



Version: 1.0, July 16, 2018

THINKPAD P51

Product Overview

The ThinkPad P51 redefines the concept of power. The latest-generation Intel® processors, optional X-Rite® PANTONE® color calibration, Mil-Spec testing for durability, blazing-fast connection speeds, and unprecedented storage and memory make this workstation your go-to PC for getting the job done.

Operating Systems

Preloaded

Genuine Windows 10® Professional 64-bit

Genuine Windows 10DG to 7® Professional 64-bit

Ubuntu Linux

Supported

Red Hat Enterprise Linux 7.3

Motherboard - P51

Chassis Summary

Chassis Information

Dimensions	24.50mm (0.96in) x 377.40mm (14.86in) x 252.30mm (9.93in)
Weight	Starting at 5.6lbs
Packaging Parameters without External Speaker	
Color	ThinkPad Business Black
PSU	170W, 2pin
Thermal Solutions	Dual Fan, 1 dedicated CPU, 1 dedicated GPU with connected heat sinks

Physical Security & Serviceability

Hardware Maintenance Manual [Click Here](#)

User Guide [Click Here](#)

Drivers & Software [Click Here](#)

Access Panel	Bottom cover, 6 screws
Hard Drives	Screw, 1x
Memory	Tool-less
Restore CD/DVD Set	Restore system to original factory shipping image - Can be obtained via Lenovo Support
Cable Lock Support	Yes, Optional Kensington Cable Lock
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Yes
Power-On Password	Yes
Setup Password	Yes
NIC LEDs (integrated)	Yes
Security Chip	Yes, TCG dTPM 2.0
Boot Sequence Control	Yes

Operating Environment

Air Temperature

- 8,000ft (2438m)
- Operating without a drive installed: 5°C to 35°C (41°F to 95°F)
- Operating with a drive installed: 10°C to 35°C (50°F to 95°F)
- Non-operating: 5°C to 31.3°C (41°F to 88°F)
- 10000ft (3048m)
- Operating unpressurized Condition: 5°C to 31.3°C (41°F to 88°F)

Storage

- *-20°C to 60°C (-4°F to 140°F)

Humidity

- Operating 8% ~ 95% (non-condensing)
- Non-Operating 5% ~ 95%(non-condensing)

Environmental Certifications

- Energy Star 6.1
- EPEAT Gold
- GreenGuard Gold
- TCO 5.0

Hazardous Substances

- Products do not contain more than; 0.1% lead, 0.01% cadmium, 0.1% mercury, 0.1% hexavalent chromium, 0.1% polybrominated biphenyls (PBB) or 0.1% polybrominated diphenol ethers (PBDE).
- Products do not contain Asbestos.
- Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (HCFC), Halons, carbontetrachloride, 1,1,1-trichloroethane, methyl bromide.
- Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation.
- Products do not contain more than 0.1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the

SCCP

- Parts with direct and prolonged skin contact do not release nickel in concentrations above 0.5 microgram/cm²/week.

SECTION II: SUPPORTED COMPONENTS

CPU Specifications

Intel 7th Gen Core and Xeon CPUs

www.ark.intel.com

Intel® Core™ i7-6700HQ processor (6MB L3, Up to 3.5GHz)

Intel® Core™ i7-6820HQ vPro processor (8MB L3, Up to 3.6GHz)

Intel® Xeon™ E3-1505M v5 vPro processor (8MB L3, Up to 3.7GHz)

Intel® Xeon™ E3-1535M v5 vPro processor (8MB L3, Up to 3.8GHz)

Memory Specifications

P51

Type SODIMM

Speed 2133MHz

Slots 4

Generation DDR4

Capacities - Non-ECC 8GB, 16GB

Capacities - ECC (Only with Xeon CPUs) 8GB, 16GB

Dual Channel Capable Yes

Storage

2x 2.5" bays; 1 bay capable of 2x M.2 drives (either PCIe or SATA) or 1x 2.5" HDD, 1 bay capable of only 1x 2.5" HDD

RAID

Supported RAID levels for a system will vary from the stated capabilities of the RAID controller due to dependencies on the number and capacity of physical disks in the system and on customer requirements for performance, fault tolerance, or data redundancy. Max support RAID 0,1

RAID levels and requirements:

- RAID 0 (striping) provides increased performance by writing data across multiple drives.
- RAID 1 (mirroring) provides fault tolerance by writing the data on two drives.

Keyboard

- 6 row; spill resistant; Multimedia Fn keys, numeric keypad, optional LED backlight, 2.2mm key stroke, 19.05mm key pitch

Pointing Devices

- Trackpoint with left/right click and scroll lock, Touchpad with left/middle/right click

Fingerprint Reader

- Touch Style, match-on-system

Color Calibrator

- X-Rite Pantone software, AMS RGB sensor

Graphics Cards

Integrated Graphics

Core CPU: Intel HD 630

Xeon CPU: Intel HD P630

Discrete Graphic Cards

NVIDIA M1200 with 4GB GDDR5

NVIDIA M2200 with 4GB GDDR5

Network

Connector

RJ-45

Model

Intel, I219-V, Intel, I219-LM

Website

[I219-V](#)

[I219-LM](#)

Miscellaneous

Thunderbolt

Intel Alpine Ridge controller, 1 port via USB Type C, max I/O of 40Gb/s

USB

4x USB Type A (1 powered), 1x USB Type C (support for Thunderbolt 3)

Audio Devices

HD Audio, Realtek ALC3268 codec, Stereo speakers, 2x 1.5W

WiFi Card

Intel Snowfield Peak 8265 2*2ac+BT4.1 vpro
Intel Snowfield Peak 8265 2*2ac+BT4.1 non-vpro

WWAN

US,CA: Sierra EM7455 LTE (HSPA+ /GSM/EDGE)
EU: Sierra EM7455 LTE (HSPA+ /GSM/EDGE)

Express Card

34mm

Chassis Materials

A Cover - GFRP
B Cover - PC/ABS
C Cover - PC/ABS
Roll Cage - Mg/Al
D Cover - Mg/Al

SECTION III: SYSTEM TECHNICAL SPECIFICATIONS

Social and Environmental Responsibility

Quality Control

- Lenovo is a member of an eco declaration system that enforces regular independent quality control

Hazardous substances and preparation

- Products do comply with current European RoHS Directive.
- Products do not contain Asbestos
- Products do not contain Ozone Depleting Substances: Chlorofluorocarbons (CFC), hydrobromofluorocarbons (HBFC), hydrochlorofluorocarbons (HCFC), Halons,

carbontetrachloride, 1,1,1- trichloroethane, methyl bromide

- Products do not contain more than; 0.005% polychlorinated biphenyl (PCB), 0.005% polychlorinated terphenyl (PCT) in preparation
- Products do not contain more than 0,1% short chain chloroparaffins (SCCP) with 10-13 carbon atoms in the chain containing at least 48% per mass of chlorine in the SCCP
- Parts with direct and prolonged skin contact do not release nickel in concentrations above 0,5 µg/cm² /week
- REACH Article 33 information about substances in articles is available at (add URL or mail contact):http://www.lenovo.com/social_responsibility/us/en/materials.html

Batteries

- If the product contains a battery or an accumulator, the battery/accumulator is labeled with the disposal symbol. Information on proper disposal is provided in user manual
- Button cells used in the product do not contain more than 2% by weight of mercury. Other batteries or accumulators do not contain more than 0.0005% of mercury or 0.002% of cadmium
- Batteries or accumulators do not contain more than 0,0005% of mercury or 0,002% of cadmium.
- Batteries and accumulators are readily removable.

Product packaging

- Packaging and packaging components do not contain more than 0,01% lead, mercury, cadmium and hexavalent chromium by weight of these together.
- The packaging materials are marked with abbreviations and numbers indicating the nature of the material(s) used.
- The product packaging material is free from ozone depleting substances as specified in the Montreal Protocol

For more information on Lenovo social environmental practices

visit: http://www.lenovo.com/social_responsibility/us/en/ThinkGreen_products.html#environment

Manageability

Industry Standard Specifications	This product meets the following industry standard specifications for manageability functionality: Intel LAN with AMT
Remote Manageability Software Solutions	Lenovo ThinkPad is supported on the following remote manageability software consoles: Lenovo ThinkManagement Console LANDesk Management Suite for ThinkVantage Technologies (www.landesk.com/lenovo) Microsoft System Center Configuration Manager
System Software Manager	Lenovo ThinkPad supports software management tools from the ThinkVantage System Update suite: System Update Update Retriever Thin Installer

Service, Support, and Warranty

On-site Warranty and Service: Up to four-years, limited warranty and service offering delivers on-site, next business-day service for parts and labor and includes free telephone support 8am - 5pm. Global coverage ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.

[Go to www.lenovo.com/support](http://www.lenovo.com/support) and www.lenovo.com/warranty for more details

SECTION IV: COMPONENT SPECIFICATIONS

Display

Model	15.6" FHD/ISP	15.6" UHD/IPS
Screen Size	15.6"	15.6"
Aspect Ratio	16:09	16:09
Resolution	FHD (1920 x 1080)	UHD (3840 x 2160)
Outline Dimension	360.0 x 224.3mm max (H x V) Thickness 3.2mm max	368.48 x 225.11mm max (H x V) Thickness 3.2mm max
Brightness	250 cd/m2	300 cd/m2
Contrast	600:01:00	1000:01:00
Viewing Angle (*1)	80/80/80/80 degree	89/89/89/89 degree
Panel Technology	IPS	IPS
Color Depth	Native 262K (RGB 6-bit data driver)	Native 262K (RGB 6-bit data driver)
Interface	eDP 1.2	eDP 1.3
Panel ID recognition	EDID in BIOS table	EDID in BIOS table
Weight	380 g max	345 g typ

HDD Specifications

2.5" SATA HDD	256 GB, PCIe NVMe, Gen3x4 (MLC), OPAL
	512 GB, PCIe NVMe, Gen3x4 (MLC), OPAL

256 GB, PCIe NVMe, Gen3x4 (TLC),
OPAL

512 GB, PCIe NVMe, Gen3x4 (TLC),
OPAL

1TB, PCIe NVMe, Gen3x4 (TLC), OPAL

SSD Specifications

M.2 PCIe & SATA SSD	256 GB, PCIe NVMe, Gen3x4 (MLC)
	512 GB, PCIe NVMe, Gen3x4 (MLC)
	1TB, PCIe NVMe, Gen3x4 (TLC)
	256GB SATA
	512GB SATA

Graphics Cards

Model	M500M	M600M	M1000M	M2000M	M3000M
TGP (GPU + VRAM)	18W	30W	45W	55W	75W
Video Ram Max	2GB	2GB	4GB	4GB	4GB
Memory type	DDR3	GDDR5	GDDR5	GDDR5	GDDR5
Memory bit	64 bit	128bits	128bits	128bits	192bits
Memory Bandwidth	14.4Gb/s	80GB/s	80GB/s	80GB/s	160GB/s
VRAM Type	2GB	2GB	4GB	4GB	4GB
GPU Cuda Cores	384	384	512	630	1024
DisplayPort Max Resolution & Color Depth	3840×2160 @ 60Hz (30bpp)	3840×2160 @ 60Hz (30bpp)	3840×2160 @ 60Hz (30bpp)	3840×2160 @ 60Hz (30bpp)	3840×2160 @ 60Hz (30bpp)
HDMI Max Resolution & Color Depth	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)
DirectX	12	12	12	12	12
OpenGL	4.4	4.4	4.4	4.4	4.4
OpenCL	1.1	1.1	1.1	1.1	1.1
Optimus	Yes	Yes	Yes	Yes	Yes
OS Support	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu
Model	M4000M	M5000M	M520	M620	M1200
TGP (GPU + VRAM)	100W	100W	25W	30W	45W
Video Ram Max	4GB	8GB	2GB	2GB	4GB
Memory type	GDDR5	GDDR5	GDDR5	GDDR5	GDDR5
Memory bit	256 bits	256 bits	64 bit	128bits	128bits
Memory Bandwidth	160GB/s	160GB/s	40GB/s	80GB/s	80GB/s
VRAM Type	8GB	8GB	2GB	2GB	4GB
GPU Cuda Cores	1280	1536	384	512	640
DisplayPort Max Resolution & Color Depth	3840×2160 @ 60Hz (30bpp)	3840×2160 @ 60Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 60Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 60Hz (30bpp)	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 60Hz (30bpp)
HDMI Max Resolution & Color Depth	Max: 5.4Gb/s ,4 lanes,36bpp	Max: 5.4Gb/s ,4 lanes,36bpp	Max: 5.4Gb/s ,4 lanes,36bpp	Max: 5.4Gb/s ,4 lanes,36bpp	Max: 5.4Gb/s ,4 lanes,36bpp

	3840×2160 @ 24Hz (30bpp)	3840×2160 @ 24Hz (30bpp)	3840×2160 @ 24Hz (30bpp)	3840×2160 @ 24Hz (30bpp)	3840×2160 @ 24Hz (30bpp)
DirectX	12	12	12	12	12
OpenGL	4.4	4.4	4.5	4.5	4.5
OpenCL	1.1	1.1	1.2	1.2	1.2
Optimus	Yes	Yes	Yes	Yes	Yes
OS Support	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu
Model	M2200	P510	P3000	P4000	P5100
TGP (GPU + VRAM)	55W	TDP 18W / TDP 2W	75W	100W	100W
Video Ram Max	4GB	2GB	6GB	8GB	16GB
Memory type	GDDR5	GDDR5	GDDR5	GDDR5	GDDR5
Memory bit	128bits	64 Bit	192bits	256 bits	256 bits
Memory Bandwidth	88GB/s	40.1GB/s	168GB/s	192GB/s	192GB/s
VRAM Type	4GB	2GB	4GB	8GB	8GB
GPU Cuda Cores	1024		1280	1920	2304
DisplayPort Max Resolution & Color Depth	Max: 5.4Gb/s ,4 lanes,36bpp 3840×2160 @ 24Hz (30bpp)		Max: 8.1Gb/s, 4 lanes,36bpp 5120×3200 @ 60Hz(24bpp, 30bpp with 422)	Max: 8.1Gb/s, 4 lanes,36bpp 5120×3200 @ 60Hz(24bpp, 30bpp with 422)	Max: 8.1Gb/s, 4 lanes,36bpp 5120×3200 @ 60Hz(24bpp, 30bpp with 422)
HDMI Max Resolution & Color Depth	4096×2160@60Hz RGB888	N/A	4096×2160@60Hz RGB888	4096×2160@60Hz RGB888	4096×2160@60Hz RGB888
DirectX	12	12	12	12	12
OpenGL	4.5	4.5	4.5	4.5	4.5
OpenCL	1.1	1.1	1.1	1.1	1.1
Optimus	Yes	Yes	Yes	Yes	Yes
OS Support	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu	Win10, Win8.1, Win7, Ubuntu

Networking

Ethernet

Connector	RJ-45	RJ-45
Model	Intel, I219-V	Intel, I219-LM
Website	Intel-Ethernet-Connection-	Intel-Ethernet-Connection-

	<u>I219-V</u>	<u>I219-LM</u>
10BASE-T (IEEE 802.3 specification conformance)	x	x
100BASE-TX (IEEE 802.3 specification conformance)	x	x
1000BASE-T (IEEE 802.3 specification conformance)	x	x
Auto-Negotiation (IEEE 802.3u)	x	x
Intel® vPro™ 2 technology		x
Intel® Stable Image Platform Program (SIPP)		x
Intel® Standard Manageability	x	x
Power optimizer platform low-power management systems	x	x
Energy Efficient Ethernet1 (IEEE 802.3az)	x	x
TCP/UDP checksum and segmentation offload (IPv4 and IPv6)	x	x
Receive Side Scaling	x	x
Dual Tx and Rx queues	x	x
Jumbo Frames (up to 9 KB)	x	x
Teaming	x	x
Integrated Auto Connect Battery Saver (ACBS) battery savings	x	x
Timing and Synchronization (802.1as / 1588)	x	x
Integrated Switched Voltage Regulator (iSVR)	x	x
Shared Flash with system BIOS	x	x
Wake from Deep Sx	x	x
Server operating system support		x
Network proxy/ARP support	x	x
32 wake filter support	x	x

WLAN

Model	Intel 8265
Dimensions	(H x W x D) M.2 2230: 22 mm x 30 mm x 2.4 mm [1.5mm Max (Top Side)/ 0.1mm Max (Bottom Side)] M.2 1216: 12mm x 16 mm x 1.8 mm
Weight	M.2 2230: 2.6g M.2 1216: 0.6g
Antenna Diversity	Supported
Radio ON/OFF Control	Supported
Connector interface	M.2: PCIe, USB, or UART (M.2 1216 only)
Operating Temperature (Adapter Shield)	0°C to +80°C
Humidity Non-	50% to 90% RH non-condensing (at temperatures of 25°C to 35°C)

Operating

Operating Systems	Microsoft Windows 7*, Microsoft Windows 8.1*, Microsoft Windows 10*, Linux* (limited featuresupport), Android
Wi-Fi Alliance	Wi-Fi CERTIFIED* a/b/g/n/ac, WMM*, WMM-PS*, WPA*, WPA2*, WPS2*, Protected Management Frames, Wi-Fi Direct* for peer to peer device connections, Wi-Fi Miracast* as Source.
IEEE WLAN Standard	IEEE 802.11a/b/g/n/ac, 802.11d, 802.11e, 802.11h, 802.11i, 802.11w; 802.11r, 802.11k, 802.11v pending OS support; Fine Timing Measurement based on 802.11REVmc
Roaming	Supports seamless roaming between access points
Bluetooth*	Dual Mode Bluetooth* 4.2, BLE
Authentication	WPA and WPA2, 802.1X (EAP-TLS, TTLS, PEAP, LEAP, EAP-FAST), EAP-SIM, EAP-AKA
Authentication Protocols	WPA and WPA2, 802.1X (EAP-TLS, TTLS, PEAP, LEAP, EAP-FAST), EAP-SIM, EAP-AKA
Encryption	64-bit and 128-bit WEP, AES-CCMP
Regulatory	For a list of country approvals, please contact your local Intel representatives.
US Government	FIPS11 ,FISMA;
Product Safety	UL, C-UL, CB (IEC 60950-1)

WWAN

Model Qualcomm Snapdragon X7 LTE-A (Sierra Wireless EM7455)

4G LTE

Category Cat-6

Frequency Bands B1-B5, B7, B12, B13, B20, B25, B26, B29, B30, B41

3G

Frequency Bands HSPA+, UMTS
B1, B2, B3, B4, B5, B8

Data Speed

Peak Download Rate 300Mbps

Peak Upload Rate 50Mbps

Location Solution

Satellite Systems GPS, Glonass, Beidou, Galileo

Audio Codecs

PCM/125 x

USB Drivers

Windows 7, 8.1, 10 x

Linus x

Android RIL x

Interfaces

USB USB 3.0, USB 2.0 High Sppeed

SIM Interface 1.8V/3V	x
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Control Options

APIs, AT Commands	x
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Hardware

Dimension	42 x 30 x 2.3mm
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Antenna

Connector: Main, Aux/GNSS, GNSS	x
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Diversity	x
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MIMO	x
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GNSS Biao	x
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Temperature Range

Industrial Grade	*-40 - 85C
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Approvals

Regulatory	CD, FCC, GCF, IC, NCC, PTCRB
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Carrier	AT&T, Bell, Rogers, Sprint, Telus, US Cellular, Verizon, Vodafone
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Cloud Services

Free Unlimited FOTA Upgrades	x
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Device Management Option	x
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Application Enablement Option	x
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Connectivity Management Option	x
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Color Calibrator

Module	ECCM-3
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Connector	USB 2.0
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Power	Operation - 24mA Suspend - 0.5mA
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Color Standard	CIE 1931
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Colorimetric Accuracy

Screen Color	Chromaticity Accuracy Limit (Δx , Δy) difference from average reference	Luminance Accuracy Limit (Percent Difference from average reference)
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White	+/-0.007	+/-5%
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Operating Temp - C	10 - 35
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Humidity %	10 - 95
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Camera

Resolution	1280 x 720
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Frames per Second

30

Focus

Fixed

Low Light Sensitive

Yes

Progressive Scan

Yes