

# ThinkPad, ThinkBook & ThinkCentre 2019



Flemming Märtens | 18. Juni, 2019

# ThinkPad 2018 – 2019 Corporate Roadmap

CY 2018			CY 2019			
Q2	Q3	Q4	Q1	Q2	Q3	Q4
2017 Sky Lake ThinkPad (Win 7 DG)			T470, X270, T470s, L570, P51 Forecast needed			
			EOL 31/12			
2018 Kaby Lake R ThinkPad All ThinkPads						
			Non-vPro ThinkPads T490, T490s, T590, X390, X390 Yoga L390, L390 Yoga, E490, E590			
			vPro ThinkPads T490, T490s, T590, X390, X390 Yoga L490, L590, X1 Carbon, X1 Yoga			
2018 Raven Ridge AMD ThinkPad			2019 Picasso AMD ThinkPad T495, T495s, X395			

# What's New on ThinkPad in 2019

- X1, X, T are ALL completely new designs

- First ever CNC Aluminum ThinkPad: X1 Yoga
- X280 moves to the 13.3" X Series clamshell: X390
- Mechanical docking expansion - now available on X1 Yoga, X390 Yoga
- Single ThinkShutter now covers both RGB, IR – on all\*

- Industry leading display technology

- Dolby Vision / HDR displays on X1C, X1Y, X1E, T490s, T490, T590
- New 400 NIT FHD, low power panel on 14" T Series / X1

- ThinkPad Privacy Guard on 5 platforms

- Privacy Guard implemented on new 400 NIT FHD panel
- T490s, T490, X1 Carbon, X1 Yoga, X390
- Includes ThinkPad Privacy Alert shoulder surfing detection SW

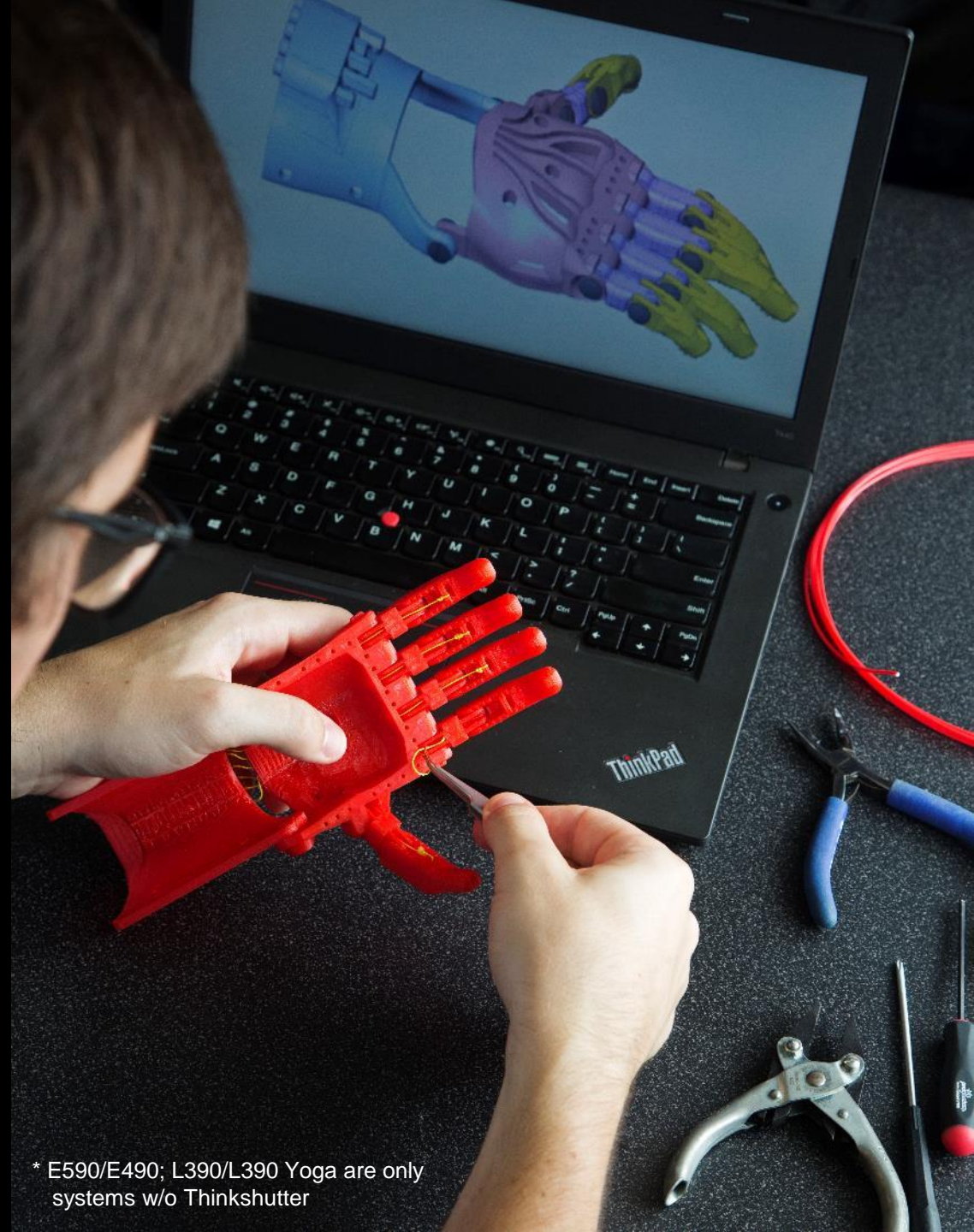
- Enhanced Audio Experiences

- Dolby Atmos sound system on X1 Carbon, X1 Yoga
- Four rich sounding, up/down firing speakers T490
- Four far field microphones on X1, two far field on T/X – digital personal assistant ready (eg.Cortana, Alexa)

- High Speed CAT16 WWAN on X1 Carbon, T490

- Moving from CAT 9 to CAT 16 (450 Mbit/s -> 1024 Mbit/s)

Lenovo



\* E590/E490; L390/L390 Yoga are only systems w/o Thinkshutter

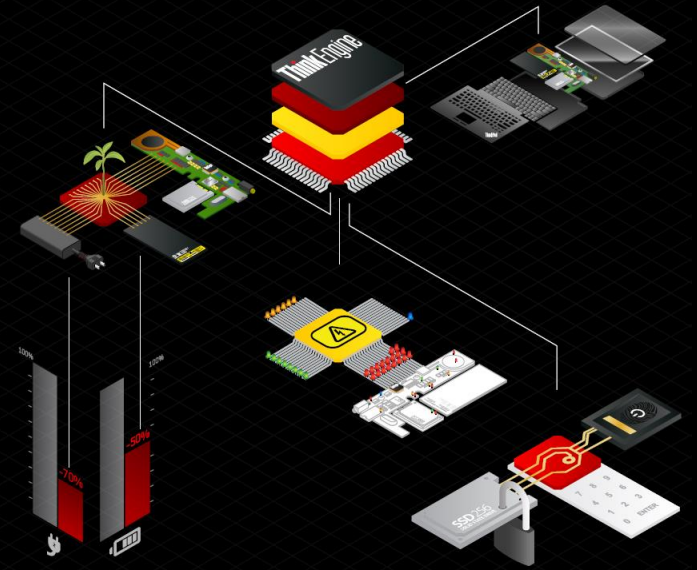
# ThinkEngine – Unique ThinkPad control chip – smarter, smaller, more efficient

## What we did:

- ThinkEngine is a unique system management chip developed by Lenovo engineers in Japan, exclusively for ThinkPad systems.
- Monitors up to 33 sensors simultaneously – including thermal, voltage, security, and G-sensors.

## Why it matters to customers:

- Delivers improved thermal and power efficiency, improved standby, faster resume times, enhanced security, as well as anti-tampering measures.



### ThinkEngine makes possible or improves functions such as:

Thermal Fan control, Sleep/Hibernate, Intelligent Cooling, Always on USB, Thunderbolt 3, Docking, Intelligent PC Diagnostics, Smart Standby, and others. All in a package that is 44% smaller and uses 19% less power than separate controller chips for these functions.

# Low-power displays to enable 4K experience with reduced impact to battery life

## What we did:

- Developed a new 500-nit, HDR400, 100% Adobe color-gamut, low-power UHD (4K) display with Dolby Vision that offers a bright, crisp image without sacrificing battery life, system thinness, thin bezels or ThinkPad durability.
- Available in flagship X1 Carbon and X1 Yoga

## Why it matters to customers:

- A brighter, crisper image makes text, icons and details easier to see
- The 14" UHD display offers more resolution than can be seen with the human eye (at a typical viewing distance of 18 inches).
- LTPS (Low-temperature polycrystalline silicon) technology boosts brightness to 500-nits with the same battery life of a 300 nit display
- 100% AdobeRGB color gamut displays a wider range of colors for accurate photo and video editing



# Low-power 400 nit FHD display for brightness w/ reduced impact to battery life

- What we did:

- Developed a new 400-nit, low-power FHD (1920x1080) display that offers a bright, crisp image without sacrificing battery life, system thinness, thin bezels or ThinkPad durability.

- Why it matters to customers:

- A brighter, crisper image makes text, icons and details easier to see
- The 14" FHD display offers more resolution than can be seen with the human eye (at a typical viewing distance of 18 inches).
- Outstanding battery life - LTPS technology boosts brightness to 400-nits with even better battery life than a 300 nit display.



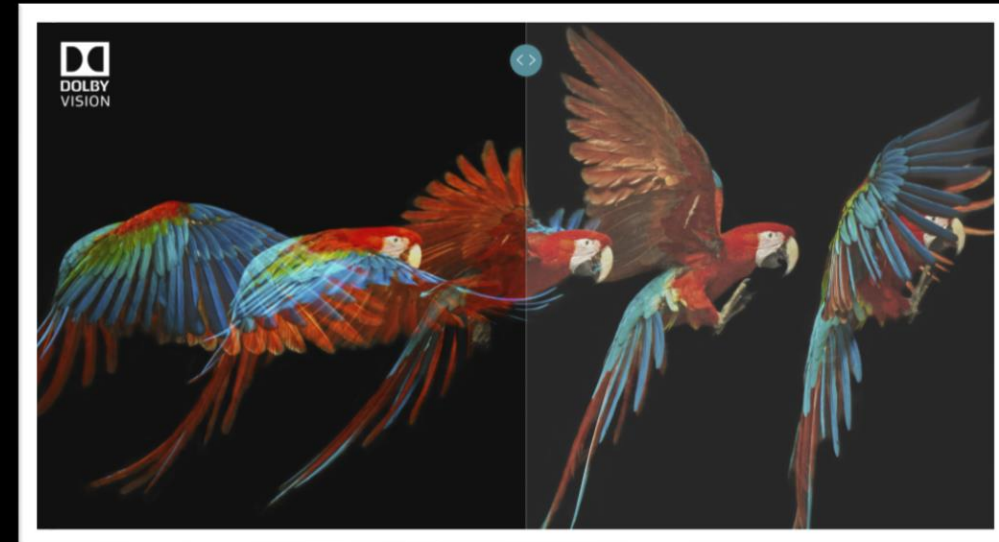
# Dolby Vision / HDR on more systems for outstanding visual performance

- What we did:

- Developed 500-nit, 100% Adobe color-gamut, Dolby Vision screen for a broader range of ThinkPad systems in 2019.

- Why it matters to customers:

- Dolby Vision HDR brings extraordinary color, contrast and brightness for an amazing user experience.



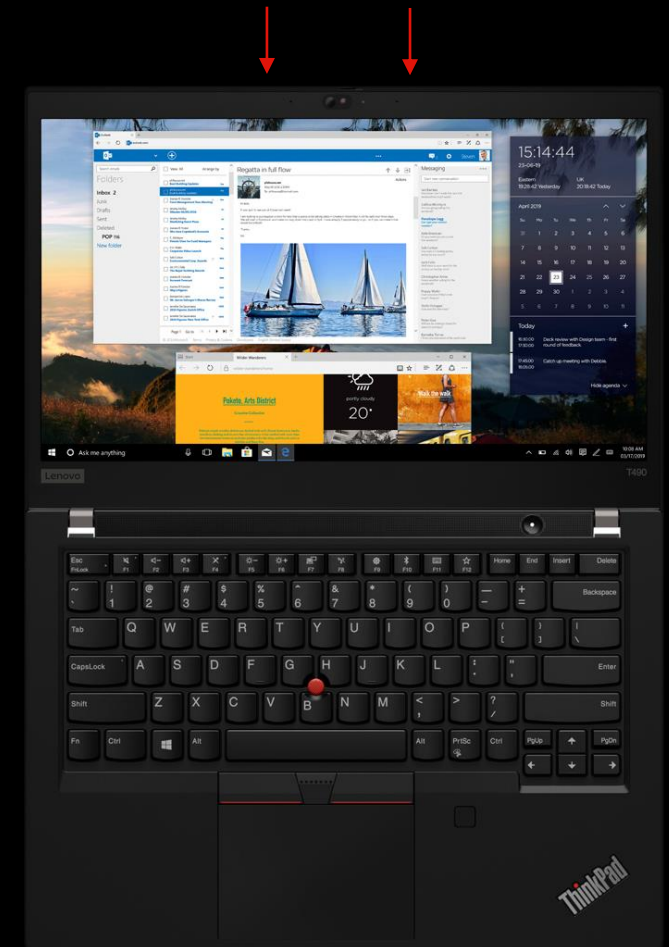
# Dual far-field microphones on T/X, quad on X1 Carbon/Yoga

## What we did:

- Included 4 microphones on X1 Carbon and X1 Yoga
- T Series and X Series gets dual microphones for 360° reception & 4 meter far-field performance.

## Why it matters to customers:

- Improved user experience with VOIP conferencing performance for improved productivity, particularly when multiple participants are speaking in the same room.





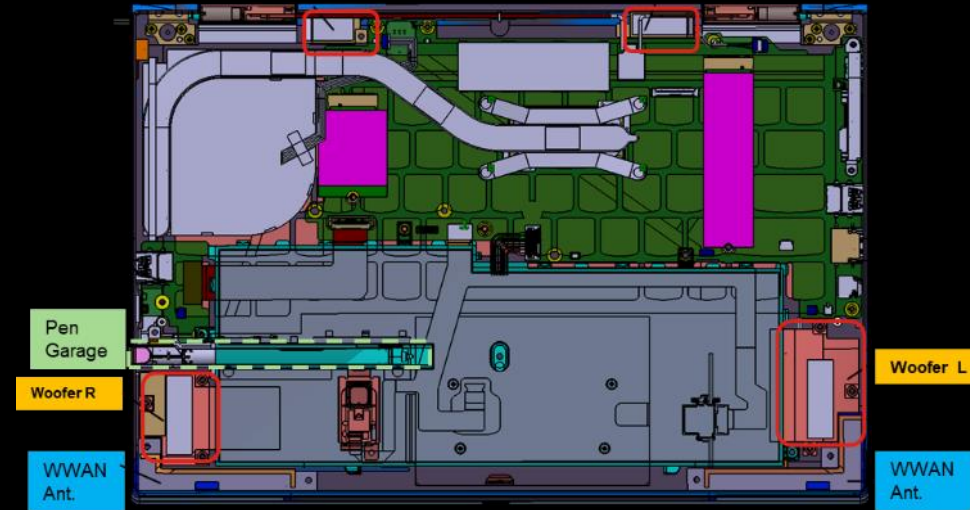
# 4-speaker Dolby Atmos Speaker System

## What we did:

- Redesigned X1C and X1Y for 2019 to include a 4-speaker Dolby Atmos Speaker System
- Extensively modeled multiple designs for the placement and shape of the speakers to optimize the audio experience on each system.
- Two top firing tweeters and two down firing woofers replace the previous design with only two total mid-range speakers.

## Why it matters to customers:

- Outstanding audio worthy of the flagship ThinkPad notebook
- More realistic, immersive sound with Atmos content, supporting Atmos virtual surround sound.



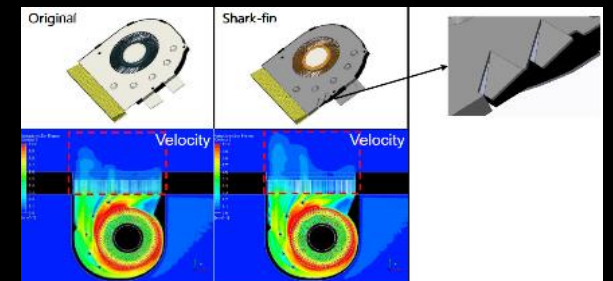
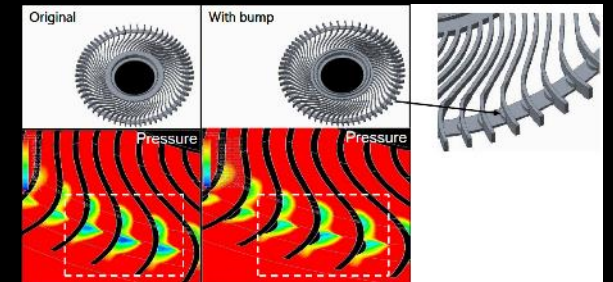
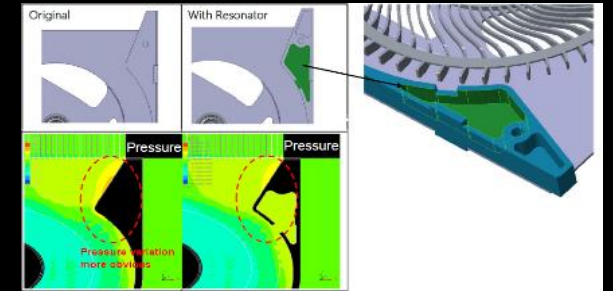
# New fan improvements for more airflow without increasing noise

## What we did:

- Developed 3 new fan/cooling technologies to improve acoustics, increase airflow, and to make cooling more efficient.
- Added a resonating chamber to cancel high-frequency noise
- Incorporated micro-spoilers on the fan blades to reduce turbulence and increase air flow
- Designed “Shark Gill” shaped structures in the fan case to direct air more efficiently across the cooling fins in the exhaust

## Why it matters to customers:

- Runs quieter at a given level of cooling
- Less distraction for the user



# Modern BIOS - Graphical User Interface (GUI)

## Problem to be solved:

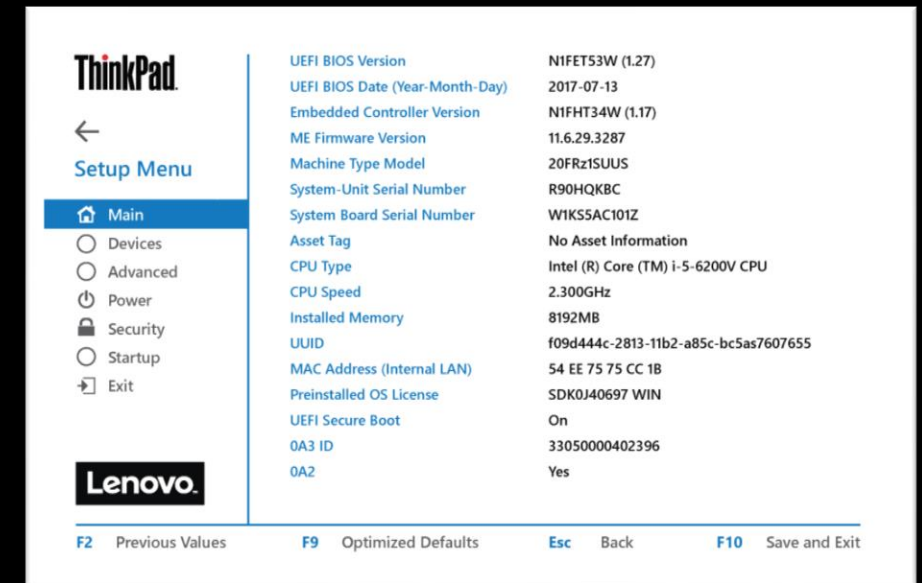
- For many years, ThinkPad BIOS Interface was antiquated, and only supported keyboard input

## What we did:

- Created a new and modern Graphical User Interface supporting multiple input methods.

## Why it matters to customers:

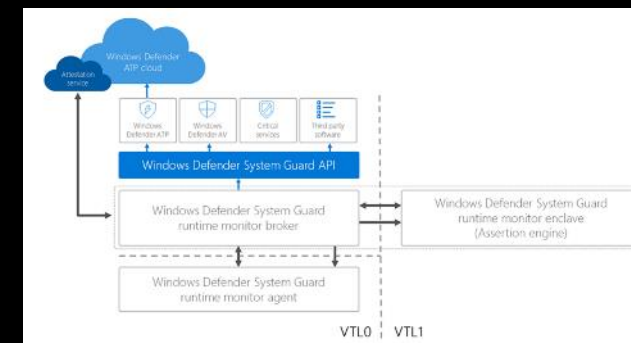
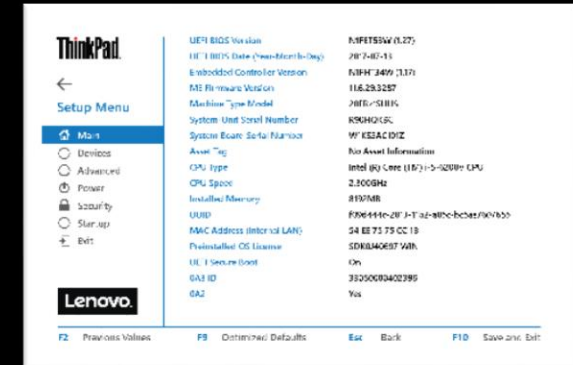
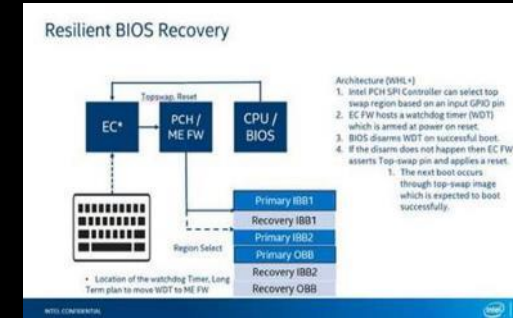
- Customers will enjoy the new look and feel which is optimized for User Experience
- Customers will also be able to use mouse and touch input to change BIOS settings.



# A range of BIOS security enhancements extends ThinkShield leadership

## What we made:

- Security features
  - Remote Supervisor Password Setting
  - Self-Healing BIOS
  - Secure Wipe
  - Privileged Access Password, MS System Guard support
  - Increased Port Access Control (Audio).
- Manageability features include
  - WiFi PXE Boot
  - System Deployment Mode
  - GUI-based BIOS settings.



# ThinkShield Secure Wipe

- Problem to be solved:

- Security conscious customers require a secure and simple way to completely wipe storage drives
  - Traditional methods that once worked on spinning HDDs are not reliable on some SSDs

- What we did:

- Added the ThinkShield Secure Wipe feature into BIOS which reliably deletes all data from a drive without the need for external tools

- Why it matters to customers:

- Customers can now completely delete sensitive data on their drives without the need for external tools or removing the drive from the ThinkPad

# ThinkShield



# ThinkShutter design covering webcam & IR camera for improved camera security

- What we did:
  - Engineered a new ThinkShutter which covers the new all-in-one (combined webcam and IR) camera on most 2019 ThinkPad systems.
  - The new ThinkShutter is engineered around a new spring-based design with a calculated force curve which distinctly clicks into the open and closed positions.
- Why it matters to customers:
  - Better camera security with both webcam and IR camera covered
  - Better user experience with open and close being clearly felt by the user when open or closed.
  - Now available on most 2019 ThinkPad systems.



# ThinkPad Privacy Guard w/ThinkPad Privacy Alert improved & on more systems

## What we did:

- Developed an integrated ePrivacy filter, the ThinkPad Privacy Guard, which reduces the (side) viewing angles of the screen to prevent onlookers from “shoulder surfing” the contents of the user’s screen.
- This also includes ThinkPad Privacy Alert, a unique software feature that will warn users if anyone is looking at their screen and automatically turn on Privacy Guard.
- Improved brightness for 2019

## Why it matters to customers:

- The ThinkPad Privacy Guard allows users to easily reduce viewing angles on their display with a simple keystroke, making security much more convenient and consistent than an add-on screen filter.
- This allows users to work in public and keep anyone seated near them from peering at their sensitive documents and stealing critical information.
- ThinkPad Privacy Alert, adds an extra layer of security by automatically warning users if anyone is looking at their screen and automatically turning on Privacy Guard.



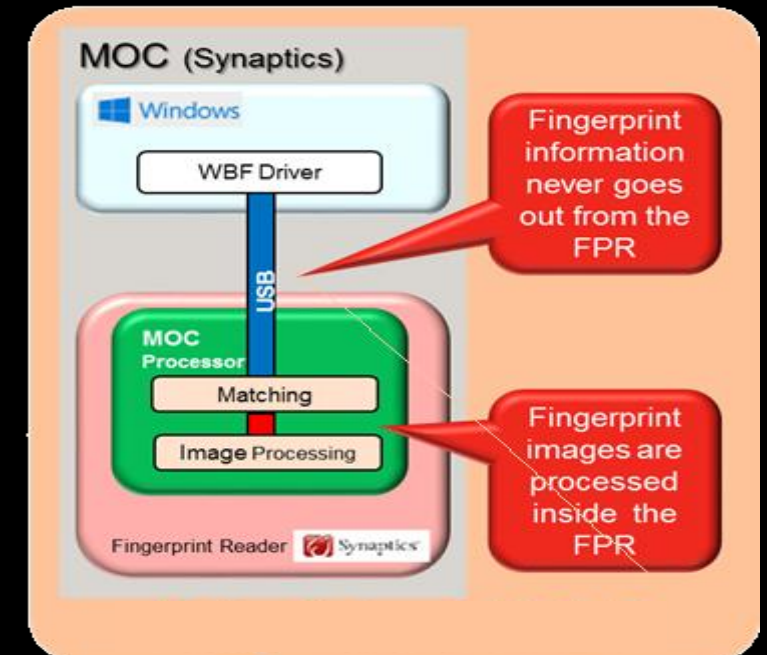
# New, faster Match on Chip fingerprint reader

## What we did:

- Implemented a faster and more secure Match on Chip fingerprint reader for 2019 ThinkPad.
- As with the previous Match on Chip sensor, all fingerprint images and image matching with the previously enrolled fingerprints is done securely in the FPR, and includes “PurePrint” anti-spoofing technology.
- The 2019 sensor is 2-3x faster than the previous generation due to hardware accelerated encryption and matching, and even more secure due to in-silicon template storage.

## Why it matters to customers:

- Most-secure implementation of fingerprint biometrics (MoC + anti-spoof)
- Enhances privacy of fingerprint information and secure online transactions
- Supports enterprise security requirements.
- Speed enhancements improve user experience





# High Speed Wireless – WiFi 6 and CAT16 WWAN

## What we did:

- Integrated WiFi 6 cards for a range of products
- WiFi 6 was formerly known as 802.11ax
  - Max theoretical speed 9.6 Gbit/s
  - Lower power consumption

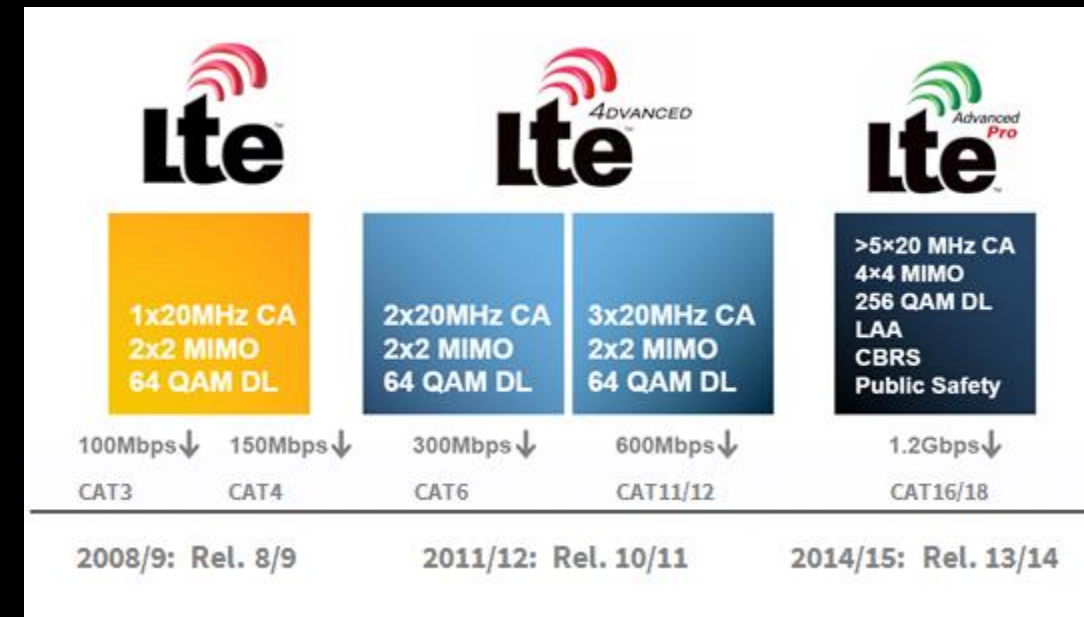


## What we did:

- Integrated LTE CAT16 WWAN with 2x2 antenna support on X1C & X1Y
- Integrated LTE CAT16 WWAN with 4x4 antenna support on T490

## Why it matters to customers:

- Fastest available WLAN/WWAN performance, improving productivity and user experience for mobile users.
- Selection of WWAN cards,
  - LTE cat 6 – 300 Mbit/s
  - LTE cat 9 – 450 Mbit/s
  - LTE cat 16 – 1.0 Gbit/s



# Power-loss Protection (PLP) for SSD



## What we did:

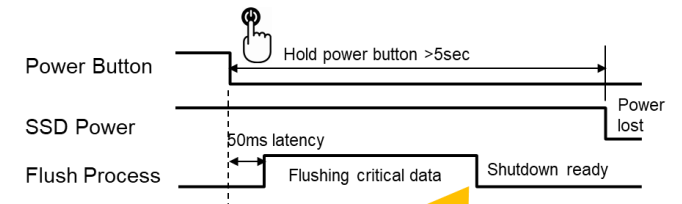
- Developed a method for preventing data loss or corruption when the power button is held down to force power-off.
- Required integration of SSD firmware, motherboard logic, and BIOS
- When power button is pressed, the system begins preparing the SSD for shutdown and flushes critical data within 5 seconds, before system power is lost.
- Requires PCIe SSD or Optane Hybrid memory

## Why it matters to customers:

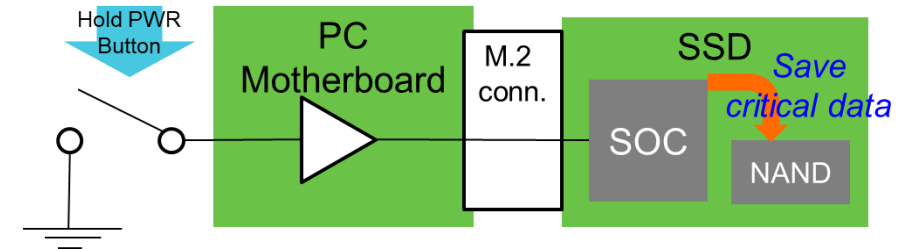
- Prevents critical data loss when the system is powered down using the power button.



Timing Diagram (ungraceful shutdown case)



Flush completes before power loss



# Mil-Spec testing – 12 Methods and 22 Procedures for commercial ThinkPad

## What we did:

- One new procedure is being added to 2019 ThinkPad MIL-STD 810G testing.
- Method 516.6 Shock adds Procedure V – Crash Hazard Shock, a test for high G force shock to the system.

## Why it matters to customers:

- ThinkPad continues to have leadership with MIL-STD in the area of total Methods and Procedures, as well as the span and consistency of testing across the portfolio.



2019 ThinkPad	
500.5 Low Pressure	(2 procedures)
501.5 High Temperature	(2 procedures)
502.5 Low Temperature	(2 procedures)
503.5 Temperature Shock	(2 procedures)
505.5 Solar Radiation	(2 procedures)
507.5 Humidity	(1 procedure)
508.6 Fungus	(1 procedure)
510.5 Sand and Dust	(2 procedures)
511.5 Explosive Atmosphere	(1 procedure)
514.6 Vibration	(2 procedures)
516.6 Shock	(3 procedures) -> (4 procedures) <b>NEW!</b>
528 Vibrations of Shipboard	(1 procedure)
<b>Total Methods: 12</b>	
<b>Total Procedures: 21 -&gt; 22</b>	



**ThinkShield**

# ThinkShield Comprehensive List of Offerings

## Data

- ThinkPad Privacy Guard
- Trusted Service
- Keep Your Drive service
- WinMagic
- Absolute
- OLDB (Online Data Backup)
- SED (Self-Encrypting Drives)
- BitLocker
- HDD Password
- Smart USB Protection
- Disk Wipe Tools
- Intel Remote Secure Erase
- Lenovo Asset Recovery Service
- USB Secure Hard Drive
- Full Drive Encryption
- ITC Image Verification
- Lenovo Asset Recovery Service

## Identity

- Intel Authenticate Multifactor (~\*)
- Match on Chip Fingerprint
- FIDO
- Broad SmartCard Support
- Secure NFC tap-to-login
- Absolute
- Windows Hello
- Intel Online Connect
- IR Camera
- Glance Presence & Gaze Detection

## Online

- BufferZone (sandboxing)
- Coronet (WiFi Security)
- MobileIron
- Lenovo Unified Workspace
- Lenovo WiFi Security
- Intel vPro
- Intel Identity Protection Technology with PKI (Public Key Infrastructure)
- Intel Software Guard Extensions (SGX)

## Device

### Process

- Trusted Supplier Program
- Transparent Supply Chain
- PSIRT & FIRST
- Packaging Security
- ITC Image Verification
- Secure patch/update of drivers/firmware
- Spare Parts Handling
- BIOS Reading Room

### Features

- ThinkShutter
- Ready to Provision (RTP) Preload
- Kensington Lock / Tamper Switch
- Thunderbolt Security
- No backdoor Supervisor Password / NIST Compliant BIOS
- TPM 1.2/2.0
- BIOS Asset Information Area
- Lenovo Patch with Self-Healing from Absolute Software
- Intel Boot Guard
- ITC First Boot Service / Anti Bridge Switch
- Asset Tagging Service / Device Registration
- Absolute Software
- LVFS and Windows Update Firmware Updates
- HVCI Compliant Drivers / One switch DeviceGuard
- C-TPAT Logistics
- Smart USB Protection

# 2019 Docking

CS18 Mechanical dock  
3 versions

Thunderbolt 3 Gen 2 dock

Thunderbolt 3 Workstation dock

USB C Gen 2 dock with native Video

Hybrid USB A/C hybrid dock

USB C Travel dock



# Mechanical Dock (CS18)

## CS18 Mechanical dock

- Basic, one monitor
- Pro, two monitors
- Ultra, three monitors

Enhanced security with key lock  
Native Ethernet from ThinkPad

## Compatible with: 2019 ThinkPads

T490, T490s, T590, T495, T495s

X390, X395, X390 Yoga

L490, L590

X1 Carbon 7th

X1 Yoga 4th

## 2018 ThinkPads

T480, T480s, T580, A485, X280, A285, L480, L580,

X1 Carbon 6<sup>th</sup>



# USB C and Thunderbolt 3 dock

- **USB C Dock Gen 2:**
  - **Display Connections**
    - 2x DisplayPort, 1x HDMI
  - **Max resolution: (DP 1.4 / DP 1.2)**
    - 1x 3840\*2160@60Hz / 3840\*2160@30Hz
    - 2x 3840\*2160@30Hz / 1920\*1080@60Hz
    - 3x 1920\*1080@60Hz / 1280\*720@60Hz
  - **Gigabit Ethernet**
  - 1x USB C, 3x USB A 3.1 Gen 2, 2x USB A 2.0
  - Audio, Kensington lock slot
- **Thunderbolt 3 Gen 2 dock and Workstation dock:**
  - **Display connections**
    - 2x Displayport, 2x HDMI, 1x USB C
  - **Max resolution:**
    - 1x 3840\*2160@60Hz
    - 2x 3840\*2160@30Hz (60hz on X1 Series)
    - 3x 3840\*2160@30Hz on X1 Series
  - **Gigabit Ethernet**
  - 1x USB C (Thunderbolt), 5x USB A 3.1 Gen 2
  - Audio, Kensington lock slot





# Hybrid USB A/C Dock

- Display Connections
  - 2x DisplayPort, 2x HDMI
- Max resolution:
  - 2x 3840\*2160@60Hz
- Gigabit Ethernet
- 1x USB C (Front)
- 5x USB A,
  - 2x USB 2.0, 3x USB 3.0
  - 1 Front, 4 Back
- Audio, Kensington lock slot
- Power to USB C connected laptop
- Separate power is needed for USB A connected laptop



# USB C Travel dock

- USB C Travel Dock Gen 2:
  - HDMI 2.0 (4k 60Hz)
  - VGA
  - RJ45 (Gigabit)
  - USB3.0
  - USB2.0
  - USB-C Charging
- Size
  - 130x53x17mm



# 2019 ThinkPad Portfolio

X1

X1 Extreme



X1 Carbon



X1 Yoga



P1

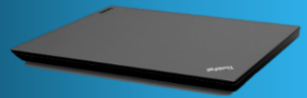


T & X Series

T490s T495s



T590



T490 T495



X390 X395



X390 Yoga



P73



P53



L-Series

L590



L490



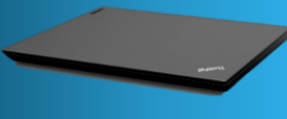
L390



L390 Yoga



P53s



E-Series

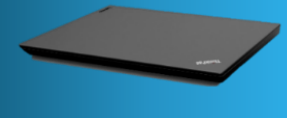
E590 E595



E490 E495



P43s



15"

14"

13"

Convertible

Workstation

Lenovo

# ThinkPad X390/X395



# X390/X395 | The Next Generation of Perfected Mobility

## ***Uncompromising Performance & Design***

- Slim Bezel Design (L/R 48% narrower, top – 20% narrower)
- Up to 32GB DDR4 Memory (soldered)
- HD TN, 400 Nit FHD IPS ,FHD IPS Touch and Privacy Guard panels
- Dual Far-Field Microphones with noise cancellation

## ***Mobility Focused***

- 16.5 mm Thin / 1.22 kg Light
- Narrow Bezel  
15.6 → 7.9 mm (L/R)  
20.4→15.9 mm (TOP)
- Up to 17.6hrs of battery life
- Global LTE WWAN

## ***Ultimate Connectivity & Enhanced Security***

- Privacy Guard for a Comprehensive Privacy Solution
- ThinkShutter for RGB and Hybrid IR Camera
- IR Camera and FPR for Windows Hello



# X390/X395 Overall Dimensions

Dimension(mm):

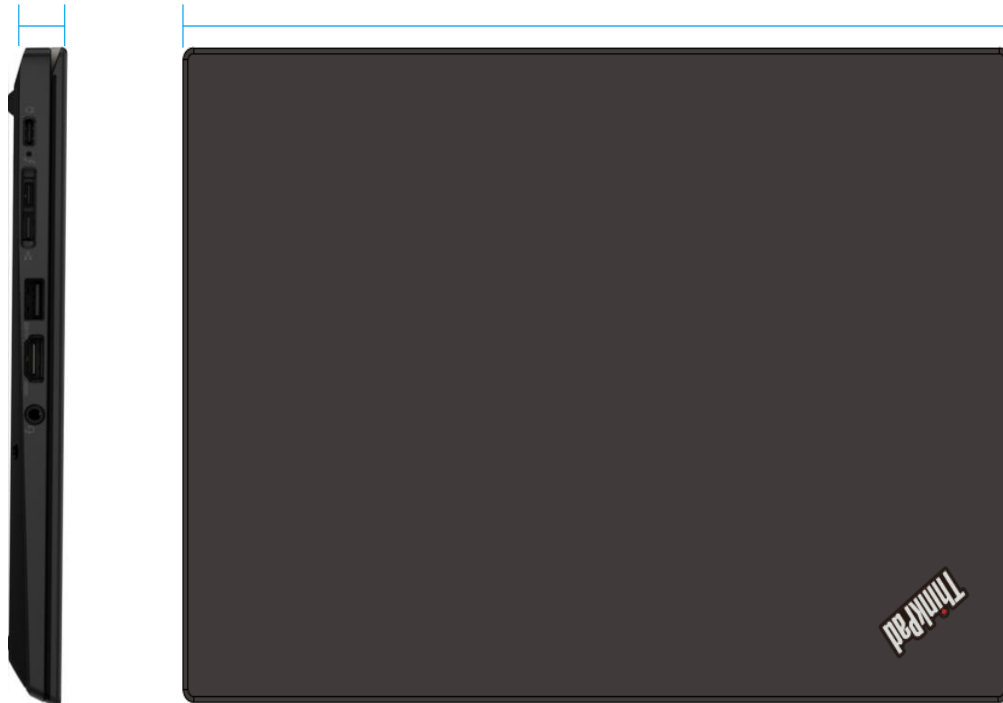
311.9 X 217.0 X 16.5 (PPS 16.9)

Weight:

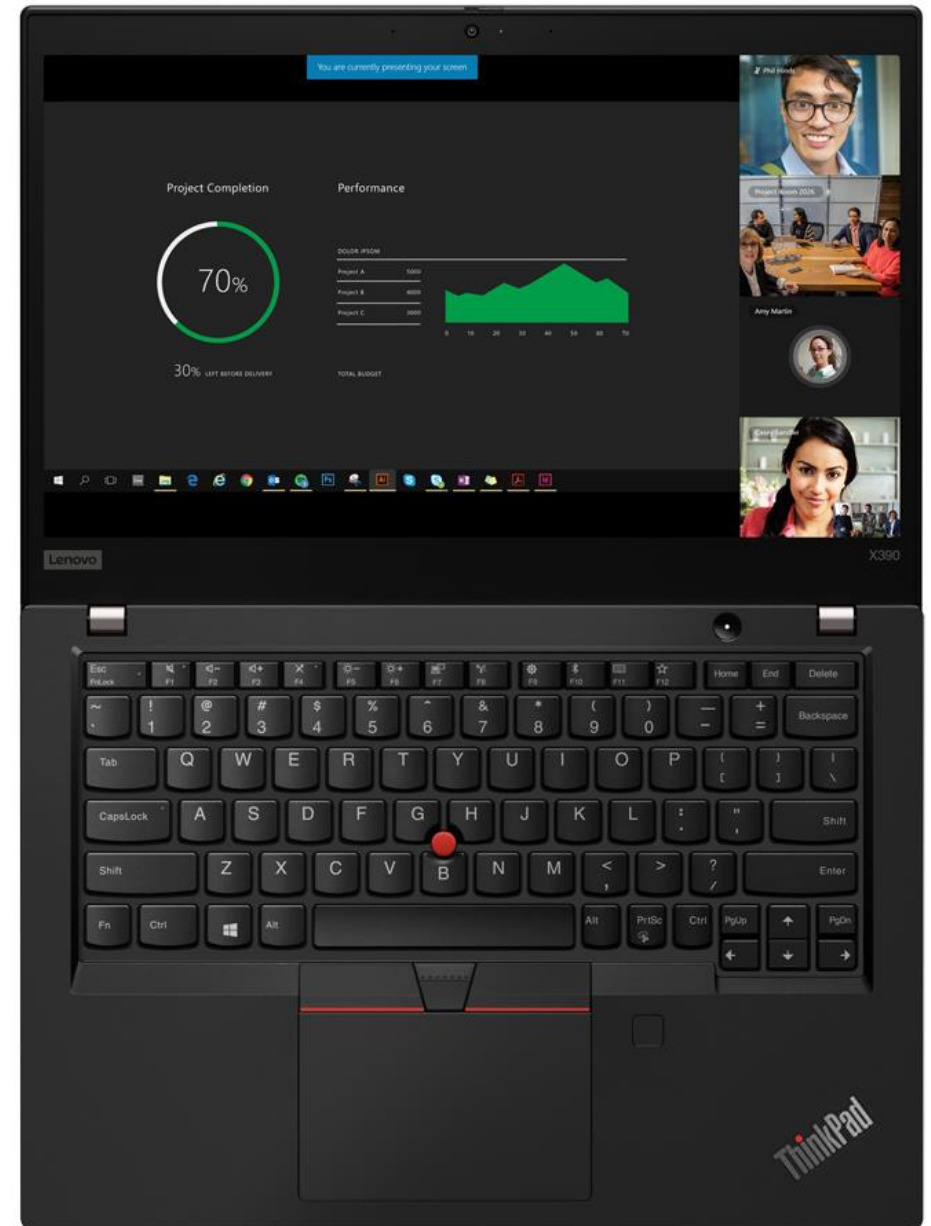
1.22kg (PPS 1.29kg)

CFRP 16.5mm  
PPS 16.9mm

311.9mm



217.0mm



# X390 GEN to GEN

Blue indicates the changes

	X280	X390
Material	A Cover: FHD: CF+GF hybrid , HD/Touch: PPS/GF C/D cover : MgAl	A Cover: FHD Non Touch: CF+GF hybrid , PPS HD/ FHD Touch: PPS/GF C/D cover : MgAl
Color	Black	Black
Dimension (mm)	FHD non touch: 308 x 210 x 17.4 HD & FHD Touch: 308 x 210 x 17.8	<b>FHD Non Touch w/ CF A cover: 311.9 x 217.0 x 16.5</b> <b>FHD Non Touch w/ PPS A cover: 312.0 x 217.2 x 16.9</b> <b>HD &amp; FHD Touch w/ PPS A cover : 311.9 x 217.2 x 16.9</b>
Weight (lbs / kg)	FHD non touch: 2.49 / 1.12 (CF A cover) HD: 2.78 / 1.26 (PPS A cover) FHD Touch: 2.79 / 1.27 (PPS A cover)	<b>FHD non touch: 2.70 / 1.22 (CF A cover)</b> <b>FHD non touch: 2.85 / 1.29 (PPS A cover)</b> <b>HD: 2.93 / 1.33 (PPS A cover)</b> <b>FHD Touch: 2.84 / 1.28 (PPS A cover)</b>
L/R Bezel Size (mm)	15.61	<b>7.9</b>
Top Bezel Size (mm)	20.44	<b>15.9</b>
Screen Size & Resolution	12.5" VESA: HD TN 220nit, FHD IPS 300nit, FHD IPS LCLW 300nit on-cell touch	<b>13.3" Narrow: HD TN 250nit, FHD IPS 300nit, FHD IPS LCLW 300nit on-cell touch, FHD IPS Privacy Guard 400nit</b>
CPU	KBL: i5 vPro; KBL-R: i3/i5/i7, i5/i7 vPro	<b>WHL: i3/i5/i7, i5/i7 vPro</b>
Graphics	Intel HD 620	Integrated Intel HD Graphics
Memory	DDR4 (2400MHz): Up to 16GB (8,16GB soldered down)	DDR4 (2400MHz): Up to 32GB (8,16, <b>32GB</b> soldered down)
Storage	Up to 1TB PCIe SSD	Up to 1TB PCIe SSD, <b>Intel SSD w/ Optane Memory</b>
Camera / Microphone	HD w/ThinkShutter, HD + IR / Dual Mic	HD w/ThinkShutter , <b>Opt. Hybrid IR w/ThinkShutter / Dual Far Field Mic</b>
Battery (Size / Life)	48Whr / Up to 15hrs (Single Battery)	48Whr / Up to 17.6hrs (Single Battery)
Rapid Charge – 80%	Yes (w\ 65W AC)	Yes (w\ 65W AC)
Keyboard	Top load Backlight w\ White LEDs (CRU)	Top load Backlight w\ White LEDs (CRU)
Pen	N/A	N/A
Docking	TBT WS, TBT, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)	TBT WS, TBT, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)
Ethernet	Via dongle only	Via dongle only
I/O Ports	2x USB-A 3.0, 2x USB-C (1x TBT), uSD Card, Audio Jack	2x USB-A 3.1 Gen1, 2x USB-C (1x TBT), uSD Card, Audio Jack
Video Ports / Audio	HDMI 1.4, TBT (DP 1.2), Audio Dolby Premium	HDMI 1.4, TBT (DP 1.2), Audio Dolby Premium
Wireless Communication	WLAN 2x2 AC, LTE CAT9 & EU CAT6, NFC	<b>WLAN 2x2 AC &amp; 2x2 AX</b> , LTE CAT9 & EU CAT6, NFC
Biometric / Security	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0

# X395 GEN to GEN

	A285	X395
Dimension (mm)	307.7 x 209.8 x 17.4-17.8mm	311.9 x 217.2 x 16.9mm
Weight (lbs / kg)	2.49lbs / 1.13kg w/ FHD non-touch LCD; 2.79lbs / 1.27kg w/ FHD touch LCD 2.78lbs/ 1.26kg w/ HD LCD	HD: 2.93 / 1.33 (PPS A cover) FHD non touch: 2.83 / 1.28 (PPS A cover) FHD Touch: 2.83 / 1.28 (PPS A cover)
L/R Bezel Size (mm) Top Bezel Size (mm)	15.61 20.44	<b>7.9</b> <b>15.9</b>
Screen Size & Resolution	12.5": HD TN, FHD IPS, FHD IPS LCLW Touch	<b>13.3": HD TN 250nit, FHD IPS 300nit, FHD IPS 300nit LCLW Touch, ePrivacy FHD IPS 400nit</b>
CPU	Ryzen R7, R5, R3	<b>Picasso: R7, R5, R3</b>
Graphics	Integrated Vega Graphics	Integrated AMD Radeon Vega Graphics
Memory	4,8,16GB DDR4 Down 2400MHz	DDR4 (2400MHz): Up to 16GB (8,16GB soldered down)
Storage	Up to 512GB PCIe SSD	<b>Up to 1TB PCIe or 256GB SATA SSD</b>
Camera / Microphone	HD w/ ThinkShutter or IR Camera w/o ThinkShutter	<b>HD, Opt. Hybrid IR w/ThinkShutter / Dual Far Field Mic</b>
Battery (Size / Life)	48Whr (10 Hrs)	<b>48Whr / Up to 14.5hrs (Single Battery)</b>
Rapid Charge – 80%	Yes- ~60mins	Yes (w\ 65W AC)
Keyboard	Top load Backlight w\ White LEDs (CRU)	Top load Backlight w\ White LEDs (CRU)
Pen	N/A	N/A
Docking	Mechanical (CS18), Thunderbolt*, USB A/C	<b>Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)</b>
Ethernet	Via dongle only	Via dongle only
I/O Ports	2x USB Type-C, 1x USB-A 3.1 Gen 1, 1x USB-A 3.1 Gen 2 Audio	1x USB-A 3.1 Gen1, <b>1x USB-A 3.1 Gen2</b> , 2x USB-C Gen2, uSD Card, Audio
Video Ports / Audio	HDMI 2.0, USB-C(DP) 1.4	HDMI 2.0, USB-C (DP 1.4)
Wireless Communication	WLAN/LTE Cat9 w/ nano SIM	<b>Intel WLAN 2x2 AC Non vPro, LTE CAT9</b>
Biometric / Security	Touch FPR, ThinkShutter, dTPM 2.0, SCR	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0
Modern Standby	N/A	N/A



# X390 Intel vs X395 AMD

	X390 Intel	X395 AMD
<b>Dimension (mm)</b>	311.9-312.0 x 217.0-217.2 x 16.5-16.9 mm	311.9 x 217.2 x 16.9mm
<b>Weight (lbs / kg)</b>	<b>1.22</b> w/ FHD non-touch LCD <b>w/Carbon Fiber</b> ; 1.29 w/ FHD touch LCD w/PPS 1.33 w/ HD non-touch w/ PPS 1.28 w/FHD touch w/PPS	HD: 1.33 (PPS A cover) FHD non touch: 1.28 (PPS A cover) FHD Touch: 1.28 (PPS A cover)
<b>L/R Bezel Size (mm)</b> <b>Top Bezel Size (mm)</b>	7.9 15.9	7.9 15.9
<b>Screen Size &amp; Resolution</b>	13.3": HD TN 250nit, FHD IPS 300nit, FHD IPS 300nit LCLW Touch, ePrivacy FHD IPS 400nit	13.3": HD TN 250nit, FHD IPS 300nit, FHD IPS 300nit LCLW Touch, ePrivacy FHD IPS 400nit
<b>CPU</b>	WHL: i3/i5/i7, i5/i7 vPro	Picasso: R7, R5, R3
<b>Graphics</b>	Integrated HD Graphics	Integrated AMD Radeon Vega Graphics
<b>Memory</b>	DDR4 (2400MHz): Up to 32GB (4,8,16, <b>32GB</b> soldered down)	DDR4 (2400MHz): Up to 16GB (8,16GB soldered down)
<b>Storage</b>	Up to 1TB PCIe SSD, <b>Intel SSD w/ Optane Memory</b>	Up to 1TB PCIe or 256GB SATA SSD
<b>Camera / Microphone</b>	HD w/ThinkShutter , Opt. Hybrid IR w/ThinkShutter / Dual Far Field Mic	HD, Opt. Hybrid IR w/ThinkShutter / Dual Far Field Mic
<b>Battery (Size / Life)</b>	48Whr / Up to 17.6hrs (Single Battery)	48Whr / Up to <b>14.5</b> hrs (Single Battery)
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	Top load Backlight w\ White LEDs (CRU)	Top load Backlight w\ White LEDs (CRU)
<b>Pen</b>	N/A	N/A
<b>Docking</b>	Thunderbolt, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)	Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)
<b>Ethernet</b>	Via dongle only	Via dongle only
<b>I/O Ports</b>	2x USB-A 3.1 Gen1, 2x USB-C ( <b>1x Thunderbolt</b> ), uSD Card, Audio Jack	1x USB-A 3.1 Gen1, <b>1x USB-A 3.1 Gen2</b> , 2x USB-C Gen2, uSD Card, Audio
<b>Video Ports / Audio</b>	HDMI 1.4, TBT (DP 1.2), Audio Dolby Premium	<b>HDMI 2.0</b> , USB-C ( <b>DP 1.4</b> )
<b>Wireless Communication</b>	<b>WLAN 2x2 AC &amp; Wifi 6 2x2 (AX)</b> – vPro Only , LTE CAT9 & EU CAT6, <b>NFC</b>	Intel WLAN 2x2 AC Non vPro, LTE CAT9
<b>Biometric / Security</b>	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0

# ThinkPad X390 Yoga



# X390 Yoga

Versatility for any Business

## *Streamlined Performance*

- Integrated Active Pen
- Mechanical Side Docking
- Dual Far-Field noise canceling microphones

## *Ultimate Portability*

- Global LTE WWAN
- Up to 14.5 hrs of battery life
- 16.75mm Thin (8% thinner) and 1.29kg Light (6% lighter)
- 16% Thinner Bezels

## *Enhanced Security and Privacy*

- IR Camera and FPR for Windows Hello
- ThinkShutter for RGB and Hybrid IR Camera



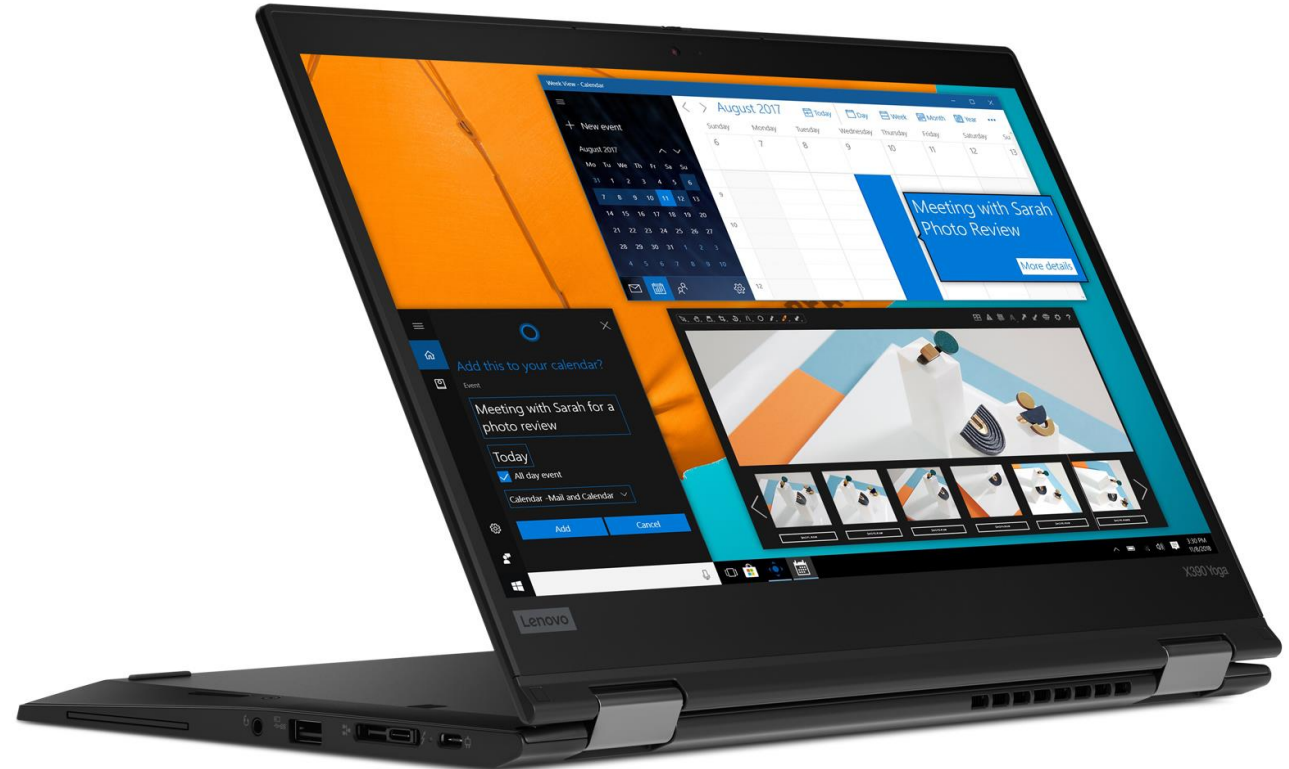
# X390 Yoga Design

Dimension(mm):

310.4 x 219 x 16.75 mm

Weight:

1.32kg



# Gen to Gen

	X380 Yoga	X390 Yoga
Dimension	313.5mm x 222.2mm x 18.2mm	<b>310.4 x 219 x 16.75 mm</b>
Weight	1.4kg	<b>1.29kg</b>
Screen Size & Resolution	13.3": FHD IPS Touch 1920x1080 (300nit)	13.3": FHD IPS Touch (300 nit)
CPU	KBL: i3, i5 vPro; KBL-R: i5/i7, i5/i7 vPro	<b>WHL-U: i5, i5 vPro, i7, i7 vPro</b>
Graphics	Intel UHD 620	Intel UHD 620
Memory	DDR4 (2133Mhz): 16GB (4,8,16GB down)	DDR4 (2400Mhz) 8GB ,16GB
Storage	Up to 1TB PCIe SSD	Up to 1TB PCIe SSD
Camera	HD HD + IR Camera	HD w/ <b>ThinkShutter</b> HD + IR Camera w/ <b>ThinkShutter</b>
Battery (Size / Life)	51Whr / Up to 13.6hrs	<b>50Wh / Up to 14.5hrs</b>
Rapid Charge – 80%	Yes, 60mins w/65W AC Adapter	Yes, 60mins w/65W AC Adapter
Keyboard	Lift & Lock Backlight w/ White LEDs	Backlight w/ White LEDs
Pen	Integrated Rechargeable Pen	Integrated Rechargeable Pen
Docking	TBT3, USB-C, USB3.0	<b>Mechanical (CS18)</b> , TBT3, USB-C, USB3.0
Ethernet	Native Ethernet Via Dongle	Native Ethernet via <b>CS18 Dongle</b>
I/O Ports	2x USB-A 3.0, 1x Thunderbolt 3, Audio	1x TBT3, <b>1x Type-C</b> 2x USB-A 3.1 (1 Gen 2), Audio
Video Ports	HDMI, Thunderbolt3	1 x HDMI, 1 x TBT3, <b>1 x Type-C</b> w/ DP
Wireless	WLAN, EU LTE CAT9, NFC	WLAN / LTE CAT 9 / NFC
Biometric / Security	Touch FPR, SCR, IR Camera, dTPM 2.0	Touch FPR, SCR, IR Camera, dTPM 2.0

# ThinkPad T490s / T495s



# T490s/T495s | The Greatest T-Series Ever Built

## ***Uncompromising Performance & Design***

- 11% Narrower Bezel Design
- New brilliant Dolby Vision WQHD Panel option
- New low power FHD 400 NIT panel for ultimate battery life
- Enhanced audio experience with dual Far field microphones
- True, Aluminum A Cover for Silver option (T490s only)

## ***Mobility Focused***

- **Black starting at 16.1mm; 1.25 kg, 8% thinner**
  - For reference: X1 Carbon 4<sup>th</sup> gen: 16.5, 1.27kg
- **Silver starting at 17.2 mm, 1.49 kg**
- 20 hrs of MM14 battery life (low power FHD panel)
- Global LTE-A WWAN

## ***Ultimate Connectivity & Enhanced Security***

- **Privacy Guard**
- ThinkShutter for RGB and **Hybrid IR Camera**
- IR Camera and FPR for Windows Hello
- **Mechanical, Type C or USB Docking**



# T490s/T495s | Dimensions

## Dimension(mm):

328.8 x 225.8 x 16.1 (CFRP 2.4T – Black WQHD, Low power FHD)

329.0x226.15x16.7 (CFRP 3.0T – FHD non touch/touch)

329.15 x 226.45 x 17.2 (Aluminum Silver)

## Weight:

1.27kg ( Black CFRP 2.4T - - Black WQHD, Low power FHD)

1.35kg ( Black CFRP 3.0T – FHD non touch/touch)

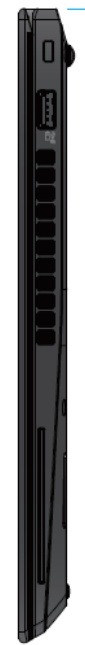
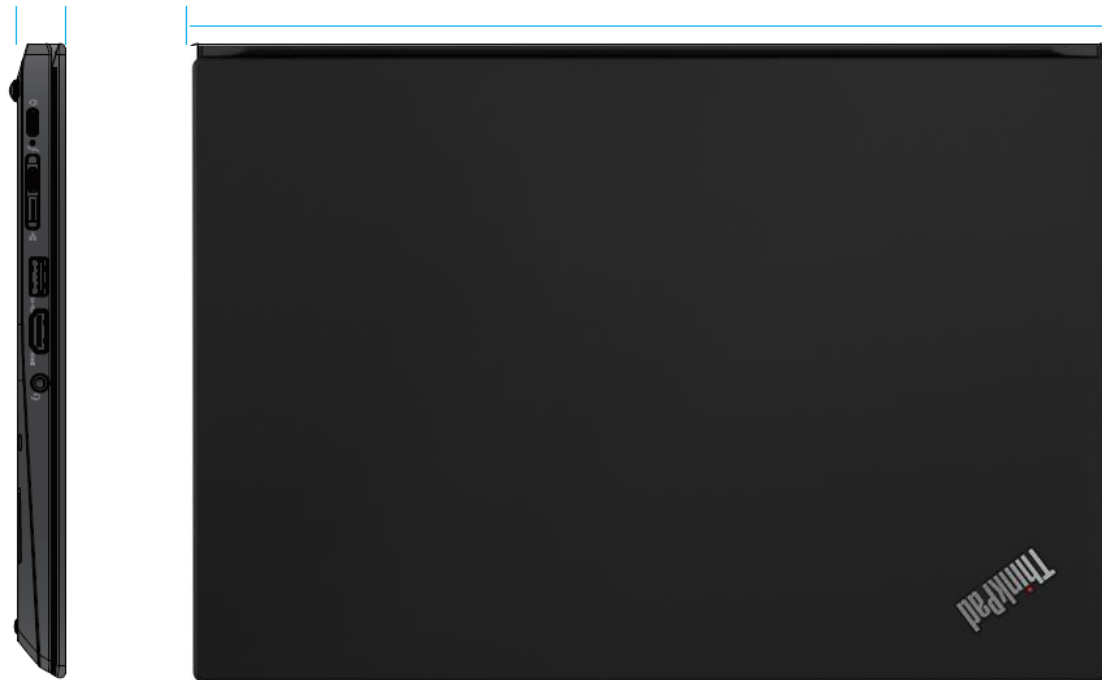
1.49kg (Aluminum Silver)

CFRP 16.1 mm

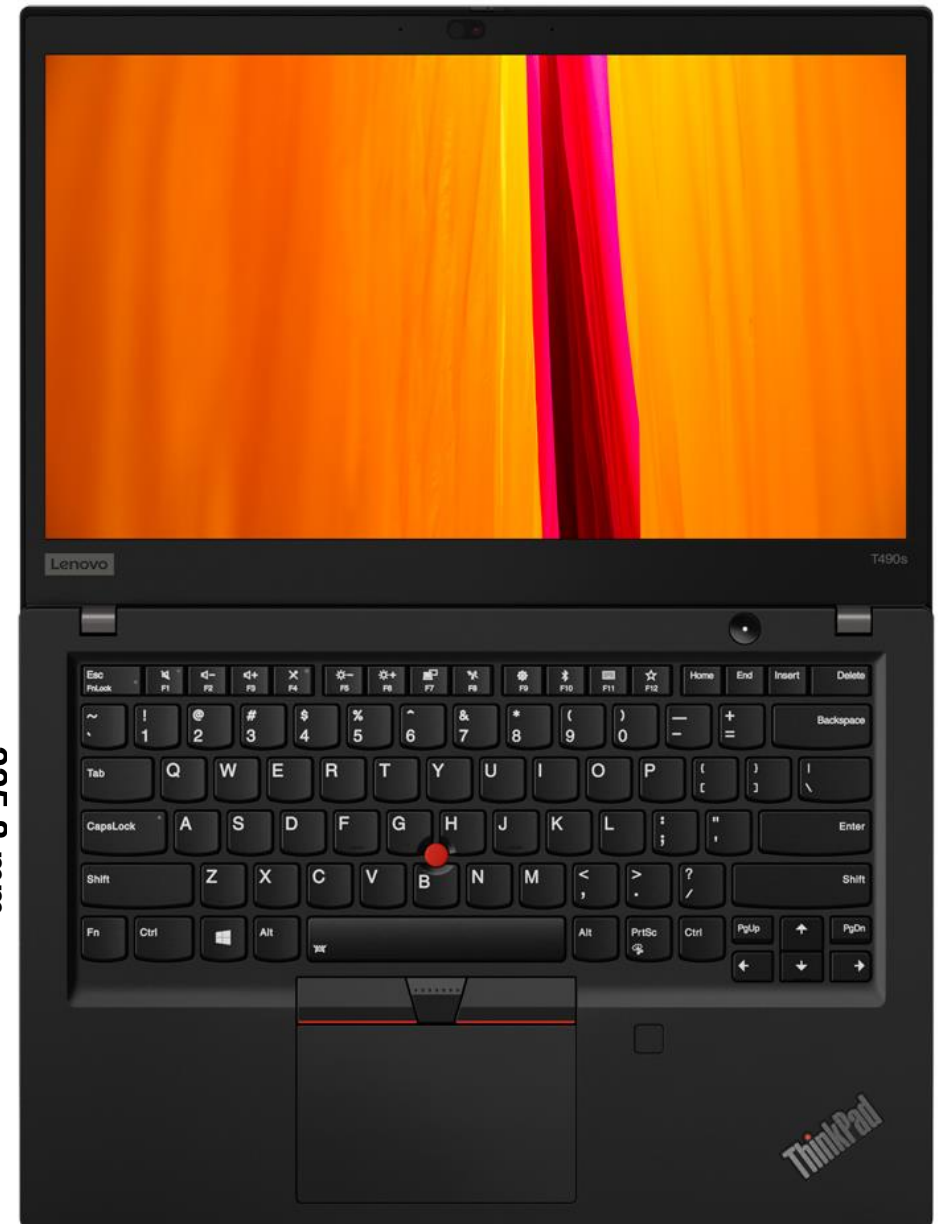
CFRP 16.7 mm

AL. 17.2 mm

328.8 mm



225.8 mm





# T490s Silver



# GEN to GEN

	T480s	T490s
<b>Materials</b>	A Cover: CF Hybrid C+D Cover: Magnesium	A Cover: CF Hybrid for Black, <b>Aluminum for Silver</b> C+D Cover: Magnesium
<b>Color</b>	Black and Silver (CF)	Black and Silver (Al)
<b>Dimension (mm)</b>	331 x 226.8 x 18.45	Black: WQHD, Low Power FHD: 329 x 225.8 x 16.1 <b>Black: FHD, FHD Touch, Privacy Guard: 328.8 x 226.15 x 16.7</b> Silver: All Panels :329.15 x 226.45 x 17.2
<b>Weight (lbs / kg)</b>	FHD: 1.39 WQHD: 1.32	Black FHD IPS, FHD Touch 1.35 <b>Black : FHD Low power , WQHD , Privacy Guard: 1.27</b> Silver: 1.49
<b>L/R Bezel Size (mm)</b>	9.7	<b>8.6</b>
<b>Screen Size &amp; Resolution</b>	<b>14" VESA 3mm panel:</b> FHD IPS 250nit, FHD IPS LCLW 250 nit on-cell Touch, FHD IPS Privacy Guard 300nit <b>14" Narrow 2.4mm panel:</b> WQHD IPS 300nit	<b>14" Narrow 3mm panel:</b> FHD IPS 250nit, FHD IPS LCLW 300nit on-cell touch <b>14" Narrow 2.4mm panel:</b> <b>FHD IPS Low power 400nit</b> <b>FHD IPS Privacy Guard 400nit</b> <b>Dolby Vision, WQHD IPS 500nit, 100% Adobe</b>
<b>CPU</b>	KBL: i5 vPro; KBL-R: i5/i7, i5/i7 vPro	<b>WHL: i5/i7, i5/i7 vPro</b>
<b>Graphics</b>	Intel HD 620, GeForce MX150 w/ 2GB GDDR5	<b>Integrated</b>
<b>Memory</b>	DDR4 (2400MHz): Up to 24GB (4,8,16GB DIMM + 4/8GB down)	DDR4 (2400MHz): <b>Up to 32GB (8, 16, 32GB soldered down)</b>
<b>Storage</b>	Up to 1TB PCIe SSD	Up to 1TB PCIe SSD, <b>Intel SSD w/ Optane Memory</b>
<b>Camera / Microphone</b>	HD w/ThinkShutter, HD + IR / Dual Near Field Mic	HD w/ThinkShutter + <b>opt. Hybrid IR w/ ThinkShutter / Dual Far Field Mic</b>
<b>Battery (Size / Life)</b>	57Whr / 16.0hrs MM14 (Single Battery)	57Whr / <b>20.0hrs MM14 (Single Battery, Low Power FHD)</b>
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	Top load Backlight w\ White LEDs (CRU)	<b>Bottom load Backlight w\ White LEDs (FRU)</b>
<b>Pen</b>	N/A	N/A
<b>Docking</b>	TBT, USB-C, USB3.0, Side Mechanical (CS18)	TBT, USB-C, USB3.0, Side Mechanical (CS18)
<b>Ethernet</b>	Trapdoor RJ45	<b>Via dongle only</b>
<b>I/O Ports</b>	2x USB-A 3.1 Gen1, 2x USB-C (1x TBT), SD Card, Audio Jack	2x USB-A 3.1 Gen 1, 2x USB-C (1x TBT), uSD Card, Audio Jack
<b>Video Ports / Audio</b>	HDMI 1.4, TBT (DP 1.2), Audio Dolby Premium	HDMI 1.4, TBT (DP 1.2), Dolby Premium
<b>Wireless Communication</b>	WLAN 2x2 AC, LTE CAT9 & EU CAT6, NFC	WLAN 2x2 AC & <b>2x2 AX(optimal on vPRO)</b> , LTE CAT9 & EU CAT6, NFC
<b>Biometric / Security</b>	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, SCR, RGB + Hybrid IR Camera w/ ThinkShutter, dTPM 2.0

# T490s Intel vs T495s AMD

	T490s	T495s
<b>Materials</b>	A Cover: CF Hybrid for Black, <b>Aluminum for Silver</b> C+D Cover: Magnesium	A Cover: CF Hybrid for Black, C+D Cover: Magnesium
<b>Color</b>	Black and <b>Silver (Al)</b>	Black
<b>Dimension (mm)</b>	Black: <b>WQHD</b> , Low Power FHD: 329 x 225.8 x 16.1	Low Power FHD: 329 x 225.8 x 16.1 FHD, FHD Touch, Privacy Guard: 328.8 x 226.15 x 16.7
	Black: FHD, FHD Touch, Privacy Guard: 328.8 x 226.15 x 16.7	
	Silver: All Panels :329.15 x 226.45 x 17.2	
<b>Weight (lbs / kg)</b>	Black FHD IPS, FHD Touch 2.98 / 1.35	Black FHD IPS, FHD Touch 2.98 / 1.35 Black : FHD Low power , Privacy Guard: 2.81 / 1.27
	Black : FHD Low power , WQHD , Privacy Guard: 2.81 / 1.27	
	Silver: 3.29 / 1.49	
<b>L/R Bezel Size (mm)</b>	8.6	<b>8.6</b>
<b>Top Bezel Size (mm)</b>	15.9	15.9
<b>Screen Size &amp; Resolution</b>	14" Narrow 3mm panel: FHD IPS 250nit, FHD IPS LCLW 300nit on-cell touch	14" Narrow 3mm panel: FHD IPS 250nit, FHD IPS LCLW 300nit on-cell touch 14" Narrow 2.4mm panel: FHD IPS Low power 400nit FHD IPS Privacy Guard 400nit
	14" Narrow 2.4mm panel: FHD IPS Low power 400nit FHD IPS Privacy Guard 400nit	
	<b>Dolby Vision, WQHD IPS 500nit, 100% Adobe</b>	
<b>CPU</b>	WHL: i5/i7, i5/i7 vPro	Ryzen Pro Gen2 w/ DASH Ryzen 5 Pro / Ryzen 7 Pro
<b>Graphics</b>	Integrated	Integrated UMA Vega Core
<b>Memory</b>	DDR4 (2400MHz): Up to 32GB (8, 16, <b>32GB</b> soldered down)	DDR4 (2400MHz): Up to 16 GB (8, 16GB soldered down)
<b>Storage</b>	Up to 1TB PCIe SSD, <b>Intel SSD w/ Optane Memory</b>	Up to 1TB PCIe SSD
<b>Camera / Microphone</b>	HD w/ThinkShutter + opt. Hybrid IR w/ ThinkShutter / Dual Far Field Mic	HD w/ThinkShutter + opt. Hybrid IR w/ ThinkShutter / Dual Far Field Mic
<b>Battery (Size / Life)</b>	57Whr / 20hrs MM14 (Single Battery, Low Power FHD)	57Whr / 20hrs MM14 (Single Battery, Low Power FHD)
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	Bottom load Backlight w\ White LEDs (FRU)	Bottom load Backlight w\ White LEDs (FRU)
<b>Pen</b>	N/A	N/A
<b>Docking</b>	TBT, USB-C, USB3.0, Side Mechanical (CS18)	USB-C, USB3.0, Side Mechanical (CS18)
<b>Ethernet</b>	Via dongle only	Via dongle only
<b>I/O Ports</b>	2x USB-A 3.1 Gen 1, 2x USB-C (1x TBT), uSD Card, Audio Jack	1x USB-A 3.1 Gen1, <b>1x USB-A 3.1 Gen2</b> , 2x USB-C Gen2, uSD, Audio Jack
<b>Video Ports / Audio</b>	HDMI 1.4, TBT (DP 1.2), Dolby Premium	<b>HDMI 2.0</b> , USB-C ( <b>DP 1.4</b> ) Dolby Premium
<b>Wireless Communication</b>	WLAN 2x2 AC & <b>Wifi6 2x2 (AX) – vPro Only</b> , LTE CAT9 & EU CAT6, <b>NFC</b>	Intel 2x2 802.11 AC / LTE Cat9
<b>Biometric / Security</b>	Touch FPR, SCR, RGB + Hybrid IR Camera w/ ThinkShutter, dTPM 2.0	Touch FPR, IR Cam, SCR, ThinkShutter, dTPM 2.0

# Performance Data



# Battery Performance

	Max Battery Life	Mainstream	Minimum Battery Life
CPU	Intel i5-8265U(non-vPro)	Intel i5-8265U(non-vPro)	Intel i7-8565U (non-vPro)
Memory	DDR4 8GB(4+4)	DDR4 8GB(4+4)	DDR4 16GB(8+8)
	Ch B: on-board 4GB	Ch B: on-board 4GB	Ch B: on-board 8GB
Graphics	UMA	UMA	UMA
LCD	FHD IPS Low Power (AUO)	FHD IPS(AUO)	WQHD(AUO)
Storage	PCIe M.2 2280 PCIe SSD 256GB	PCIe M.2 2280 SSD 256GB	PCIe M.2 2280 SSD 1TB
Wireless	Jefferson Peak 2 (AC 9560)	Jefferson Peak 2 (AC 9560)	Jefferson Peak 2 (AC 9560)
Battery	57Wh	57Wh	57Wh
OS	WIN10	WIN10	WIN10
BIOS/EC	BIOS17/EC12	BIOS17/EC12	BIOS17/EC12
BAPCo MobileMark 2014 [Hours]	20	16.8	14.2
JEITA2.0 (Idle + Mpeg Time)/2[Hours]	23.945	17.685	15.56
- JEITA2.0 Idle Time @150nit [Hours]	28.86	18.56	16.92
- JEITA2.0 Mpeg Time@150nit [Hours]	19.03	16.81	14.2
Video Playback [Hours]	19.7	16.8	14.2

# ThinkPad T490 / T495



# T490 / T495

## The Corporate Workhorse

### *Uncompromising Performance*

- Up-firing speakers for premium audio experience.
- Dual Far-Field microphones
- 3 New panel choices with 22% thinner bezels:
  - 400 nit Privacy Guard Display
  - 400 nit Low Power FHD IPS
  - 500 nit QHD IPS with HDR
- 5% thinner (18.9mm) and 7% lighter (1.46kg)
  - For reference - T480s: 18.5mm, X1 Carbon 1<sup>st</sup> gen: 18.8mm
- Discrete MX250 nVidia Graphics (T490 only)

### *Unparalleled Connectivity*

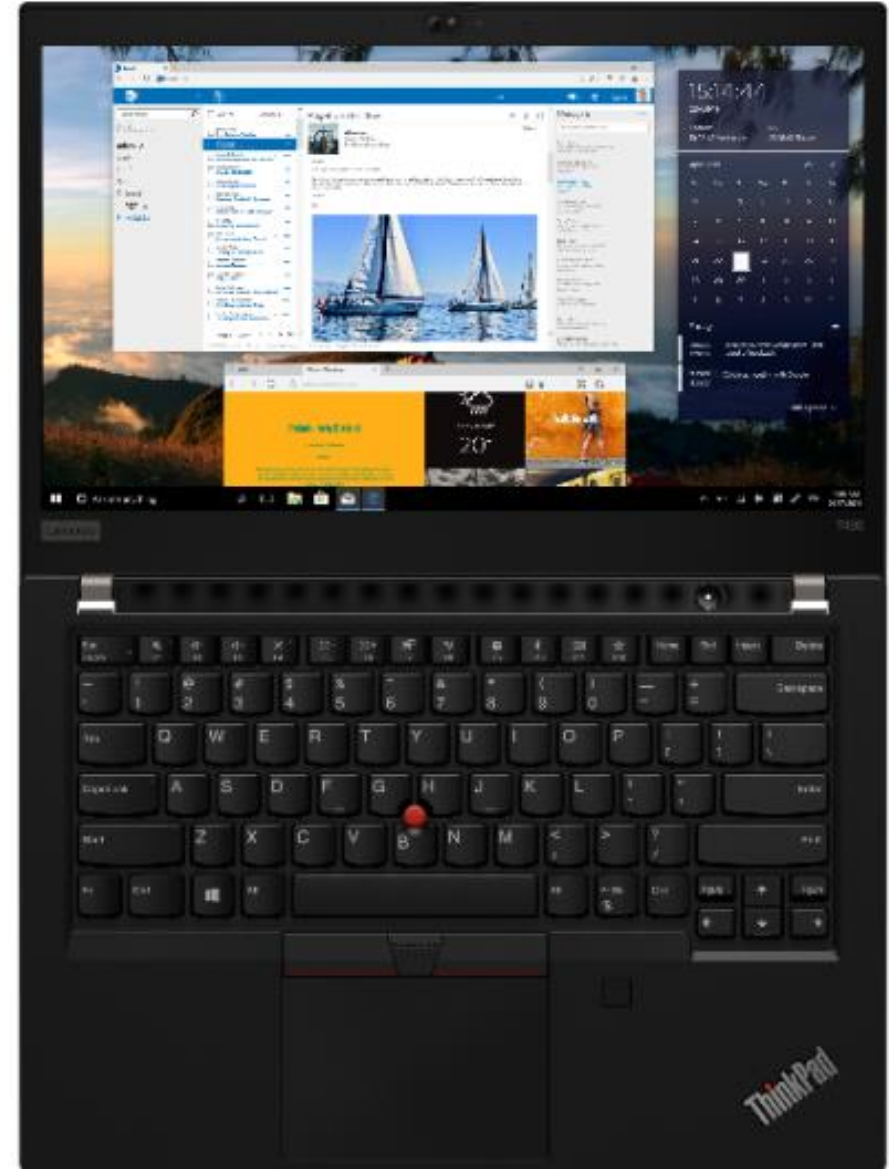
- Quad-antenna CAT16 WWAN availability
- 14+ hrs battery life with rapid charge

### *Enhanced Security*

- Privacy Guard – e privacy solution
- ThinkShutter for RGB and Hybrid IR Camera
- IR Camera and FPR for Windows Hello



# ThinkPad T490





# T480 vs T490 GEN TO GEN

	T480	T490
Dimension (mm)	336.6 x 232.5 x 19.95	329 x 227 x 18.9
L / R Bezel Size	11mm	8.6mm
Weight (lbs)	PPS: 1.65kg	FHD non-touch & touch 3.0mm: 1.55kg FHD Low Power 2.4mm: 1.46kg WQHD 2.4mm: 1.46kg
Color	Black	Black
Screen Size & Resolution	14" VESA 3mm panel: HD TN 220nit, FHD IPS 250nit, FHD IPS LCLW Touch 250nit, WQHD IPS 300nit	14" Narrow 3mm panel: HD TN 220nit FHD IPS 250nit, FHD IPS LCLW Touch 300nit, <b>*FHD IPS Privacy Guard 400nit, FHD IPS Low Power 400nit</b> 14" Narrow 2.4mm panel: <b>QHD IPS 500nit</b>
CPU	KBL: i3, i5 vPro; KBL R: i3/i5/i7, i5/i7 vPro	WHL: i5/i7, i5/i7 vPro
Graphics	Intel UHD 620, GeForce MX150 w/ 2GB GDDR5	Integrated, nVidia GeForce MX250 w/ 2GB GDDR5
Memory	DDR4 (2400MHz): Up to 32GB (4,8,16GB DIMM)	<b>DDR4 (2400MHz): Up to 48GB (8, 16, 32 DIMM + 8,16 soldered down)</b>
Storage	Up to 1TB HDD or Up to 1TB PCIe SSD	<b>SSD only</b> - Up to 1TB PCIe SSD & Intel Optane SSD
Camera / Microphone	HD w/ThinkShutter, HD + IR / Dual Mic	<b>HD + opt. IR w/ThinkShutter / Dual Far Field Mic</b>
Battery (Size / Life)	48Wh / 13.9hrs MM14, 24Wh, 72Wh, 96Wh Dual Battery	<b>50Whr / 16hrs MM14 (Single Battery)</b>
Rapid Charge – 80%	N/A	Yes (w\ 65W AC)
Keyboard	Top load Backlight w\ White LEDs (CRU)	Top load Backlight w\ White LEDs (CRU)
Pen	N/A	N/A
Docking	TBT, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)	TBT, Mainstream USB-C, Hybrid USB-C, USB3.0, Side Mechanical (CS18)
Ethernet	RJ-45	RJ-45
I/O Ports	2x USB-A 3.0, 2x USB-C (1x TBT), SD Card, Audio Jack	2x USB-A 3.1 Gen1, 2x USB-C (1x TBT), <b>uSD</b> Card, Audio Jack
Video Ports / Audio	HDMI 1.4, TBT (DP 1.2), Dolby Premium	HDMI 1.4, TBT (DP 1.2), <b>Dolby Premium with Up firing speakers</b>
Wireless Communication	WLAN 2x2 AC, LTE CAT9 & EU CAT6, NFC	Integrated WLAN 2x2 AC, <b>LTE CAT 16</b> , CAT9, EU CAT6, NFC
Biometric / Security	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0

# A485 vs T495 GEN TO GEN

	A485	T495
Dimension	336.6 x 232.5 x 19.95 mm	329 x 227 x 17.9
Weight	1.65kg	1.54kg
Screen Resolution	14": HD TN, FHD IPS, FHD IPS Touch (on cell),	14": HD TN (220nit), FHD IPS (250nit), FHD IPS LCLW Touch (300nit), Low Power FHD IPS (400nit)
CPU	Raven Ridge: R7, R5, R3	Picasso: R7, R5, R3
Graphics	AMD Vega Integrated Graphics	AMD Vega Integrated Graphics
Memory	32GB(2DIMM) DDR4 2400Mhz	Up to 32GB DDR4 (2400MHz) One DIMM and One Down
Storage	Up to 512 GB PCIe SSDs & 1TB SATA HDD	Up to 1TB PCIe & 256GB SATA SSD
Camera	HD w/ privacy shutter	HD & IR camera w/ ThinkShutter
Battery (Size / Life)	48 Whr , 72Whr, 96Whr	50Wh, Internal
Rapid Charge – 80%	No	Yes
Keyboard	Backlight	Backlight
Docking	CS18, Type C Cable Dock, Thunderbolt*, USB 3.0 Dock	Mechanical Side Dock, Type C Cable Dock, USB 3.0 Dock
Ethernet	RJ45 / AC 2x2	RJ45 / AC 2x2
I/O Ports	1x USB A 3.1 Gen1, 1x USB-A 3.1 Gen2, 2x USB-C, Audio, SD, SCR	1x USB-A 3.1 Gen1, 1x USB-A 3.1 Gen2, 2x USB-C Gen2, uSD, Audio
Video Ports	HDMI 2.0, USB-C(DP 1.4)	HDMI 2.0, USB-C (DP 1.4)
Wireless Communication	Intel 2x2 802.11 AC / LTE Cat9	Intel 2x2 802.11 AC / LTE Cat9
Biometric / Security	Touch FPR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, IR Camera, ThinkShutter, dTPM 2.0

# T490 Intel vs T495 AMD

	T490	T495
Dimension	329 x 227 x 17.9mm	329 x 227 x 17.9
Weight	1.46-1.55kg	1.54kg
Screen Resolution	14": HD TN (220nit), FHD IPS (250nit), FHD IPS LCLW Touch (300nit), Low Power FHD IPS (400nit)	14": HD TN (220nit), FHD IPS (250nit), FHD IPS LCLW Touch (300nit), Low Power FHD IPS (400nit)
CPU	WHL: i5/i7, i5/i7 vPro	Picasso: R7, R5, R3
Graphics	Integrated, nVidia G2 w/ 2GB DDR5	AMD Vega Integrated Graphics
Memory	DDR4 (2400MHz): Up to 48GB (8, 16, 32 DIMM + 8,16 soldered down)	Up to 32GB DDR4 (2400MHz) One DIMM and One Down
Storage	Up to 1TB PCIe SSD & <b>Intel Optane SSD</b>	Up to 1TB PCIe & 256GB SATA SSD
Camera	HD + opt. IR w/ThinkShutter / Dual Far Field Mic	HD & IR camera w/ ThinkShutter
Battery (Size / Life)	50Whr / 16.1hrs MM14 (Single Battery)	50Wh, Internal
Rapid Charge – 80%	Yes (w\ 65W AC)	Yes
Keyboard	Top load Backlight w\ White LEDs (CRU)	Backlight
Docking	TBT, Mainstream USB-C, Hybrid USB-C, USB3.0, Side Mechanical (CS18)	Mechanical Side Dock, Type C Cable Dock, USB 3.0 Dock
Ethernet	RJ-45	RJ45 / AC 2x2
I/O Ports	2x USB-A 3.1 Gen1, <b>1x Thunderbolt</b> , 1x USB-C, uSD Card, Audio Jack	1x USB-A 3.1 Gen1, <b>1x USB-A 3.1 Gen2</b> , 2x USB-C Gen2, uSD, Audio
Video Ports	HDMI 1.4, TBT (DP 1.2), Dolby Premium	<b>HDMI 2.0</b> , USB-C (DP 1.4)
Wireless Communication	Integrated WLAN 2x2 AC, LTE CAT 16, CAT9, EU CAT6, <b>NFC</b>	Intel 2x2 802.11 AC / LTE Cat9
Biometric / Security	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, IR Camera, ThinkShutter, dTPM 2.0

# ThinkPad T590



# T590

## The Corporate Workhorse

### *Uncompromising Productivity*

- 15" 500 nit HDR UHD IPS display with Dolby Vision
- New Single 57Whr battery with rapid charge
- Dual Far Field noise canceling microphones
- Discrete nVidia MX250 graphics

### *Workhorse Mobility*

- 15 hrs battery life (MM14)
- 19.95mm thin and 1.75kg – 11% lighter

### *Ultimate Connectivity & Enhanced Security*

- 1x TBT3, 1x Type-C, 2x USB-A 3.1 (Gen 1), HDMI 1.4
- ThinkShutter for RGB and IR Camera



# ThinkPad T590



# GEN TO GEN

	T580	T590
Dimension (mm)	365.8 x 253 x 19.95	365.8 x <b>248</b> x 19.95
L / R Bezel Size	7.2mm	7.2mm
Weight (lbs)	1.96kg	<b>1.75kg</b>
Color	Black	Black
Screen Size & Resolution	<i>15" Narrow 3.2mm panel:</i> FHD IPS 250nit, FHD IPS LCLW Touch 250nit <i>15" Narrow 2.6mm panel:</i> 4K IPS 300nit	<i>15" Narrow 3.2mm panel:</i> FHD IPS 250nit, FHD IPS LCLW Touch 250nit, <i>15" Narrow 2.6mm panel:</i> 4k IPS <b>500nit</b>
CPU	KBL: i5/i5 vPro; KBL R: i5/i7, i5/i7 vPro	<b>WHL:</b> i5/i7, i5/i7 vPro
Graphics	Intel UHD 620, GeForce MX150 w/ 2GB GDDR5	Intel UHD 620, NVIDIA GeForce MX250 w/ 2GB GDDR5
Memory	DDR4 (2400MHz): Up to 32GB (4,8,16GB DIMM)	<b>DDR4 (2400MHz): Up to 48GB (8, 16, 32 DIMM + 8,16 soldered down)</b>
Storage	Up to 1TB HDD or Up to 1TB PCIe SSD	<b>SSD only</b> - Up to 1TB PCIe SSD & Intel Optane SSD ( <b>TBD</b> )
Camera / Microphone	HD w/ThinkShutter, HD + IR / Dual Mic	<b>HD + opt. IR w/ThinkShutter / Dual Far Field Mic</b>
Battery (Size / Life)	FHD: 56Wh / 12.41hrs MM14, 96Wh Dual Battery 4K w/ Discrete: 56Wh / 6.4hrs MM14	<b>T: 57Whr / 15 hrs MM14 (Single Battery)</b> <b>4K w/ Discrete: 57Wh / 9.5 hrs MM14</b>
Rapid Charge – 80%	N/A	Yes (w\ 65W AC)
Keyboard	Top load Backlight w\ White LEDs (CRU)	Top load Backlight w\ White LEDs (CRU)
Pen	N/A	N/A
Docking	TBT, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)	TBT, Mainstream USB-C, Enhanced USB-C, USB3.0, Side Mechanical (CS18)
Ethernet	RJ-45	RJ-45
I/O Ports	2x USB-A 3.0, 2x USB-C (1x TBT), SD Card, Audio Jack	2x USB-A 3.1 Gen1, 1x TBT, 1x USB-C, <b>uSD</b> Card, Audio Jack
Video Ports / Audio	HDMI 1.4, TBT (DP 1.2), Dolby Premium	HDMI 1.4, TBT (DP 1.2), <b>Dolby Premium with up firing speakers</b>
Wireless Communication	WLAN 2x2 AC, LTE CAT9 & EU CAT6, NFC	Integrated CNVi WLAN 2x2 AC, LTE CAT9, EU CAT6, NFC
Biometric / Security	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, SCR, IR Camera, ThinkShutter, dTPM 2.0

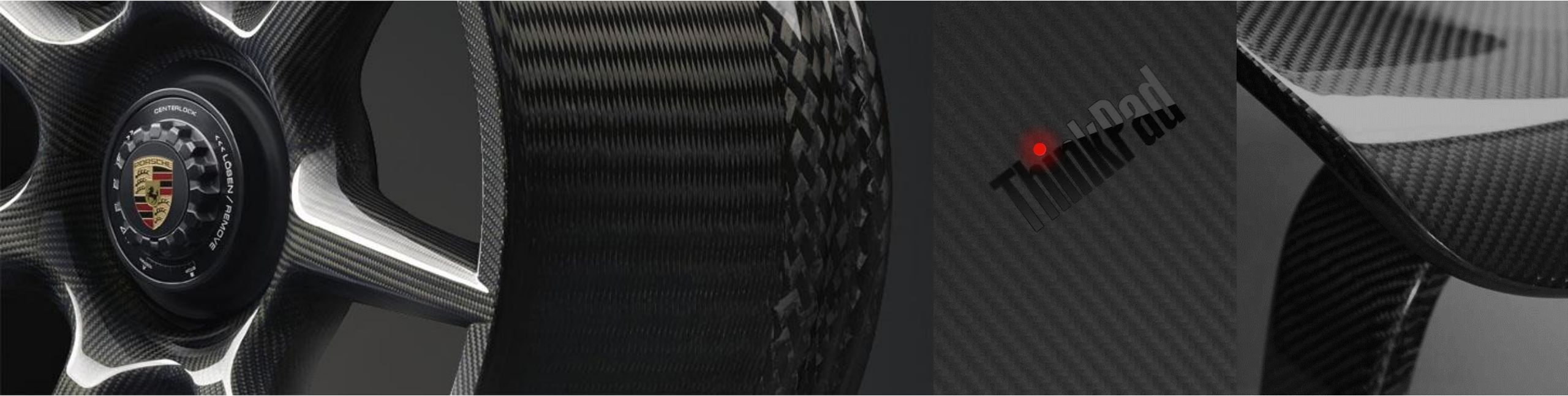


# ThinkPad X1 Carbon 7<sup>th</sup> gen





# X1 Carbon



Reinforcing premium performance utilizing the inherent strength and ultra-light weight of carbon fiber

# ThinkPad X1 Carbon

The Perfect Business Notebook

- Premium Dolby Atmos<sup>®</sup> Speaker System
- Industry leading 4k Dolby Vision<sup>®</sup> panel
- ThinkPad Privacy Guard FHD panel option
- Available with Woven Carbon finish
- 6% thinner at 14.9 mm; 1.09 kg
- 15 hours battery life
- Full range of ports and docking



# ThinkPad X1 Carbon | Gen to Gen

Blue indicates the changes

	X1 Carbon G6	X1 Carbon G7
<b>Materials</b>	CF A Cover w/ Paint, Mag Hybrid C & D	CF A Cover w/ Paint or <b>Weave</b> , Mag Hybrid C & D
<b>Dimension</b>	323 x 217 x 15.95 mm	323mm x 217mm x <b>14.95 mm (-1.0)</b>
<b>L / R Bezel Size (mm)</b> <b>Top Bezel Size (mm)</b>	7.0mm / 7.0mm 12.0mm / 29.0mm	7.0mm / 7.0mm 13.0mm / 29.5mm
<b>Weight</b>	1.13kg	<b>1.09kg</b>
<b>Color</b>	Black or Mineral Metallic	<b>Black or Black with Carbon Fiber Top Cover</b>
<b>Screen Size &amp; Resolution</b>	14": FHD IPS (300nit), <i>FHD IPS Touch (300nit)</i> , WQHD IPS(300nit), <i>HDR WQHD IPS (500nit)</i>	14": FHD IPS ( <b>400nit</b> ), <i>FHD IPS Touch (300nit)</i> , <b>FHD IPS ePrivacy (400nit)</b> , WQHD IPS(300nit), <b>HDR400 UHD IPS (500 nit) 10bit</b>
<b>CPU</b>	KBL: i5 vPro; <i>KBL R: i5/i7, i5/i7 vPro</i>	<b>WHL: i5/i7, i5/i7 vPro</b>
<b>Graphics</b>	Intel UHD 620	Intel UHD
<b>Memory</b>	LPDDR3: 2133Mhz 8GB / 16GB	LPDDR3 8GB / 16GB
<b>Storage</b>	Up to 2TB PCIe SSD	Up to 2TB PCIe SSD
<b>Camera</b>	<i>HD w/ThinkShutter</i> , HD + IR	<b>HD + IR w/ThinkShutter</b>
<b>Battery (Size / Life)</b>	57Whr / Up to 15hrs	<b>51Wh</b> 10- >15hrs
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	<i>White LEDs &amp; Backlight (1.8mm &amp; 5.3mm TP)</i>	<i>White LEDs &amp; Backlight</i> ( <b>1.5mm &amp; 4.5mm TP</b> )
<b>Pen</b>	N/A	N/A
<b>Docking</b>	Thunderbolt 3, USB3.0, <i>Side Mechanical (CS18)</i>	Thunderbolt 3, USB3.0, <i>Side Mechanical (CS18)</i>
<b>Ethernet</b>	<i>Via "New" Ethernet Docking Dongle</i>	<i>Via "New" Ethernet Docking Dongle</i>
<b>I/O Ports</b>	2x USB3.0, 2x Thunderbolt 3, Audio, microSD Card	<b>2 x USB3.1 (Gen1)</b> , 2x TBT3, Audio
<b>Video Ports / Audio</b>	HDMI, Thunderbolt 3 (DP1.2), Dolby Premium Audio, 2x Mic	HDMI 1.4, Thunderbolt 3 (DP1.2), <b>Dolby Atmos Speaker System, 4x Mic</b>
<b>Wireless Communication</b>	WLAN / LTE CAT9 / NFC	WLAN / LTE CAT9 & <b>16</b> / NFC
<b>Biometric / Security</b>	Touch FPR, IR Camera, <i>ThinkShutter</i> , dTPM 2.0	Touch FPR, IR Camera, <b>ThinkShutter RGB&amp;IR</b> , dTPM 2.0

# ThinkPad X1 Carbon



Black

Carbon Fiber Weave



# ThinkPad X1 Yoga 4<sup>th</sup> gen



# X1 Yoga



Precision machined aluminum construction exhibiting lustrous metallic finishing

# X1 Yoga | No Compromise Convertible



- 17% smaller footprint
- Precision CNC Aluminum chassis
- 11% thinner at 15.5 mm; 1.36 kg
- Premium Dolby Atmos<sup>®</sup> Speaker System, Digital Assistant Ready
- 4k, 500NIT Dolby Vision<sup>®</sup> panel, optional Privacy Guard FHD panel
- Now supports ALL docking solutions: Mechanical, USB-C, USB-A



# ThinkPad X1 Yoga





# 2019 X1 Yoga 3<sup>rd</sup> vs 4<sup>th</sup>

Blue indicates the changes

	X1 Yoga G3	X1 Yoga G4
Materials	A:CF, C: Mag, D:Mag	<b>A:ALU, C: ALU, D:Mag</b>
Dimension	333 x 229 x 17.05 mm	<b>323mm (-10) x 218mm (-11) x 15.5 mm (-1.8)</b>
L / R Bezel Size (mm) Top Bezel Size (mm)	11.0mm / 11.0mm 19.0mm / 35.0mm	<b>6.8mm / 6.8mm 13.0mm / 29.5mm</b>
Weight	1.40kg	<b>1.36kg</b>
Color	Black, Silver	<b>Iron Gray</b>
Screen Size & Resolution	14": FHD IPS Touch (300nit), WQHD IPS (300 nit), HDR WQHD IPS (500 nits)	14": FHD IPS Touch (400nit), <b>FHD ePrivacy +1</b> , WQHD IPS Touch(300nit), <b>HDR400 UHD IPS (500nit)</b>
CPU	KBL: i5 vPro; <i>KBL R: i5/i7, i5/i7 vPro</i>	<b>WHL: i5/i7, i5/i7 vPro</b>
Graphics	Intel UHD 620; Intel IRIS Plus 640 (Qual only)	<b>Intel UHD</b>
Memory	LPDDR3: 2133Mhz 8GB / 16GB	LPDDR3 8GB / 16GB
Storage	Up to 2TB PCIe SSD	Up to 2TB PCIe SSD
Camera	HD w/Privacy, HD + IR	HD w/Privacy, <b>HD + IR w/ Privacy</b>
Battery (Size / Life)	54Whr / Up to 15hrs	<b>51Wh</b> / 10- >15hrs
Rapid Charge – 80%	Yes (w\ 65W AC)	Yes (w\ 65W AC)
Keyboard	Rise and Fall & <i>White LEDs</i> w\ Backlight (1.8mm & 5.3mm TP)	<b>Standard Keyboard with backlight (1.5mm &amp; 4.5mm TP)</b>
Pen	Integrated and Optional ThinkPad Pen Pro	Integrated and Optional ThinkPad Pens
Docking	Thunderbolt 3, USB3.x	<b>Side Mechanical Dock</b> , Thunderbolt 3, USB3.x
Ethernet	Via Native Ethernet Dongle	Via Native Ethernet Dongle
I/O Ports	2x USB3.0, 2x Thunderbolt 3, Audio, microSD Card,	<b>2 x USB3.1 (2x Gen1)</b> , 2x TBT 3, Audio
Video Ports / Audio	HDMI 1.4, Thunderbolt 3 (DP1.2), Dolby Premium Audio, 2x Mic	<b>HDMI 1.4</b> , Thunderbolt 3 ( <b>DP1.4</b> ), <b>Dolby Atmos Speaker System, 4x Mic</b>
Wireless Communication	WLAN / LTE CAT9 / NFC	WLAN / <b>LTE CAT9&amp;16</b> / NFC
Biometric / Security	Touch FPR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, IR Camera, <b>ThinkShutter RGB&amp;IR</b> , dTPM 2.0

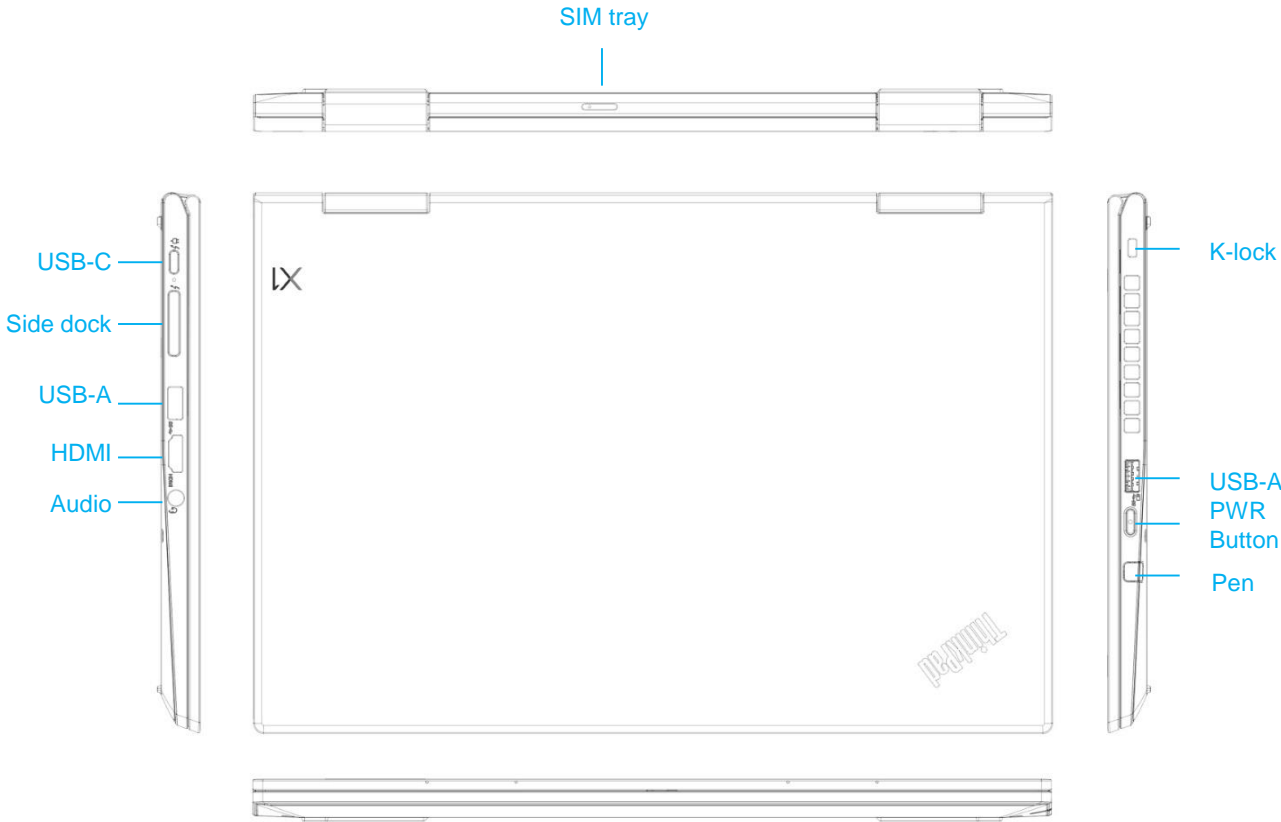
# 2019 X1 Carbon 7<sup>th</sup> vs X1 Yoga 4<sup>th</sup>

	X1 Carbon G7	X1 Yoga G4
<b>Materials</b>	CF A Cover w/ Paint or Weave , Mag Hybrid C & D	A:ALU, C: ALU, D:Mag
<b>Dimension</b>	323mm x 217mm x 14.95 mm	323mm x 218mm x 15.5 mm
<b>L / R Bezel Size (mm)</b> <b>Top Bezel Size (mm)</b>	7.0mm / 7.0mm 13.0mm / 29.5mm	6.8mm / 6.8mm 13.0mm / 29.5mm
<b>Weight</b>	1.09kg	1.36kg
<b>Color</b>	Black or Black with Carbon Fiber Top Cover	Iron Gray
<b>Screen Size &amp; Resolution</b>	14": FHD IPS (400nit), FHD IPS Touch (300nit), FHD IPS ePrivacy (400nit), WQHD IPS(300nit), HDR400 UHD IPS (500 nit) 10bit	14": FHD IPS Touch (400nit), FHD ePrivacy, WQHD IPS Touch(300nit), HDR400 UHD IPS (500nit)
<b>CPU</b>	WHL: i5/i7, i5/i7 vPro	WHL: i5/i7, i5/i7 vPro
<b>Graphics</b>	Intel UHD	Intel UHD
<b>Memory</b>	LPDDR3 8GB / 16GB	LPDDR3 8GB / 16GB
<b>Storage</b>	Up to 2TB PCIe SSD	Up to 2TB PCIe SSD
<b>Camera</b>	HD + IR w/ThinkShutter	HD + IR w/ThinkShutter
<b>Battery (Size / Life)</b>	51Wh 10- >15hrs	51Wh / 10- >15hrs
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	White LEDs & Backlight (1.5mm & 4.5mm TP)	White LEDs & Backlight (1.5mm & 4.5mm TP)
<b>Pen</b>	N/A	Integrated and Optional ThinkPad Pens
<b>Docking</b>	Side Mechanical Dock, Thunderbolt 3, USB A	Side Mechanical Dock, Thunderbolt 3, USB A
<b>Ethernet</b>	Via Native Ethernet Dongle	Via Native Ethernet Dongle
<b>I/O Ports</b>	2 x USB3.1 (Gen1), 2x TBT3, Audio	2 x USB3.1 (2x Gen1), 2x TBT 3, Audio
<b>Video Ports / Audio</b>	HDMI 1.4, Thunderbolt 3 (DP1.2), Dolby Atmos Speaker System, 4x Mic	HDMI 1.4, Thunderbolt 3 (DP1.4), Dolby Atmos Speaker System, 4x Mic
<b>Wireless Communication</b>	WLAN / LTE CAT9 & 16 / NFC	WLAN / LTE CAT9&16 / NFC
<b>Biometric / Security</b>	Touch FPR, IR Camera, ThinkShutter RGB&IR, dTPM 2.0	Touch FPR, IR Camera, ThinkShutter RGB&IR, dTPM 2.0

# ThinkPad X1 Yoga Dimension

Dimension: 323 x 218 x 15.2mm

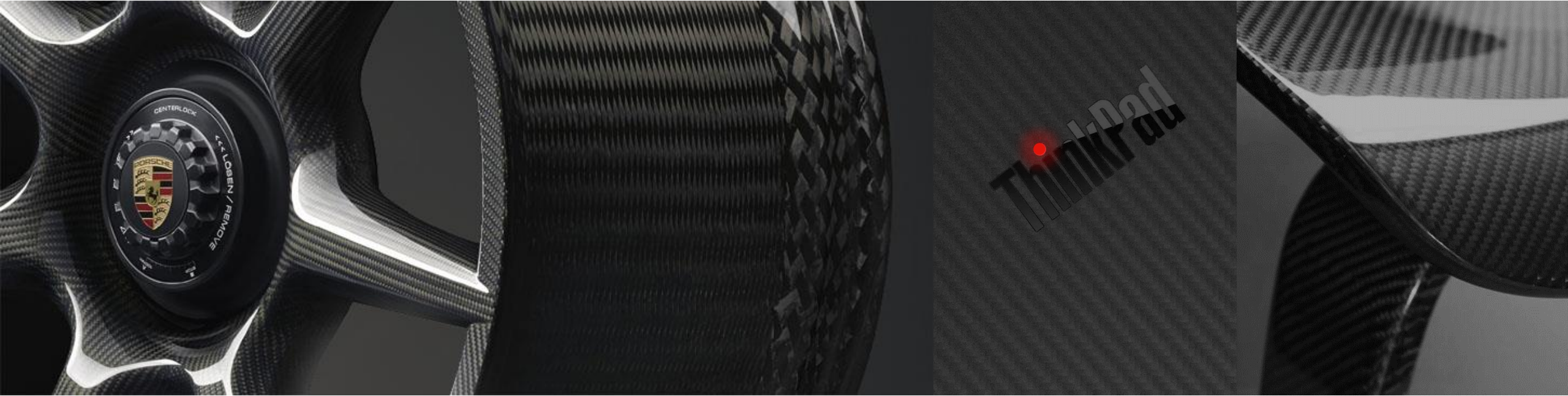
Weight: 1.38kg



# ThinkPad X1 Extreme 2<sup>nd</sup> gen



# X1 Extreme



Reinforcing premium performance utilizing the inherent strength and ultra-light weight of carbon fiber

# ThinkPad X1 Extreme

Ultimate Performance

- NEW carbon fiber woven finish option
- 4k, 500NIT HDR400 Dolby Vision® panel
- nVIDIA GeForce GTX 1650 Ti Graphics
- 360° Far-field microphones
- 18mm thin; from 1.7 kg
- Small 135W Power Supply
- ThinkShutter Camera Privacy
- AR/VR Certified/Ready



# ThinkPad X1 Extreme | Gen to Gen

	X1 Extreme G1	X1 Extreme G2
<b>Materials</b>	CF A Cover w/ Paint, Mag Hybrid C & D	CF A Cover w/ Paint or <b>Weave</b> , Mag Hybrid C & D
<b>Dimension</b>	361.8 x 245.7 x 18.4 (18.7 w/touch) mm	361.8 x 245.7 x 18.4 (18.7 w/touch) mm
<b>L / R Bezel Size (mm)</b>	7.5mm / 7.5mm	7.5mm / 7.5mm
<b>Weight</b>	1.7kg (Touch 1.8kg)	1.7kg (Touch 1.8kg)
<b>Color</b>	Black	Black or <b>Black with Carbon Fiber Top Cover</b>
<b>Screen Size &amp; Resolution</b>	15.6": FHD IPS AG 300nits, 4K IPS AR/AS w\ touch 400nits	15.6": FHD IPS AG (300nit), <b>FHD IPS HDR 400 (500nit), 4K IPD HDR400 (500nit), 4K OLED Touch (350 nit)</b>
<b>CPU</b>	CFL H: i5/i7, i5/i7 vPro	<b>CFL-R H: i5/i7/i9, i5/i7 vPro</b>
<b>Graphics</b>	Nvidia GeForce 1050 Ti (MaxQ w/4GB GDDR5)	<b>GeForce GTX 1650 Ti (MaxQ w/4GB GDDR5)</b>
<b>Memory</b>	DDR4 (2666MHz): 8/16/32GB/64GB Non ECC Dual DIMM	DDR4 (2666MHz): 8/16/32GB/64GB Non ECC Dual DIMM
<b>Storage</b>	2 Devices (2x M.2 2280 PCIe TLC & SATA w/ Raid 0/1 Up to 2TB (2x 1TB PCIe SSD)	2 Devices (2x M.2 2280 PCIe TLC & SATA w/ Raid 0/1 Up to 2TB (2x 1TB PCIe SSD)
<b>Camera</b>	HD w/ThinkShutter, HD + IR	<b>HD + IR w/ThinkShutter</b>
<b>Battery (Size / Life)</b>	80Whr / Up to 15hrs	80Whr / Up to 15hrs
<b>Rapid Charge – 80%</b>	Yes (w\ 135W AC)	Yes (w\ 135W AC)
<b>Keyboard</b>	CS18 Keyboard w/o Num Pad, Backlight	CS18 Keyboard w/o Num Pad, Backlight
<b>Pen</b>	Yes (optional, not garaged)	Yes (optional, not garaged)
<b>Docking</b>	Thunderbolt 3 WS Cable Dock w/PD	Thunderbolt 3 WS Cable Dock w/PD
<b>Ethernet</b>	Via Ethernet Dongle	Via Ethernet Dongle
<b>I/O Ports</b>	2x USB3.1 (1x PWR), 2x TBT3, 1x SD, SCR	2x USB3.1 (1x PWR), 2x TBT3, 1x SD, SCR
<b>Video Ports / Audio</b>	HDMI 2.0, TBT3 (DP 1.4), Dolby Premium Audio, ATMOS via headphones	HDMI 2.0, TBT3 (DP 1.4), Dolby Premium Audio, ATMOS via headphones
<b>Wireless Communication</b>	WLAN (802.11AC)	WLAN <b>(802.11AX)</b>
<b>Biometric / Security</b>	Touch FPR, IR Camera, ThinkShutter, dTPM 2.0	Touch FPR, IR Camera, <b>ThinkShutter RGB&amp;IR</b> , dTPM 2.0
<b>AC Adapter</b>	135W Slim Tip, 118 x 77x 22mm (220cc)	135W Slim Tip, 118 x 77x 22mm (220cc)

# ThinkPad X1 Extreme





# ThinkPad L390 / L390 Yoga



# L390 / L390 Yoga

*“Business Grade Mobile Productivity”*

- **Full Performance**

- Core i WHL-U CPUs
- FHD and FHD Touch Options
- SSD and DDR4

- **Connected Mobility**

- Up to 14 hrs of battery life
- 18.8 mm Thin and 1.46kg Light
- Integrated Active Pen on Yoga model

- **Refined Security and Privacy**

- IR Camera on Yoga Model
- FPR on Black and Silver
- dTPM 2.0



# + L390 Clamshell Gen to Gen

	L380	L390
<b>Dimension</b>	322 x 224.2 x 18.8 (Al)	322 x 224.2 x 18.8 (Al)
<b>Weight</b>	1.46kg	1.46kg
<b>Screen Size &amp; Resolution</b>	13.3": HD TN, FHD IPS, FHD IPS Touch	13.3": HD TN, FHD IPS, FHD IPS Touch
<b>CPU</b>	KBL: Celeron, i3; KBL R: i5/i7, i5 Vpro	<a href="#">WHL: Celeron, i3, i5, i5 vPro, i7</a>
<b>Graphics</b>	Intel HD 620	Intel HD
<b>Memory</b>	DDR4: 4GB, 8GB, 16GB, 32GB; 2 DIMM	DDR4: 4GB, 8GB, 16GB, 32GB; 2 DIMM
<b>Storage</b>	Up to 512GB PCIe SSD	Up to 512GB PCIe SSD
<b>Camera</b>	720p HD	720p HD
<b>Battery (Size / Life)</b>	45 Whr / Up to 14hrs	45 Whr / Up to 14hrs
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	Standard and Backlit KBD (optional) w\ white LED	Standard and Backlit KBD (optional) w\ white LED
<b>Pen</b>	N/A	N/A
<b>Docking</b>	USB3.0 / Type C	USB3.0 / Type C
<b>Ethernet</b>	Mini RJ-45	Mini RJ-45
<b>I/O Ports</b>	2x USB 3.0, 2x USB Type-C	2 x USB 3.0, 2x USB Type-C, Audio, microSD Card, 1 x HDMI
<b>Video Ports</b>	HDMI	HDMI
<b>Wireless</b>	WLAN, NFC	WLAN, NFC
<b>Biometric / Security</b>	Touch FPR, dTPM 2.0, K-Lock	Touch FPR, dTPM 2.0, K-Lock

# + L390 Yoga Gen to Gen

	L380 Yoga	L390 Yoga
<b>Dimension</b>	322 x 224.2 x 18.8 (Al)	322 x 224.2 x 18.8 (Al)
<b>Weight</b>	1.56kg	1.56kg
<b>Screen Size &amp; Resolution</b>	13.3": FHD IPS Touch	13.3": FHD IPS Touch
<b>CPU</b>	KBL:i3; KBL R: i5/i7, i5 Vpro	WHL: i3, i5, i5 vPro, i7
<b>Graphics</b>	Intel HD 620	Intel HD 620
<b>Memory</b>	DDR4: 4GB, 8GB, 16GB, 32GB; 2 DIMM	DDR4: 4GB, 8GB, 16GB, 32GB; 2 DIMM
<b>Storage</b>	Up to 512GB PCIe SSD	Up to 512GB PCIe SSD
<b>Camera</b>	HD, HD+ IR, World Facing Camera	HD, HD+ IR, World Facing Camera
<b>Battery (Size / Life)</b>	45Whr / Up to 12hrs	45Whr / Up to 12hrs
<b>Rapid Charge – 80%</b>	Yes (w\ 65W AC)	Yes (w\ 65W AC)
<b>Keyboard</b>	Standard and Backlit KBD (optional) w\ white LED	Standard and Backlit KBD (optional) w\ white LED
<b>Pen</b>	YES-Garaged Pen	YES-Garaged Pen
<b>Docking</b>	USB3.0 / Type C	USB3.0 / Type C
<b>Ethernet</b>	Mini RJ-45	Mini RJ-45
<b>I/O Ports</b>	2 x USB 3.0, 2x USB Type-C	2 x USB 3.0, 2x USB Type-C, Audio, microSD Card, 1 x HDMI
<b>Video Ports</b>	HDMI	HDMI
<b>Wireless</b>	WLAN, NFC	WLAN, NFC
<b>Biometric / Security</b>	Touch FPR, dTPM 2.0, IR Camera, K-Lock	Touch FPR, dTPM 2.0, IR Camera, K-Lock

# ThinkPad L490/L590



# L490/L590 Mainstream Commercial

## *All Day Performance & Power*

- Core i WHL CPUs
- New AMD Radeon 535 Discrete Graphics
- Up to 12 hrs of Battery Life + Rapid Charge

## *Essential Connectivity*

- 2x Type-C (1x 3.1 Gen 2), 2x Type-A 3.1 Gen 1
- Mechanical Docking support
- Global LTE WWAN
- Wifi-6 support on vPro sku

## *Built for Business*

- IR Camera and FPR for Windows Hello
- ThinkShutter 100% for RGB and IR Camera
- Dual DIMM (64 GB RAM)



# GEN TO GEN

	L480	L490
Dimension	335 x 235 x 22.5 mm	335 x 235 x 22.5 mm
Bezel Width (L/R)/ TOP	12mm/20.94mm	12mm/20.94mm
Weight	1.68 kg	1.69 kg
Screen Size & Resolution	14" : HD TN, FHD IPS, FHD IPS Touch	14" : HD TN, FHD IPS, FHD IPS Touch
CPU	KBL: Cele/i3/i5; KBL R: i5/i7, i5/i7 vPro	<b>WHL: Cel/i3/i5; i5/i7 vPro</b>
Graphics	Intel UHD 620, AMD Radeon 530	Intel UHD 620 , <b>AMD Radeon 535</b>
Memory	DDR4: 4GB, 8GB, 16GB, 32GB; 2 DIMM	DDR4: 4GB, 8GB, 16GB, 32GB <b>64GB</b> ; 2 DIMM; <b>Optane</b>
Storage	Up to 2TB HDD; Up to 512GB PCIe SSD	Up to 2TB HDD; <b>Up to 1TB PCIe SSD</b>
Camera	HD, HD + IR	HD, HD + IR, <b>ThinkShutter</b>
Battery (Size / Life)	45Whr / Up to 12 hrs	45Whr / Up to 12 hrs
Rapid Charge – 80%	Yes (w\ 65W AC)	Yes (w\ 65W AC)
Keyboard	Standard and Backlit KBD (optional) w\ white LEDs	Standard and Backlit KBD (optional) w\ white LEDs
Pen	No	No
Docking	Mechanical Side docking (CS18)	Mechanical Side docking (CS18)
Ethernet	RJ-45	RJ-45
I/O Ports	2x USB 3.0, 2x USB-C, uSD	2x USB 3.1 Gen1, <b>1x USB-C 3.1 Gen1, 1x USB-C 3.1 Gen2</b> , uSD
Video Ports	Type-C, HDMI	Type-C, HDMI
Wireless Communication	WLAN, LTE CAT9 & EU CAT6, NFC	WLAN 802.11 AC & <b>AX</b> , LTE CAT9 & EU CAT6, NFC
Biometric / Security	Touch FPR, SCR	Touch FPR, SCR

# ThinkBook





# ThinkBook



# WorkLife



1.39kg 15.9mm thin

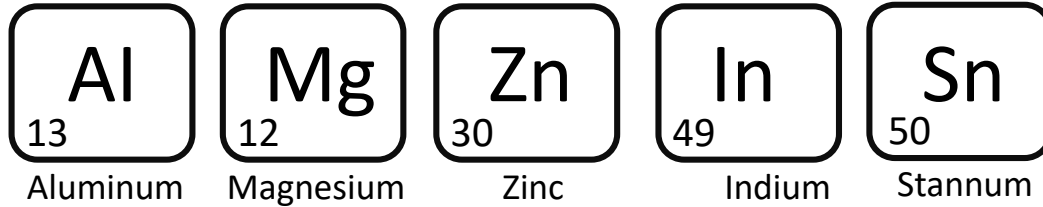
# Power button with Finger Print



Finger print indicator  
LED

# FIVE METAL ELEMENTS MAKES THINKBOOK S

Position in Periodic Table of the Element



## Chassis:

- Metal A/C/D cover: **Al** cover with **Mg** element

## Vacuum Indium coating hinge:

Non-conductive vacuum metallization (NCVM) coating technology

- Base material of the hinge surface is **In & Sn** (The In total reserves in world's is 50,000 tons)
- Avoid Wi-Fi interference of radio frequency (RF) signals compare with other metallization methods such as aluminum
- Corrosion resistant

**Zinc alloy** inside hinge material with powder metallurgy technology:

- More durability compare with normal casting technology
- 25000 cycles hinge open and close test
- Excellent cooling with hinge design

Lenovo



# ThinkCentre 2019



# ThinkCentre M90n - Nano



# Autopilot for TopSeller



# Enhanced Package Label

Productname  
Serialno.

MTM and Serialno.

UUID  
Origin country (manufacturing)

EAN Code  
MAC1 (LAN Adpater)  
MAC2 WLAN Adapter

IMEI (WWAN LTE-Modul)

**AutoPilot Product Key ID (PKID)**

*PKID is part of the 4K HH\* generated by Microsoft's OA3 Tool.*

*The OEM will copy the PKID out of the 4K HH\* (OEM name, serial number, and model name) (\*Hardware Hash)*



PO – purchasing order no.



**thanks.**

**Different is better**

