tr>
<tr>
<td>Display</td>
<td>Some: 13.3&quot; (338mm) HD (1366x768), anti-glare, LED backlight, 250 nits, 16:9 aspect ratio, 500:1 contrast ratio Some: 13.3&quot; (338mm) 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</td>
</tr>
<tr>
<td>Storage</td>
<td>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)</td>
</tr>
<tr>
<td>Optical</td>
<td>None</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro) via optional ThinkPad Ethernet Extension Cable</td>
</tr>
<tr>
<td>WLAN + Bluetooth™</td>
<td>Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card * Intel 8265ac card supports B14.2 but is limited to B14.1 by Windows OS</td>
</tr>
<tr>
<td>WWAN</td>
<td>None</td>
</tr>
<tr>
<td>SIM card</td>
<td>None</td>
</tr>
</tbody>
</table>

### Specifications Reference (PSREF)

- **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 Bottom: GFRP
- **Smart card reader**: None
- **Media reader**: MicroSD card reader
- **Ports**: 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 * Depending on many factors, actual data transfer speed may be lower than theoretical speed 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 Cable
- **Camera**: 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**: 6-row, spill-resistant, multimedia Fn keys, optional LED backlight
- **UltraNav™**: TrackPoint® pointing device and buttonless Mylar surface touchpad, multi-touch
- **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 fingerprint reader on the keyboard bezel, anti-spoofing technology
- **NFC (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: 16.1 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 testing
- **Environment**: EPEAT™ Gold (US only); ENERGY STAR® 6.1; RoHS-compliant

Note: The specifications above may not be available in all regions.
## ThinkPad L390 Platform Specifications

### Processor

<table>
<thead>
<tr>
<th>Processor Number</th>
<th>Core(s)</th>
<th>Frequency</th>
<th>Turbo Frequency</th>
<th>Cache</th>
<th>Memory Types</th>
<th>Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i3-8145U</td>
<td>2 / 4</td>
<td>2.1 GHz</td>
<td>3.9 GHz</td>
<td>4 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8265U</td>
<td>4 / 8</td>
<td>1.6 GHz</td>
<td>3.9 GHz</td>
<td>6 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8365U</td>
<td>4 / 8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>6 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>4 / 8</td>
<td>1.8 GHz</td>
<td>4.6 GHz</td>
<td>8 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</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
- 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</th>
<th>Resolution</th>
<th>Type</th>
<th>Brightness</th>
<th>Aspect Ratio</th>
<th>Contrast Ratio</th>
<th>Viewing Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.3&quot;</td>
<td>HD (1366x768)</td>
<td>Anti-glare TN</td>
<td>250 nits</td>
<td>16:9</td>
<td>500:1</td>
<td>90°</td>
</tr>
<tr>
<td>13.3&quot;</td>
<td>FHD (1920x1080)</td>
<td>Anti-glare IPS</td>
<td>250 nits</td>
<td>16:9</td>
<td>700:1 (non-touch) 800:1 (multi-touch)</td>
<td>170°</td>
</tr>
</tbody>
</table>

### Multi-touch

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

### Storage

- One of the following, configurable by model:
  - M.2 2280 SSD / SATA 6.0Gbps
  - M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2
  - M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
  - Intel Optane™ Memory H10 with Solid State Storage, M.2 2282, PCIe NVMe 3.0 x 4

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

### Bluetooth™

- None

### SIM card

- 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
- Bottom: FRP

### Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Discrete TPM 2.0, TCG Certified
- Intel vPro Technology
- Optional: Touch style fingerprint reader on the palm rest

### Security chip

- NFC (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
- Battery life varies significantly with settings, usage, & other factors
- MobileMark 2014: 14.61 hr

### 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
  - 5-year/1-yr battery limited onsite service

### Mil-Spec test

- MIL-STD-810G military testing

### Environment

- EPEAT™ Silver, ENERGY STAR® 7.1; RoHS-compliant

### Note

The specifications above may not be available in all regions.

July 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>i3-6006U</td>
<td>2</td>
<td>4</td>
<td>2.0 GHz</td>
<td>-</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>i3-6100U</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 520</td>
</tr>
<tr>
<td>i5-6200U</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz (2.8 GHz)</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
<td></td>
</tr>
<tr>
<td>i5-6300U</td>
<td>2</td>
<td>4</td>
<td>2.4 GHz</td>
<td>3.0 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>i7-6600U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>-</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i7-7500U</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>i7-7700U</td>
<td>2</td>
<td>4</td>
<td>2.8 GHz</td>
<td>3.9 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>i7-7800U</td>
<td>2</td>
<td>4</td>
<td>3.0 GHz</td>
<td>-</td>
<td>6MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
</tbody>
</table>

* i7 processor is NOT available in EMEA

**Graphics**

Intel HD Graphics 610 or 620 in processor only, or Intel HD Graphics 620 in processor and AMD Radeon™ R5 M430, 2GB memory; supports external analog monitor via VGA and digital monitor via Mini DisplayPort; supports three independent displays; Max resolution: 3840x2160@60Hz (DP via mDP cable); 1920x1200@60Hz (VGA)

**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: 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

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

**WLAN (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

**Case color**

Black

**Case material**

PC/ABS plastic

**Smart card reader**

Optional: Smart card reader

**Media reader**

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

**Port**

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

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

**Keyboard**

UltraNav™ 6-row spill-resistant, multimedia Fn keys

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

**Security**

Security chip

vPro (optional) Fingerprint reader

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

Discrete TPM 2.0, TCG Certified

Intel vPro Technology

Optional: Swipe style fingerprint reader on the keyboard bezel

None

**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

**AC adapter**

45W or 65W slim tip AC adapter

**Preload**

Windows® 7 Professional 64 preinstalled through downgrade rights in Windows 10 Pro 64

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

**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 limited onsite service

**Mil-Spec test**

MIL-STD-810G military testing

**Environment**

EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant
# ThinkPad L480 Platform Specifications

## 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>
</tr>
</thead>
<tbody>
<tr>
<td>3-7130U</td>
<td>2</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>5-7200U</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>7-7300U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>3.6 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD 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>
<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>5-8250U</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>7-8550U</td>
<td>1</td>
<td>2</td>
<td>1.6 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

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

*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

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

## Smart card reader

Optional: Smart card reader

## Media reader

MicroSD card reader

## Ports

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 (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, microSD card reader, side docking connector, security keyhole

## Monitor cable

* 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

**Integrated Mobile Broadband 4G LTE-A,**

Intel XMM

## 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

45W or 65W USB Type-C AC adapter

## Limited warranty

One of the following, configurable by model:

1. 1-year depot repair service
2. 3-year/1-yr battery depot repair service
3. 3-year/1-yr battery limited onsite service

## Mil-Spec test

MIL-STD-810G military testing

## Environment

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

Note: The specifications above may not be available in all regions.
### ThinkPad L490 Platform Specifications

<table>
<thead>
<tr>
<th>Processor</th>
<th>Intel® Celeron® Processor or 8th Generation Intel® Core™ i3 / i5 / i7 Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>Cel 4305U</td>
<td>2</td>
</tr>
<tr>
<td>3-8145U</td>
<td>2</td>
</tr>
<tr>
<td>5-8265U</td>
<td>4</td>
</tr>
<tr>
<td>5-8365U</td>
<td>4</td>
</tr>
<tr>
<td>7-8565U</td>
<td>4</td>
</tr>
<tr>
<td>7-8665U</td>
<td>4</td>
</tr>
</tbody>
</table>

| Graphics | Intel UHD Graphics 610 or 620 in processor only or Intel UHD Graphics 620 in processor and AMD Radeon 535, 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 @ 24Hz (HDMI) |

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Intel SoC (System on Chip) platform</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Surface</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>14.0&quot; HD (1366x768)</td>
<td>TN</td>
<td>Anti-glare</td>
<td>220 nits</td>
<td>16:9</td>
<td>400:1</td>
<td>45%</td>
<td>90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0&quot; FHD (1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>250 nits</td>
<td>16:9</td>
<td>700:1</td>
<td>45%</td>
<td>170°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Storage</th>
<th>* HDD / SATA 6.0 Gb/s, 2.5&quot; wide, 7mm high, Active Protection System™</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* SSD / SATA 6.0 Gb/s, 2.5&quot; wide, 7mm high</td>
</tr>
<tr>
<td></td>
<td>* M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4</td>
</tr>
<tr>
<td></td>
<td>* M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optane™ memory</th>
<th>Optional: Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Intel Ethernet Connection I219-V (Jacksonville) vPro model: Intel Ethernet Connection I219-LM (Jacksonville)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WLAN + Bluetooth™ (optional)</th>
<th>One of the following, configurable by model:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* Realtek® RTL8822BE, Wi-Fi 2x2 802.11ac + Bluetooth 4.2, M.2 card (NOT available in EMEA)</td>
</tr>
<tr>
<td></td>
<td>* Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0</td>
</tr>
<tr>
<td></td>
<td>* Intel Wi-Fi 6 AX200, Wi-Fi 2x2 802.11ax + Bluetooth 5.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWAN (optional)</th>
<th>One of the following, configurable by model:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* Wireless WAN upgradable</td>
</tr>
<tr>
<td></td>
<td>* Integrated Mobile Broadband 4G LTE, Fibocom L830-EB, M.2 card (EMEA only)</td>
</tr>
<tr>
<td></td>
<td>* Integrated Mobile Broadband 4G LTE-A, Fibocom L850-GL, M.2 card</td>
</tr>
</tbody>
</table>

| SIM card | None |

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>WxDxH: 13.19&quot; x 9.25&quot; x 0.89&quot;; 335mm x 235mm x 22.5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Starting at 3.72 lb / 1.69 kg</td>
</tr>
<tr>
<td>Case color</td>
<td>Black</td>
</tr>
<tr>
<td>Case material</td>
<td>PC/ABS plastic</td>
</tr>
<tr>
<td>Smart card reader</td>
<td>Optional: Smart card reader</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), one USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), one USB 3.1 Type-C Gen 2 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, microSD card reader, side docking connector, security keyhole</td>
</tr>
<tr>
<td>Monitor cable (optional)</td>
<td>HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter</td>
</tr>
<tr>
<td>Bundled Accy</td>
<td>USB-C to VGA: Lenovo USB-C to VGA Adapter</td>
</tr>
<tr>
<td></td>
<td>USB-C to DP: Lenovo USB-C to DisplayPort Adapter</td>
</tr>
<tr>
<td>Keyboard</td>
<td>6-row, spill-resistant, multimedia Fn keys, optional LED backlight</td>
</tr>
<tr>
<td>Audio support</td>
<td>TrackPoint® pointing device and bottomless Mylar surface multi-touch touchpad</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>Discrete TPM 2.0, TCG Certified</td>
</tr>
<tr>
<td>System Mgt (opt)</td>
<td>Intel vPro Technology</td>
</tr>
<tr>
<td>Fingerprint reader (opt)</td>
<td>Optional: Touch style match on chip fingerprint reader on the palm rest</td>
</tr>
<tr>
<td>NFC (optional)</td>
<td>Near Field Communication</td>
</tr>
<tr>
<td>Battery</td>
<td>Integrated Li-ion 45Wh battery, supports Rapid Charge (charge up to 80% in 1 hr) with 65W USB Type-C AC adapter</td>
</tr>
<tr>
<td></td>
<td>MobileMark® 2014: 12 hr</td>
</tr>
<tr>
<td>AC adapter</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>* Battery life varies significantly with settings, usage, &amp; other factors</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></td>
<td>* 1-year depot repair service</td>
</tr>
<tr>
<td></td>
<td>* 3-year/1-yr battery depot repair service</td>
</tr>
<tr>
<td>Mil-Spec test</td>
<td>MIL-STD-810G military testing</td>
</tr>
<tr>
<td>Environment</td>
<td>EPEAT™ Silver; ENERGY STAR® 7.1; RoHS-compliant</td>
</tr>
</tbody>
</table>

Note: The specifications above may not be available in all regions. Lenovo July 2019
### ThinkPad L570 Platform Specifications

**Processor** 6th Generation Intel® Core™ i3 / i5 / i7 Processor or Intel Celeron® Processor 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>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>
<td>DDR4-2133</td>
<td>Intel HD Graphics 520</td>
</tr>
<tr>
<td>i3-6100U</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 660</td>
</tr>
<tr>
<td>i5-6200U</td>
<td>4</td>
<td>2</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 6500</td>
</tr>
<tr>
<td>i5-6300U</td>
<td>4</td>
<td>2</td>
<td>2.4 GHz</td>
<td>3.0 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 6500</td>
</tr>
<tr>
<td>i7-6500U</td>
<td>4</td>
<td>2</td>
<td>2.5 GHz</td>
<td>3.1 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 6600</td>
</tr>
<tr>
<td>i7-6600U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.4 GHz</td>
<td>4MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 6600</td>
</tr>
</tbody>
</table>

**Note:** The specifications above may not be available in all regions. Lenovo September 2018

**WLAN**
- 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

**Ethernet**
- Intel Ethernet Connection I219-LM (Jacksonville)
- Intel Ethernet Connection I219-V (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

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

Lenovo September 2018
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>3-7130U</td>
<td>4</td>
<td>8</td>
<td>2.7 GHz</td>
<td>3.1 GHz</td>
<td>3MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>5-7200U</td>
<td>4</td>
<td>8</td>
<td>2.5 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2400</td>
<td>Intel UHD 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>
<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>5-8250U</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>5-8350U</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>
</tbody>
</table>

* 3-7130U 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**

Intel SoC (System on Chip) platform

**Memory**

- supports dual-channel capable, two DDR4 SO-DIMM sockets (optional)
- * 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 2.5" 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

**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™ (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-A:
    - Intel XMM™ 7680 (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:** WxDxH: 14.82” x 10.02” x 0.90”; 376.5mm x 254.5mm x 22.95mm
- Starting at 4.46 lb / 2.0 kg

**Case color**

None

**ExpressCard**

None

**Smart card reader**

**Optional:** Smart card reader

**Media reader**

**Optional:** Media reader

**Ports**

- 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 (RJ-45), nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, microSD card reader, side docking connector, security keyhole
- * Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Monitor cable (optional)**

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

**Camera (optional)**

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**

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

**Security**

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

**Security chip**

- True TP 2.0, TCG Certified

**Fingerprint reader**

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

**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**

- * 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

**Environment**

- **EPEAT™ Gold (US only)**; **ENERGY STAR® 6.1; RoHS-compliant**
## ThinkPad L590 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 4305U</td>
<td>2</td>
<td>2</td>
<td>2.2 GHz</td>
<td>-</td>
<td>2MB</td>
<td>DDR4-2133</td>
<td>Intel UHD Graphics 610</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>DDR4-2133</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>DDR4-2400</td>
<td></td>
</tr>
<tr>
<td>5-8365U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>6MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-8565U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-8665U</td>
<td>4</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graphics

- Intel UHD Graphics 610 or 620 in processor only or Intel UHD Graphics 620 in processor and AMD Radeon 535, 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@24Hz (HDMI)

### Chipset

- Intel SoC (System on Chip) platform
- 64GB max / 2400MHz DDR4, dual-channel capable, two DDR4 SO-DIMM sockets
- Installed memory is actually 2666MHz but run at 2133MHz or 2400MHz due to Intel limitation

### Display

<table>
<thead>
<tr>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Surface</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; HD</td>
<td>(1366x768)</td>
<td>TN</td>
<td>Anti-glare</td>
<td>220 nits</td>
<td>16:9</td>
<td>400:1</td>
<td>45%</td>
<td>90°</td>
</tr>
<tr>
<td>15.6&quot; FHD</td>
<td>(1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>250 nits</td>
<td>16:9</td>
<td>700:1</td>
<td>45%</td>
<td>170°</td>
</tr>
</tbody>
</table>

### Multi-touch

- None

### Storage

- • HDD / SATA 6.0Gb/s, 2.5" wide, 7mm high, Active Protection System™
- • SSD / SATA 6.0Gb/s, 2.5" wide, 7mm high
- • M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
- • M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2
- • Installed M.2 2280 SSD is PCIe 3x4 but run at PCIe 3x2 due to M.2 SSD adapter limitation

### Optane™

#### Memory
- Optional: 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)

### WLAN + Bluetooth™ (optional)

- 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
  - Intel Wi-Fi 6 AX200, 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

### SIM card

- None

### Note:

The specifications above may not be available in all regions.
# 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>i5-8400H</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>i7-8750H</td>
<td>6</td>
<td>12</td>
<td>2.2 GHz</td>
<td>4.1 GHz</td>
<td>9MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>E-2176M</td>
<td>6</td>
<td>12</td>
<td>2.7 GHz</td>
<td>4.4 GHz</td>
<td>12MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics P630</td>
</tr>
</tbody>
</table>

**Graphics**

- Intel UHD Graphics 630 or P630 in processor and NVIDIA Quadro P1000 or P2000 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)

**Chipset**

- Mobile Intel CM246 Chipset

**Memory**

- 64GB max / 2666MHz DDR4, ECC or non-ECC (ECC function supported only on Xeon processor), dual-channel capable, two DDR4 SO-DIMM sockets

**Display**

- 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
- 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) Pen**

- 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 (optional)**

- RAID 0/1 support

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

**WWAN SIM card**

- None

**Dimensions**

- **WxDxH (non-touch):** 14.24" x 9.67" x 0.72"; 361.8mm x 245.7mm x 18.4mm
- **WxDxH (multi-touch):** 14.24" x 9.67" x 0.74"; 361.8mm x 245.7mm x 18.7mm

**Weight**

- **Non-touch model:** starting at 3.76 lb (1.7 kg);
- **Multi-touch model:** starting at 4.06 lb (1.8 kg)

**Case color**

- Black

**Case material**

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

Note: The specifications above may not be available in all regions.
ThinkPad P1 (2nd Gen) 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>i5-9400H</td>
<td>4</td>
<td>8</td>
<td>2.5 GHz</td>
<td>4.3 GHz</td>
<td>8MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>i7-9750H</td>
<td>6</td>
<td>12</td>
<td>2.6 GHz</td>
<td>4.5 GHz</td>
<td>12MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>i7-9850H</td>
<td>6</td>
<td>12</td>
<td>2.6 GHz</td>
<td>4.6 GHz</td>
<td>12MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>i9-9880H</td>
<td>8</td>
<td>16</td>
<td>2.3 GHz</td>
<td>4.8 GHz</td>
<td>16MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>E-2276M</td>
<td>6</td>
<td>12</td>
<td>2.8 GHz</td>
<td>4.7 GHz</td>
<td>12MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics P630</td>
</tr>
</tbody>
</table>

Graphics

- Intel UHD Graphics 630 in processor only or NVIDIA® Quadro® T1000 or T2000 Max-Q 4GB GDDR5 memory;
- supports external digital monitor via HDMI or Thunderbolt®;
- supports four independent displays;
- Max resolution: 4096x2160@60Hz (Thunderbolt®); 4096x2160@60Hz (HDMI)

Chipset

- Mobile Intel CM246 Chipset
- Memory: 64GB max / 2666MHz DDR4, ECC or non-ECC (ECC function supported only on Xeon processor), dual-channel capable, two DDR4 SO-DIMM sockets

Display

<table>
<thead>
<tr>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Surface</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</td>
<td>Anti-glare</td>
<td>300 nits</td>
<td>16:9</td>
<td>700:1</td>
<td>72% NTSC</td>
<td>170°</td>
</tr>
<tr>
<td>15.6&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>500 nits</td>
<td>16:9</td>
<td>1200:1</td>
<td>72% NTSC</td>
<td>170°</td>
</tr>
<tr>
<td>15.6&quot;</td>
<td>UHD (3840x2160)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>500 nits</td>
<td>16:9</td>
<td>1200:1</td>
<td>100% Adobe</td>
<td>170°</td>
</tr>
<tr>
<td>15.6&quot;</td>
<td>UHD (3840x2160)</td>
<td>OLED</td>
<td>AR, AS</td>
<td>SDR 400nit HDR 600nit (Peak)</td>
<td>16:9</td>
<td>100000:1</td>
<td>100% DCI-P3</td>
<td>170°</td>
</tr>
</tbody>
</table>

Multi-touch (opt)

- Capacitive-type multi-touch, supports 10-finger gesture (UHD OLED only), anti-reflection (AR), anti-smudge (AS) coating
- Supports pen accessory, please see the accessory compatibility for details

Pen

Storage

- Up to two M.2 SSD
- M.2 2280 SSD / PCIe NVMe 3.0 x 4

RAID (optional)

<table>
<thead>
<tr>
<th>RAID 0/1 support</th>
<th>Optical</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAID 0/1 support</td>
<td>None</td>
</tr>
</tbody>
</table>

Ethernet

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

WLAN

- Intel Wireless-AX 22260, Wi-Fi 2x2 802.11ax + Bluetooth 5.1
- Bluetooth 5.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

WWAN

- SIM card: None

Audio support

- Dolby Atmos® sound system
- Supports 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, SD card reader, security keyhole, slim tip AC adapter
- * Power Delivery only supports power-out for charging peripherals
- * Depending on many factors, actual data transfer speed may be lower than theoretical speed
- 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 Cable

Camera (optional)

- One of the following, configurable by model:
- 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
  - HD Audio, Synaptic® CX11880 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array far-field microphone, headphone / microphone combo jack, Dolby Atmos® sound system

Security

- Security chip: Discrete TPM 2.0, TCG Certified
- Security chip: Intel vPro Technology
- Security chip: Finger print reader: Touch style match on chip fingerprint reader on the keyboard bezel
- Security chip: System Mgt (opt): None

Battery

- Integrated Li-Ion 80Wh battery, supports Rapid Charge (charge up to 80% in 1hr)
- Battery life varies significantly with settings, usage, & other factors
- AC adapter: 135W 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-year battery depot repair service
  - 3-year/1-year battery limited onsite service

Mil-Spec test

- MIL-STD-810G military testing

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

<table>
<thead>
<tr>
<th>Processor 6th or 7th Generation Intel® Core™ i7 Processor or Intel Xeon® Processor E3 v5 or v6 Family</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
<td># of Threads</td>
</tr>
<tr>
<td>17620HQ</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>E3-1505M v5</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>17700HQ</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>E3-1505M v6</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>E3-1535M v6</td>
<td>4</td>
<td>8</td>
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<table>
<thead>
<tr>
<th>Graphics</th>
<th>17620HQ</th>
<th>17700HQ</th>
<th>E3-1505M v5</th>
<th>E3-1505M v6</th>
<th>E3-1535M v6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Chipset</th>
<th>Mobile Intel CM238 Chipset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory</td>
<td>464GB max / 2400MHz DDR4, ECC or non-ECC (ECC function supported only on Xeon processor), dual-channel capable, four DDR4 SO-DIMM sockets</td>
</tr>
<tr>
<td>Display</td>
<td>15.6&quot; (396mm) FHD (1920x1080), anti-glare, LED backlight, IPS, 250 nits, 16:9 aspect ratio, 700:1 contrast ratio, 160° viewing angle</td>
</tr>
<tr>
<td>Multi-touch (opt) Pen (optional)</td>
<td>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)</td>
</tr>
<tr>
<td>RAiD (optional)</td>
<td>RAID 0/1 support</td>
</tr>
<tr>
<td>Optical</td>
<td>None</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Non-vPro model: Intel Ethernet Connection I219-V (Jacksonville) vPro model: Intel Ethernet Connection I219-L (Jacksonville)</td>
</tr>
<tr>
<td>WLAN</td>
<td>One of the following, configurable by model: Intel Dual Band Wireless-A 8260, Wi-Fi 2x2 802.11ac + BT4.1, M.2 card, Intel Dual Band Wireless-A 8265, 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 upgradable, Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card</td>
</tr>
<tr>
<td>SIM card (opt)</td>
<td>Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card</td>
</tr>
</tbody>
</table>

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

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**Lenovo**

September 2018
### ThinkPad P52 Platform Specifications

**Product Specifications Reference (PSREF)**

<table>
<thead>
<tr>
<th>Processor</th>
<th>8th Generation Intel® Core™ i7 / i9 Processor or Intel Xeon® E Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor Number</td>
<td># of Cores</td>
</tr>
<tr>
<td>7-8750H</td>
<td>6</td>
</tr>
<tr>
<td>7-8850H</td>
<td>6</td>
</tr>
<tr>
<td>9-8950HK</td>
<td>6</td>
</tr>
<tr>
<td>E-2176M</td>
<td>6</td>
</tr>
</tbody>
</table>

**Chipset**

- Mobile Intel CM246 Chipset
- 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)

**Display**

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

**Storage**

- Up to 3 drives (two M.2 SSD and one HDD)
- Some: HHD / 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
- Optional memory

**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**

- Bluetooth™
  - 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 L950-G), M.2 card
- SIM card (opt)
  - Nano-SIM card slot, optional Verizon LTE (US) SIM card

**Dimensions**

- WxDxH: 14.86” x 9.93” x 0.96-1.16”; 377.4mm x 252.3mm x 24.5-29.4mm
- WxDxHTouch: 14.86” x 9.93” x 1.02-1.21”; 377.4mm x 252.3mm x 25.8-30.7mm

**Weight**

- Weight: starting at 5.4 lb (2.45kg);
- Multi-touch model: starting at 6.4 lb (2.9kg)

**Case color**

- Black

**Case material**

- Display cover: Glass-Fiber Reinforced Plastic;
- Bottom: Magnesium/Aluminum

**Smart card reader**

- Optional: Smart card reader

**Media reader**

- Ports
  - 4-in-1 reader (MMC, SD, SDHC, SDXC), supports UHS-II SD card
  - 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 (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
- Security chip
  - vPro Technology
- Fingerprint reader
  - Touch style match on chip fingerprint reader on the palm rest
- Color calibration
  - None
- NFC (optional)
  - Near Field Communication

**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*

**AC adapter**

- 170W slim tip AC adapter

**Preload**

- One of the following, configurable by model:
  - Windows® 10 Home 64
  - Windows 10 Pro
  - Windows 10 Pro 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 testing

**Environment**

- EPEAT™ Silver; ENERGY STAR® 6.1; RoHS-compliant
ThinkPad P52s Platform Specifications

**Processor**
8th Generation Intel® Core™ i5 / i7 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>i5-8550U</td>
<td>4</td>
<td>1.6 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8650U</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 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)

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

**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
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
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**
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)

**WLAN + Bluetooth™**
Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2 802.11ac + Bluetooth 4.1, M.2 card
* For non-WWAN model, it means the model is NOT WWAN upgradable

**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™ 7362 (Fibocom L830-EB), M.2 card (EMEA only)
* 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**
WxHxD: 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 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)

**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

**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 camera and HD720p camera, fixed focus

**Audio support**
HD Audio, Realtek® ALC222 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array 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 chip**
Power-on password, hard disk password, supervisor password, security keyhole
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**
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 72Wh
Max battery life 12.2 hr 18.5 hr 13.5 hr 20.1 hr 26.3 hr
* Battery life varies significantly with settings, usage, & other factors

**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

**Mi-Spec test**
MIL-STD-810G military testing

**Environment**
EPEAT® Silver; ENERGY STAR® 6.1; RoHS-compliant

Lenovo
July 2019
ThinkPad P53s Platform Specifications

Processor 8th Generation Intel® Core™ 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>7-8565U</td>
<td>4</td>
<td>8</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>
<tr>
<td>7-8665U</td>
<td>8</td>
<td>16</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graphics Intel UHD Graphics 620 in processor and NVIDIA Quadro® P520, 2GB GDDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 3840x2160@60Hz (USB-C); 3840x2160@30Hz (HDMI) (optional)

Chipset Memory Intel SoC (System on Chip) platform, 48GB max / 2400MHz DDR4, dual-channel capable, 8GB or 16GB memory soldered to systemboard, one DDR4 SO-DIMM socket

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</td>
<td>Anti-glare</td>
<td>250 nits</td>
<td>16:9</td>
<td>700:1</td>
<td>45% 170°</td>
</tr>
<tr>
<td>15.6&quot;</td>
<td>UHD (3840x2160)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>500 nits</td>
<td>16:9</td>
<td>1200:1</td>
<td>100% Adobe 170°</td>
</tr>
</tbody>
</table>

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
- Intel Optane™ Memory H10 with Solid State Storage, M.2 2280, PCIe NVMe 3.0 x 4

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

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

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

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

Memory 48GB max / 2400MHz DDR4, dual-channel capable, Intel SoC (System on Chip) platform

Graphics Intel UHD Graphics 620 in processor and NVIDIA Quadro® P520, 2GB GDDR5 memory; supports external digital monitor via HDMI or USB Type-C; supports three independent displays; Max resolution: 3840x2160@60Hz (USB-C); 3840x2160@30Hz (HDMI) (optional)

Audio support

- 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
- HD camera and 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

Camera (optional)

- IR camera and 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

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

Security chip

- Security chip
- Security chip
- Security chip

System Mgmt (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)

Max battery life MobileMark® 2014: 15 hr (FHD model) / 10 hr (UHD model)

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

Mi-Spec test MIL-STD-810G military testing

Environment EPEAT® Silver; ENERGY STAR® 7.1; RoHS-compliant

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

July 2019
## ThinkPad P72 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>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>E-2176M</td>
<td>6</td>
<td>2.7 GHz</td>
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<td>12MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 630</td>
</tr>
<tr>
<td>E-2186M</td>
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<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
- 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 Pen

- None
- Supports pen accessory, please see the accessory compatibility for details

### 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, PCIe NVMe, PCIe 3.0 x 2

### Optical

- **None**
- **RAID 0/1 support**
- **Intel vPro Technology**

### 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

- **None**

### SIM card

- **None**

### Dimensions

- **WxDxH**: 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

### Monitor cable

- **None**

### 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

### UltraNav™

- 3-button TrackPoint® pointing device and 3-button 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

- 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 testing

### Environment

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

---

**Note**: The specifications above may not be available in all regions.
<table>
<thead>
<tr>
<th>Processor</th>
<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>Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-6200U</td>
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</table>

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

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<th>Processor Number</th>
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<td>i5-7500U</td>
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<td>2.9 GHz</td>
<td>3.9 GHz</td>
<td>4MB</td>
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</tr>
</tbody>
</table>

* 7th-6500U is not available in EMEA

** Graphics **

Intel HD Graphics 520 or 620 in processor only, or 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 Memory **

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, 400:1 or 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 (opt) **

On-cell touch, supports 10-finger gesture (FHD IPS panel with PPS cover only)

** 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, Action 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 I219-V (Jacksonville)
vPro model: Intel Ethernet Connection I219-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® 4.1 wireless, integrated in Wi-Fi + Bluetooth combo adapter

- 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 (opt) **

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

** Weight Models **

<table>
<thead>
<tr>
<th>Models</th>
<th>3-cell or 3 + 3-cell</th>
<th>6-cell or 3 + 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>

** Screen **

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

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

** WiGig dock (opt) **

ThinkPad WiGig dock

Optional: Lenovo USB-C to VGA Adapter

** Camera (optional) **

720p: HD720p resolution, fixed focus
IR & 720p: IR camera and HD720p camera (mutually exclusive with WiGig)

** 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

** Security **

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

Discrete TPM 2.0, TCG Certified

** UltraNav™ **

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

** Security chip **

Intel vPro Technology

** NFC (optional) **

Optional: Touch style match on chip fingerprint reader on the keyboard bezel

Near Field Communication

** Display cover **

Lenovo USB-C to VGA Adapter

** AC adapter **

45W or 65W slim tip AC adapter, 45W or 65W USB Type-C AC adapter

** Preload **

Windows® 7 Professional 64 preinstalled Some: Windows 10 Home 64
Some: Windows 10 Pro 64

Lenovo Companion

Lenovo Setting

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 testing

** Test **

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

Lenovo April 2019
ThinkPad T470s Platform Specifications

Processor

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

or 7th Generation Intel Core i5 / i7 Processor

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<td>Intel HD Graphics 520</td>
</tr>
</tbody>
</table>

Chipset

- Intel SoC (System on Chip) platform
- 20GB or 42GB 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, 160° viewing angle
- Some: 14.0" (355mm) QWHQD (2560x1440), anti-glare, LED backlight, IPS, 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 160° viewing angle
- 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 (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

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):
  - 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-LTE-A 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)

- One of the following, configurable by model (mutually exclusive with WiGig):
  - Wireless LAN upgradable
  - Integrated Mobile Broadband 4G LTE-A, Qualcomm® Snapdragon™ X7 LTE-A (Sierra Wireless EM7455), M.2 card
  - Micro-SIM card slot, opt Verizon LTE (US) or Lenovo® Connect (EMEA) SIM card

SIM card (opt)

- None

Camera

- Camera (optional) HD720p resolution, fixed focus

Audio support

- Stereo speakers, 1W x 2 / dual array microphone, combo audio/microphone jack

Keyboard

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

Security

- Security chip
- vPro (optional)

Fingerprint reader

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

NFCA (optional)

- Near Field Communication

Internal battery

- Front Li-Polymer 3-cell (23Wh) and rear Li-ion 3-cell (26Wh), both Integrated MobileMark 2014: up to 10.5 hr
- * Battery life varies significantly with settings, usage, & other factors

Max battery life

- MobileMark 2014: up to 10.5 hr

AC adapter

- 45W slim tip AC adapter, 45W or 65W USB Type-C AC adapter

Preload

- Windows® 7 Professional 64 preinstalled
- Some: Windows 10 Home 64
- Some: Windows 10 Pro 64
- Lenovo Companion
- Lenovo Setting
- 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 testing

Environment

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

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)

Smart card reader

- Optional: Smart card reader

Media reader

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

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

Monitor cable

- (optional)

HDMI to VGA: Lenovo HDMI to VGA Monitor Adapter

Wireless WAN

- ThinkPad WiGig dock, mutually exclusive with WWAN
- * Depending on many factors, actual data transfer speed may be lower than theoretical speed

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

Discrete TPM 2.0, TCG Certified

Office preloaded; up to 10.5 hr

Lenovo vPro Technology

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

Adobe® Reader®

- Microsoft® Office preloaded; purchase a product key to activate
- McAfee® LiveSafe™ (30-day trial)

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

Lenovo

April 2019
ThinkPad T480 Platform Specifications

Product Specifications Reference (PSREF)

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<th>7th Generation Intel® Core™ i5 Processor</th>
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</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel HD Graphics 620</td>
</tr>
<tr>
<td>Number</td>
<td>DDR4-2133</td>
</tr>
<tr>
<td># of Cores</td>
<td>2</td>
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<tr>
<td># of Threads</td>
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<tr>
<td>Base Frequency</td>
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<td>Max Turbo Frequency</td>
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<td>Graphics</td>
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</table>

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

| Processor | Intel HD Graphics 620                   |
| Processor | DDR4-2400                               |
| Number    | 3-8130U                                 |
| # of Cores| 2                                      |
| # of Threads| 4                                    |
| Base Frequency | 5-8250U  1.6 GHz                      |
| Max Turbo Frequency | 5-8250U  3.4 GHz                      |
| Cache      | 4MB                                    |
| Memory Types| DDR4-2400                              |
| Graphics   | Intel UHD Graphics 620                 |

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 GDDR5S 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

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 (1386x768), 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.
Some: 14.0” (355mm) WQHD (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 (FHD only)

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 4
Some: 128GB M.2 SSD / PCIe NVMe, PCIe 3.0 x 2, in WWAN slot as 2nd Storage, mutually exclusive with WWAN

Optane™ memory 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 + Bluetooth™

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

WWAN (optional)

One of the following, configurable by model (mutually exclusive with Intel Optane memory):
• 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

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Weight</th>
<th>WxDxH: 13.25” x 9.15” x 0.79”</th>
<th>5.7-200U  336.8mm x 232.5mm x 19.95mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models</td>
<td>24Wh or 24Wh + 24Wh</td>
<td>48Wh, 72Wh, or 24Wh + 48Wh / 72Wh</td>
<td></td>
</tr>
<tr>
<td>Integrated Magnesium</td>
<td>3.49 lb / 1.58 kg</td>
<td>3.92 lb / 1.78 kg</td>
<td></td>
</tr>
<tr>
<td>Integrated PPS</td>
<td>3.63 lb / 1.65 kg</td>
<td>4.08 lb / 1.85 kg</td>
<td></td>
</tr>
<tr>
<td>Discrete Magnesium</td>
<td>3.53 lb / 1.60 kg</td>
<td>3.97 lb / 1.80 kg</td>
<td></td>
</tr>
<tr>
<td>Discrete PPS</td>
<td>3.68 lb / 1.67 kg</td>
<td>4.12 lb / 1.87 kg</td>
<td></td>
</tr>
</tbody>
</table>

Case color Case material
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

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

Ports

USB-C to DisplayPort Adapter

Camera (optional)

One of the following, configurable by model:
• HD720p camera with ThinkShutter camera privacy, fixed focus
• IR camera and HD720p camera, fixed focus
HD Audio, Realtek® ALC298 codec / stereo speakers, 2W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

Audio support

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

Lenovo May 2019
### 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>

**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

4GB or 8GB memory soldered to systemboard; one DDR4 SO-DIMM socket

**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) WQHD (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

**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 upgradeable
- 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

**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

**Dimensions**

WxDxH: 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 / Thunderbolt3 (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

**Monitor cable**

(optional)

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

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

**Camera**

One of the following, configurable by model:

- HD720p camera with ThinkShutter camera privacy, fixed focus
- HD Audio, Realtek ALC3287 codec / stereo speakers, 1W x 2, Dolby® Audio™ Premium / dual array microphone, headphone / microphone combo jack

**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

**Security chip**

vPro (optional)

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**

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 testing

**Environmental**

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

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

Lenovo
July 2019
### ThinkPad T490 Platform Specifications

**Product Specifications Reference (PSREF)**

**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>16 MB</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>4.1 GHz</td>
<td>16 MB</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>16 MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8665U</td>
<td>4</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>16 MB</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**

**Non-vPro model:**
- 4GB max / 2400MHz DDR4, dual-channel capable,
- 8GB or 16GB memory soldered to systemboard, one DDR4 SO-DIMM socket

**vPro model:**
- 16GB or 18GB memory soldered to systemboard, two DDR4 SO-DIMM sockets

**Chipset** Intel Integrated Memory Controller

**Memory**
- DDR4-2400
- Max capacity: 128GB / 2400MHz DDR4 dual-channel capable, Intel SoC (System on Chip) platform

**Display**

- **14.0” FHD (1920x1080):** IPS Anti-glare, 220 nits, 60 Hz, 16:9, 77% NTSC, 72% NTSC, 170° viewing angle
- **14.0” WQHD (2560x1440):** IPS Glossy, 500 nits, 60 Hz, 16:9, 100% NTSC, 170° viewing angle

**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
- Intel Optane™ Memory H10 with Solid State Storage, M.2 2280, PCIe NVMe 3.0 x 4

**Optical** None

**Ethernet**

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

**WLAN (optional):** Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0

**Bluetooth (opt):** Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

**WWAN (optional):**
- 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
- Integrated Mobile Broadband 4G LTE-A, Fibocom L860-GL, MIMO 4x4, M.2 card

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

**Battery**
- Integrated Li-ion 50Wh battery, supports Rapid Charge (charge up to 80% in 1hr)

**Max battery life**
- MobileMark® 2014: 16.11 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
- 3-year/1-yr battery depot repair service
- 3-year/1-yr battery limited onsite service

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

**Environment**
- EPEAT® Silver; ENERGY STAR® 7.1; RoHS-compliant

**Note:** The specifications above may not be available in all regions. Lenovo July 2019
ThinkPad T490s 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>i5-8265U</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>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>6MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i7-8656U</td>
<td>8</td>
<td></td>
<td>1.6 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i7-8665U</td>
<td>8</td>
<td></td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphics**

Intelli UHD Graphics 620 in processor; 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**

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

* Installed memory is actually 2066MHz 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>14.0&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS Anti-glare</td>
<td>250 nits (non-touch)</td>
<td>16:9</td>
<td>700:1</td>
<td>45%</td>
<td>170°</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>FHD (1920x1080)</td>
<td>IPS Anti-glare</td>
<td>400 nits (multi-touch)</td>
<td>16:9</td>
<td>800:1</td>
<td>72%</td>
<td>170°</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>FHD (1920x1080)</td>
<td>ThinkPad Privacy Guard</td>
<td>IPS Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>1000:1</td>
<td>72%</td>
</tr>
<tr>
<td>14.0&quot;</td>
<td>WQHD (2560x1440)</td>
<td>HDR, Dolby Vision</td>
<td>IPS Glossy</td>
<td>500 nits</td>
<td>16:9</td>
<td>1500:1</td>
<td>100% Adobe</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
- Intel Optane Memory H10 with Solid State Storage, M.2 2280, PCIe NVMe 3.0 x 4

**Optical**

None

**Ethernet**

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

via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2

**WLAN - Bluetooth (optional)**

One of the following, configurable by model:

- Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + Bluetooth 5.0
- Intel Wi-Fi 6 AX200, 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

**SIM card (opt)**

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

**Dimensions**

<table>
<thead>
<tr>
<th>Models</th>
<th>WxDxH (black with FHD / Privacy Guard):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.95&quot; x 8.90&quot; x 0.66&quot;; 329.0mm x 226.15mm x 16.7mm</td>
</tr>
</tbody>
</table>

**Weight**

<table>
<thead>
<tr>
<th>Models</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.96 lb / 1.35 kg</td>
</tr>
<tr>
<td></td>
<td>2.81 lb / 1.27 kg</td>
</tr>
<tr>
<td></td>
<td>3.29 lb / 1.49 kg</td>
</tr>
</tbody>
</table>

**Case color**

Black or Silver

**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),
headphone / microphone combo jack, optional smart card reader,
microSD card reader, side docking connector, security keyhole

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

**Camera**

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

**Audio support**

Bundled Accy

Optional: ThinkPad Ethernet Extension Adapter Gen 2

**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

Discrete TPM 2.0, TCG Certified

**System Mgl (opt)**

Intel vPro Technology

**Fingerprint reader**

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

Near Field Communication

**Battery**

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

**Max battery life**

MobileMark® 2014: 20 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 testing

**Environment**

EPEAT Silver / ENERGY STAR® 7.1; RoHS-compliant

Lenovo

July 2019
## 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 Controller</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryzen 3 3300U</td>
<td>4</td>
<td>4</td>
<td>2.1 GHz</td>
<td>3.5 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>AMD Ryzen 5 Graphics</td>
<td></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>AMD Ryzen 8 Graphics</td>
<td></td>
</tr>
<tr>
<td>Ryzen 7 3700U</td>
<td>8</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>AMD Ryzen 10 Graphics</td>
<td></td>
</tr>
</tbody>
</table>

## Graphics

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

## Chipset

- AMD SoC (System on Chip) platform
- 32GB max / 2400MHz DDR4, dual-channel capable.
- 8GB or 16GB memory soldered to system board, one DDR4 SO-DIMM socket.
- Installed memory is actually 2933MHz but run at 2400MHz due to AMD 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>14.0” HD</td>
<td>(1366x768)</td>
<td>TN</td>
<td>Anti-glare</td>
<td>220 nits</td>
<td>16:9</td>
<td>800:1</td>
<td>45% 90°</td>
</tr>
<tr>
<td>14.0” FHD</td>
<td>(1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>250 nits (non-touch) 300 nits (multi-touch)</td>
<td>16:9</td>
<td>700:1</td>
<td>45% 170°</td>
</tr>
<tr>
<td>14.0” FHD</td>
<td>Low Power</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>800:1</td>
<td>72% 170°</td>
</tr>
</tbody>
</table>

## Multi-touch (optional)

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

## Storage

- M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
- M.2 2242 SSD / PCIe NVMe, PCIe 3.0 x 2

## Optical

- None

## Ethernet

- Realtek® RTL8111 Gigabit Ethernet connection

## WLAN

- Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0
- Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

## WWAN (optional)

- One of the following, configurable by model:
  - Wireless WAN upgradable
  - Integrated Mobile Broadband 4G LTE-A, Fibocom L850-GL, M.2 card

## SIM card (optional)

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

## Weight

<table>
<thead>
<tr>
<th>Models</th>
<th>HD</th>
<th>FHD</th>
<th>FHD Low Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.46 lb / 1.57 kg</td>
<td>3.46 lb / 1.57 kg</td>
<td>3.39 lb / 1.54 kg</td>
</tr>
</tbody>
</table>

## Case material

- Display cover: PPS / 50% GF;
- Bottom: PA / 50% GF

## Smart card reader

- Optional: Smart card reader

## Media reader

- Bundled Accy
- None

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

## Audio support

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

## Security

- Power-on password, hard disk password, supervisor password, security keyhole
- Security chip: Discrete TPM 2.0, TCG Certified
- System Mgt: DASH Management
- Fingerprint reader: Optional: Touch style match on chip fingerprint reader on the palm rest
- NFC: None

## Battery

- Integrated Li-ion 50Wh battery, supports Rapid Charge (charge up to 80% in 1hr)
- Max battery life: MobileMark® 2014: 13.4 hr
- 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

## Mil-Spec test

- MIL-STD-810G military testing

## Environment

- EPEAT® Silver; ENERGY STAR® 7.1; RoHS-compliant
**ThinkPad T495s 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 5 Pro 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 Pro 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 Vega 10 Graphics</td>
</tr>
</tbody>
</table>

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

July 2019

### Graphics

- AMD Radeon Vega 8 or Vega 10 Graphics in processor
- Supports external digital monitor via USB-C or HDMI
- Supports three independent displays
- Max resolution: 4096x2304@60Hz (USB-C); 4096x2160@24Hz (HDMI)

### Chipset Memory

- AMD SoC (System on Chip) platform
- 8GB or 16GB / 2400MHz DDR4 / soldered to system board, no sockets
- * Installed memory is actually 2666MHz but run at 2400MHz due to AMD limitation

### Display

<table>
<thead>
<tr>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Surface</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>14.0”</td>
<td>FHD (1920x1080)</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>
<td></td>
</tr>
<tr>
<td>14.0”</td>
<td>FHD (1920x1080) Low Power</td>
<td>IPS Anti-glare</td>
<td>400 nits</td>
<td>16.9</td>
<td>800:1</td>
<td>72%</td>
<td>170°</td>
<td></td>
</tr>
<tr>
<td>14.0”</td>
<td>FHD (1920x1080) ThinkPad Privacy Guard</td>
<td>IPS Anti-glare</td>
<td>400 nits</td>
<td>16.9</td>
<td>1000:1</td>
<td>72%</td>
<td>170°</td>
<td></td>
</tr>
</tbody>
</table>

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

### Storage Optical

- M.2 2280 SSD / PCIe NVMe, PCIe 3.0 x 4
- None

### 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) Bluetooth™

- Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0
- Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter

### WWAN (optional)

- One of the following, configurable by model:
- * Wireless WAN upgradable
- * 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

- **Weight:**
  - Models: FHD / FHD Low Power / FHD Privacy Guard
  - Weight: 2.92 lb / 1.33 kg

### Smart card reader

- Optional: Smart card reader
- **Smart card reader:** MicroSD card reader
- **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, nano-SIM card slot (WWAN models), headphone / microphone combo jack, optional smart card reader, microSD card reader, side docking connector, security keyhole

### Monitor cable

- **Monitor cable (optional):**
  - **Bundled Accy:** Lenovo USB-C to VGA Adapter
    - Optional: ThinkPad Ethernet Extension Adapter Gen 2

### Camera

- 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
- * 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 System Mgt:** Discrete TPM 2.0, TCG Certified
- **DASH Management:**
- **Fingerprint reader:** Optional: Touch style match on chip fingerprint reader on the palm rest

### Battery

- **Battery:**
  - Integrated Li-ion 57Wh battery, supports Rapid Charge (charge up to 80% in 1hr) MobileMark® 2014: 16.4 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

### MIL-Spec test

- MIL-STD-810G military testing

### Environment

- EPEAT™ Silver; ENERGY STAR® 7.1; RoHS-compliant

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

<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>7th Generation Intel® Core™ i5 Processor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>i5-7200U</td>
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<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>
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<th>Memory Types</th>
<th>Processor Graphics</th>
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<td>3.4 GHz</td>
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<td>i5-8350U</td>
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<td>8</td>
<td>1.7 GHz</td>
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<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
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<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>
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<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 Specifications

- 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.

### Chipset Memory Specifications

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

### Display Specifications

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

### Storage Specifications

- 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 Memory Specifications

- Intel Optane memory, PCIe NVMe, PCIe 3.0 x 2 (optional)

### Ethernet Specifications

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

- One of the following, configurable by model:
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7682 (Fibocom L830-EB), M.2 card (EMEA only)
  - Integrated Mobile Broadband 4G LTE-A, Intel XMM™ 7460 (Fibocom L850-GL), M.2 card
  - For non-WWAN model, the model is NOT WWAN upgradable

### SIM card (opt)

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

### Product Specifications Reference (PSREF)

- Lenovo ThinkPad T580 Platform Specifications
- ThinkPad T580 Product Specifications Reference (PSREF)

- **Dimensions:** WxDxH: 14.40" x 9.95" x 0.79-0.80"; 365.8mm x 252.8mm x 19.95-20.2mm
- **Weight:** Integrated model: starting at 4.29 lb / 1.95 kg;
  Discrete model: starting at 4.39 lb / 1.99 kg
- **Case color:** Black
- **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

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

- **Monitor cable (optional):** Lenovo HDMI to VGA Monitor Adapter
  Lenovo HDMI to VGA Monitor Adapter
  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
  - HD720p camera and HD720p camera, fixed focus
  - HD Audio, Realtek ALC3287 codec / stereo speakers, 2W x 2, Dolby Audio Premium / dual array microphone, headphone / microphone combo jack

- **Audio support:** Intel 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, 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
  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
  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
  Max battery life 5.8 hr 12.5 hr 18.1 hr 13.8 hr 20.3 hr 26.1 hr

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

- **AC adapter:** 45W or 65W USB type-C AC adapter

- **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 onsite service

- **MI-Spec test:** MIL-STD-810G military testing

- **Environment:** EPEAT Silver; ENERGY STAR® 6.1; RoHS-compliant

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

Lenovo
July 2019
# ThinkPad T590 Platform Specifications

**Dimensions**

- WxDxH: 14.40" x 9.76" x 0.75"; 365.8mm x 248mm x 19.1mm
- Weight:
  - FHD model: 3.87 lb / 1.75 kg;
  - UHD model: 3.86 lb / 1.75 kg

**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>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>4.1 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8565U</td>
<td>7</td>
<td>8</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>
<tr>
<td>i7-8865U</td>
<td>7</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
- 4096x2160 (Thunderbolt);
- 4096x2160@24Hz (HDMI)

**Chipset**

- Intel SoC (System on Chip) platform
- 48GB max / 2400MHz DDR4, dual-channel capable;
- 8GB or 16GB memory soldered to system board, one DDR4 SO-DIMM socket

**Memory**

- *Installed memory is actually 2066MHz but run at 2400MHz due to Intel limitation*

**Display**

- **Size**
  - 15.6": FHD (1920x1080) IPS Anti-glare 250 nits 16:9 700:1 100% 170°
  - 15.6": UHD (3840x2160) HDR, Dolby Vision™ IPS Anti-glare 500 nits 16:9 1200:1 100% Adobe 170°

**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
- Intel Optane™ Memory H10 with Solid State Storage
- M.2 2280, PCIe NVMe 3.0 x 4

**Optical**

- None

**Ethernet**

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

**WLAN (optional)**

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

**Bluetooth™**

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

**WWAN (optional)**

- Wireless WAN upgradable
- Integrated Mobile Broadband 4G LTE, Fibocom L830-EUB, 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
- Nano-SIM card slot, optional Verizon LTE (US) SIM card

**SIM card**

- Non-vPro model:
  - Multi-touch
- vPro model:
  - UltrNav
  - 6-row, spill-resistant, multimedia Fn keys, numeric keypad, optional LED backlight pointing device and buttonless Mylar surface multi-touch touchpad
  - Intel vPro Technology
  - Intel vPro Technology

**Audio support**

- HD720p camera with ThinkShutter camera privacy, fixed focus
- IR camera and 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 comb jack

**Security**

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

**System Mgl (opt)**

- 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)
- 65W USB Type-C AC adapter
- Max battery life
  - MobileMark® 2014: 14.98 hr (9.5 hr for UHD model with discrete graphics)
  - 45W or 65W USB Type-C AC adapter

**AC adapter**

- Windows® 10 Home 64 or Windows 10 Pro 64

**Preload**

- 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

**Limited warranty**

- One of the following, configurable by model:
  - Limited warranty
  - Limited warranty

**Mi-Spec test**

- MIL-STD-810G military testing

**Environment**

- EPEAT™ Silver; ENERGY STAR® 7.1; RoHS-compliant

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

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Lenovo

July 2019
## ThinkPad X1 Carbon (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>Max Turbo Frequency</th>
<th>Cache</th>
<th>Processor Graphics</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i5-6200U</td>
<td>2</td>
<td>4</td>
<td>2.3 GHz</td>
<td>2.8 GHz</td>
<td>3MB</td>
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<td>i5-6300U</td>
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<tr>
<td>i7-6500U</td>
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<td>LPDDR3-1866</td>
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</table>

For 7th 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>
<th>Memory Types</th>
<th>Processor Graphics</th>
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<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>Intel HD Graphics 620</td>
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<td>i5-7300U</td>
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<td>4</td>
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<td>3.9 GHz</td>
<td>4MB</td>
<td></td>
<td>LPDDR3-1866</td>
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</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)

### Chipset

- Intel SoC (System on Chip) platform
- 8GB or 16GB / 1866MHz LPDDR3 / soldered to systemboard, no sockets

### Display

- **Some:** 14.0" (355mm) FHD (1920x1080), anti-glare, LED backlight, IPS, supports external digital monitor via HDMI or USB Type-C;
- **Some:** 14.0" (355mm) WQHD (2560x1440), anti-glare, LED backlight, IPS, supports three independent displays;
- Max resolution: 4096x2304@60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

### Storage

- M.2 SSD / PCIe NVMe, PCIe 3.0 x 4, 32Gb/s (e.g. xxxGB SSD M.2 PCIe NVMe)
- M.2 SSD / SATA 6.0Gb/s (e.g. xxxGB SSD M.2)
- 300 nits, 16:9 aspect ratio, 700:1 contrast ratio, 170° viewing angle

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

### SIM card (optional)

- Mi-Spec test MIL-STD-810G military testing

### Preload

- Windows 7 Professional installed through HP's preload services
- Some: Windows 10 Home 64 bit
- Some: Windows 10 Pro 64 bit

### Security

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

### Battery

- Integrated Li-Polymer 3-cell (3Wh) RapidCharge battery
- * Battery life varies significantly with settings, usage, & other factors
- MobileMark® 2014: 15.5 hr

### Chipset

- ThinkPad Ethernet Extension Cable
- 6-row, spill-resistant, multimedia Fn keys, LED backlight
- TrackPoint® pointing device and buttonless Glass surface multi-touch touchpad

### Audio

- HD Audio, Conexant® CX11871 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack
- HD Audio, Conexant® CX11871 codec / stereo speakers, 2W x 2 / dual array microphone, combo audio/microphone jack
- **Some:** 12.74" x 8.55" x 0.63"; 323.5mm x 217.1mm x 15.95mm
- Starting at 2.49 lb / 1.13 kg
- Black or Silver (silver is NOT available in EMEA)
- Display cover: CFRP/GFRP hybrid; Bottom: magnesium alloy hybrid

### Environment

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

---

**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>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
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<tbody>
<tr>
<td>i5-7300U</td>
<td>2</td>
<td>4</td>
<td>2.6 GHz</td>
<td>3.5 GHz</td>
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<td>Intel UHD Graphics 620</td>
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</table>

**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>
<th>Cache</th>
<th>Memory Types</th>
<th>Processor Graphics</th>
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<td>8MB</td>
<td></td>
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<td>i7-8650U</td>
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<td>1.9 GHz</td>
<td>4.7 GHz</td>
<td>8MB</td>
<td></td>
<td></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: 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

### 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, 150:1 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)

### Optane™ memory

- None

### Optical

- None

### Ethernet

- Native Intel Ethernet Connection I219-V (Non-vPro) or I219-LM (vPro)
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2: 802.11ac + Bluetooth 4.1, M.2 card
  - Intel Dual Band Wireless-AC 8265, Wi-Fi 2x2: 802.11ac + Bluetooth 4.1, M.2 card
  - *For non-WWAN model, it means the model is NOT WWAN upgradable

### 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

- WxDxH: 12.74" x 8.55" x 0.63"; 323.55mm x 217.11mm 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: CFP&R/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 (optional)

- 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

### Keyboard

- 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

- Intel vPro Technology
  - Fingerprint reader
    - 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 (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

- 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 testing

### Environment

- EPEAT® Gold (US only); ENERGY STAR® 6.1; RoHS-compliant
ThinkPad X1 Carbon (7th Gen) 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>
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</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>LPDDR3-2133</td>
<td>Intel UHD Graphics 620</td>
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<td>i5-8365U</td>
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<td>8</td>
<td>1.6 GHz</td>
<td>4.1 GHz</td>
<td>8MB</td>
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</tr>
<tr>
<td>i7-8565U</td>
<td>4</td>
<td>8</td>
<td>1.8 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i7-8665U</td>
<td>4</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.8 GHz</td>
<td>8MB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graphics

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

Chipset

Intel SoC (System on Chip) platform

Memory

8GB or 16GB / 2133MHz LPDDR3 / soldered to systemboard, no sockets

Display

- Size: 14.0" FHD (1920x1080)
- Type: Multi-touch
- Surface: Anti-glare
- Brightness: 300 nits
- Aspect Ratio: 16:9
- Contrast Ratio: 72%
- Color Gamut: 72%
- Viewing Angle: 170°

Multi-touch (opt)

Capacitive-type multi-touch, supports 10-finger gesture (FHD only), anti-reflection (AR), anti-smudge coating

Storage

One of the following, configurable by model:
- M.2 2280 SSD / SATA 6.0Gb/s
- M.2 2280 SSD / PCIe NVMe 3.0 x 4
- Intel Optane™ Memory H10 with Solid State Storage, M.2 2280, PCIe NVMe 3.0 x 4
- Intel Optane SSD, M.2 2280, PCIe NVMe 3.0 x 2

Optical

None

Ethernet

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

WLAN

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

Bluetooth™

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-A, Fibocom L850-GL, M.2 card
- Integrated Mobile Broadband 4G LTE-A, Fibocom L860-GL, MIMD 2x2, 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

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

Audio support

HD Audio, Realtek® ALC3268 codec / Dolby® Atmos™ speaker system, 2W x 2, 0.8 x 2 / 4 array far-field microphones, headphone / microphone combo jack

Keyboard

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

Battery

Integrated Li-ion 51Wh battery, supports Rapid Charge (charge up to 80% in 1hr) with 65W USB Type-C AC adapter

Max battery life

MobileMark® 2014: 18.3 hr

Near Field Communication

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

Mil-Spec test

MIL-STD-810G military testing

Environment

EPEAT™ Silver; ENERGY STAR® 7.1; RoHS-compliant

Lenovo July 2019
## ThinkPad X1 Extreme 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>i5-8300H</td>
<td>4</td>
<td>8</td>
<td>3.7 GHz</td>
<td>4.4 GHz</td>
<td>8MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
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<tr>
<td>i5-8400H</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>
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<tr>
<td>i7-8750H</td>
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<td>12</td>
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<td>4.1 GHz</td>
<td>9MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</td>
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<tr>
<td>i7-8855H</td>
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<td>4.3 GHz</td>
<td>9MB</td>
<td>DDR4-2666</td>
<td>Intel UHD Graphics 630</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)

### Chipset
- Mobile Intel CM246 Chipset
- 64GB max / 2666MHz DDR4, 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) HDR 4K (3840x2160) with Dolby Vision™, 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)
- 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 / 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 (optional)
- None
- 0/1 support
- None

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

### 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
- None

### Dimensions
- WxDxH (non-touch): 14.24" x 9.67" x 0.72"
- WxDxH (multi-touch): 14.24" x 9.67" x 0.74"
- Weight: 3.76 lb (1.7 kg)
- Multi-touch model: 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

### Monitor cable
- Optional: ThinkPad Ethernet Extension Cable

### Security chip
- Discrete TPM 2.0, TCG Certified

### 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 or Windows 10 Pro 64

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

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

Lenovo
July 2019
## ThinkPad X270 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>Graphics</th>
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</thead>
<tbody>
<tr>
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<td>Intel HD Graphics 520</td>
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<td>Intel HD Graphics 520</td>
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<td>Intel HD Graphics 520</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 display monitors via HDMI or USB Type-C;
- Supports three independent displays;
- Max resolution: 4096x2160 @60Hz (USB Type-C); 4096x2160@24Hz (HDMI)

### Chipset

- 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

- Some: 12.5" (317.5mm) HD (1366x768), anti-glare, LED backlight, 220 nits, 16:9 aspect ratio, 500:1 contrast ratio
- Some: 12.5" (317.5mm) HD (1366x768), anti-glare, LED backlight, 300 nits, 16:9 aspect ratio, 800:1 contrast ratio, 170° viewing angle
- Some: 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 (optional)

- 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: 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. x800GB 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 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

### SIM card (optional)

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

---

**Dimensions**

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

**Weight**

- Models: No + 3-cell: 2.79 lb / 1.27 kg, 3-cell: 2.98 lb / 1.36 kg, 3-cell + 6-cell: 3.33 lb / 1.52 kg

**Case color**

- Black

**Case material**

- Glass-Fiber Reinforced Plastic

**Display cover**

- 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 (USB 3.0, one Always On), USB 3.1 Type-C Gen 1 (with the function of Power Delivery and DisplayPort), HDMI 1.4b, Ethernet (RJ-45), Dock connector
  - * Depending on many factors, actual data transfer speed may be lower than theoretical speed

**WiGig dock (optional)**

- ThinkPad WiGig dock, mutually exclusive with WWAN (US only)

**Monitor cable**

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

**Fingerprint reader**

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

**Audio support**

- HD Audio, Realtek ALC3268 codec / stereo speakers, 1.5W x 2 / dual array microphone, combo audio/microphone jack

**Keyboard**

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

**UltraNav™**

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

**Security chip**

- Intel vPro Technology

**vPro (optional)**

- Intel vPro Technology

**Fingerprint reader**

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

**Near Field Communication**

- Intel vPro Technology

**Internal battery**

- Optional: Integrated Li-ion or Li-Polymer 3-cell (23Wh)

**External battery**

- Li-ion 3-cell (23Wh) or 6-cell (48Wh or 72Wh)

**Max battery life**

- Models: No + 3-cell: 6.52 hr, 3-cell: 13.04 hr, 3-cell + 6-cell: 20.1 hr, 3-cell + 6-cell: 26.9 hr

**AC adapter**

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

**Preload**

- Windows® 7 Professional 64 preinstalled

**Limitation 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 testing

**Environment**

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

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Lenovo

April 2019
## ThinkPad X280 Platform Specifications

### Processor

**7th Generation Intel® Core™ i3 / i5 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>i3-7130U</td>
<td>2</td>
<td>4</td>
<td>2.7 GHz</td>
<td>3.5 GHz</td>
<td>3MB</td>
<td>DDR4-2133</td>
<td>Intel HD Graphics 620</td>
</tr>
<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>4</td>
<td>8</td>
<td>2.6 GHz</td>
<td>4.0 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
</tbody>
</table>

**8th Generation Intel Core i3 / 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>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>4.0 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i5-8550U</td>
<td>4</td>
<td>8</td>
<td>1.7 GHz</td>
<td>4.0 GHz</td>
<td>6MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8550U</td>
<td>4</td>
<td>8</td>
<td>1.9 GHz</td>
<td>4.3 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;
- 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, 8GB, or 16GB / 2400MHz DDR4 / soldered to systemboard, no sockets
- * 4GB memory is NOT available in US and EMEA
- * System clocks down for processors with lower memory controller

### Display

**Some:**
- 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

###oretical speed

**Optical**

- None

### Ethernet

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

### 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:
  - Integrated Mobile Broadband 4G LTE, Intel XMM™ 7660 (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 (optional)

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

### 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 testing

### Environment

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

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

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*Lenovo April 2019*
ThinkPad X390 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>i3-8145U</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>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>i5-8365U</td>
<td>4</td>
<td>8</td>
<td>1.6 GHz</td>
<td>4.1 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>1.8 GHz</td>
<td>4.6 GHz</td>
<td>8MB</td>
<td>DDR4-2400</td>
<td>Intel UHD Graphics 620</td>
</tr>
<tr>
<td>i7-8655U</td>
<td>4</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; 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 system board, 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>500:1</td>
<td>45% 90°</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>800:1</td>
<td>500:1 700:1  72% 170°</td>
</tr>
<tr>
<td>13.3&quot;</td>
<td>FHD (1920x1080)</td>
<td>ThinkPad Privacy Guard</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 (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
- Intel Optane™ Memory H10 with Solid State Storage, M.2 2280, PCIe NVMe 3.0 x 4

Optical

None

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:
- Intel Wireless-AC 9560, Wi-Fi 2x2 802.11ac + 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

Bluetooth™

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

WWAN (optional)

- 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

Audio

Premium / 7.1; RoHS-compliant

Camera

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

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 chip

Discrete TPM 2.0, TCG Certified

Security

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

System Mgt (optional)

Intel vPro Technology

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 testing

Environment

EPEAT® Silver; ENERGY STAR® 7.1; RoHS-compliant

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

Lenovo
July 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 Controller</th>
<th>Graphics</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD Ryzen™ PRO Mobile Processors with Radeon™ Vega Graphics</td>
<td>4</td>
<td>4</td>
<td>2.1 GHz</td>
<td>3.5 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 6 Graphics</td>
</tr>
<tr>
<td>Ryzen 3 3300U</td>
<td>4</td>
<td>4</td>
<td>2.1 GHz</td>
<td>4.0 GHz</td>
<td>2MB L2 / 4MB L3</td>
<td>DDR4-2400</td>
<td>Radeon Vega 8 Graphics</td>
</tr>
<tr>
<td>Ryzen 5 3500U</td>
<td>8</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 10 Graphics</td>
</tr>
<tr>
<td>Ryzen 7 3700U</td>
<td>8</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 Vega 10 Graphics</td>
</tr>
</tbody>
</table>

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

### Graphics

| Graphics | AMD Radeon Vega 6, Vega 8, or Vega 10 Graphics in processor; supports external digital monitor via USB-C or HDMI; supports three independent displays; Max resolution: 4096x2304@60Hz (USB-C): 4096x2160@24Hz (HDMI) |

### Chipset

<table>
<thead>
<tr>
<th>Chipset Memory</th>
<th>AMD SoC (System on Chip) platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>8GB or 16GB / 2400MHz DDR4 / soldered to systemboard, no sockets</td>
<td></td>
</tr>
</tbody>
</table>

### Display

<table>
<thead>
<tr>
<th>Display</th>
<th>Size</th>
<th>Resolution</th>
<th>Type</th>
<th>Surface</th>
<th>Brightness</th>
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<td>45%</td>
<td>90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.3&quot; FHD (1920x1080)</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>300 nits</td>
<td>16:9</td>
<td>800:1 (non-touch)</td>
<td>700:1 (multi-touch)</td>
<td>72%</td>
<td>170°</td>
<td></td>
</tr>
<tr>
<td>13.3&quot; FHD (1920x1080)</td>
<td>ThinkPad Privacy Guard</td>
<td>IPS</td>
<td>Anti-glare</td>
<td>400 nits</td>
<td>16:9</td>
<td>1000:1</td>
<td>72%</td>
<td>178°</td>
<td></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

### Optical

None

### Ethernet

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Native Realtek® RTL8153 Gigabit Ethernet connection via bundled or optional ThinkPad Ethernet Extension Adapter Gen 2</th>
</tr>
</thead>
</table>

### WLAN (optional)

| Bluetooth™ | Intel Wireless-AC 9260, Wi-Fi 2x2 802.11ac + Bluetooth 5.0 Bluetooth 5.0 wireless, integrated in Wi-Fi + Bluetooth combo adapter |

### WWAN (optional)

- One of the following, configurable by model:
  - Wireless WAN upgradeable
  - Integrated Mobile Broadband 4G LTE-A, Fibocom L850-GL, M.2 card
- Nano-SIM card slot, optional Verizon LTE (US) SIM card

### Media reader

- MicroSD card reader, in the combo slot with nano-SIM card
- 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
- Depending on many factors, actual data transfer speed may be lower than theoretical speed

### Monitor cable (optional)

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

### Bundled Accy (optional)

- ThinkPad Ethernet Extension Adapter Gen 2

### Software

- Mini-OS (optional)
- Windows 10 Home 64 or Windows 10 Pro 64

### Security

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

### System Mgt

- DASH Management
- Discrete TPM 2.0, TCG Certified

### Fingerprint reader

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

### Battery

- Integrated Li-ion 48Wh battery, supports Rapid Charge (charge up to 80% in 1hr)
- Batteries may vary significantly with settings, usage, & other factors

### AC adapter

- 4S or 6S USB Type-C AC adapter
- MobileMark® 2014: 14.5 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

### Mil-Spec test

- MIL-STD-810G military testing

### Environment

- EPEAT™ Silver; ENERGY STAR® 7.1; RoHS-compliant

Note: The specifications above may not be available in all regions.
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Limited warranty: Support unrelated to a warranty issue may be subject to additional charges.

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Carry-in or Mail-in Service: Parts and labor repair coverage where the customer is responsible for shipping (including packaging) or delivery to authorized warranty provider or repair center.

Depot or Courier Service: Parts and labor repair coverage where shipping (including packaging) or delivery to the repair center is paid for by Lenovo.

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

Onsite / In-home Service: Parts and labor repair coverage where labor is provided onsite at your place of business. 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.


Included software: may differ from its retail version (if available), and may not include user manuals or all program functionality. Software license agreements may apply.

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.


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