

Latitude 7650

Owner's Manual

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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Introduction

Welcome - Getting started

The Latitude 7650 field service manual enables the service technicians to accurately and effectively resolve customer inquiries and technical issues regarding this computer. The document informs the field service technicians of the proper steps for replacing hardware and also gives an overview of the system BIOS, features, and safety precautions.

To contact Dell regarding issues with this reference material, write to Educate@dell.com.

Views of Latitude 7650

Right

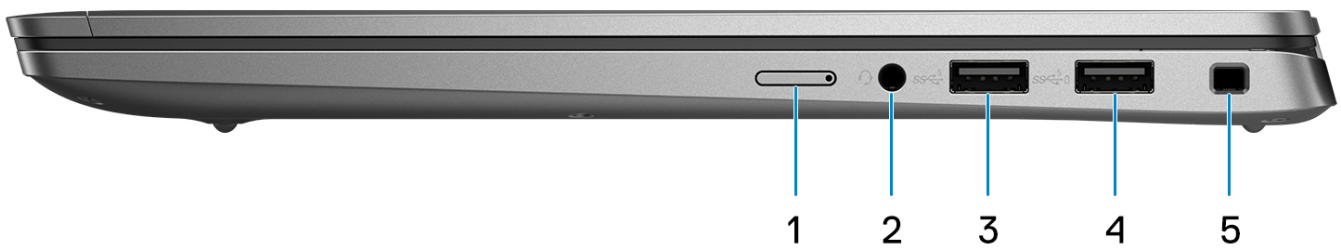


Figure 1. Right view

1. **NanoSIM slot (optional)**

Insert a nano-SIM card to connect to a mobile broadband network.

NOTE: Availability of the nano-SIM card slot depends on the region and configuration ordered.

2. **Universal audio port**

Connect headphones or a headset (headphone and microphone combo).

3. **USB 3.2 Gen 1 port**

Connect devices such as external storage devices and printers.

4. **USB 3.2 Gen 1 port with PowerShare**

Connect devices such as external storage devices and printers. Provides data transfer speeds up to 5 Gbps.

5. **Wedge-shaped lock slot**

Connect a security cable to prevent unauthorized movement of your computer.

Left



Figure 2. Left view

1. HDMI 2.1 port

Connect to a TV, external display or another HDMI-in enabled device. Provides video and audio output.

2. Thunderbolt 4.0 with DisplayPort Alt Mode/USB Type-C/USB4/Power Delivery

Supports USB4, DisplayPort 2.1, Thunderbolt 4 and also enables you to connect to an external display using a display adapter. Provides data transfer rates of up to 40 Gbps for USB4 and Thunderbolt 4.

NOTE: You can connect a Dell Docking Station to one of the Thunderbolt 4 ports. For more information, search in the Knowledge Base Resource at www.dell.com/support.

NOTE: A USB Type-C to DisplayPort adapter (sold separately) is required to connect a DisplayPort device.

NOTE: USB4 is backward compatible with USB 3.2, USB 2.0, and Thunderbolt 3.

NOTE: Thunderbolt 4 supports two 4K displays or one 8K display.

3. Thunderbolt 4.0 with DisplayPort Alt Mode/USB Type-C/USB4/Power Delivery

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NOTE: USB4 is backward compatible with USB 3.2, USB 2.0, and Thunderbolt 3.

NOTE: Thunderbolt 4 supports two 4K displays or one 8K display.

4. Battery-status/diagnostic light

Indicates the battery-charge status.

- Solid yellow-Battery charge is low.
- Blinking yellow-Battery charge is critical.
- Solid white-Battery is fully charged.

5. Smart card reader slot (optional)

Using smart card provides authentication in corporate networks.

Front



Figure 3. Image: Front view

1. Infrared camera (optional)

Enhances security when paired with Windows Hello face authentication.

2. Infrared LED

Emits infrared light, which enables the infrared camera to sense and track motion.

3. RGB Camera

Enables you to video chat, capture photos, and record videos.

4. Camera-status light

Turns on when the camera is in use.

5. Ambient-light sensor (ALS)

The sensor detects the ambient light and automatically adjusts the display brightness.

6. LCD panel

Provides visual output to the user.

Top

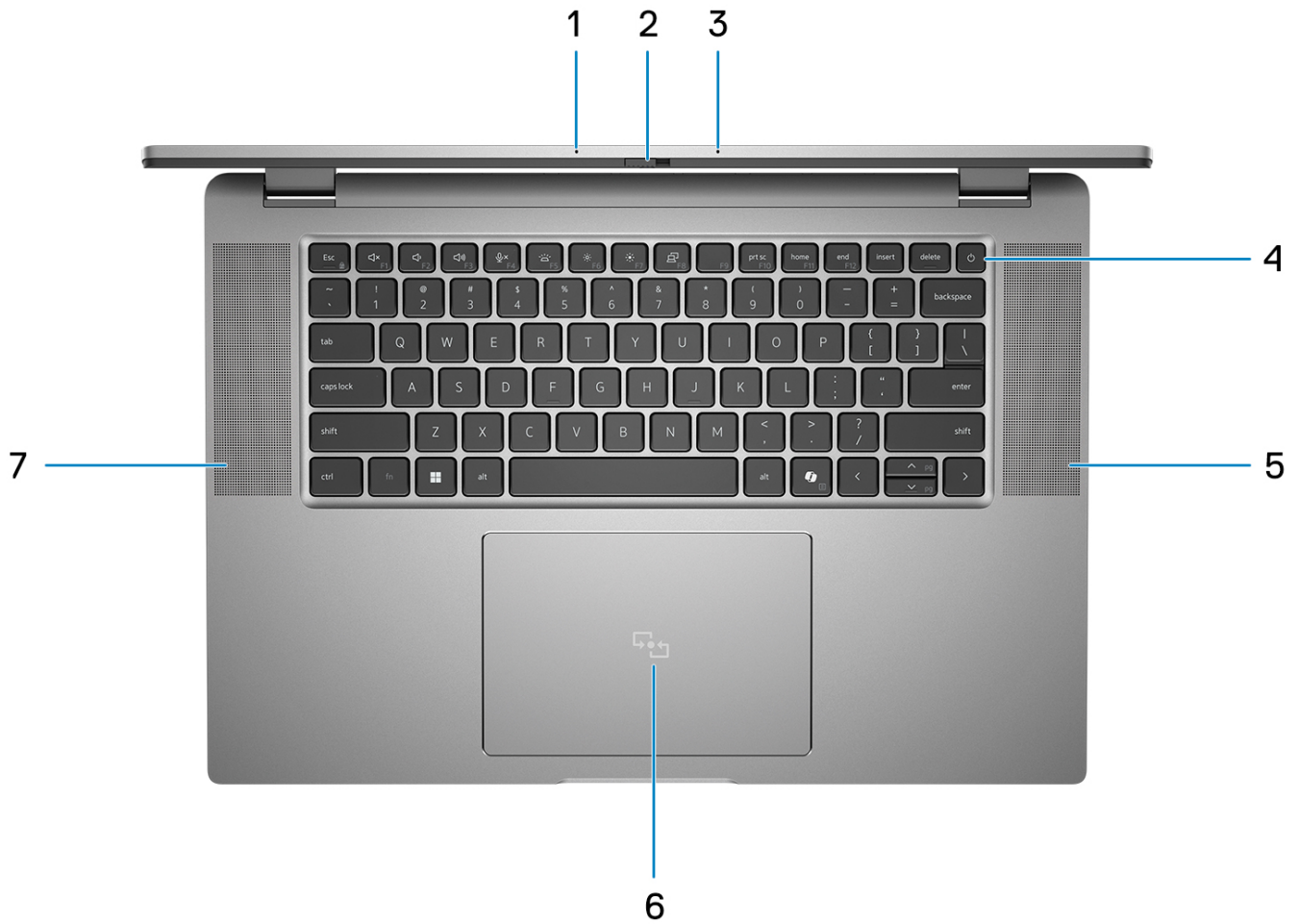


Figure 4. Image: Top view

1. Dual-array microphone

Provides digital sound input for audio recording and voice calls.

2. Camera shutter

Slide the privacy shutter to the left to access the camera lens.

3. Power button with fingerprint reader (optional)

Press to turn on the computer if it is turned off, in sleep state, or in hibernate state.

When the computer is turned on, press the power button to put the computer into sleep state; press and hold the power button for 10 seconds to force shut-down the computer.

If the power button has a fingerprint reader, place your finger on the power button steadily to log in.

NOTE: The power-status light on the power button is available only on computers without the fingerprint reader. Computers that are shipped with the fingerprint reader that is integrated on the power button will not have the power-status light on the power button.

NOTE: You can customize the power-button behavior in Windows.

4. Keyboard

5. Speaker

Provides audio output.

6. Clickpad

Move your finger on the touchpad to move the mouse pointer. Tap to left-click and two fingers tap to right-click.

7. Speaker

Provides audio output.

Bottom

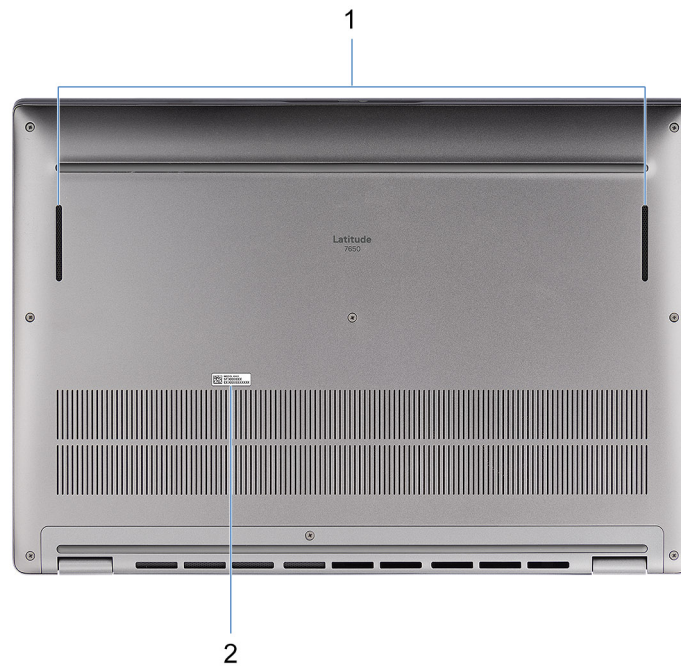


Figure 5. Image: Bottom view

1. Speakers

Provide audio output.

2. Service Tag label

The Service Tag is a unique alphanumeric identifier that enables Dell service technicians to identify the hardware components in your computer and access warranty information.

Service Tag

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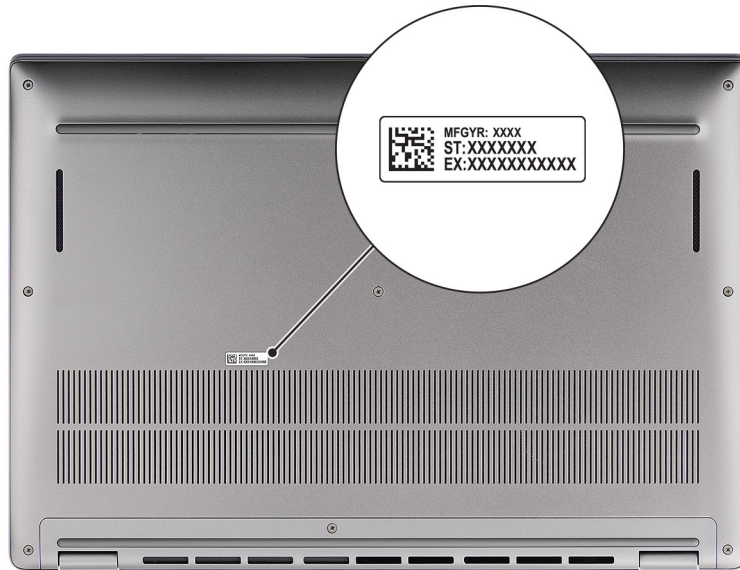


Figure 6. Image: Service Tag location

Battery charge and status light

The following table lists the battery charge and status light behavior of your Latitude 7650.

Table 1. Battery charge and status light behavior

Power Source	LED Behavior	System Power State	Battery Charge Level
AC Adapter	Off	S0 - S5	Fully Charged
AC Adapter	Solid White	S0 - S5	< Fully Charged
Battery	Off	S0 - S5	11-100%
Battery	Solid Amber (590+/-3 nm)	S0 - S5	< 10%

- S0 (ON) - System is turned on.
- S4 (Hibernate) - The system consumes the least power compared to all other sleep states. The system is almost at an OFF state, except for a trickle power. The context data is written to a hard drive.
- S5 (OFF) - The system is in a shutdown state.

Set up your Latitude 7650

About this task

NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Steps

1. Connect the power adapter and press the power button.



Figure 7. Connect the power adapter and press the power button

NOTE: The battery may go into power-saving mode during shipment to conserve charge on the battery. Ensure that the power adapter is connected to your computer when it is turned on for the first time.

2. Finish the operating system setup.

For Ubuntu:

Follow the on-screen instructions to complete the setup. For more information about installing and configuring Ubuntu, search in the Knowledge Base Resource at www.dell.com/support.

For Windows:

Follow the on-screen instructions to complete the setup. When setting up, Dell Technologies recommends that you:

- Connect to a network for Windows updates.
 - NOTE:** If connecting to a secured wireless network, enter the password for the wireless network access when prompted.
- If connected to the Internet, sign in with or create a Microsoft account. If not connected to the Internet, create an offline account.
- On the **Support and Protection** screen, enter your contact details.

3. Locate and use Dell apps from the Windows Start menu—Recommended.

Table 2. Locate Dell apps in Windows in S-mode







Resources	Description
	<p>Dell Product Registration</p> <p>Register your computer with Dell.</p>
	<p>Dell Help & Support</p> <p>Access help and support for your computer.</p>
	<p>SupportAssist</p> <p>SupportAssist proactively and predictively identifies hardware and software issues on your computer and automates the engagement process with Dell Technical support. It addresses performance and stabilization issues, prevents security threats, monitors, and detects hardware failures. For more information, see <i>SupportAssist for Home PCs User's Guide</i> at www.dell.com/support/home/product-support/product/dell-supportassist-pcs-tablets/docs.</p> <p>NOTE: In SupportAssist, click the warranty expiry date to renew or upgrade your warranty.</p>

Table 3. Locate Dell apps in Windows


Resources	Description
	<p>Dell Command Update</p> <p>Updates your computer with critical fixes and latest device drivers as they become available. For more information about using Dell Command Update, see the product guides and third-party license documents at www.dell.com/support.</p>
	<p>Dell Digital Delivery</p> <p>Download software applications, which are purchased but not preinstalled on your computer. For more information about using Dell Digital Delivery, search in the Knowledge Base Resource at www.dell.com/support.</p>
	<p>SupportAssist</p> <p>SupportAssist proactively and predictively identifies hardware and software issues on your computer and automates the engagement process with Dell Technical support. It addresses performance and stabilization issues, prevents security threats, monitors, and detects hardware failures. For more information, see <i>SupportAssist for Home PCs User's Guide</i> at www.dell.com/support/home/product-support/product/dell-supportassist-pcs-tablets/docs.</p> <p>NOTE: In SupportAssist, click the warranty expiry date to renew or upgrade your warranty.</p>

Specifications of Latitude 7650

Dimensions and weight

The following table lists the height, width, depth, and weight of your Latitude 7650.

Table 4. Dimensions and weight

Description	Values
Height:	
Front height	18.40 mm (0.72 in.)
Rear height	19.50 mm (0.77 in.)
Width	358.00 mm (14.09 in.)
Depth	250.42 mm (9.86 in.)
Weight  NOTE: The weight of your computer depends on the configuration that is ordered and manufacturing variability.	1.835 kg (4.05 lb)

Processor

The following table lists the details of the processors that are supported for your Latitude 7650.

Table 5. Processor

Description	Option one	Option two	Option three	Option four	Option five	Option six
Processor type	Intel Core Ultra 5 135H	Intel Core Ultra 5 125U	Intel Core Ultra 5 135U	Intel Core Ultra 7 155U	Intel Core Ultra 7 165H	Intel Core Ultra 7 165U
Intel vPro Enterprise support	YES	NO	YES	NO	YES	YES
Processor wattage	28 W	15 W	15 W	15 W	28 W	15 W
Processor core count	14	12	12	12	16	12
Processor thread count	18	14	14	14	22	14
Processor speed	Up to 4.6 GHz	Up to 4.3 GHz	Up to 4.4 GHz	Up to 4.8 GHz	Up to 5.0 GHz	Up to 4.9 GHz
P-Core base frequency	1.7 GHz	1.3 GHz	1.6 GHz	1.7 GHz	1.4 GHz	1.7 GHz

Table 5. Processor (continued)

Description	Option one	Option two	Option three	Option four	Option five	Option six
P-Core Maximum turbo frequency	4.6 GHz	4.3 GHz	4.4 GHz	4.8 GHz	5.0 GHz	4.9 GHz
E-Core base frequency	1.2 GHz	0.8 GHz	1.1 GHz	1.2 GHz	0.9 GHz	1.2 GHz
E-Core Maximum turbo frequency	3.6 GHz	3.6 GHz	3.6 GHz	3.8 GHz	3.8 GHz	3.8 GHz
Processor cache	18 MB	12 MB	12 MB	12 MB	24 MB	12 MB
Integrated graphics	Intel Arc Graphics	Intel Graphics	Intel Graphics	Intel Graphics	Intel Arc Graphics	Intel Graphics

Chipset

The following table lists the details of the chipset that is supported for your Latitude 7650.

Table 6. Chipset

Description	Option one	Option two
Processors	Intel Core Ultra 5	Intel Core Ultra 7
Chipset	Integrated in the processor	Integrated in the processor
DRAM bus width	Dual-channel, 64-bit	Dual-channel, 64-bit
Flash EPROM	64 MB	64 MB
PCIe bus	Gen 4	Gen 4

Operating system

Your Latitude 7650 supports the following operating systems:

- Windows 11 22H2
- Windows 11 23H2
- Ubuntu Linux 22.04 LTS

Memory

The following table lists the memory specifications of your Latitude 7650.

Table 7. Memory specifications


Description	Values
Memory slots	Onboard memory  NOTE: The memory is not upgradable
Memory type	Dual-channel, LPDDR5x

Table 7. Memory specifications (continued)

Description	Values
Memory speed	6400 MT/s
Maximum memory configuration	64 GB
Minimum memory configuration	16 GB
Memory configurations supported	<ul style="list-style-type: none">• 16 GB: LPDDR5x, 6400 MT/s, dual-channel• 32 GB: LPDDR5x, 6400 MT/s, dual-channel• 64 GB: LPDDR5x, 6400 MT/s, dual-channel

External ports

The following table lists the external ports on your Latitude 7650.


Table 8. External ports

Description	Values
USB ports	<ul style="list-style-type: none">• Two Thunderbolt™ 4 with DisplayPort™ Alt Mode/USB Type-C/USB4/Power Delivery• Two USB 3.2 Gen 1 ports
Audio port	One Universal audio port
Video port/ports	One HDMI 2.1 port
Media-card reader	Not supported
Power-adaptor port	60W/65W/100W adapter USB Type-C, 2-pin, 3-pin
Security-cable slot	One Wedge-shaped lock slot
Smart Card Reader	Contacted and Contactless + NFC (optional)
SIM slot	NanoSIM slot (optional)

Internal slots

The following table lists the internal slots of your Latitude 7650.


Table 9. Internal slots

Description	Values
M.2	<ul style="list-style-type: none">• One M.2 2230 slot for solid-state drive• One M.2 3042 slot for WWAN Card (optional) <p> NOTE: To learn more about the features of different types of M.2 cards, search in the Knowledge Base Resource at www.dell.com/support.</p>

Wireless module

The following table lists the Wireless Local Area Network (WLAN) module that is supported on your Latitude 7650.

Table 10. Wireless module specifications

Description	Values
Model number	Intel BE200 (integrated on system board)
Transfer rate	5760 Mbps
Frequency bands supported	2.40 GHz/5 GHz/6 GHz
Wireless standards	<ul style="list-style-type: none"> • WiFi 802.11a/b/g • Wi-Fi 4 (WiFi 802.11n) • Wi-Fi 5 (WiFi 802.11ac) • Wi-Fi 6E (WiFi 802.11ax) • Wi-Fi 7 (WiFi 802.11be)
Encryption	<ul style="list-style-type: none"> • 64-bit/128-bit WEP • AES-CCMP • TKIP
Bluetooth wireless card	Bluetooth 5.4 wireless card
	 NOTE: The version of the Bluetooth wireless card may vary depending on the operating system that is installed on your computer.

WWAN module

The following table lists the Wireless Wide Area Network (WWAN) module supported on your Latitude 7650.

Table 11. WWAN module specifications

Description	Option one	Option two
Model number	DW5825e (FM101R-GL), Qualcomm Snapdragon X12 global LTE-Advanced, CAT12	DW5932e, 5G, Qualcomm Snapdragon X62 Global 5G Modem
Form Factor	M.2 3042 Key-B	M.2 3042 Key
Host Interface	PCIe Gen2	PCIe Gen3
Network Standard	LTE FDD/TDD, WCDMA/HSPA+, GPS/GLONASS/BDS/Galileo	LTE FDD/TDD, WCDMA/HSPA+, GNSS/Beidou NR FR1 (Sub6) FDD/TDD, LTE FDD/TDD, WCDMA/HSPA+, GPS/GLONASS/Galileo/BDS/QZSS
Transfer data rate	<ul style="list-style-type: none"> • Up to 1 Gbps DL (Cat 12) • Up to 150 Mbps UL 	<ul style="list-style-type: none"> • SA: DL 4.67 Gbps/UL 1.25 Gbps • NSA: DL 3.74 Gbps/UL 700 Mbps • LTE: DL 1.6 Gbps (CAT19)/UL 150 Mbps • UMTS: DL 384 kbps/UL 384 kbps • DL DC-HSPA+: 42 Mbps (CAT24)/UL 11.5 Mbps (CAT7)

Table 11. WWAN module specifications (continued)

Description	Option one	Option two
Operating Frequency Bands	<ul style="list-style-type: none"> LTE (B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41(HPUE), B42, B43, B46(receiver only), B48, B66, B71) WCDMA/HSPA+ (1, 2, 4, 5, 8) 	<ul style="list-style-type: none"> NR (n1, n2, n3, n5, n7, n8, n20, n25, n28, n30, n38, n40, n41, n48, n66, n71, n77, n78, n79) LTE (B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71) WCDMA/HSPA+ (1, 2, 4, 5, 8)
Power supply	DC 3.135 V to 4.4 V, Typical 3.3 V	DC 3.135 V to 4.40 V, Typical 3.30 V
SIM card	Supported through external SIM slot	Supported through external SIM slot
eSIM with Dual SIM (DSSA)	Supported	Supported
Antenna Diversity	Supported	Supported
Radio On/Off	Supported	Supported
Wake On Wireless	Supported	Supported
Temperature	<ul style="list-style-type: none"> Normal operating temperature: -10°C to + 55°C (14°F to 131°F) Extended Operating temperature: -20°C to + 65°C (-4°F to 149°F) 	<ul style="list-style-type: none"> Normal operating temperature: -10°C to + 55°C (14°F to 131°F) Extended Operating temperature: -30°C to +75°C (-22°F to 167°F) Storage temperature: -40°C to +85°C (-40°F to 185°F)
Antenna connector	<ul style="list-style-type: none"> WWAN Main Antenna x 4 Supports 4x4 MIMO 	<ul style="list-style-type: none"> WWAN Main Antenna x 4 Supports 4x4 MIMO
<p>NOTE: For instructions on how to find your computer's International Mobile Station Equipment Identity (IMEI) number, search in the Knowledge Base Resource at www.dell.com/support.</p>		

Audio

The following table lists the audio specifications of your Latitude 7650.

Table 12. Audio specifications

Description	Values
Audio controller	Realtek ALC3281
Stereo conversion	Stereo (2.0)
Internal audio interface	High definition audio interface
External audio interface	Universal Audio Jack
Number of speakers	Four
Internal-speaker amplifier	Supported
External volume controls	Supported
Speaker output:	
Average speaker output	2W

Table 12. Audio specifications (continued)

Description		Values
	Peak speaker output	2.5W
Subwoofer output		Not supported
Microphone		Camera module above LCD

Storage

This section lists the storage options on your Latitude 7650.

Your computer supports the following storage configurations:

- One M.2 2230 solid state drive

The M.2 2230 solid state drive is the primary drive of your computer.

Table 13. Storage specifications

Storage type	Interface type	Capacity
M.2 2230 solid state drive	PCIe NVMe Gen 4x4	256 GB/512 GB/1 TB/2 TB
M.2 2230 solid state drive, Self-encrypting drive, Opal 2.0	PCIe Gen 3.0x4 NVMe, up to 32 Gbps	512 GB

Keyboard

The following table lists the keyboard specifications of your Latitude 7650.

Table 14. Keyboard specifications




Description	Values
Keyboard type	Battery-saving mini LED backlit AI hotkey keyboard  NOTE: Copilot in Windows is available only in approved markets.
Keyboard layout	QWERTY
Number of keys	<ul style="list-style-type: none"> • United States and Canada: 79 keys • United Kingdom: 80 keys
Keyboard size	X=19.05 mm key pitch Y=18.05 mm key pitch
Keyboard shortcuts	Some keys on your keyboard have two symbols on them. These keys can be used to type alternate characters or to perform secondary functions. To type the alternate character, press Shift and the desired key. To perform secondary functions, press Fn and the desired key.  NOTE: You can define the primary behavior of the function keys (F1–F12) changing Function Key Behavior in BIOS setup program.
Copilot	Launch Copilot in Windows  NOTE: If Copilot in Windows is not available on your computer, the Copilot key launches Windows Search. For

Table 14. Keyboard specifications (continued)

Description	Values
	more information about Copilot in Windows, search in the Knowledge Base Resource at www.dell.com/support.

Camera

The following table lists the camera specifications of your Latitude 7650.

Table 15. Front camera specifications

Description	Values
Number of cameras	One
Camera type	FHD RGB HDR Camera
Camera location	Front camera
Camera sensor type	Ambient light sensor
Camera resolution:	
Still image	1080p at 30 fps
Video	1080p at 30 fps
Infrared camera resolution:	
Still image	640 x 360
Video	640 x 360 at 30 fps
Diagonal viewing angle:	
Camera	80 degrees
Infrared camera	86.6 degrees

Table 15. Front camera specifications

Description	Values
Number of cameras	One
Camera type	FHD RGB-IR HDR Camera
Camera location	Front camera
Camera sensor type	Ambient light sensor
Camera resolution:	
Still image	1080p at 30 fps
Video	1080p at 30 fps
Diagonal viewing angle:	
Camera	82 degrees

Clickpad

The following table lists the clickpad specifications of your Latitude 7650.

Table 16. Clickpad specifications

Description		Values
Clickpad resolution:		
	Horizontal	>300 dpi
	Vertical	
Clickpad dimensions:		
	Horizontal	133 mm (5.23 in.)
	Vertical	90 mm (3.54 in.)
Clickpad gestures		For more information about clickpad gestures available on Windows, see the Microsoft knowledge base article at support.microsoft.com .


Power adapter

The following table lists the power adapter specifications of your Latitude 7650.

Table 17. Power adapter specifications

Description	Option one	Option two	Option three
Type	60W AC adapter, USB Type-C	65W AC adapter, USB Type-C	100W AC adapter, USB Type-C
Power-adapter dimensions:			
Height	22.00 mm (0.86 in.)	28.00 mm (1.10 in.)	26.50 mm (1.04 in.)
Width	66.00 mm (2.59 in.)	51.00 mm (2.01 in.)	60.00 mm (2.36 in.)
Depth	55.00 mm (2.16 in.)	112.00 mm (4.41 in.)	122.00 mm (4.80 in.)
Weight	0.10 kg (0.23 lbs)	0.20 kg (0.44 lbs)	0.33 kg (0.73 lbs)
Input voltage	100 VAC – 240 VAC	100 VAC – 240 VAC	100 VAC – 240 VAC
Input frequency	50 Hz – 60 Hz	50 Hz – 60 Hz	50 Hz – 60 Hz
Input current (maximum)	1.70 A	1.70 A	1.70 A
Output current (continuous)	<ul style="list-style-type: none"> • 5 V/3 A • 9 V/3 A • 15 V/3 A • 20 V/3 A 	<ul style="list-style-type: none"> • 5 V/3 A • 9 V/3 A • 15 V/3 A • 20 V/3.25 A 	<ul style="list-style-type: none"> • 5 V/3 A • 9 V/3 A • 15 V/3 A • 20 V/5 A
Rated output voltage	<ul style="list-style-type: none"> • 5 VDC • 9 VDC • 15 VDC • 20 VDC 	<ul style="list-style-type: none"> • 5 VDC • 9 VDC • 15 VDC • 20 VDC 	<ul style="list-style-type: none"> • 5 VDC • 9 VDC • 15 VDC • 20 VDC
Temperature range:			
Operating	0°C to 40°C (32°F to 104°F)	0°C to 40°C (32°F to 104°F)	0°C to 40°C (32°F to 104°F)

Table 17. Power adapter specifications (continued)

Description	Option one	Option two	Option three
Storage	-20°C to 70°C (-4°F to 158°F)	-40°C to 70°C (-40°F to 158°F)	-40°C to 70°C (-40°F to 158°F)
 CAUTION: Operating and storage temperature ranges may differ among components, so operating or storing the device outside these ranges may impact the performance of specific components.			

Battery

The following table lists the battery specifications of your Latitude 7650.

Table 18. Battery specifications

Description	Option one	Option two	Option three	Option four	
Battery type	2-cell, 38 Wh, ExpressCharge Capable, Long Life Cycle, 3-year limited hardware warranty	3-cell, 57 Wh, ExpressCharge Capable, Long Life Cycle, 3-year limited hardware warranty	2-cell, 38 Wh, ExpressCharge, ExpressCharge Boost Capable	3-cell, 57 Wh, ExpressCharge, ExpressCharge Boost Capable	
Battery voltage	7.60 VDC	11.40 VDC	7.60 VDC	11.40 VDC	
Battery weight (maximum)	0.156 Kg (0.34 lb)	0.227 kg (0.50 lb)	0.156 Kg (0.34 lb)	0.227 kg (0.50 lb)	
Battery dimensions:					
	Height	6.30 mm (0.24 in.)	6.30 mm (0.24 in.)	6.30 mm (0.24 in.)	6.30 mm (0.24 in.)
	Width	210.97 mm (8.30 in.)	254.80 mm (10.03 in.)	210.97 mm (8.30 in.)	254.8 mm (10.03 in.)
	Depth	79.80 mm (3.14 in.)	79.80 mm (3.14 in.)	79.80 mm (3.10 in.)	79.8 mm (3.10 in.)
Temperature range:					
	Operating	<ul style="list-style-type: none"> Charge: 0°C to 45°C (32°F to 113°F) Discharge: 0°C to 70°C (32°F to 158°F) 	<ul style="list-style-type: none"> Charge: 0°C to 45°C (32°F to 113°F) Discharge: 0°C to 70°C (32°F to 158°F) 	<ul style="list-style-type: none"> Charge: 0°C to 45°C (32°F to 113°F) Discharge: 0°C to 70°C (32°F to 158°F) 	<ul style="list-style-type: none"> Charge: 0°C to 45°C (32°F to 113°F) Discharge: 0°C to 70°C (32°F to 158°F)
	Storage	-20°C to 65°C (-4°F to 149°F)	-20°C to 65°C (-4°F to 149°F)	-20°C to 65°C (4°F to 149°F)	-20°C to 65°C (4°F to 149°F)
Battery operating time	Varies depending on operating conditions and can significantly reduce under certain power-intensive conditions.	Varies depending on operating conditions and can significantly reduce under certain power-intensive conditions.	Varies depending on operating conditions and can significantly reduce under certain power-intensive conditions.	Varies depending on operating conditions and can significantly reduce under certain power-intensive conditions.	
Battery charging time (approximate)	Express Charge Method: <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 	Express Charge Method: <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 	Express Charge Method: <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 	Express Charge Method: <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 	

Table 18. Battery specifications (continued)

Description	Option one	Option two	Option three	Option four
<p>Manager application. For more information about Dell Power Manager, search in the Knowledge Base Resource at www.dell.com/support.</p>	<ul style="list-style-type: none"> 16 - 45°C normal express charge 46 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Standard Charge/ Predominately AC User Charge Method:</p> <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 16 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Express Charge Boost Charge Method (Fast Charge for Initial 35%):</p> <ul style="list-style-type: none"> 16 - 45°C target charge time from 0 to 35% RSOC is 20 mins for Accelerated Charge 	<ul style="list-style-type: none"> 16 - 45°C normal express charge 46 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Standard Charge/ Predominately AC User Charge Method:</p> <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 16 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Express Charge Boost Charge Method (Fast Charge for Initial 35%):</p> <ul style="list-style-type: none"> 16 - 45°C target charge time from 0 to 35% RSOC is 20 mins for Accelerated Charge 	<ul style="list-style-type: none"> 16 - 45°C normal express charge 46 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Standard Charge/ Predominately AC User Charge Method:</p> <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 16 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours 	<ul style="list-style-type: none"> 16 - 45°C normal express charge 46 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours <p>Standard Charge/ Predominately AC User Charge Method:</p> <ul style="list-style-type: none"> 0 - 15°C maximum allowable charge time from 0 to 100% RSOC is 4 hours 16 - 50°C maximum allowable charge time from 0 to 100% RSOC is 3 hours
RTC coin-cell battery	Supported Battery life of rechargeable coin cell is 60 days	Supported Battery life of rechargeable coin cell is 60 days	Supported Battery life of rechargeable coin cell is 60 days	Supported Battery life of rechargeable coin cell is 60 days
<p>CAUTION: Operating and storage temperature ranges may differ among components, so operating or storing the device outside these ranges may impact the performance of specific components.</p> <p>CAUTION: Dell recommends that you charge the battery regularly for optimal power consumption. If your battery charge is completely depleted, connect the power adapter, turn on your computer, and then restart your computer to reduce the power consumption.</p>				

Display

The following table lists the display specifications of your Latitude 7650.

Table 19. Display specifications

Description	Values
Display type	Full High Definition Plus (FHD+)
Touch options	No
Display-panel technology	In-Plane Switching (IPS)
Display-panel dimensions (active area):	
Height	344.68 mm (13.57 in.)
Width	215.42 mm (8.48 in.)
Diagonal	406.46 mm (16.00 in.)

Table 19. Display specifications (continued)

Description	Values
Display-panel native resolution	1920 x 1200
Luminance (typical)	250 nit
Megapixels	2.30
Color gamut	45% NTSC
Pixels Per Inch (PPI)	141.5 ppi
Contrast ratio (minimum)	800:1
Response time (maximum)	35 ms
Refresh rate	60 Hz
Horizontal view angle	<ul style="list-style-type: none"> • 85 degrees (typical) • 80 degrees (min)
Vertical view angle	<ul style="list-style-type: none"> • 85 degrees (typical) • 80 degrees (min)
Pixel pitch	0.17952 mm x 0.17952 mm
Power consumption (maximum)	4.15 W
Anti-glare vs glossy finish	Anti-glare

Fingerprint reader (optional)

The following table lists the fingerprint-reader specifications of your Latitude 7650.


 **NOTE:** The fingerprint reader is located on the power button.

Table 20. Fingerprint reader specifications

Description	Option One	Option two
Fingerprint-reader sensor technology	Capacitive	Capacitive
Fingerprint-reader sensor resolution	500 dpi	508 dpi
Fingerprint-reader sensor pixel size	<ul style="list-style-type: none"> • X: 108 • Y: 88 	<ul style="list-style-type: none"> • X: 96 • Y: 96

Sensor

The following table lists the sensor of your Latitude 7650.

Table 21. Sensor

Sensor support
Accelerometer (ST Micro LIS2DW12TR): On the base (system board)
Accelerometer (ST Micro LIS2DW12TR): On the hinge-up 180 midboard
Ambient Light Sensor
E-compass (ST Micro LIS2MDLTR), only for 2-in-1 computer
Proximity for SAR compliance (for the WWAN module) Near Field Proximity Sensor

Table 21. Sensor (continued)

Sensor support
Hall Effect Sensor

GPU—Integrated

The following table lists the specifications of the integrated Graphics Processing Unit (GPU) supported by your Latitude 7650.

Table 22. GPU—Integrated

Controller	Memory size	Processor
Intel Arc Graphics	Shared system memory	For Intel Core H processors and requires 128-bit (dual-channel) memory with minimum of 16 GB memory)
Intel Graphics	Shared system memory	Intel Core Ultra 5/7

Multiple display support matrix

The following table lists the multiple display support matrix for your Latitude 7650.

Table 23. Multiple display support matrix

Graphics Card	Direct Graphics Controller Direct Output Mode	Supported external displays with computer internal display on	Supported external displays with computer internal display off
Intel Arc Graphics	Not applicable	3	4
Intel Graphics	Not applicable	3	4

Hardware security

The following table lists the hardware security of your Latitude 7650.

Table 24. Hardware security

Hardware security
Trusted Platform Module (TPM) 2.0 discrete
FIPS 140-2 certification for TPM
Trusted Computing Group (TCG) Certification for TPM
Contacted smart card and Control vault 3 +
Contactless smart card, NFC, and Control vault 3 +
SED SSD NVMe, SSD, and HDD (Opal and non-Opal) per SDL
Fingerprint reader in power button tied to Control vault 3 +
One wedge-shaped lock slot
SED (Opal 2.0 only - PCIe Interface)
Windows Hello - Fingerprint Reader (optional)
Mechanical privacy shutter for camera (only for metal laptops)
Control vault 3 + Advanced Authentication with FIPS 140-2 Level 3 Certification

Smart-card reader

Contactless smart-card reader

This section lists the contactless smart-card reader specifications of your Latitude 7650. This module is only available in computers shipped with Smart-card readers.

Table 25. Contactless smart-card reader specifications

Title	Description	Dell ControlVault 3 contactless smart-card reader with NFC
Felica Card Support	Reader and software capable of supporting Felica contactless cards	Yes
ISO 14443 Type A Card Support	Reader and software capable of supporting ISO 14443 Type A contactless cards	Yes
ISO 14443 Type B Card Support	Reader and software capable of supporting ISO 14443 Type B contactless cards	Yes
ISO/IEC 21481	Reader and software capable of supporting ISO/IEC 21481 compliant contactless cards and tokens	Yes
ISO/IEC 18092	Reader and software capable of supporting ISO/IEC 21481 compliant contactless cards and tokens	Yes
ISO 15693 Card Support	Reader and software capable of supporting ISO15693 contactless cards	Yes
NFC Tag Support	Supports reading and processing of NFC-compliant tag information	Yes
NFC Reader Mode	Support for NFC Forum Defined Reader mode	Yes
NFC Writer Mode	Support for NFC Forum Defined Writer mode	Yes
NFC Peer-to-Peer Mode	Support for NFC Forum Defined Peer to Peer mode	Yes
EMVCo Compliant	Compliant with EMVCO smart card standards as posted to www.emvco.com	Yes
EMVCo Certified	Formally certified based on EMVCO smart card standards	Yes
NFC Proximity OS Interface	Enumerates NFP (Near Field Proximity) device for OS to use	Yes
PC/SC OS interface	Personal Computer/Smart Card specification for integration of hardware readers into personal computer environments	Yes
CCID driver compliance	Common driver support for Integrated Circuit Card Interface Device for OS level drivers	Yes
Windows Certified	Device certified by Microsoft WHCK	Yes
Dell ControlVault support	Device connects to Dell ControlVault for usage and processing	Yes

Table 25. Contactless smart-card reader specifications (continued)

Title	Description	Dell ControlVault 3 contactless smart-card reader with NFC
FIDO2 compliance	Dell ControlVault 3 Smart-card reader is compliant with the FIDO SPEC	No


 **NOTE:** 125 Khz proximity cards are not supported.

Table 26. Supported cards

Manufacturer	Card
HID	jCOP readertest3 A card (14443a)
	1430 1L
	DESFire D8H
	iClass (Legacy)
	iClass SEOS
NXP/Mifare	Mifare DESFire 8 K White PVC Cards
	Mifare Classic 1 K White PVC Cards
	NXP Mifare Classic S50 ISO Card
G&D	idOnDemand - SCE3.2 144 K
	SCE6.0 FIPS 80 K Dual+ 1 K Mifare
	SCE6.0 non-FIPS 80 K Dual+ 1 K Mifare
	SCE6.0 FIPS 144 K Dual + 1 K Mifare
	SCE6.0 non-FIPS 144 K Dual + 1 K Mifare
	SCE7.0 FIPS 144 K
Oberthur	idOnDemand - OCS5.2 80 K
	ID-One Cosmo 64 RSA D V5.4 T = 0 card

Contacted smart-card reader

The following table lists the contacted smart-card reader specifications of your Latitude 7650.

Table 27. Contacted smart-card reader specifications

Title	Description	Dell ControlVault 3 smart-card reader
ISO 7816 -3 Class A Card Support	Reader capable of reading 5V powered smart card	Yes
ISO 7816 -3 Class B Card Support	Reader capable of reading 3V powered smart card	Yes
ISO 7816 -3 Class C Card support	Reader capable of reading 1.8V powered smart card	Yes
ISO 7816-1 Compliant	Specification for the reader	Yes
ISO 7816 -2 Compliant	Specification for smart card device physical characteristics (size, location of connection points, so forth.)	N/A

Table 27. Contacted smart-card reader specifications (continued)

Title	Description	Dell ControlVault 3 smart-card reader
T=0 support	Cards support character level transmission.	Yes
T=1 support	Cards support block level transmission.	Yes
EMVCo Compliant	Compliant with EMVCo (for electronic payment standards) smart card standards as posted to www.emvco.com	Yes
EMVCo Certified	Formally certified based on EMVCO smart card standards	Yes
PC/SC OS interface	Personal Computer/Smart Card specification for integration of hardware readers into personal computer environments	Yes
CCID driver compliance	Common driver support for Integrated Circuit Card Interface Device for OS level drivers.	Yes
Windows Certified	Device certified by WHCK	Yes
FIPS 201 (PIV/HSPD-12) Compliant via GSA	Device compliant with FIPS 201/PIV/HSPD-12 requirements	Yes
FIDO2 compliance	Dell ControlVault 3 Smart-card reader is compliant with the FIDO SPEC	No

Operating and storage environment

This table lists the operating and storage specifications of your Latitude 7650.

Airborne contaminant level: G1 as defined by ISA-S71.04-1985

Table 28. Computer environment

Description	Operating	Storage
Temperature range	0°C to 35°C (32°F to 95°F)	-40°C to 65°C (-40°F to 149°F)
Relative humidity (maximum)	10% to 90% (non-condensing)	0% to 95% (non-condensing)
Vibration (maximum)*	0.66 GRMS	1.30 GRMS
Shock (maximum)	110 G†	160 G†
Altitude range	-15.2 m to 3048 m (4.64 ft to 5518.4 ft)	-15.2 m to 10668 m (4.64 ft to 19234.4 ft)

 **CAUTION: Operating and storage temperature ranges may differ among components, so operating or storing the device outside these ranges may impact the performance of specific components.**











* Measured using a random vibration spectrum that simulates the user environment.

† Measured using a 2 ms half-sine pulse.

Working inside your computer



Safety instructions

Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure in this document assumes that you have read the safety information that shipped with your computer.

-  **WARNING:** Before working inside your computer, read the safety information that is shipped with your computer. For more safety best practices, see the Regulatory Compliance home page at www.dell.com/regulatory_compliance.
-  **WARNING:** Disconnect your computer from all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting your computer to an electrical outlet.
-  **CAUTION:** To avoid damaging the computer, ensure that the work surface is flat, dry, and clean.
-  **CAUTION:** To avoid damaging the components and cards, handle them by their edges, and avoid touching the pins and the contacts.
-  **CAUTION:** You should only perform troubleshooting and repairs as authorized or directed by the Dell technical assistance team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. See the safety instructions that is shipped with the product or at www.dell.com/regulatory_compliance.
-  **CAUTION:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity which could harm internal components.
-  **CAUTION:** When you disconnect a cable, pull it by its connector or its pull tab, not the cable itself. Some cables have connectors with locking tabs or thumbscrews that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending the connector pins. When connecting cables, ensure that the ports and the connectors are correctly oriented and aligned.
-  **CAUTION:** Press and eject any installed card from the media-card reader.
-  **CAUTION:** Exercise caution when handling rechargeable Li-ion batteries in laptops. Swollen batteries should not be used and should be replaced and disposed properly.
-  **NOTE:** The color of your computer and certain components may differ from what is shown in this document.

Before working inside your computer


Steps


1. Save and close all open files and exit all open applications.
2. Shut down your computer. For Windows operating system, click **Start** >  **Power** > **Shut down**.
 -  **NOTE:** If you are using a different operating system, see the documentation of your operating system for shut-down instructions.
3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.

5. Remove any media card and optical disk from your computer, if applicable.
6. Enter the service mode, if you are able to power on your computer.


Service Mode

Service Mode is used to cut-off power, without disconnecting battery cable from system board prior conducting repairs in the computer.

 **CAUTION:** If you are unable to turn on the computer to put it into Service Mode or the computer does not support Service Mode then proceed to disconnect the battery cable. To disconnect the battery cable, follow the steps in [Removing the battery](#).

 **NOTE:** Ensure that your computer is shut down and the AC adapter is disconnected.

- a. Hold **** key on the keyboard and press the power button for 3 seconds or until the Dell logo appears on the screen.
- b. Press any key to continue.
- c. If the AC adapter is not disconnected, a message prompting you to remove the AC adapter appears on the screen. Remove the AC adapter and then press any key to continue the **Service Mode** procedure. The **Service Mode** procedure automatically skips the following step if the **Owner Tag** of the computer is not set up in advance by the user.
- d. When the ready-to-proceed message appears on the screen, press any key to proceed. The computer emits three short beeps and shuts down immediately.
- e. Once the computer shuts down, it has successfully entered Service Mode.

 **NOTE:** If you are unable to power on your computer or unable to enter service mode skip this process.

Safety precautions

The safety precautions chapter details the primary steps to be taken before performing any disassembly instructions.

Observe the following safety precautions before you perform any installation or break-fix procedures involving disassembly or reassembly:

- Turn off the computer and all attached peripherals.
- Disconnect the computer and all attached peripherals from AC power.
- Disconnect all network cables, telephone, and telecommunications lines from the computer.
- Use an ESD field service kit when working inside any notebook to avoid electrostatic discharge (ESD) damage.
- After removing any computer component, carefully place the removed component on an anti-static mat.
- Wear shoes with non-conductive rubber soles to reduce the chance of getting electrocuted.
- Unplugging, pressing, and holding the power button for 15 seconds should discharge residual power in the system board.

Standby power

Dell products with standby power must be unplugged before you open the case. Systems that incorporate standby power are powered while turned off. The internal power enables the computer to be remotely turned on (Wake-on-LAN) and suspended into a sleep mode and has other advanced power management features.

Bonding

Bonding is a method for connecting two or more grounding conductors to the same electrical potential. This is done by using a field service electrostatic discharge (ESD) kit. When connecting a bonding wire, ensure that it is connected to bare metal and never to a painted or nonmetal surface. The wrist strap should be secure and in full contact with your skin, and ensure that you remove all jewelry such as watches, bracelets, or rings prior to bonding yourself and the equipment.

Electrostatic discharge—ESD protection

ESD is a major concern when you handle electronic components, especially sensitive components such as expansion cards, processors, memory modules, and system boards. Slight charges can damage circuits in ways that may not be obvious, such as intermittent problems or a shortened product life span. As the industry pushes for lower power requirements and increased density, ESD protection is an increasing concern.

Due to the increased density of semiconductors used in recent Dell products, the sensitivity to static damage is now higher than in previous Dell products. For this reason, some previously approved methods of handling parts are no longer applicable.

Two recognized types of ESD damage are catastrophic and intermittent failures.

- **Catastrophic** – Catastrophic failures represent approximately 20 percent of ESD-related failures. The damage causes an immediate and complete loss of device functionality. An example of catastrophic failure is a memory DIMM that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code that is emitted for missing or nonfunctional memory.
- **Intermittent** – Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable. The DIMM receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms that are related to the damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity, intermittent memory errors, and so on.

The more difficult type of damage to recognize and troubleshoot is the intermittent (also called latent or "walking wounded") failure.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. Wireless anti-static straps do not provide adequate protection. Touching the chassis before handling parts does not ensure adequate ESD protection on parts with increased sensitivity to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, ensure that you discharge static electricity from your body.
- Before transporting a static-sensitive component, place it in an anti-static container or packaging.

ESD Field Service kit

The unmonitored Field Service kit is the most commonly used service kit. Each Field Service kit includes three main components: anti-static mat, wrist strap, and bonding wire.

Components of an ESD field service kit

The components of an ESD field service kit are:

- **Anti-Static Mat** – The anti-static mat is dissipative and parts can be placed on it during service procedures. When using an anti-static mat, your wrist strap should be snug and the bonding wire should be connected to the mat and to any bare metal on the computer being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the mat. ESD-sensitive items are safe in your hand, on the ESD mat, in the computer, or inside an ESD bag.
- **Wrist Strap and Bonding Wire** – The wrist strap and bonding wire can be either directly connected between your wrist and bare metal on the hardware if the ESD mat is not required, or connected to the anti-static mat to protect hardware that is temporarily placed on the mat. The physical connection of the wrist strap and bonding wire between your skin, the ESD mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, mat, and bonding wire. Never use wireless wrist straps. Always be aware that the internal wires of a wrist strap are prone to damage from normal wear and tear, and must be checked regularly with a wrist strap tester in order to avoid accidental ESD hardware damage. It is recommended to test the wrist strap and bonding wire at least once per week.
- **ESD Wrist Strap Tester** – The wires inside an ESD strap are prone to damage over time. When using an unmonitored kit, it is a best practice to regularly test the strap prior to each service call, and at a minimum, test once per week. A wrist strap tester is the best method for doing this test. If you do not have your own wrist strap tester, check with your regional office to find out if they have one. To perform the test, plug the bonding-wire of wrist-strap into the tester while it is strapped to your wrist and push the button to test. A green LED is lit if the test is successful; a red LED is lit and an alarm sounds if the test fails.
- **Insulator Elements** – It is critical to keep ESD sensitive devices, such as plastic heat sink casings, away from internal parts that are insulators and often highly charged.
- **Working Environment** – Before deploying the ESD Field Service kit, assess the situation at the customer location. For example, deploying the kit for a server environment is different than for a desktop or laptop environment. Servers are typically installed in a rack within a data center; desktops or laptops are typically placed on office desks or cubicles. Always look for a large open flat work area that is free of clutter and large enough to deploy the ESD kit with additional space to accommodate the type of computer that is being repaired. The workspace should also be free of insulators that can cause an ESD event. On the work area, insulators such as Styrofoam and other plastics should always be moved at least 12 inches or 30 centimeters away from sensitive parts before physically handling any hardware components.

- **ESD Packaging** – All ESD-sensitive devices must be shipped and received in static-safe packaging. Metal, static-shielded bags are preferred. However, you should always return the damaged part using the same ESD bag and packaging that the new part arrived in. The ESD bag should be folded over and taped shut and all the same foam packing material should be used in the original box that the new part arrived in. ESD-sensitive devices should be removed from packaging only at an ESD-protected work surface, and parts should never be placed on top of the ESD bag because only the inside of the bag is shielded. Always place parts in your hand, on the ESD mat, in the computer, or inside an anti-static bag.
- **Transporting Sensitive Components** – When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

ESD protection summary

It is recommended to always use the traditional wired ESD grounding wrist strap and protective anti-static mat when servicing Dell products. In addition, it is critical to keep sensitive parts separate from all insulator parts while performing service and use anti-static bags for transporting sensitive components.

Transporting sensitive components

When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

After working inside your computer


About this task

 **CAUTION:** Leaving stray or loose screws inside your computer may severely damage your computer.

Steps

1. Replace all screws and ensure that no stray screws remain inside your computer.
2. Connect any external devices, peripherals, or cables you removed before working on your computer.
3. Replace any media cards, discs, or any other parts that you removed before working on your computer.
4. Connect your computer and all attached devices to their electrical outlets.
 - ① **NOTE:** To exit service mode, ensure to connect the AC adapter to the power-adapter port on your computer.
5. Press the power button to turn on the computer. Your computer will automatically return to normal functioning mode.

BitLocker

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the system it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the system will ask for the recovery key on each reboot. If the recovery key is not known, this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, see Knowledge Article: [updating the BIOS on Dell systems with BitLocker enabled](#).

The installation of the following components triggers BitLocker:

- Hard disk drive or solid-state drive
- System board

Recommended tools

The procedures in this document may require the following tools:

- Phillips screwdriver #0
- Phillips screwdriver #1
- Plastic scribe

Screw list

- NOTE:** When removing screws from a component, it is recommended to note the screw type, and the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.
- NOTE:** Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surfaces when replacing a component.
- NOTE:** Screw color may vary with the configuration ordered.

Table 29. Screw list


















Component	Screw type	Quantity	Screw image
Base cover	Captive screw	8	
M.2 SSD shielding cover	M2x4	1	
WWAN card	M2x2	1	
2-cell battery	Captive screw	3	
2-cell battery filler	Captive screw	2	
3-cell battery	Captive screw	4	
Fan assembly	M2x4	2	
Heat sink	Captive screw	4	
WLAN-antenna module	M1.6x2.5	4	
Display hinges	M2.5x5	6	
SIM-card tray bracket	M2x2	1	
Smart-card reader	M2x2	4	
System board	M2x4	9	
USB Type-C bracket	M2x2.5	3	
Display cable bracket	M2x2	2	

Table 29. Screw list (continued)

Component	Screw type	Quantity	Screw image
I/O daughterboard	M2x2	6	
I/O daughterboard bridge connector	M2x4	6	
Power button	M1.6x1.7	2	
Keyboard support plate	M1.6x1.7	2	
Keyboard support plate to palmrest	M1.6x1.7	23	
Keyboard to palmrest	M1.6x1.4	5	

Major components of Latitude 7650

The following image shows the major components of Latitude 7650.

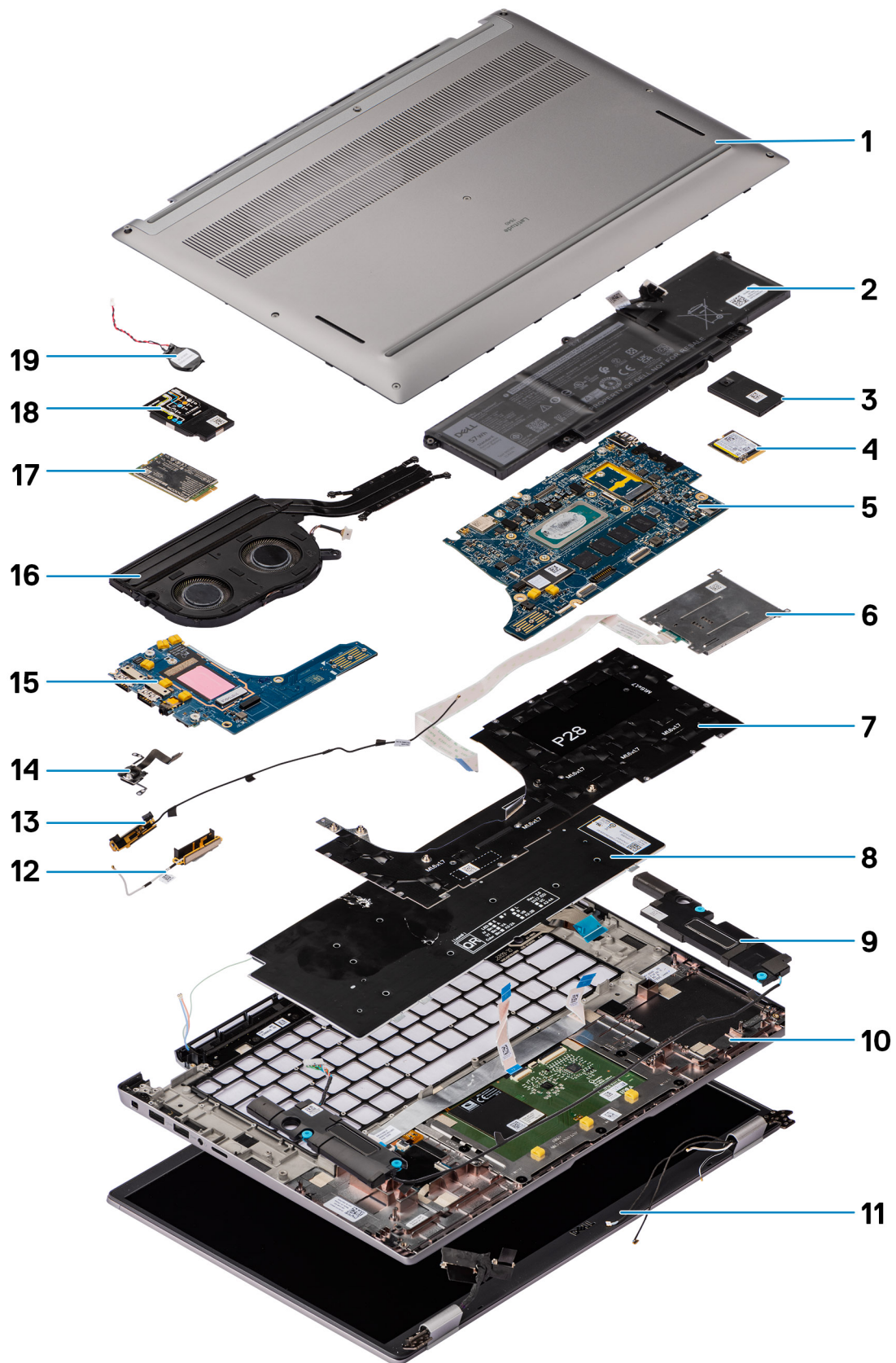



Figure 8. Major Components of Latitude 7650

- 1. Base cover
- 2. Battery


3. System Board
4. Smartcard reader
5. Keyboard bracket
6. Keyboard
7. Speaker
8. Palm-rest and keyboard assembly
9. Display assembly
10. Solid-state drive
11. Solid-state drive shield
12. Antenna
13. Antenna
14. Fingerprint reader
15. I/O Daughterboard
16. Thermal module
17. WWAN card
18. WWAN card shield
19. Coincell

 **NOTE:** Dell provides a list of components and their part numbers for the original computer configuration purchased. These parts are available according to warranty coverages purchased by the customer. Contact your Dell sales representative for purchase options.

Removing and installing Customer Replaceable Units (CRUs)

The replaceable components in this chapter are Customer Replaceable Units (CRUs).

 **CAUTION:** Customers can replace only the Customer Replaceable Units (CRUs) following the safety precautions and replacement procedures.

 **NOTE:** The images in this document may differ from your computer depending on the configuration you ordered.


NanoSIM-card tray

Removing the nanoSIM-card tray

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

About this task

 **NOTE:** This procedure applies only to computers shipped with a nanoSIM-card tray installed. No pre-removals for models shipped without WWAN antennas.

The following images indicate the location of the nanoSIM-card tray and provide a visual representation of the removal procedure.

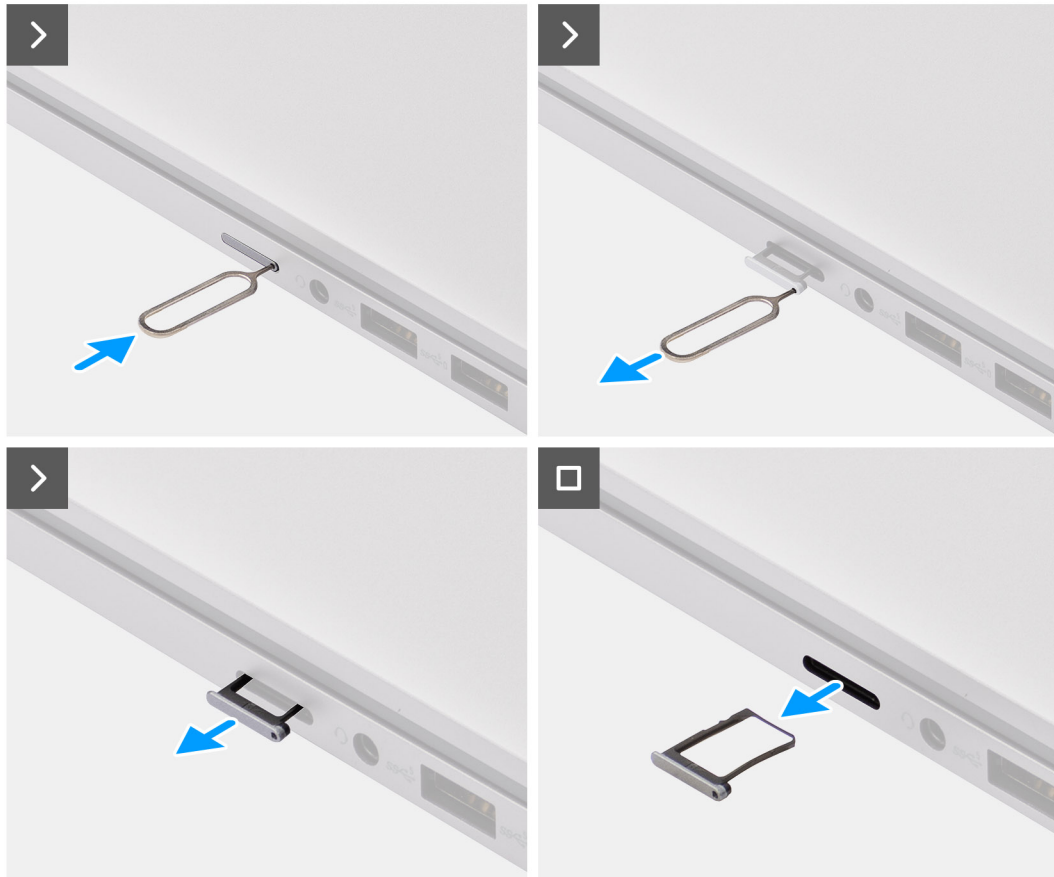


Figure 9. Removing the SIM-card tray

Steps

1. Insert a pin into the release hole of the nanoSIM-card tray and push inward until the tray is released.
2. Slide the nanoSIM-card tray out of the slot on the computer.
3. Remove the SIM card from the nanoSIM-card tray.
4. Slide the nanoSIM-card tray into the slot, until it clicks into place.
For Latitude 7650 lift the I/O daughterboard directly out of its compartment.

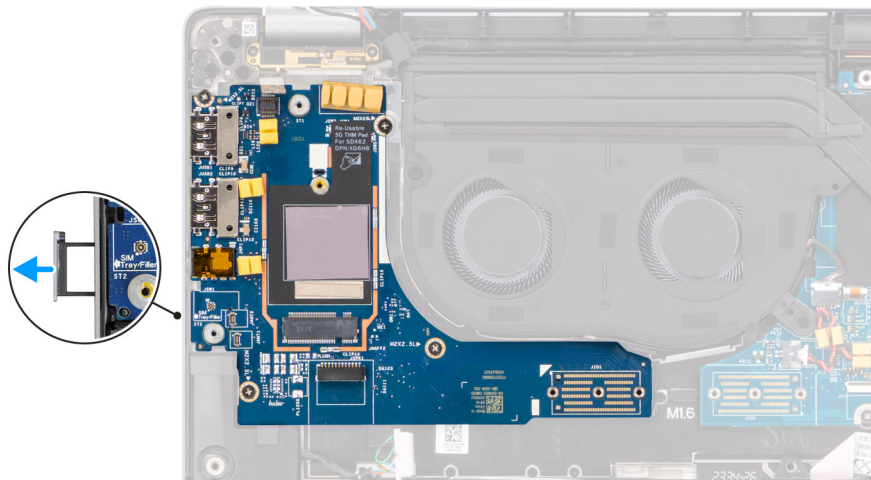


Figure 10. I/O daughterboard Removal

Installing the nanoSIM-card tray

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the nanoSIM-card tray and provide a visual representation of the installation procedure.

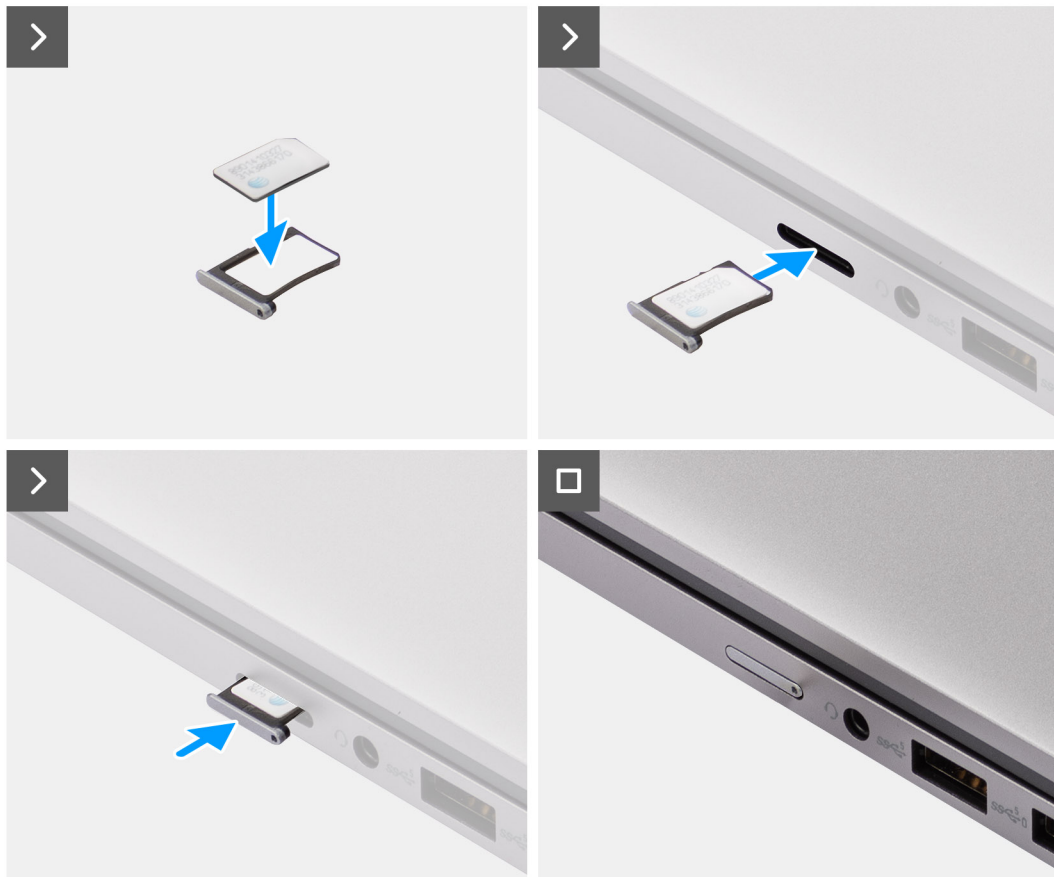


Figure 11. Installing SIM-card tray

Steps

1. Insert a pin into the hole of the nanoSIM-card tray and push inward until the tray is released.
2. Slide the nanoSIM-card tray out of the slot on the computer.
3. Place the SIM card into the nanoSIM-card tray with the metallic contact facing up.
4. Align the nanoSIM-card tray with the slot on the computer and carefully slide it in.

Next steps

1. Follow the procedure in [After working inside your computer](#).

Base cover

Removing the base cover

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

About this task

The following images indicate the location of the base cover and provide a visual representation of the removal procedure.



Figure 12. Removing the base cover

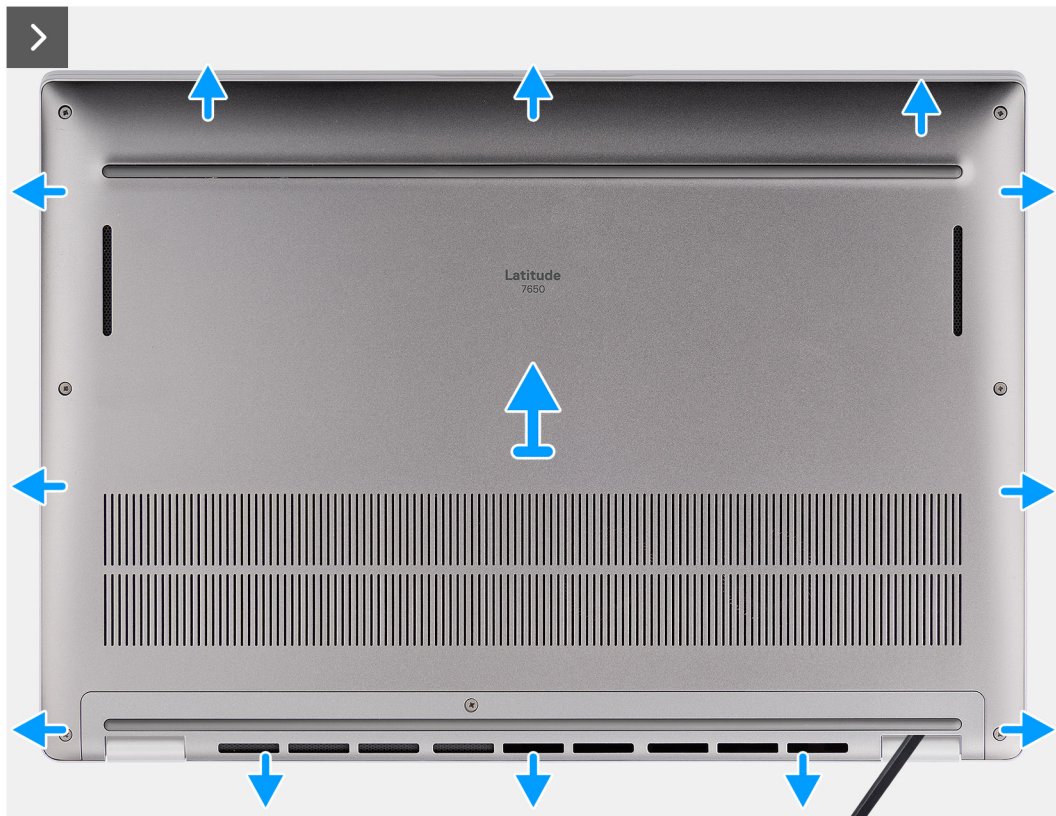


Figure 13. Removing the base cover

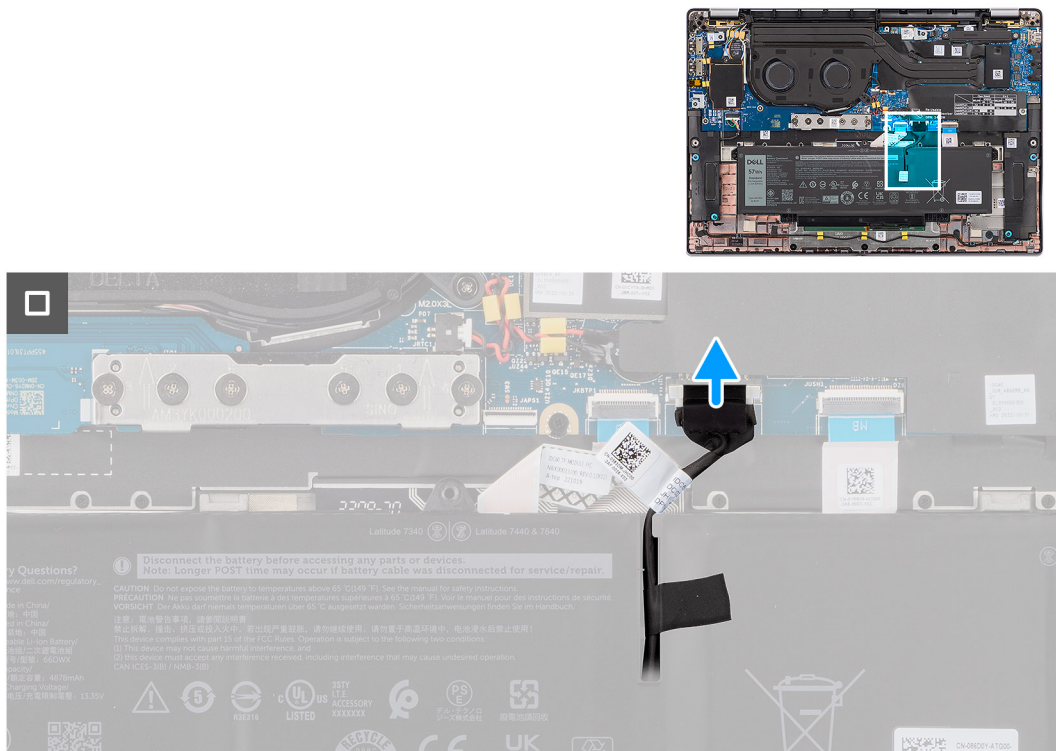


Figure 14. Removing the base cover

Steps

1. Loosen the eight captive screws that secure the base cover to the palm-rest and keyboard assembly.

- Using a plastic scribe, pry open the base cover starting from the recesses, which are located in the U-shaped indents at the top edge of the base cover, near the hinges.

CAUTION: Do not slide the scribe through the edge of the top side of the base cover as it damages the latches inside the base cover.

CAUTION: Do not pry upwards from the edge near the vents, at the top side of the base cover, as it damages the base cover.

- Pry open the top side of the base cover and continue working on the left, right and, bottom sides to open the base cover.
- Lift the base cover from the left and right sides and remove the base cover off the palm-rest and keyboard assembly.

Installing the base cover

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the base cover and provide a visual representation of the installation procedure.

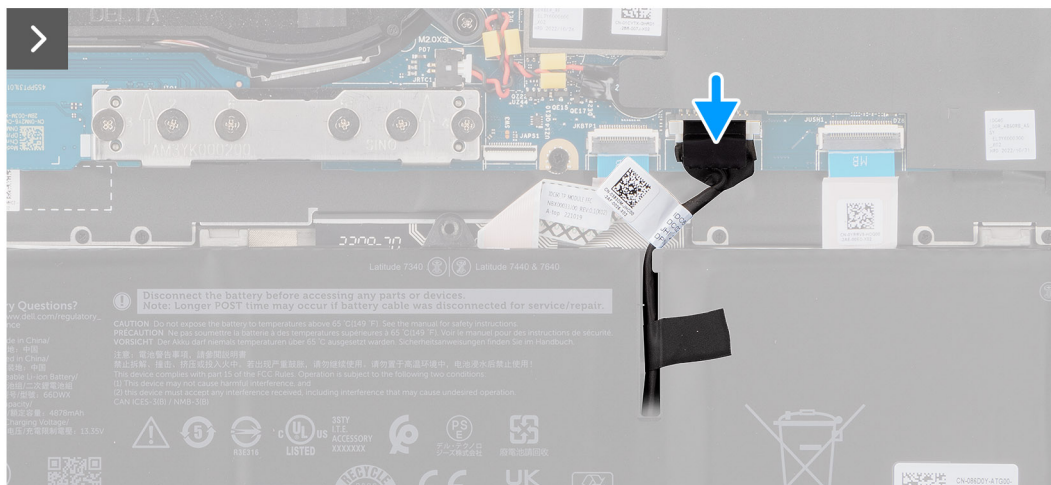
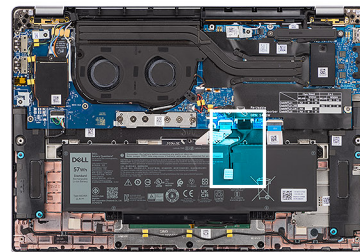


Figure 15. Installing the base cover

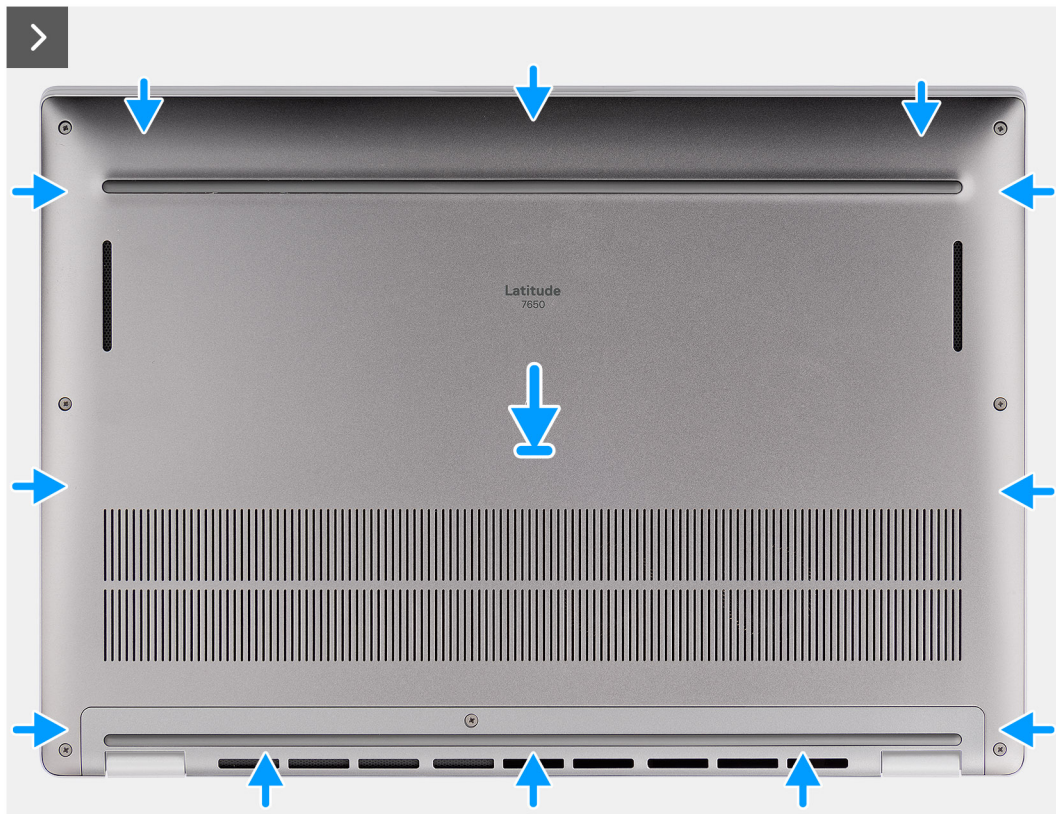


Figure 16. Installing the base cover



Figure 17. Installing the base cover

Steps

1. Place the base cover on top of the palm-rest and keyboard assembly.
2. Align the screw holes on the base cover with the screw holes on the palm-rest and keyboard assembly, and snap the base cover latches into place.
3. Tighten the eight captive screws to secure the base cover to the palm-rest and keyboard assembly.

Next steps

1. Follow the procedure in [After working inside your computer](#).

Solid-state drive

Removing the M.2 2230 Solid State Drive

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
NOTE: SSDs are fragile. Exercise care when handling the SSD.

NOTE: To avoid data loss, do not remove the SSD while the computer is in sleep or on state.

2. Remove the [base cover](#).

About this task

NOTE: The M.2 card that is installed on your computer depends on the configuration ordered. Supported card configurations on the M.2 card slot are:

- M.2 2230 SSD

The following image indicates the location of the M.2 2230 SSD and provides a visual representation of the removal procedure.

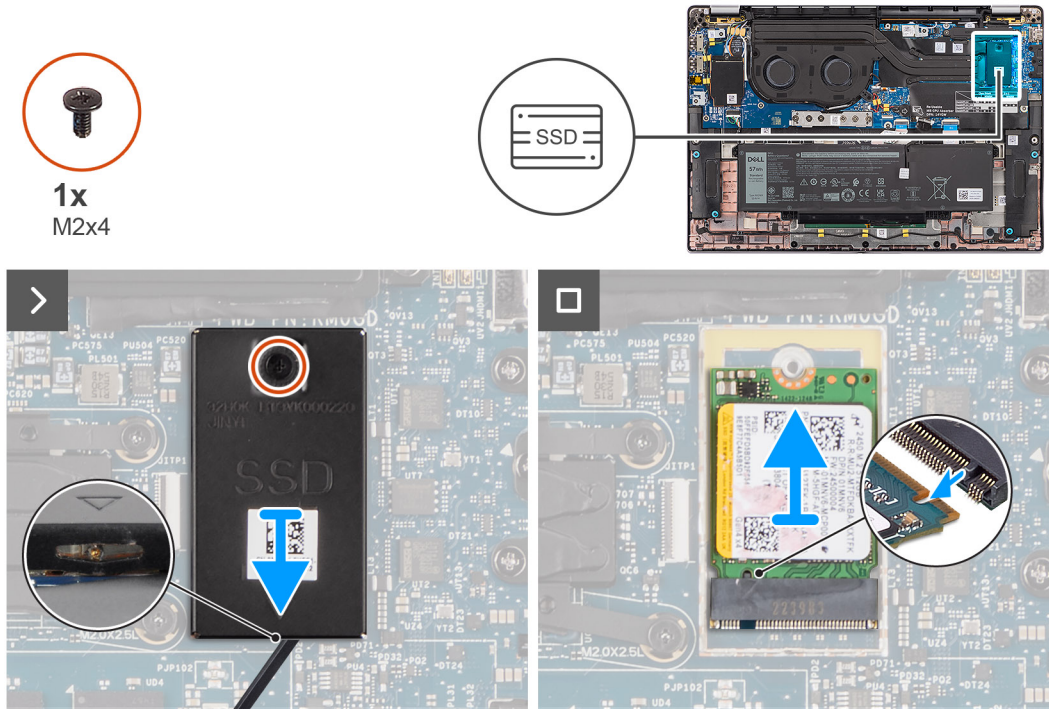


Figure 18. Removing the M.2 2230 Solid State Drive

Steps

1. Remove the single screw (M2x4) that secure the M.2 2230 SSD extension thermal plate to the system board.
2. Using a flat-headed tool, pry open the M.2 SSD shielding cover from the recess on its bottom side and remove it from the system board.
3. Slide and remove the M.2 2230 SSD from the M.2 card slot on the system board.

NOTE: For computers shipped without an SSD thermal plate, a thermal pad sticker is adhered to the system board underneath the SSD. If in the process of replacing the SSD, the thermal pad is separated from the plate or gets adhered to the SSD, adhere the thermal pad to the system board before reinstalling the SSD to the computer.

Installing the M.2 2230 Solid State Drive

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the M.2 2230 SSD and provides a visual representation of the installation procedure.

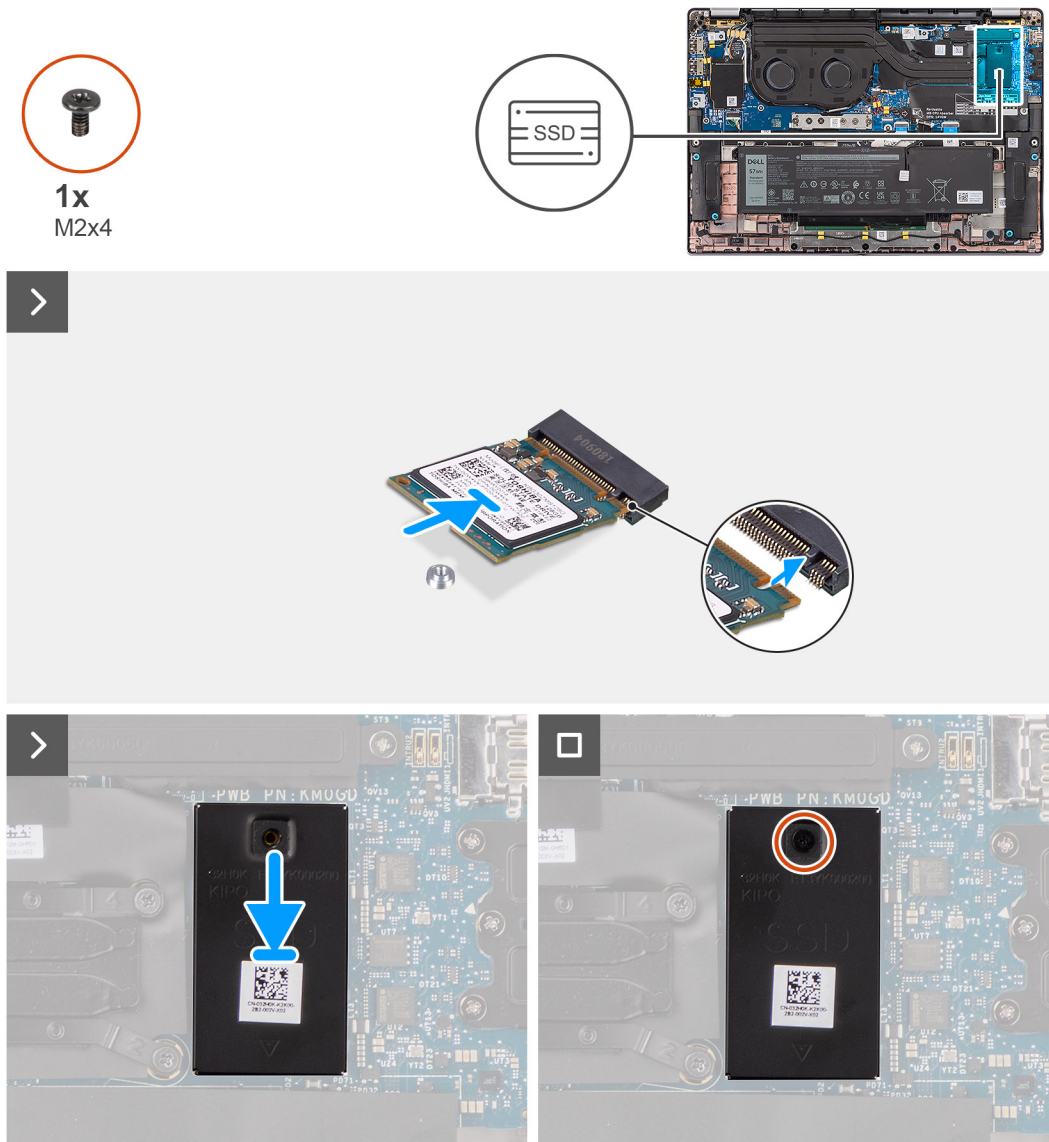


Figure 19. Installing the M.2 2230 Solid State Drive

Steps

1. Align the notch on the M.2 2230 SSD with the tab on the M.2 card slot on the system board.
 - i** **NOTE:** For computers shipped without an SSD thermal plate, a thermal pad sticker is adhered to the system board underneath the SSD. If in the process of replacing the SSD, the thermal pad is separated from the plate or gets adhered to the SSD, adhere the thermal pad to the system board before reinstalling the SSD to the computer.
2. Align the screw holes on the M.2 2230 SSD extension thermal plate with the screw holes on the system board.
3. Replace the single screw (M2x4) to secure the M.2 2230 SSD extension thermal plate to the palm-rest and keyboard assembly.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).
3. Verify if the storage device is installed correctly:
 - a. Turn on or restart your computer.
 - b. Press F2 when the Dell logo is displayed on the screen to enter the computer setup (BIOS) program.
 - i** **NOTE:** A list of storage devices are displayed under the **System Information** in the **General** group.

- c. If you have replaced the primary storage device that had the operating system that is installed, search in the Knowledge Base Resource at www.dell.com/support.

Wireless Wide Area Network (WWAN) card

Removing the 4G WWAN card

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

- i** **NOTE:** This procedure applies only to computers shipped with a 4G WWAN card installed.
- i** **NOTE:** When reinstalling the WWAN card shielding cover, ensure that the shielding cover is inserted into the clips on the I/O daughterboard.

The following images indicate the location of the 4G WWAN card and provide a visual representation of the removal procedure.

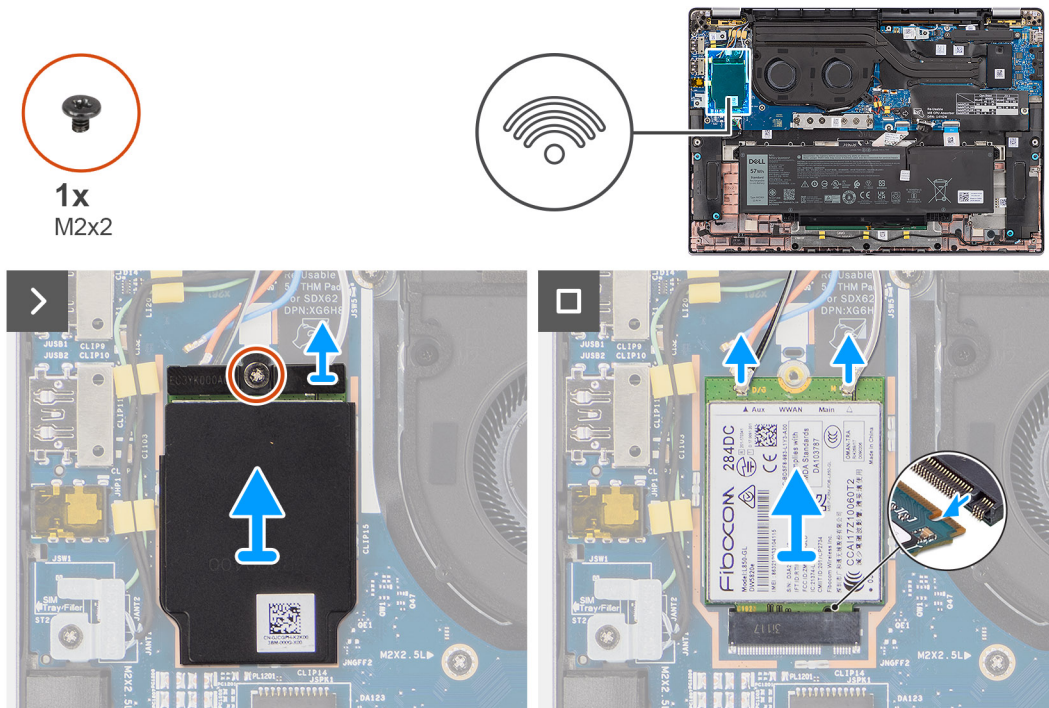


Figure 20. Removing the 4G WWAN card

Steps

1. Remove the single screw (M2x2) that secures the 4G WWAN-card bracket to the I/O daughterboard.
2. Pry the WWAN shielding cover from the top-left side of the shielding cover and remove it from the computer.
3. Lift the 4G WWAN-card bracket off the I/O daughterboard.
4. Disconnect the antenna cables from the connectors on the 4G WWAN card.
5. Slide and remove the 4G WWAN card from the M.2-card slot on the I/O daughterboard.

Installing the 4G WWAN card

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

NOTE: When reinstalling the WWAN card shielding cover, ensure that the shielding cover is inserted into the clips on the I/O daughterboard.

About this task

The following images indicate the location of the 4G WWAN card and provide a visual representation of the installation procedure.

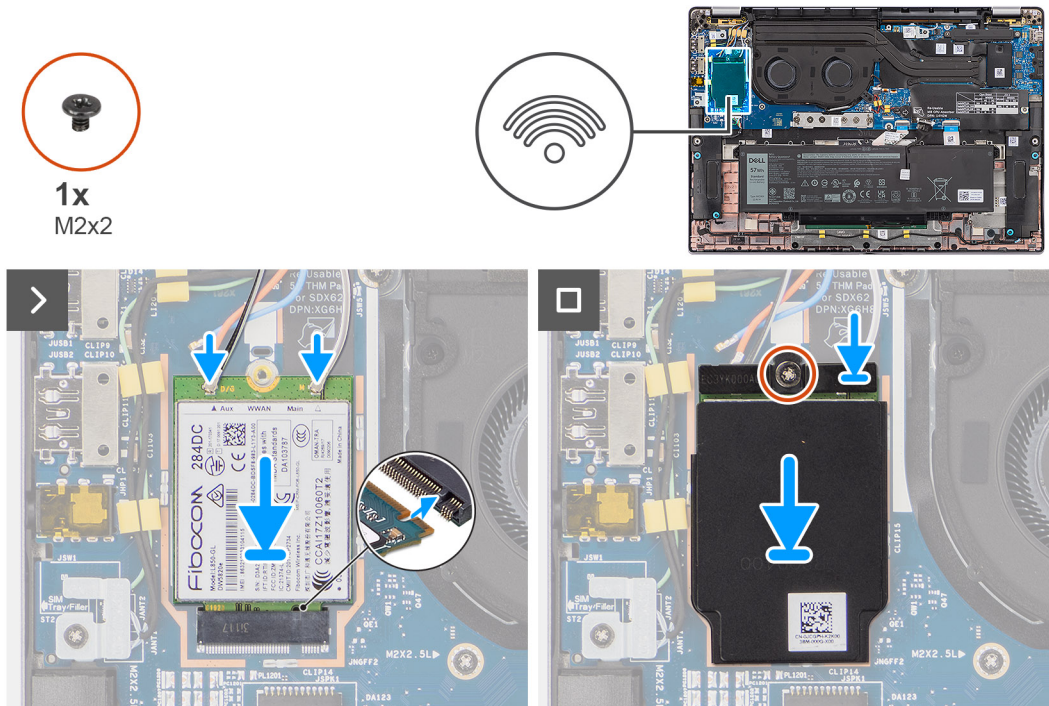


Figure 21. Installing the 4G WWAN card

Steps

1. Align the notch on the 4G WWAN card with the tab on the M.2-card slot on the I/O daughterboard.
2. Slide the 4G WWAN card firmly into the M.2-card slot on the I/O daughterboard.
3. Connect the antenna cables to the connectors on the 4G WWAN card.
4. Place the 4G WWAN-card bracket on the 4G WWAN card.
5. Align the screw hole on the 4G WWAN-card bracket with the screw hole on the I/O daughterboard.
6. Replace the single screw (M2x2) that secures the 4G WWAN-card bracket to the I/O daughterboard.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Removing the 5G WWAN card

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

NOTE: This procedure applies only to computers shipped with a 5G WWAN card installed.

NOTE: When reinstalling the WWAN card shielding cover, ensure that the shielding cover is inserted into the clips on the I/O daughterboard.

The following images indicate the location of the 5G WWAN card and provide a visual representation of the removal procedure.

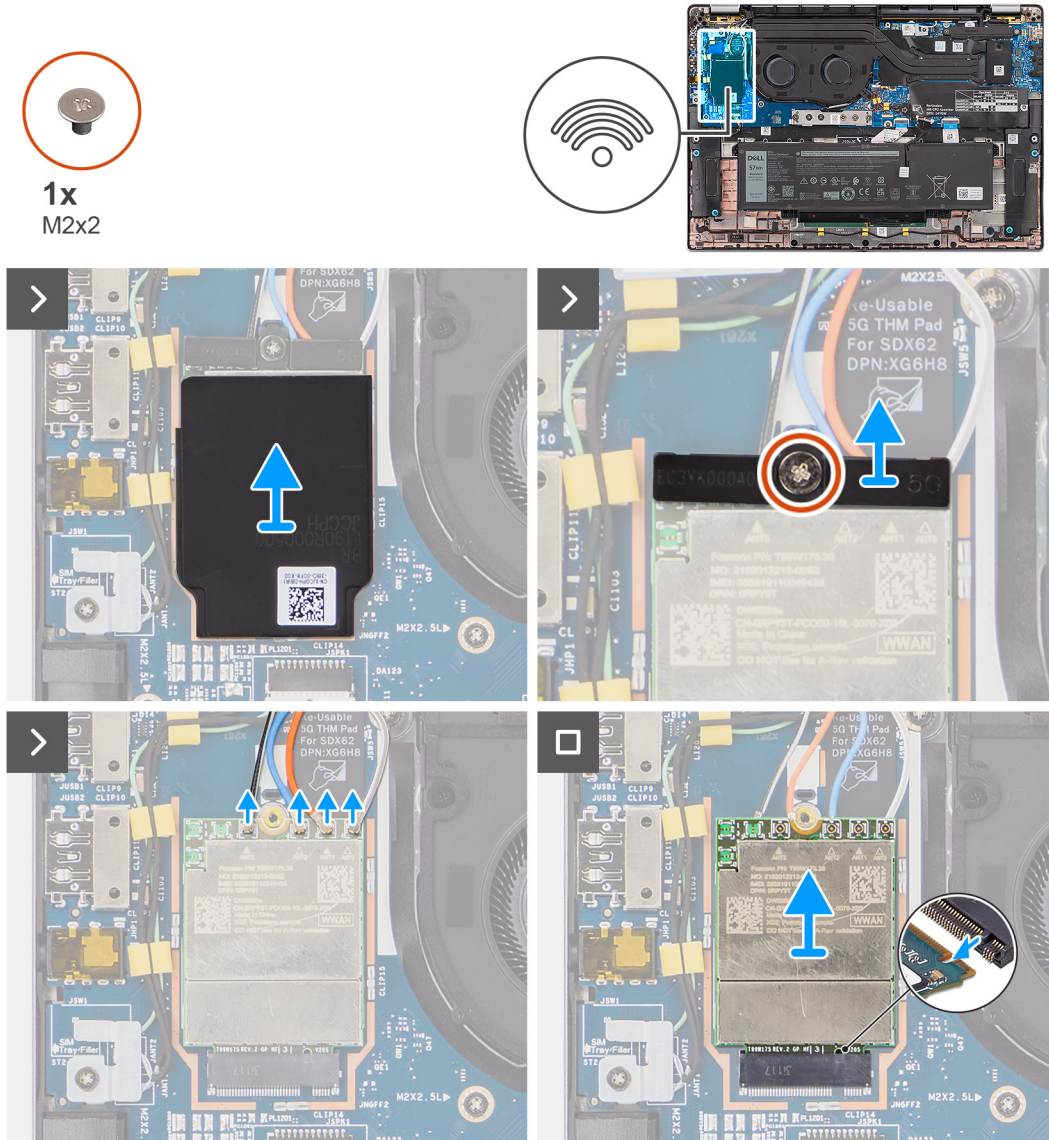


Figure 22. Removing the 5G WWAN card

Steps

1. Pry the WWAN shielding cover from the top-left side of the shielding cover and remove it from the computer.
2. Lift the 5G WWAN-card bracket off the I/O daughterboard.
3. Remove the single screw (M2x2) that secures the 5G WWAN-card bracket to the I/O daughterboard.
4. Disconnect the antenna cables underneath the rubber sponge from the connectors on the 5G WWAN card.
5. Slide and remove the 5G WWAN card from the M.2-card slot on the I/O daughterboard.

Installing the 5G WWAN card

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

NOTE: When reinstalling the WWAN card shielding cover, ensure that the shielding cover is inserted into the clips on the I/O daughterboard.

About this task

The following images indicate the location of the 5G WWAN card and provide a visual representation of the installation procedure.

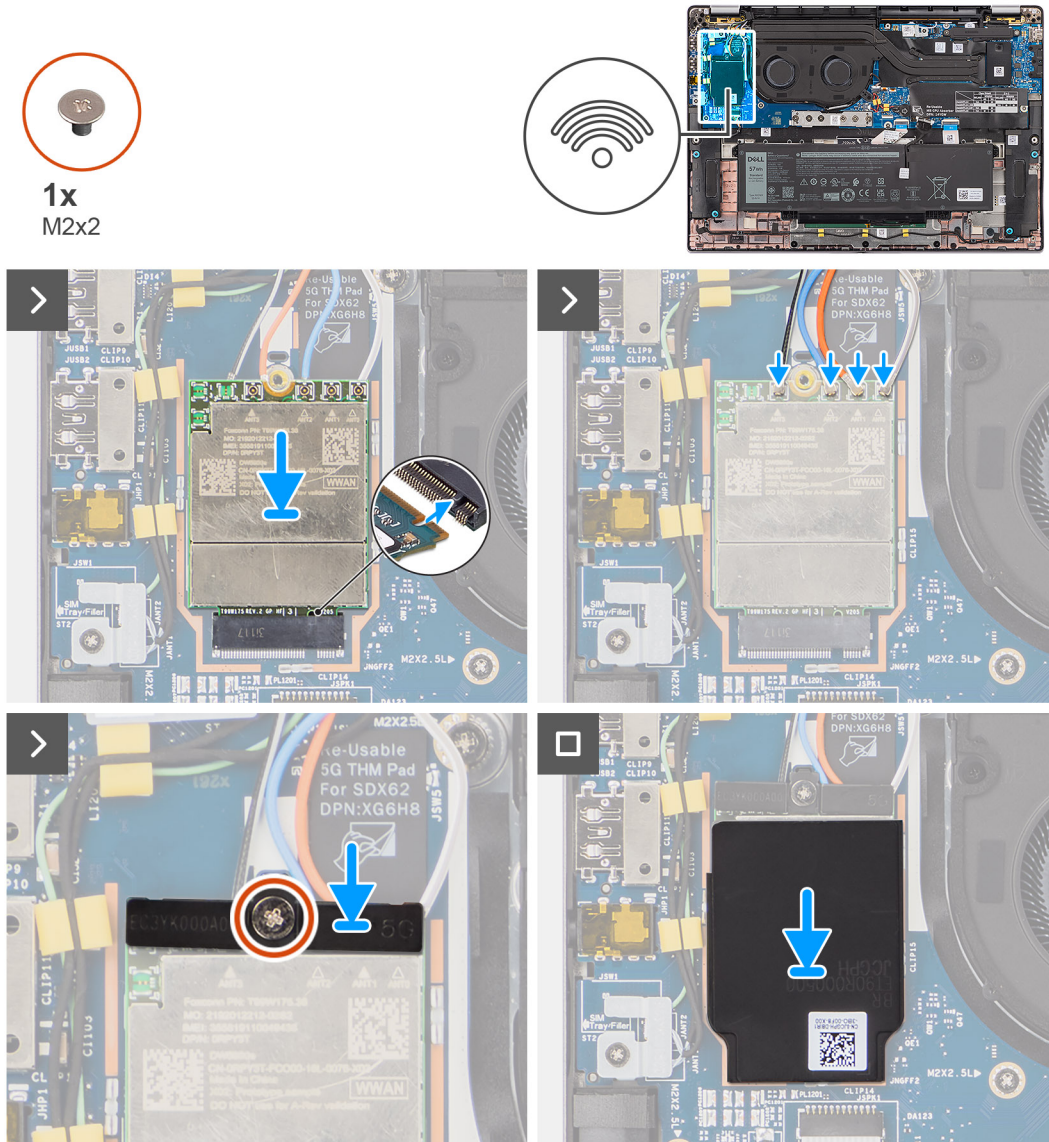


Figure 23. Installing the 5G WWAN card

Steps

1. Align the notch on the 5G WWAN card with the tab on the M.2-card slot on the I/O daughterboard.
2. Slide the 5G WWAN card firmly into the M.2-card slot on the I/O daughterboard.
3. Connect the antenna cables to the connectors on the 5G WWAN card.
4. Place the 5G WWAN-card bracket on the 5G WWAN card.
5. Align the screw hole on the 5G WWAN-card bracket with the screw hole on the I/O daughterboard.

6. Replace the single screw (M2x2) that secures the 5G WWAN-card bracket to the I/O daughterboard.
7. When reinstalling the WWAN card shielding cover, ensure that the shielding cover is inserted into the clips on the I/O daughterboard.

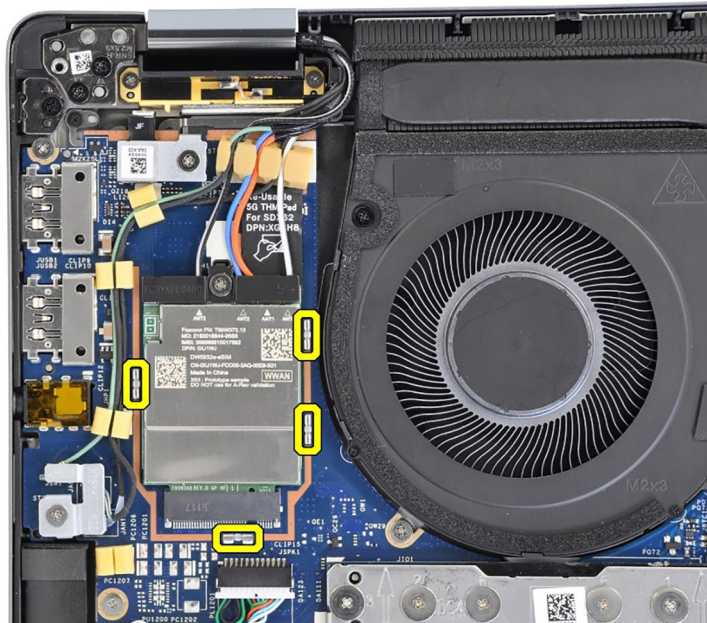


Figure 24. Installing the 5G WWAN card

NOTE: For instructions on how to find your computer's International Mobile Station Equipment Identity (IMEI) number, search in the Knowledge Base Resource at www.dell.com/support.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Speakers

Removing the speakers

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

The following image indicates the location of the speakers and provides a visual representation of the removal procedure.

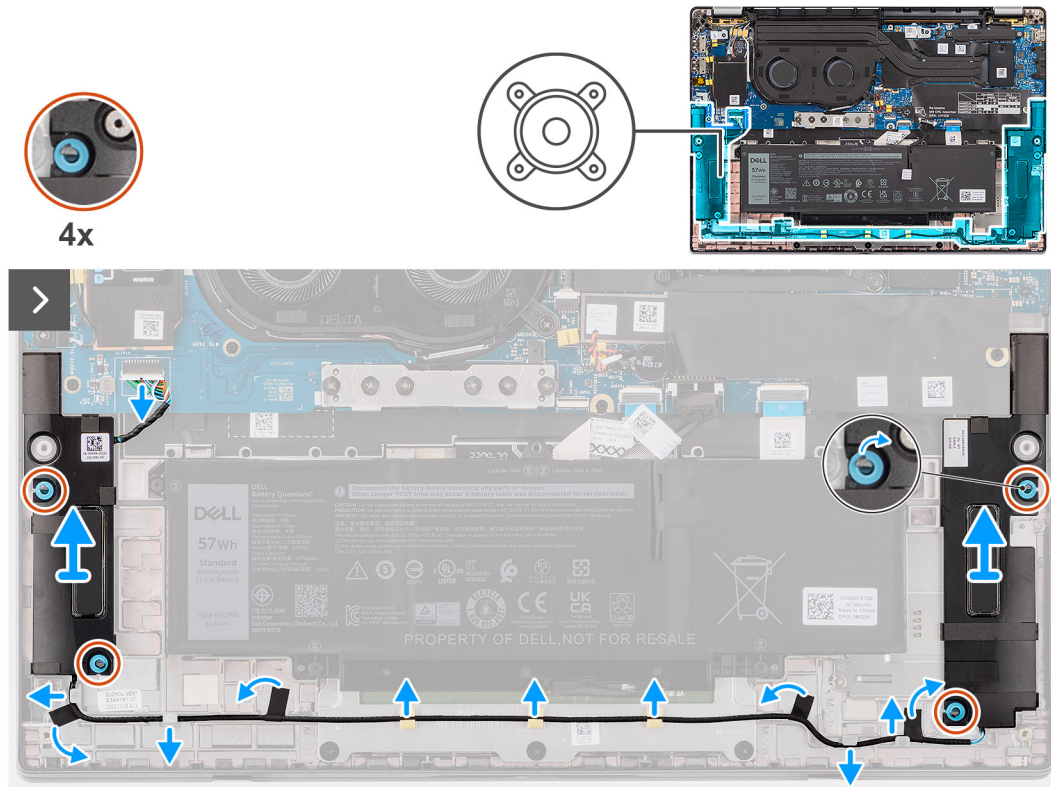


Figure 25. Removing the speakers

Steps

1. Disconnect the speaker cable from the connector on the system board.
2. Peel the tape that secures the speaker cable to the palm-rest and keyboard assembly.
3. Note the speaker cable routing, and unroute the speaker cable from the routing guides on the palm-rest and keyboard assembly.
4. Lift the speakers, along with the cable, off the palm-rest and keyboard assembly.

Installing the speakers

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the speakers and provides a visual representation of the installation procedure.

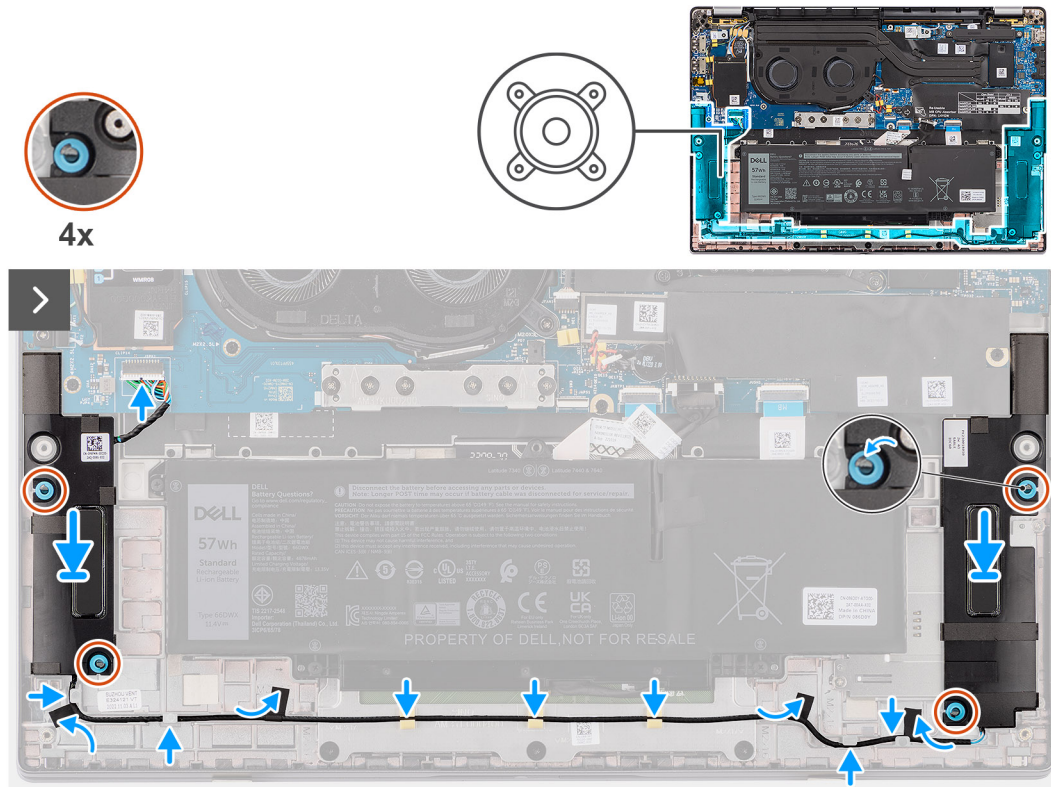


Figure 26. Installing the speakers

Steps

1. Using the alignment posts and rubber grommets, place the speakers into the slots on the palm-rest and keyboard assembly.
 - NOTE:** If the rubber grommets are pushed out during speaker removal, make sure to reinsert them before reinstalling the speakers.
2. Route the speaker cable along the bottom side of the palm-rest and keyboard assembly. Then secure the speaker cable into the routing guides on the palm-rest and keyboard assembly.
3. Connect the speaker cable to the connector on the I/O daughterboard.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [Before working inside your computer](#).

Coin-cell battery

Removing the coin-cell battery

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
 - CAUTION:** Removing the coin-cell battery resets the BIOS setup program's settings to default. It is recommended that you note the BIOS setup program's settings before removing the coin-cell battery.
2. Remove the [base cover](#).

About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the removal procedure.

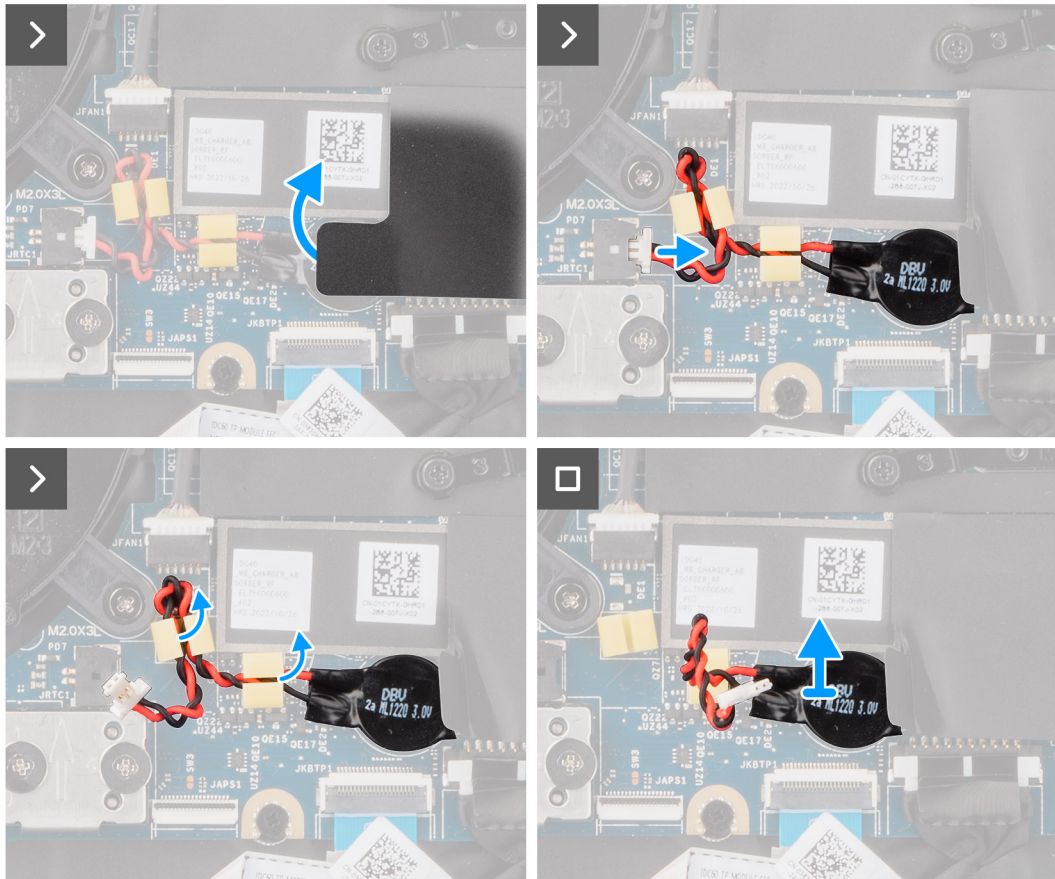
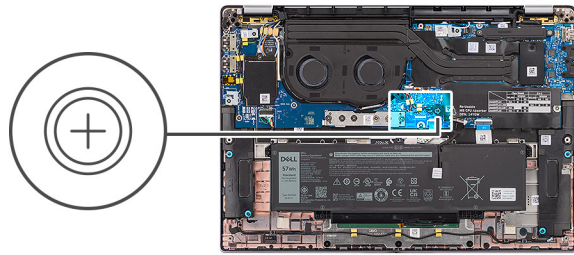


Figure 27. Removing the coin-cell battery

Steps

1. Remove the shielding cover that holds the coin-cell battery.
2. Disconnect the coin-cell battery cable from the connector on the system board.
3. Unroute the coin-cell battery cable from the routing guides on the system board.
4. Using a plastic scribe, pry the coin-cell battery off its slot on the system board.

Installing the coin-cell battery

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the installation procedure.

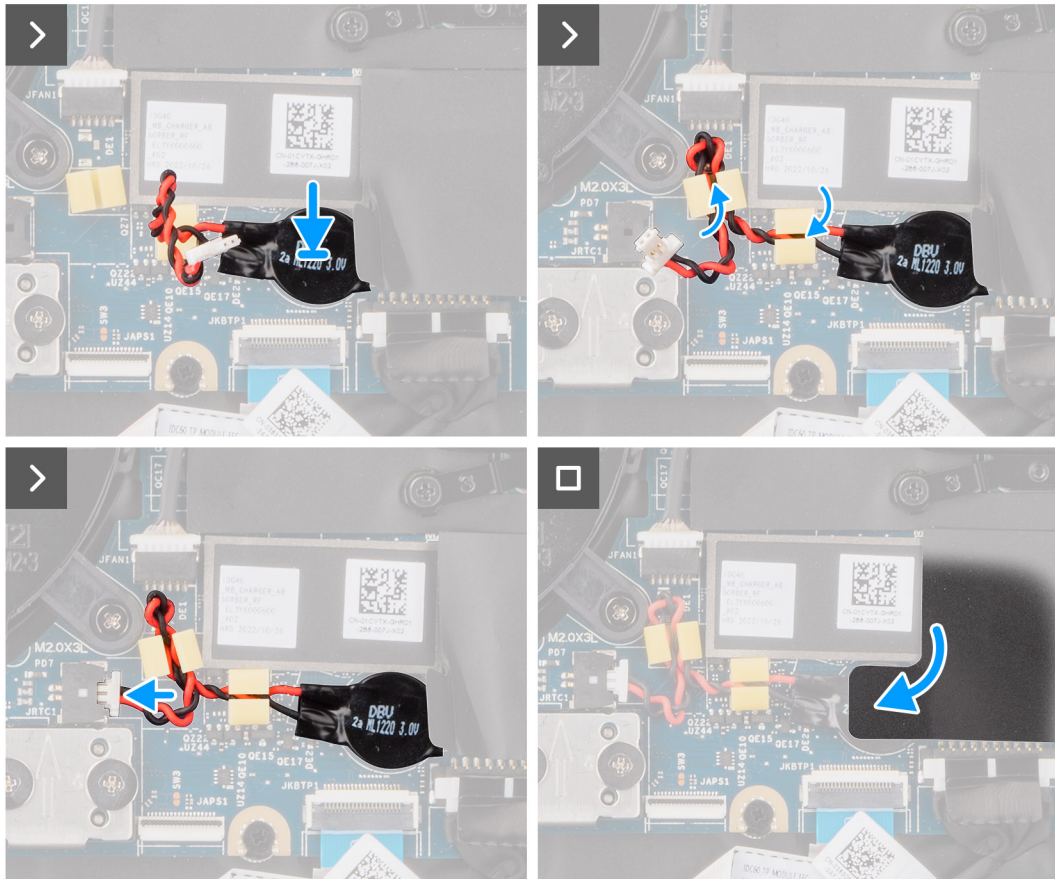
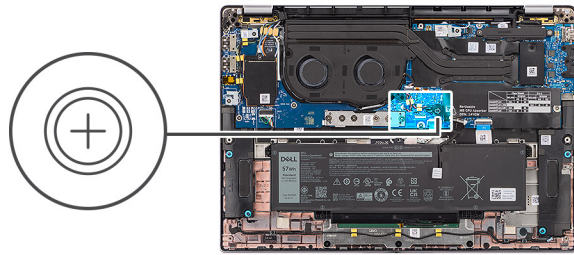


Figure 28. Installing the coin-cell battery

Steps

1. Place the coin-cell battery into its slot on the system board.
2. Route the coin-cell battery cable back to the routing guides on the system board.
3. Connect the coin-cell battery cable to the connector on the system board.
4. Align and place the shielding cover that holds the coin-cell battery.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Removing and installing Field Replaceable Units (FRUs)

The replaceable components in this chapter are Field Replaceable Units (FRUs).

CAUTION: The information in this section is intended for authorized service technicians only.

CAUTION: To avoid any potential damage to the component or loss of data, ensure that an authorized service technician replaces the Field Replaceable Units (FRUs).

CAUTION: Dell Technologies recommends that this set of repairs, if needed, to be conducted by trained technical repair specialists.

CAUTION: As a reminder, your warranty does not cover damages that may occur during FRU repairs that are not authorized by Dell Technologies.

NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Battery

Rechargeable Li-ion battery precautions

CAUTION:

- Exercise caution when handling rechargeable Li-ion batteries.
- Discharge the battery completely before removing it. Disconnect the AC power adapter from the computer and operate the computer solely on battery power—the battery is fully discharged when the computer no longer turns on when the power button is pressed.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any kind to pry on or against the battery.
- Ensure any screws during the servicing of this product are not lost or misplaced, to prevent accidental puncture or damage to the battery and other computer components.
- If the battery gets stuck inside your computer as a result of swelling, do not try to release it as puncturing, bending, or crushing a rechargeable Li-ion battery can be dangerous. In such an instance, contact Dell technical support for assistance. See www.dell.com/contactdell.
- Always purchase genuine batteries from www.dell.com or authorized Dell partners and resellers.
- Swollen batteries should not be used and should be replaced and disposed properly. For guidelines on how to handle and replace swollen rechargeable Li-ion batteries, see [Handling swollen rechargeable Li-ion batteries](#).

Removing the 2-cell battery

CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

The following image indicates the location of the 2-cell battery and provides a visual representation of the removal procedure.

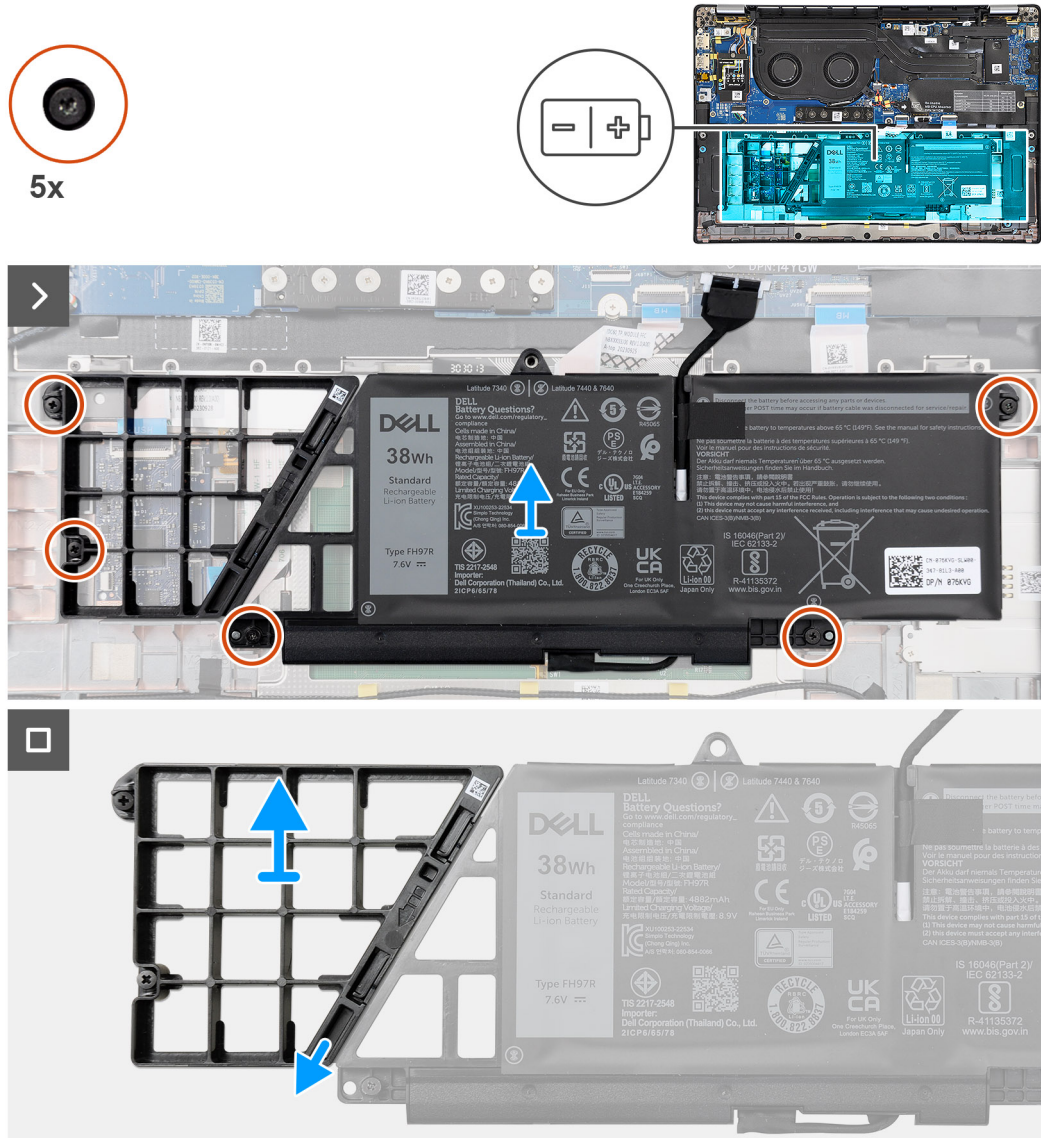


Figure 29. Removing the 2-cell battery

Steps

1. Use the pull tab to disconnect the battery cable from the connector on the system board.
2. Loosen the five captive screws that secure the 2-cell battery to the palm-rest and keyboard assembly.
3. Lift the 2-cell battery along with the battery cable off the palm-rest and keyboard assembly.
4. Disconnect the battery cable from the connector on the 2-cell battery.
5. Carefully push the battery filler downwards to remove it from the 2-cell battery.

NOTE: For models shipped with a 2-cell battery, push downward to remove the dummy cell from the battery, and then reverse the process to install the dummy cell on the replacement battery.



Figure 30. Removing the 2-cell battery

Installing the 2-cell battery

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the 2-cell battery and provides a visual representation of the installation procedure.

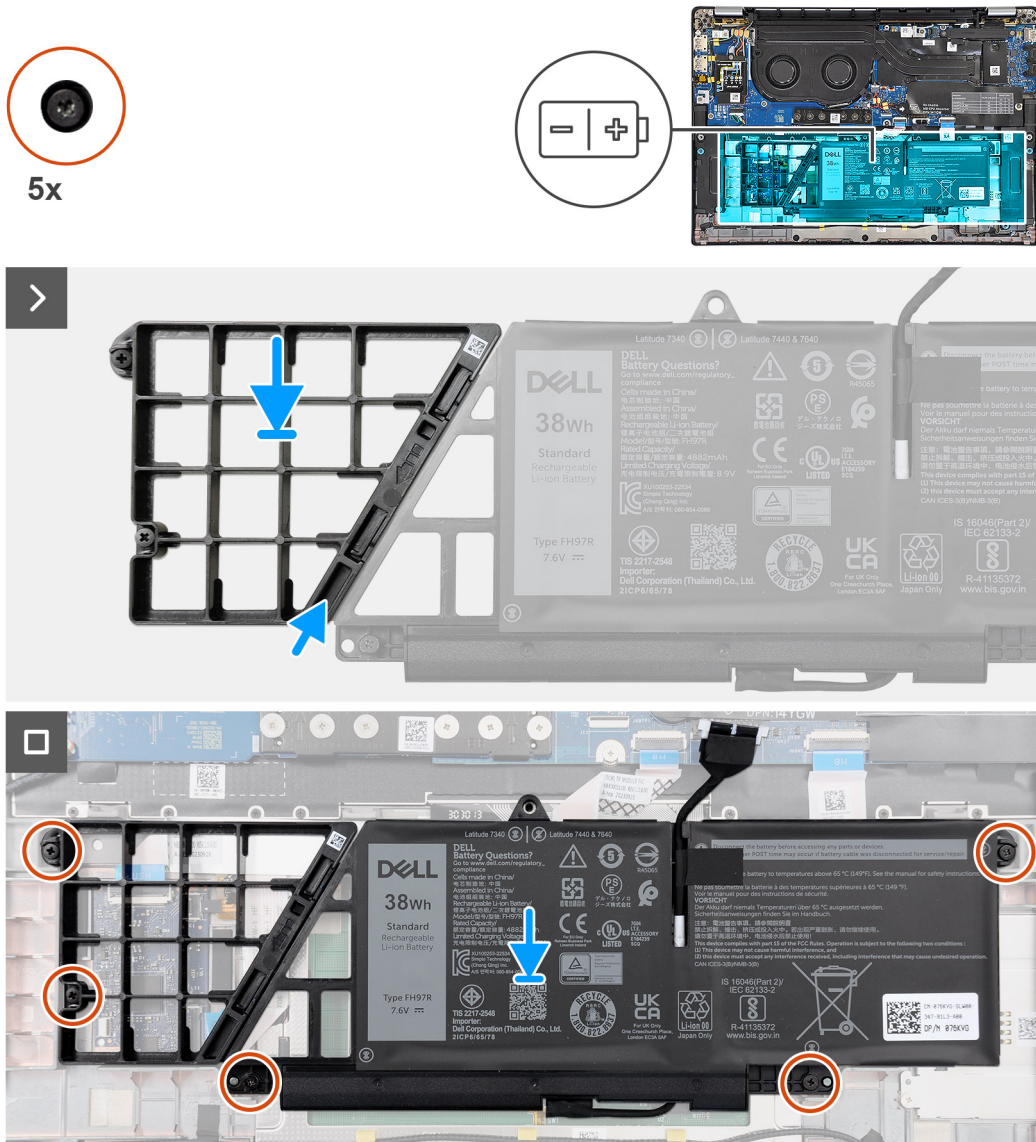


Figure 31. Installing the 2-cell battery

Steps

1. Carefully push the battery filler upwards to attach it to the 2-cell battery.
2. Place the 2-cell battery along with the battery cable on the palm-rest and keyboard assembly.
3. Align the screw holes on the 2-cell battery to the screw holes on the palm-rest and keyboard assembly.
4. Tighten the five captive screws to secure the 2-cell battery to the palm-rest and keyboard assembly.
5. Connect the battery cable to the connector on the system board.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Removing the 3-cell battery

CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

The following image indicates the location of the 3-cell battery and provides a visual representation of the removal procedure.

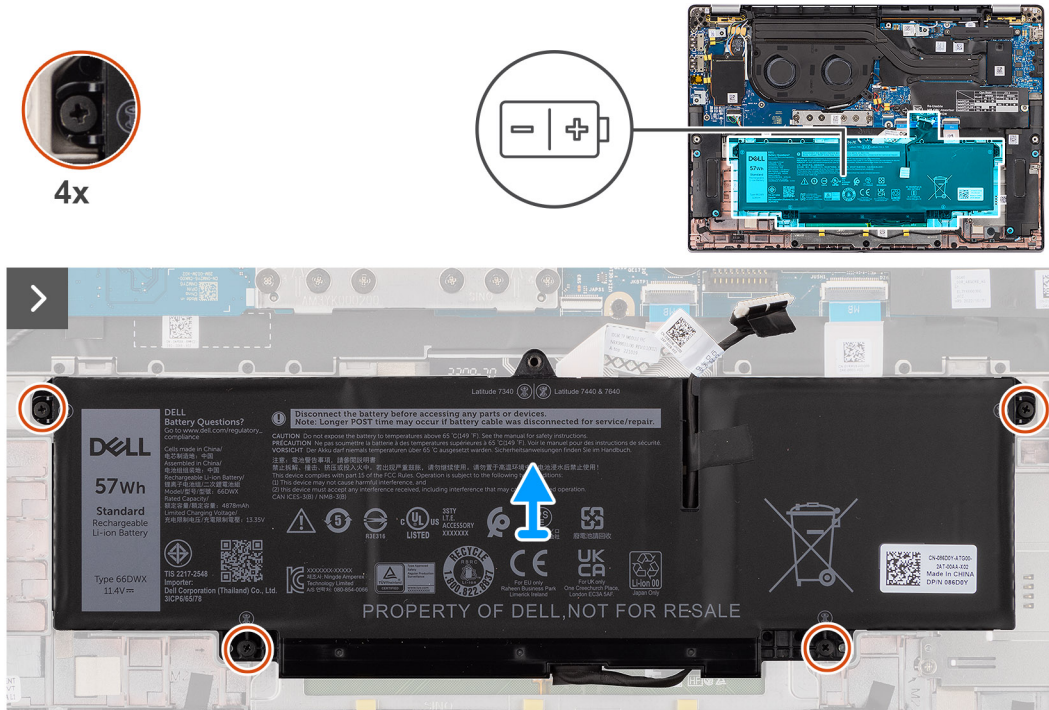


Figure 32. Removing the 3-cell battery

Steps

1. Disconnect the battery cable from the connector on the system board, if it was not disconnected earlier.
2. Loosen the four captive screws that secure the 3-cell battery to the palm-rest and keyboard assembly.
3. Remove the battery from the computer.
4. Flip the battery, peel the tape that secures the battery cable to the battery.
5. Lift the 3-cell battery along with the battery cable off the palm-rest and keyboard assembly.

Installing the 3-cell battery

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the 3-cell battery and provides a visual representation of the installation procedure.

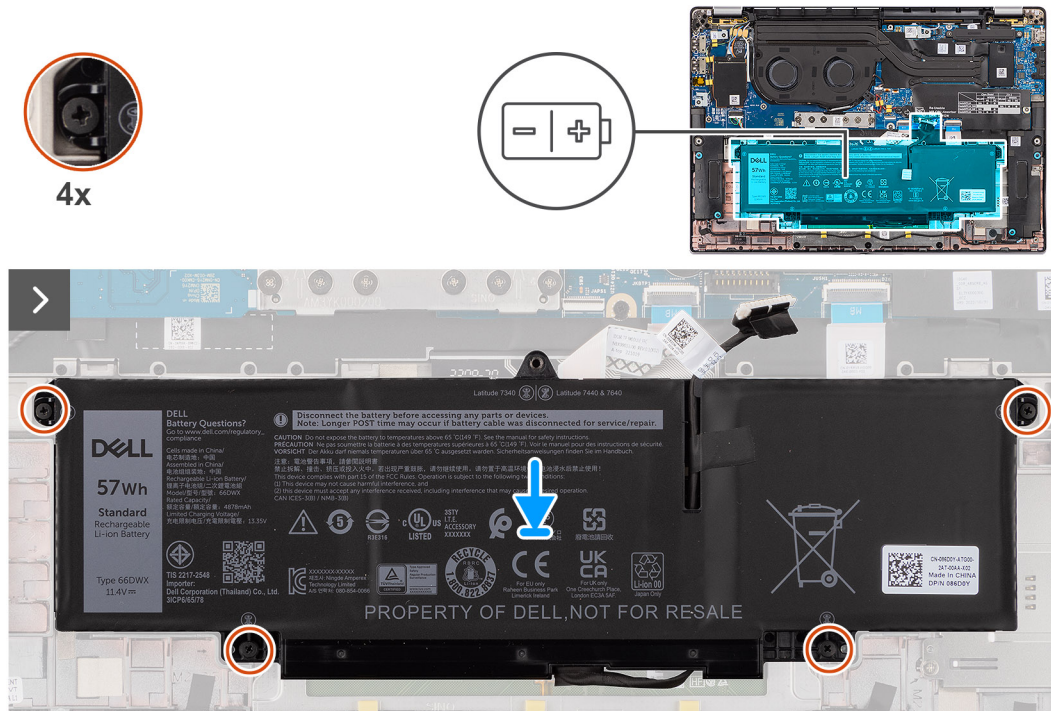


Figure 33. Installing the 3-cell battery

Steps

1. Place the 3-cell battery along with the battery cable on the palm-rest and keyboard assembly.
2. Adhere the tape to secure the battery cable to the battery.
3. Align the screw holes on the 3-cell battery to the screw holes on the palm-rest and keyboard assembly.
4. Tighten the four captive screws to secure the 3-cell battery to the palm-rest and keyboard assembly.
5. Connect the battery cable to the connector on the system board.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Battery cable

Removing the battery cable

⚠ CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [After working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.

i NOTE: If the battery is disconnected from the system board for service, then there is a delay during computer boot as the computer undergoes RTC battery reset.

About this task

The following images indicate the location of the battery cable and provide a visual representation of the removal procedure.

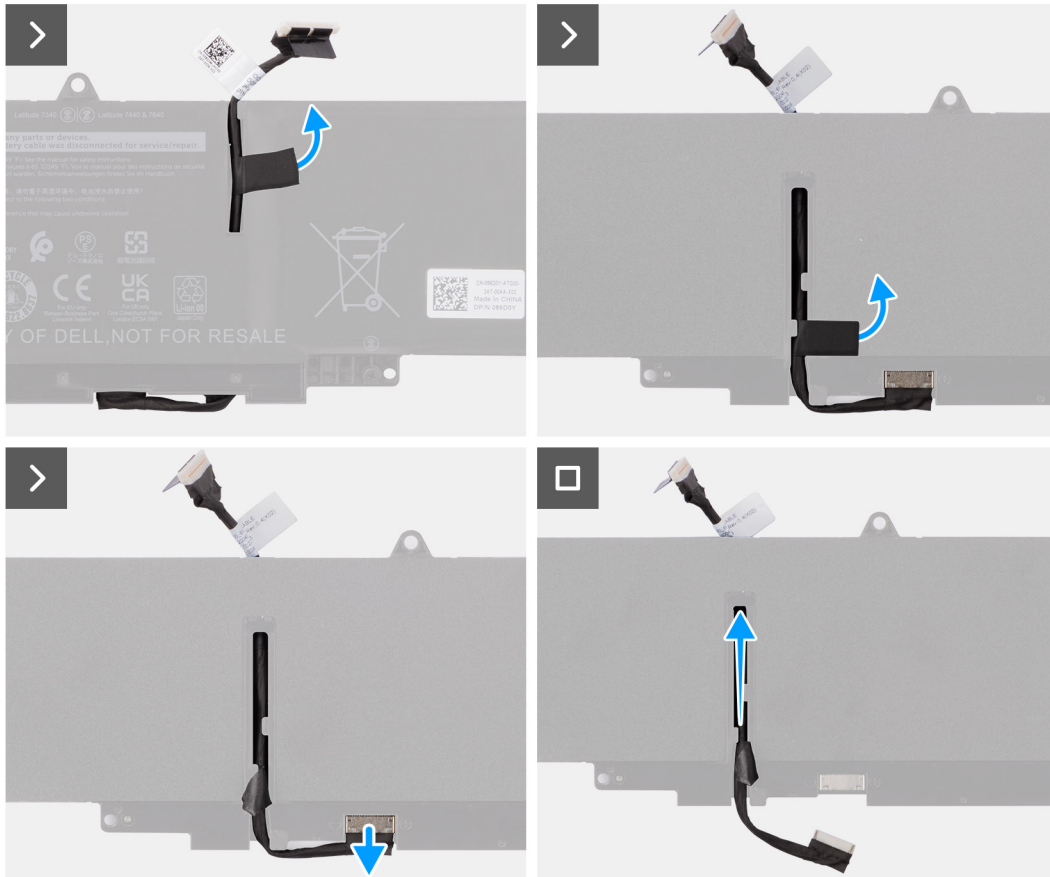


Figure 34. Removing the battery cable

Steps

1. Flip the battery and unrout the battery cable from the routing guides on the battery.
2. Disconnect the battery cable from the connector on the battery.
3. Lift the battery cable away from the battery.

NOTE: Dummy filler for a 2-cell battery is not required for the lightweight WLAN configuration.

Installing the battery cable

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the battery cable and provide a visual representation of the installation procedure.

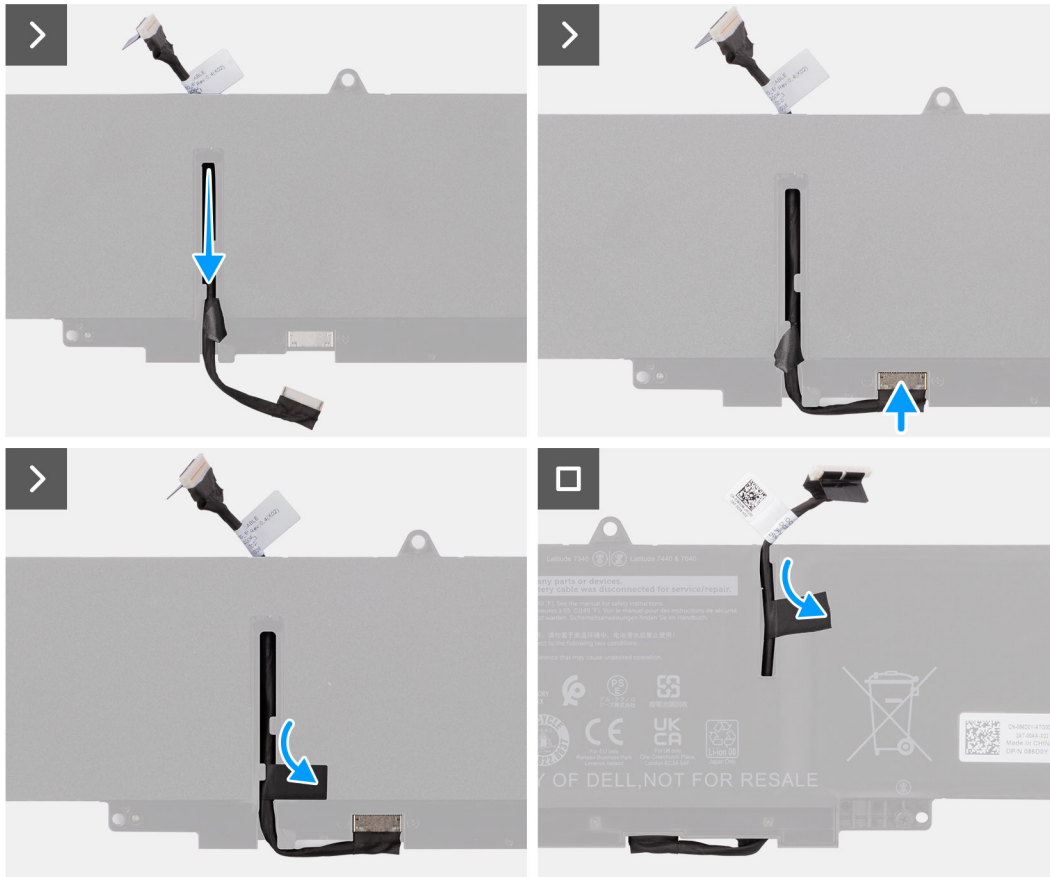


Figure 35. Installing the battery cable

Steps

1. Connect the battery cable to the connector on the battery.
2. Route the battery cable through the routing guides on the battery.

Next steps

1. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Heat-sink with fan

Removing the heat-sink with fan

⚠ CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

- NOTE:** The heat-sink may become hot during normal operation. Allow sufficient time for the heat-sink to cool before you touch it.
- NOTE:** For maximum cooling of the processor, do not touch the heat transfer areas on the heat-sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

The following image indicates the location of the heat-sink and provides a visual representation of the removal procedure.

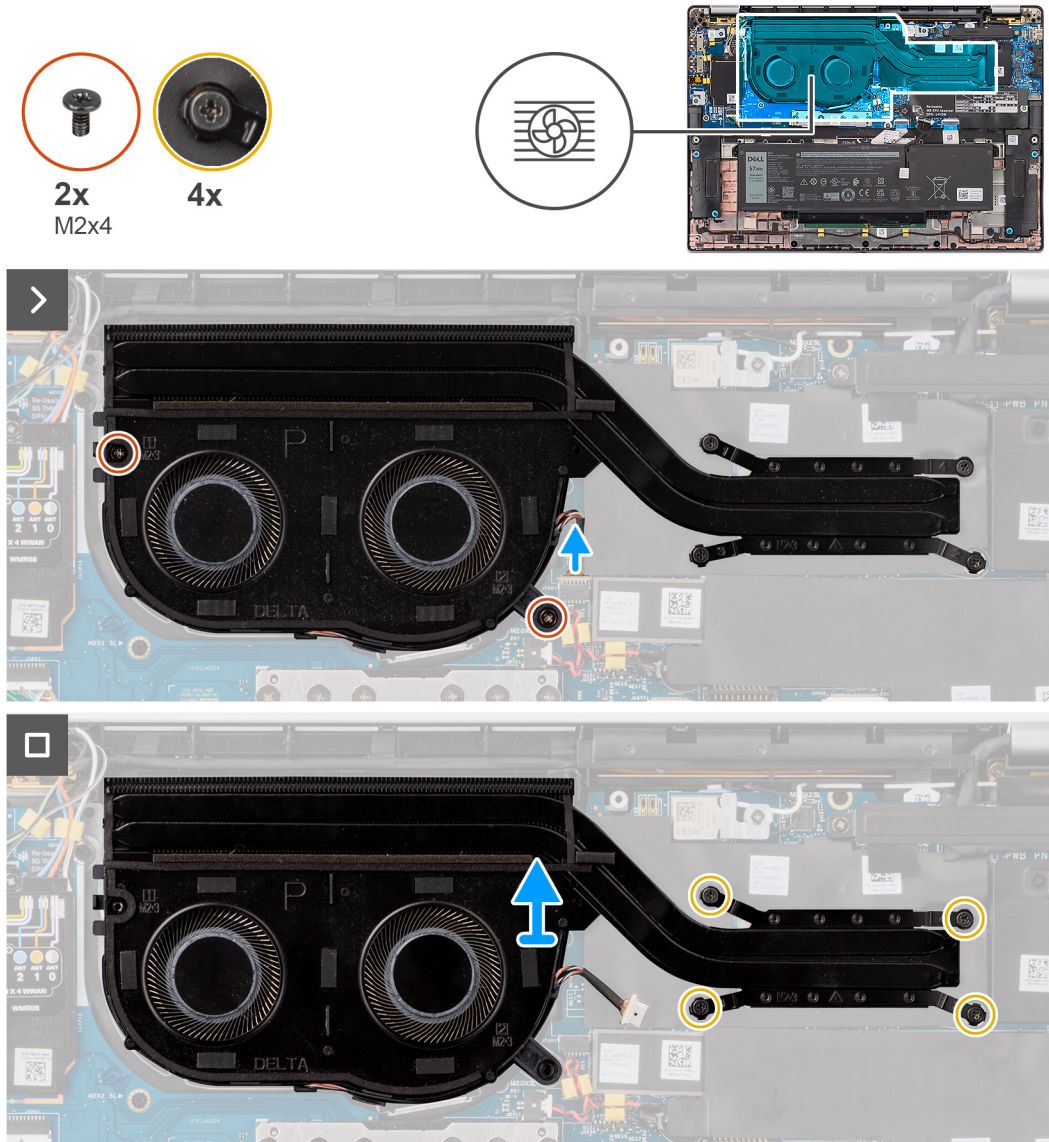


Figure 36. Removing the heat-sink and fan assembly

Steps

1. Disconnect the computer fan cable from the connector on the system board.
2. Remove the four captive screws and the two screws (M2x4) that secure the thermal fan to the system board.
3. In reverse sequential order (as indicated on the heat-sink), loosen the four captive screws that secure the heat-sink and fan assembly to the system board.
4. Lift the heat-sink off the system board.

Installing the heat-sink with fan

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

NOTE: If either the system board or the heat-sink is replaced, use the thermal grease that is provided in the kit to ensure that thermal conductivity is achieved.

NOTE: Incorrect alignment of the heat-sink can damage the system board and processor.

The following image indicates the location of the heat-sink and provides a visual representation of the installation procedure.

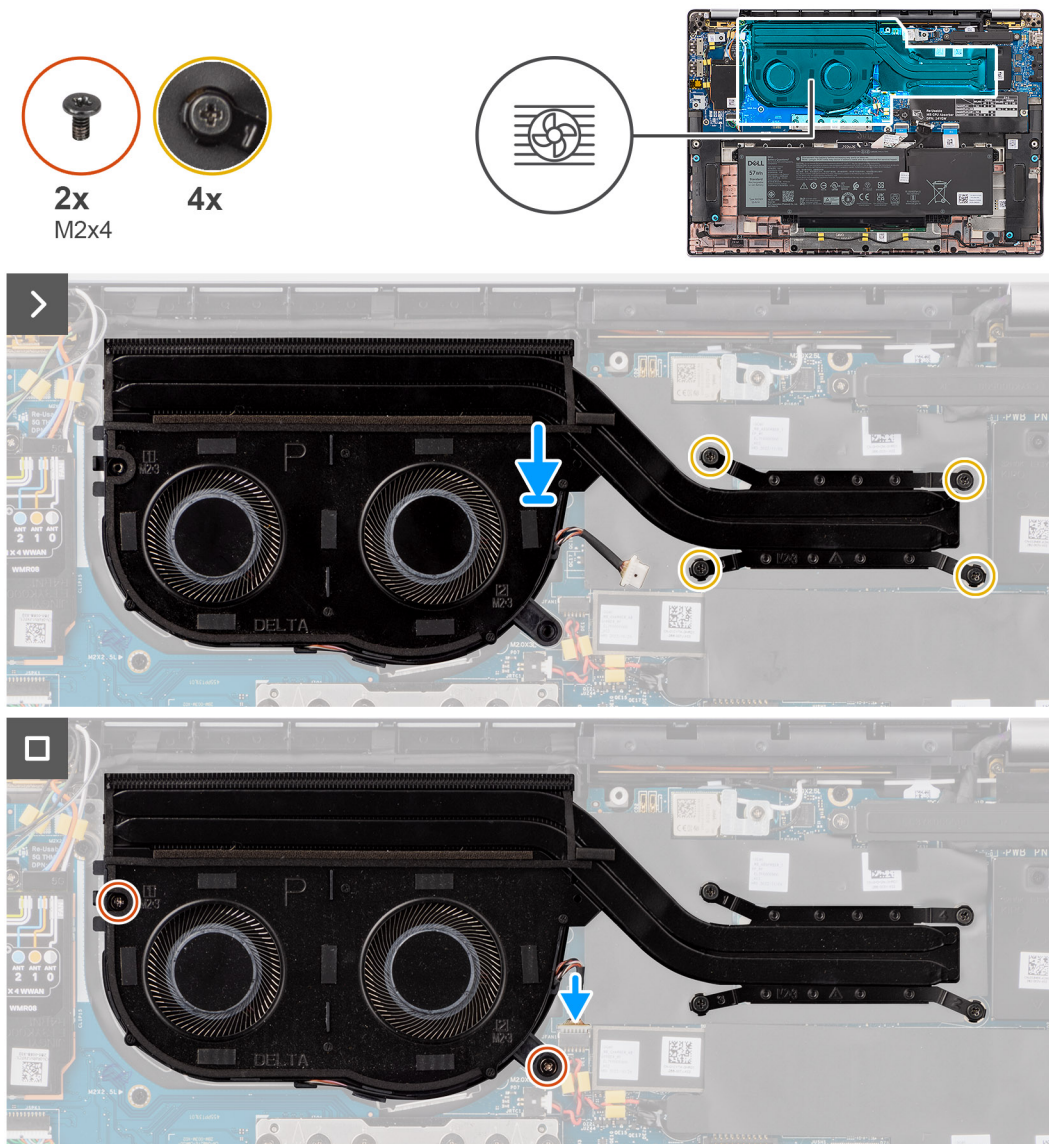


Figure 37. Installing the heat-sink and fan assembly

Steps

1. Place the heat-sink on the system board.
2. Align the screw holes on the heat-sink and fan assembly with the screw holes on the system board.

3. Replace the four captive screws and two screws (M2x4) that secure the system fan to the system board.
4. In reverse sequential order (as indicated on the heat-sink), tighten the four captive screws that secure the heat-sink and fan assembly to the system board.
5. Connect the computer fan cable to the connector on the system board.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).


Display assembly

Removing the display assembly

 **CAUTION:** The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [WWAN card](#).

 **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.

About this task

The following images indicate the location of the display assembly and provide a visual representation of the removal procedure.

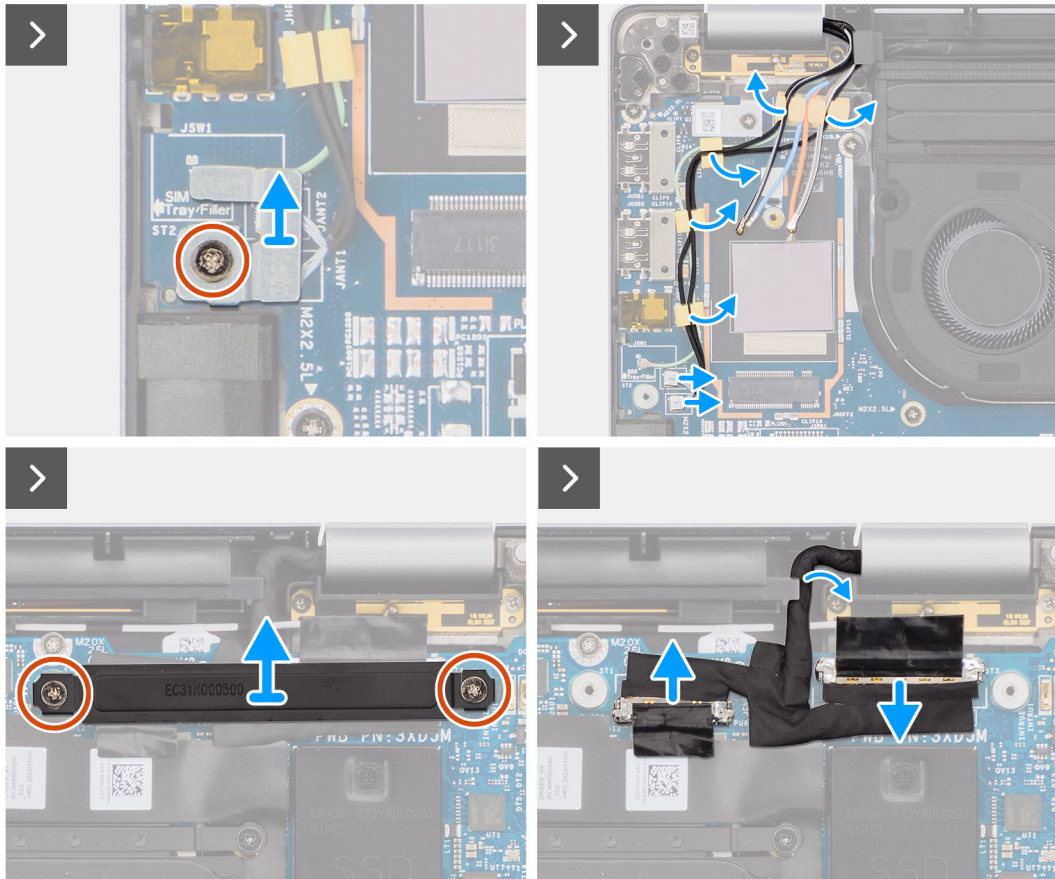
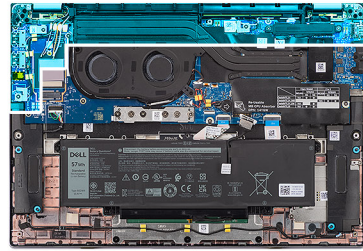


Figure 38. Removing the display assembly

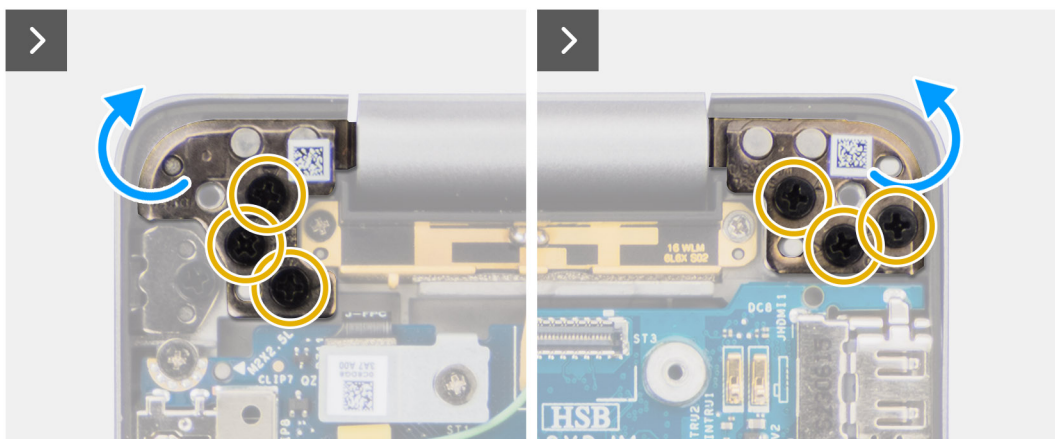


Figure 39. Removing the display assembly

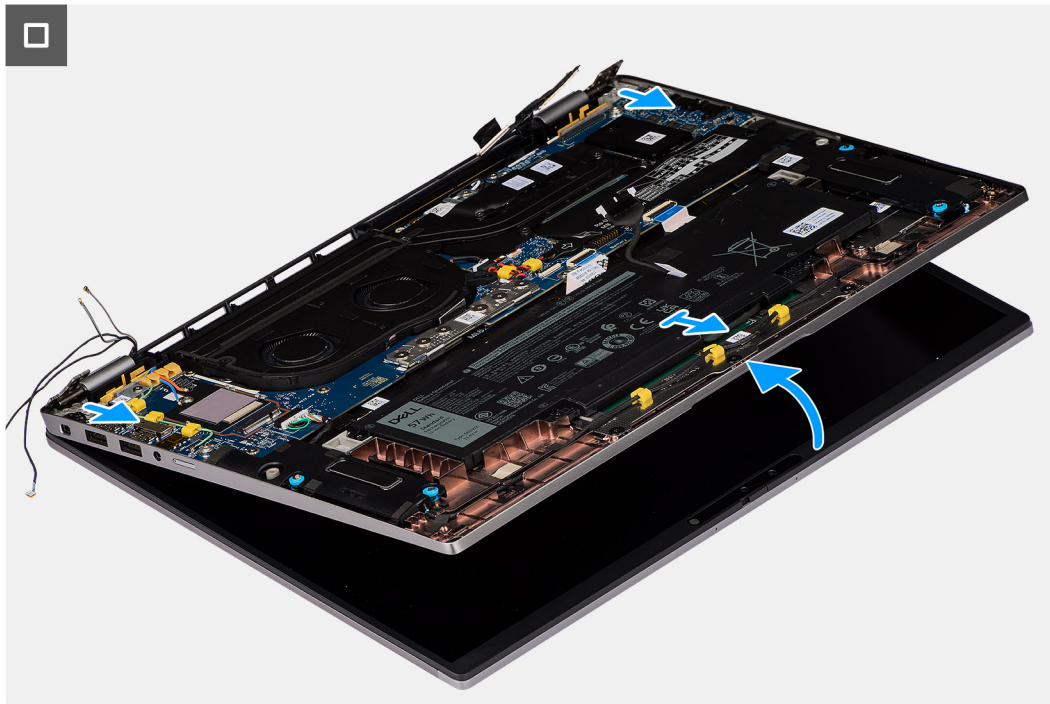


Figure 40. Removing the display assembly

Steps

1. Remove the single screw (M2x2) securing the Darwin antenna cable bracket on the system board.
i **NOTE:** The steps from 1 to 4 apply only to computers shipped with a WWAN antenna installed in the display assembly.
2. Remove the Darwin antenna cable bracket from the system board.
3. Disconnect both the Darwin antenna cables from the respective connectors on the I/O daughterboard.
4. Unroute the antenna cables from the routing guide on the I/O daughterboard.
5. Remove the two screws (M2x2) securing the display cable bracket to the system board.
6. Lift the display cable bracket off the computer.
7. Using the pull tab, disconnect and peel the camera cable and display cable from the system board.
8. Remove the six screws (M2.5x5) that secure the display hinges to the system board and lift the hinges away from base 45 to 90 degrees to allow clearance for base removal.
9. Lift the base assembly slightly at an angle.
10. Lift the base assembly away from the display assembly.
i **NOTE:** The display assembly is a Hinge-Up Design (HUD) assembly and cannot be further disassembled once it is removed from the bottom chassis. If any components in the display assembly are malfunctioning and is required to be replaced, replace the entire display assembly.



Figure 41. Display assembly

Installing the display assembly

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

NOTE: Ensure that the hinges are opened to the maximum before replacing the display assembly on the palm-rest and keyboard assembly.

The following images indicate the location of the display assembly and provide a visual representation of the installation procedure.

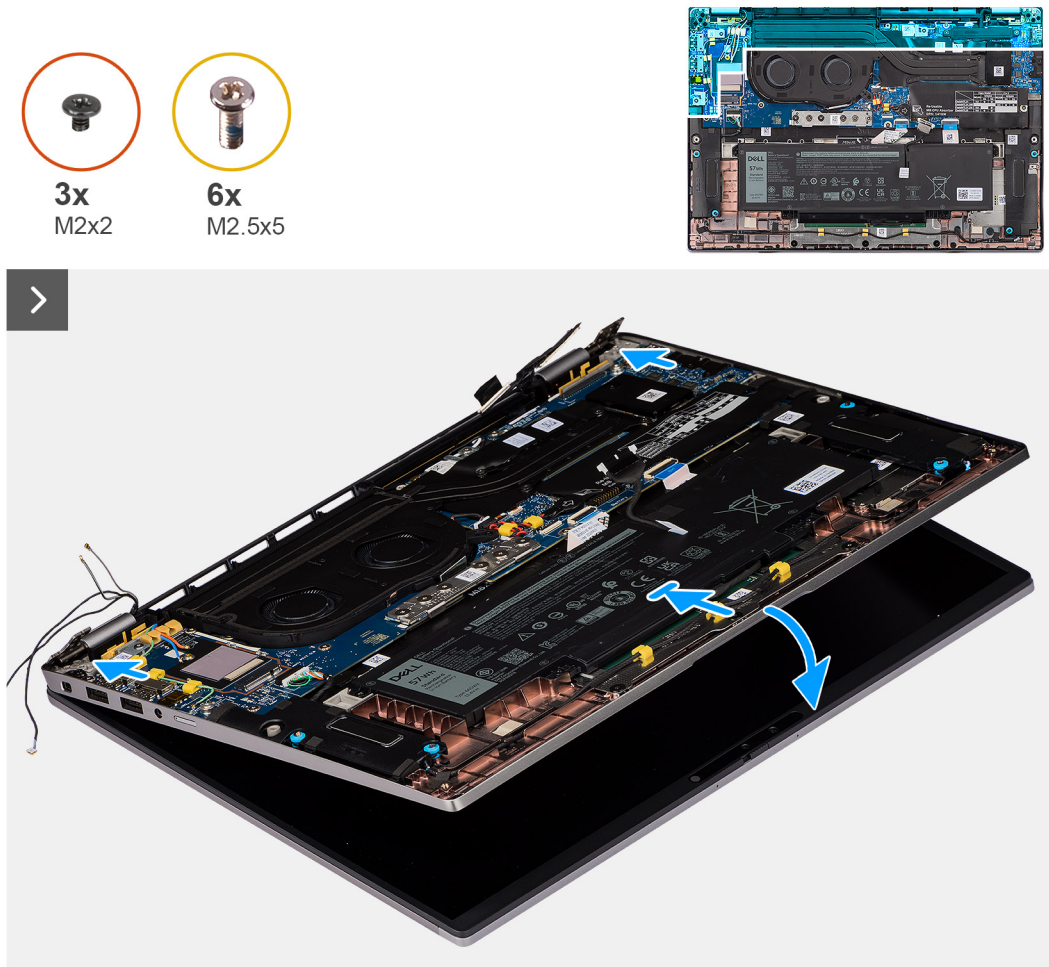


Figure 42. Installing the display assembly

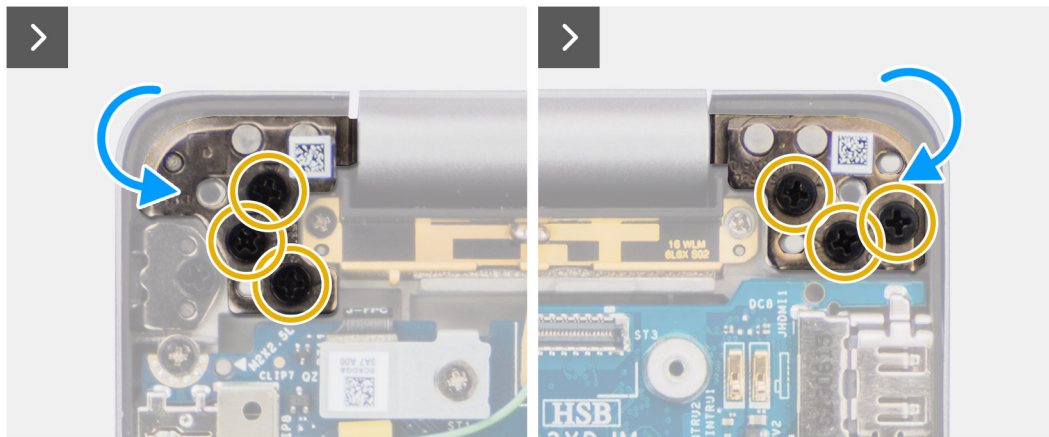


Figure 43. Installing the display assembly

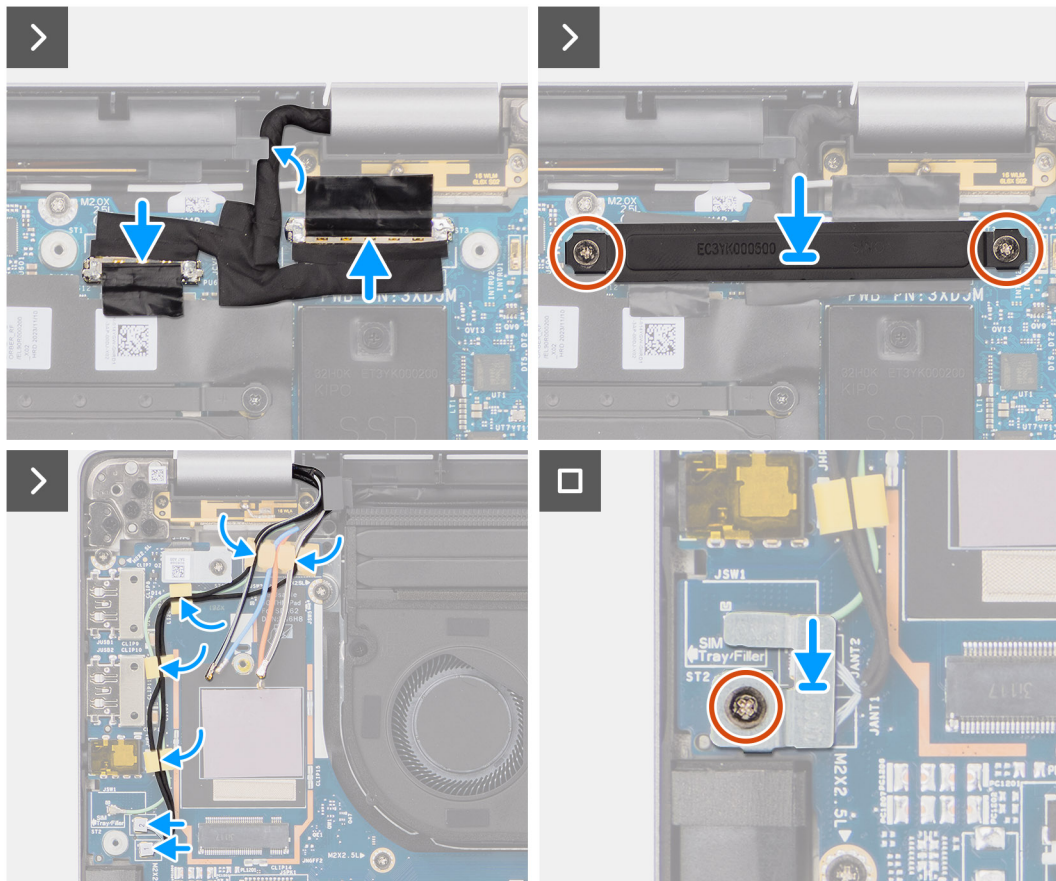


Figure 44. Installing the display assembly

Steps

1. Place the display assembly on a flat surface.
2. Slide the base assembly at an angle and gently press down on the hinges to align the screw holes on the display hinges with screw holes on the system board.
3. Replace the six screws (M2.5x5) that secure the display hinges to the system board.
4. Connect the camera cable and display cable to the connectors on the system board.
5. Adhere the tape that secures the display and camera cable to the system board.
6. Align the screw holes on the display cable bracket with the screw holes on the system board.
7. Replace the two screws (M2x2) that secure the display cable bracket to the system board.
8. Route the antenna cables through the routing guides on the I/O daughterboard.
9. Connect both the Darwin antenna cables from the respective connectors on the I/O daughterboard.
10. Align and place the Darwin antenna cable bracket on the system board.
11. Replace the single screw (M2x2) that secures the Darwin antenna cable bracket to the system board.

NOTE: The steps from 8 to 11 apply only to computers shipped with a WWAN antenna installed in the display assembly.

Next steps

1. Install the [WWAN card](#).
NOTE: This procedure applies only to computers shipped with a WWAN card installed.
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Smart card reader

Removing the smart card reader

CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [speakers](#).
4. Remove the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.

About this task

NOTE: This procedure applies only to computers shipped with a smart card reader installed.

The following images indicate the location of the smart card reader and provide a visual representation of the removal procedure.

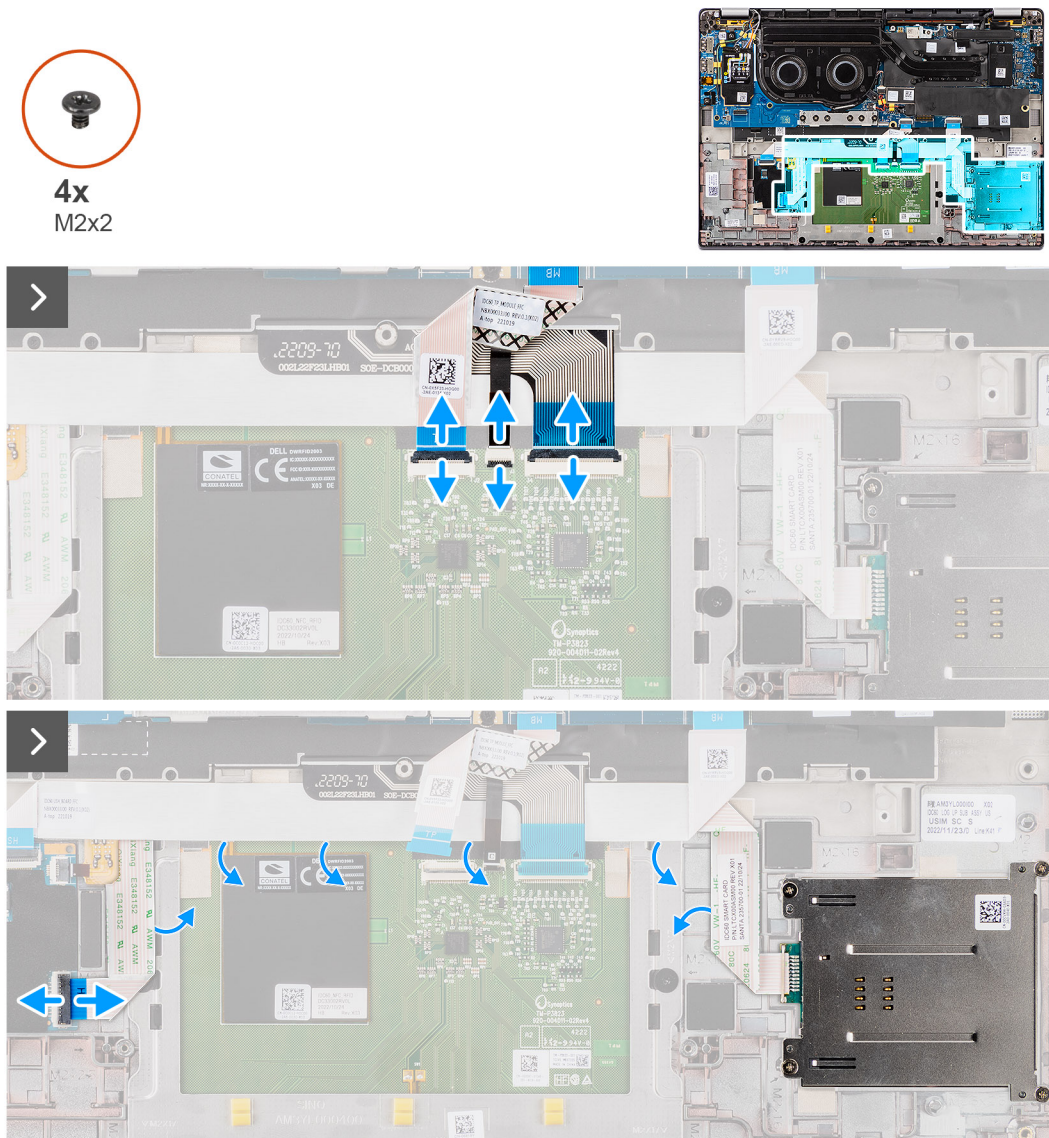


Figure 45. Removing the smart card reader

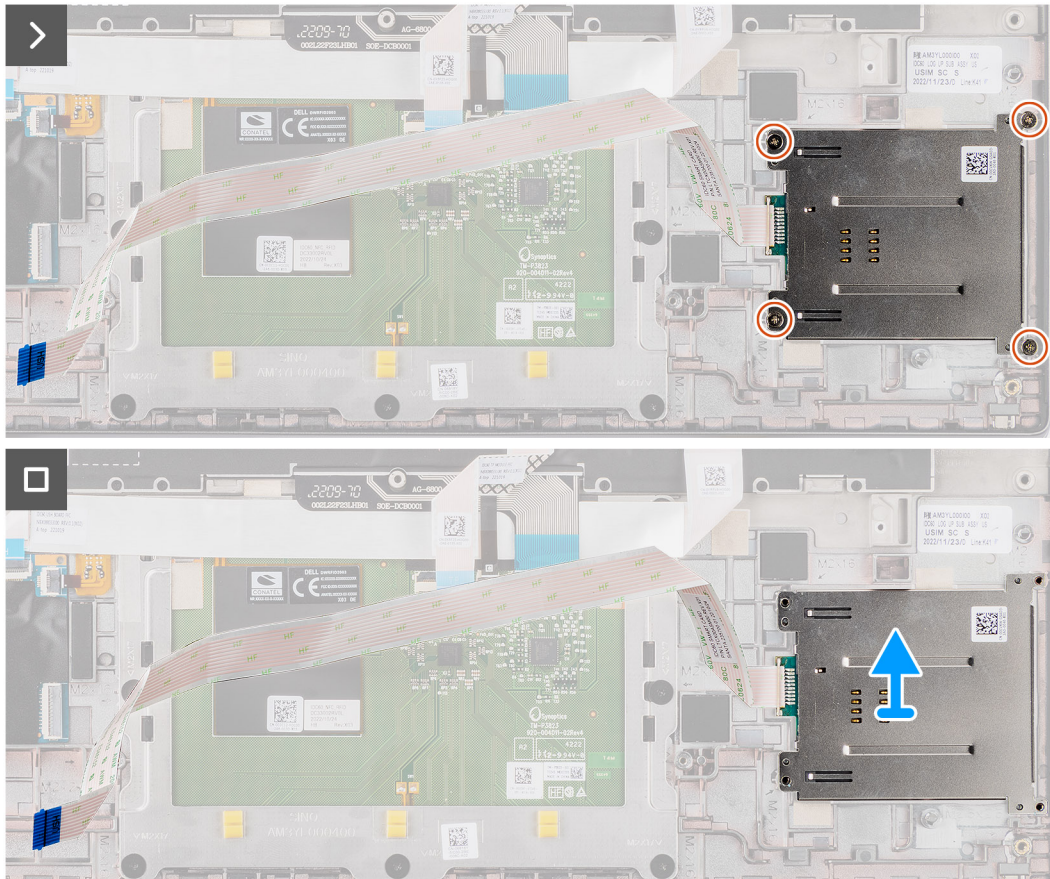


Figure 46. Removing the smart card reader

Steps

1. Open the latch and disconnect the click pad flexible flat cable, keyboard backlight flexible printed circuit, and keyboard flexible printed circuit from the connector on the click pad.
2. Disconnect the smart card reader flexible flat cable from the respective connectors on the click pad.
3. Peel off the smart card reader flexible flat cable from the palm-rest and keyboard assembly.
4. Remove the four screws (M2x2) that secure the smart card reader to the palm-rest and keyboard assembly.
5. Remove the smart card reader from the computer.

Installing the smart card reader

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

NOTE: If the rubber grommets are pushed out when removing the left speaker, push them back in before replacing the left speaker.

The following images indicate the location of the smart card reader and provide a visual representation of the installation procedure.



4x
M2x2

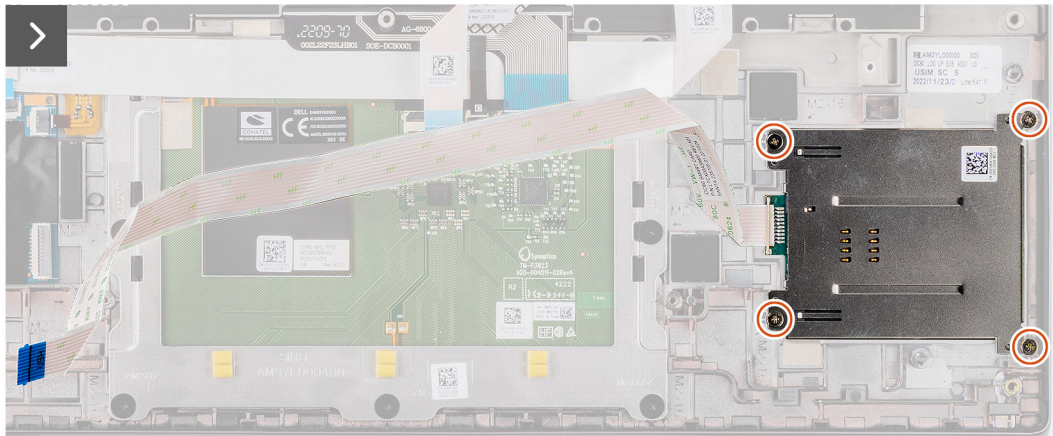
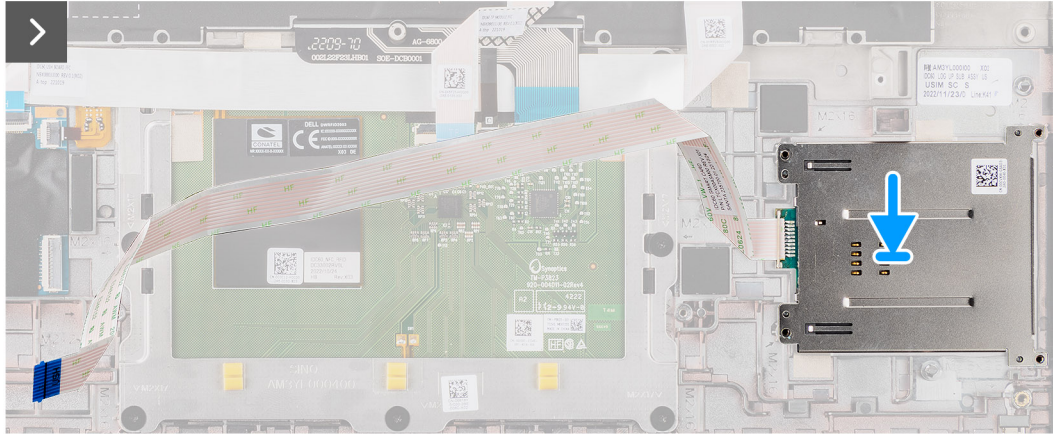
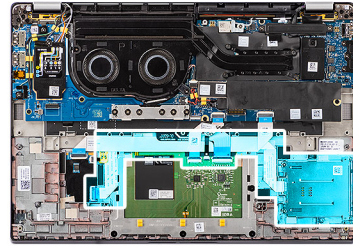


Figure 47. Installing the smart card reader



Figure 48. Installing the smart card reader



Steps

1. Align and place the smart card reader on the palm-rest and keyboard assembly.
2. Replace the four screws (M2x2) that secure the smart card reader to the palm-rest and keyboard assembly.
3. Adhere the smart card reader cable on the palm-rest and keyboard assembly.
4. Connect the smart card reader flexible flat cable to the respective connectors on the click pad.
5. Connect the click pad flexible flat cable, keyboard backlight flexible printed circuit, and keyboard flexible printed circuit to the connectors on the click pad.

Next steps

1. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
2. Install the [speakers](#).
3. Install the [base cover](#).
4. Follow the procedure in [After working inside your computer](#).

System board

Removing the system board

CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [M.2 2230 solid-state drive](#).
4. Remove the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
5. Remove the [heat-sink](#).

About this task

The following image indicates the connectors on your system board.

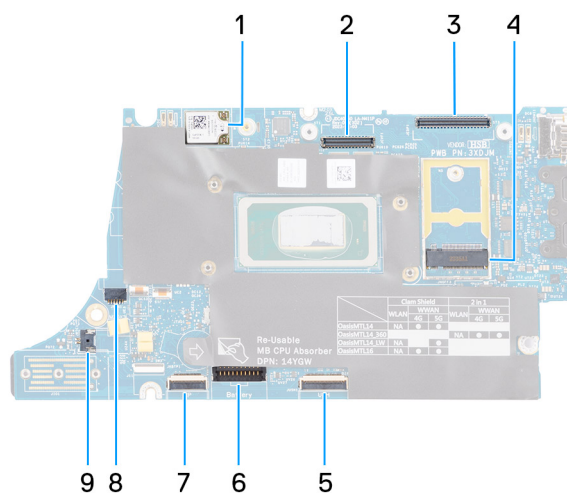


Figure 49. System Board Callout

1. WWAN card
2. LCD connector
3. Touchscreen and IR-camera cable connector
4. M.2 solid state drive connector

5. USH daughterboard FFC connector
6. Battery cable connector
7. Click pad FFC connector
8. Coin-cell battery cable connector
9. Fan connector

NOTE: For computers shipped without a WWAN card, a WWAN shielding cover and WWAN bracket is preinstalled to the computer. As a result, follow the steps in the WWAN card removal/installation section to remove the WWAN shielding cover and WWAN bracket before removing the system board.

The following images indicate the location of the system board and provide a visual representation of the removal procedure.

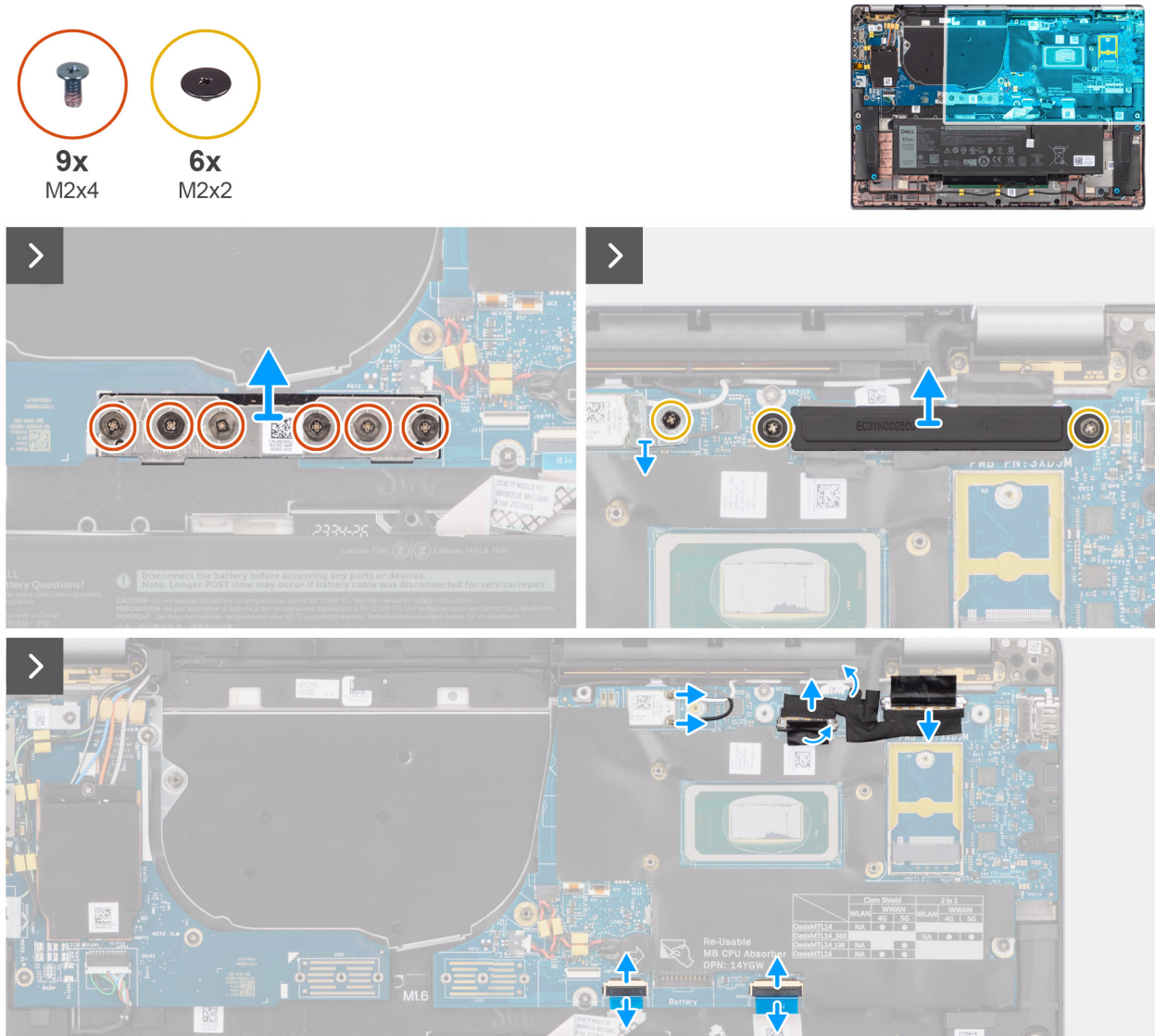


Figure 50. Removing the system board

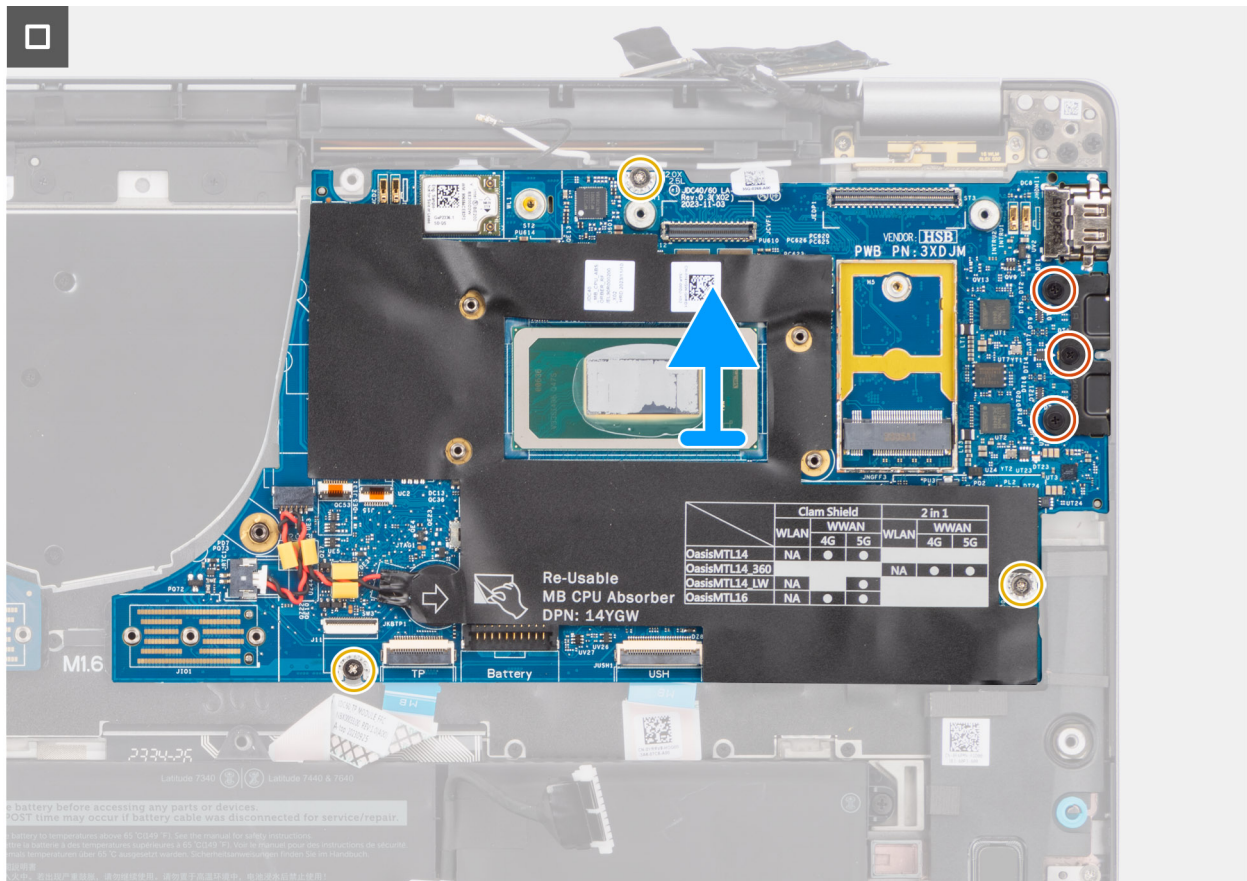


Figure 51. Removing the system board

Steps

1. Remove the six screws (M2x4) securing the I/O daughterboard bridge connector board in place.
2. Remove the single screw (M2x2) screw securing the WLAN module bracket in place.
3. Remove the two screws (M2x2) securing the display cable bracket on the system board.
4. Disconnect the WLAN Main and Aux antenna from the WLAN module.
5. Remove the WLAN module bracket from the computer.
6. Remove the display cable bracket from the computer.
7. Remove the I/O daughterboard bridge connector board from the computer.
 - NOTE:** When reinstalling the I/O daughterboard bridge connector board align the connector so that the arrows etched on the connector are pointed upward towards the heat sink and fan assembly.
 - NOTE:** When reinstalling the I/O daughterboard bridge connector board secure the six screws (M2x4) in sequential order (1 > 2 > 3 > 4 > 5 > 6) marked on the FPC.
8. Disconnect the (1) camera cable, (2) display cable, (3) Click pad flexible flat cable, and (4) USH daughterboard flexible flat cable (for models shipped with a USH daughterboard) from the system board.
9. Remove the three screws (M2x2.5) securing the system board in place.
10. Remove the system board from the computer.
 - NOTE:** For Latitude 7640 laptop models with a 5G WWAN card, if replacing the system board, peel off the CPU absorber sticker and transfer it over to the new system board.
11. Carefully lift and remove the system board away from the palm-rest and keyboard assembly.
 - NOTE:** When replacing the system board for the models, the CPU absorber sticker (top side) and CPU bracket absorber (bottom side) must be peeled off and transferred over to the replacement system board.

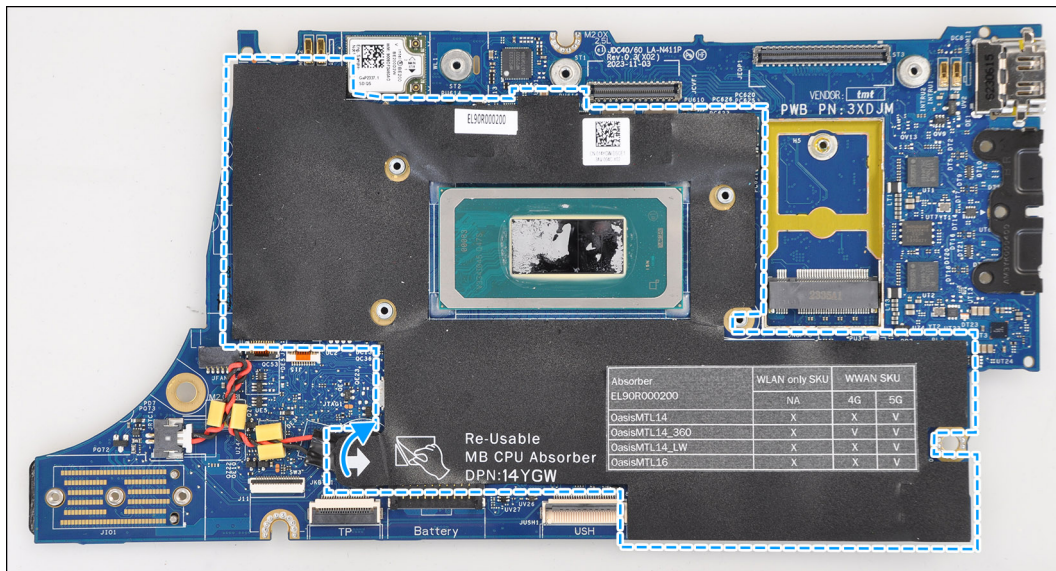


Figure 52. CPU absorber

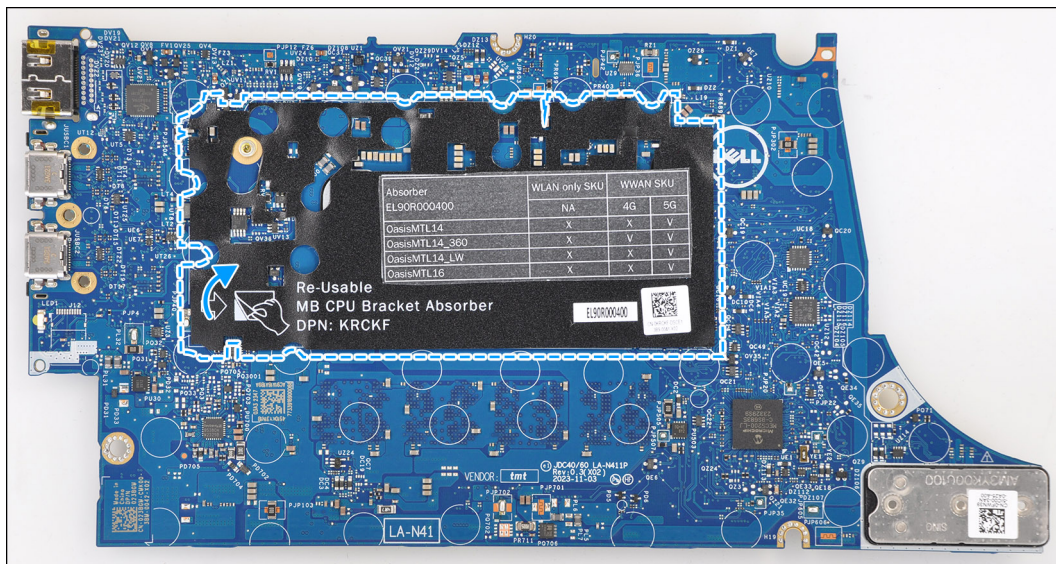


Figure 53. CPU bracket absorber

Installing the system board

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the connectors on your system board.

NOTE: When replacing the system board, the CPU absorber sticker adhered onto the system board must be peeled off and transferred over to the replacement system board.

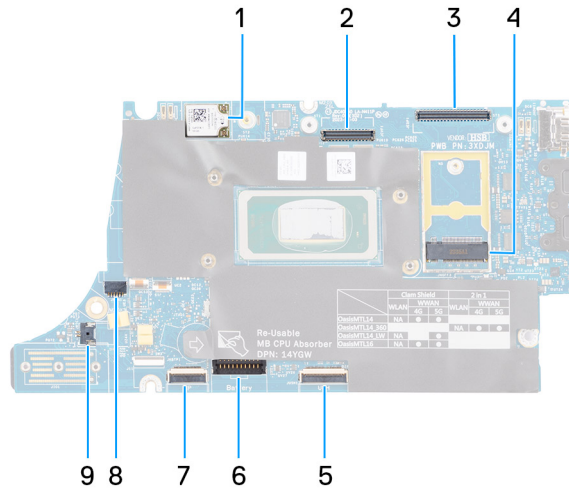


Figure 54. System board callout

1. WWAN card
2. LCD connector
3. Touchscreen and IR-camera cable connector
4. M.2 solid state drive connector
5. USH daughterboard FFC connector
6. Battery cable connector
7. Click pad FFC connector
8. Coin-cell battery cable connector
9. Fan connector

NOTE: For computers shipped without a WWAN card, a WWAN shielding cover and WWAN bracket is preinstalled to the computer. As a result, follow the steps in the WWAN card removal/installation section to remove the WWAN shielding cover and WWAN bracket before removing the system board.

CAUTION: Install the heat-sink after installing the system board as there are two screws (M2x3) underneath the heat-sink that secures the system board to the computer that needs to be installed first.

The following images indicate the location of the system board and provide a visual representation of the installation procedure.

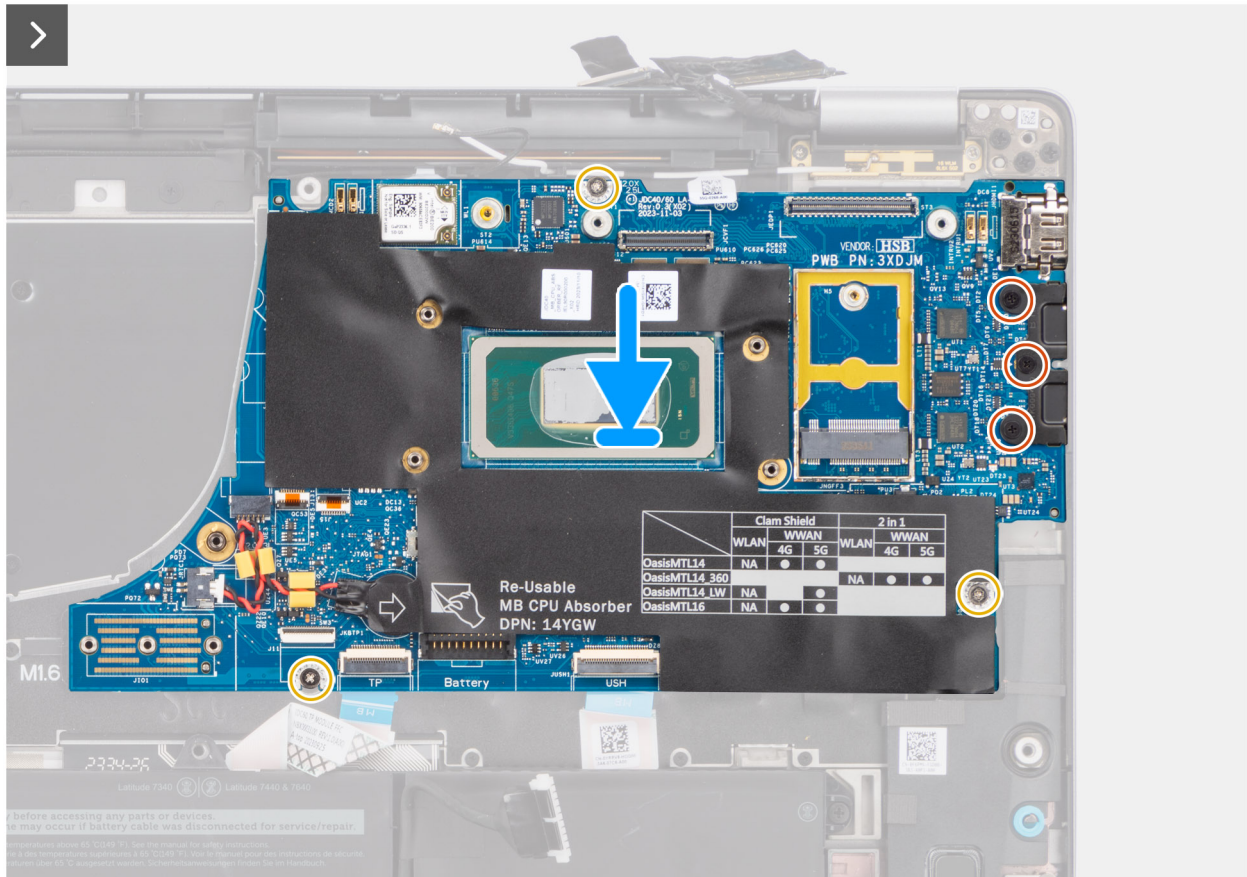
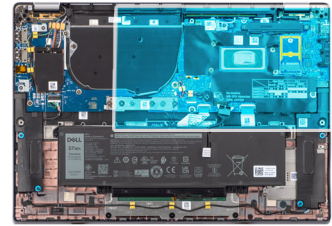
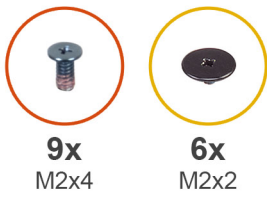


Figure 55. Installing the system board

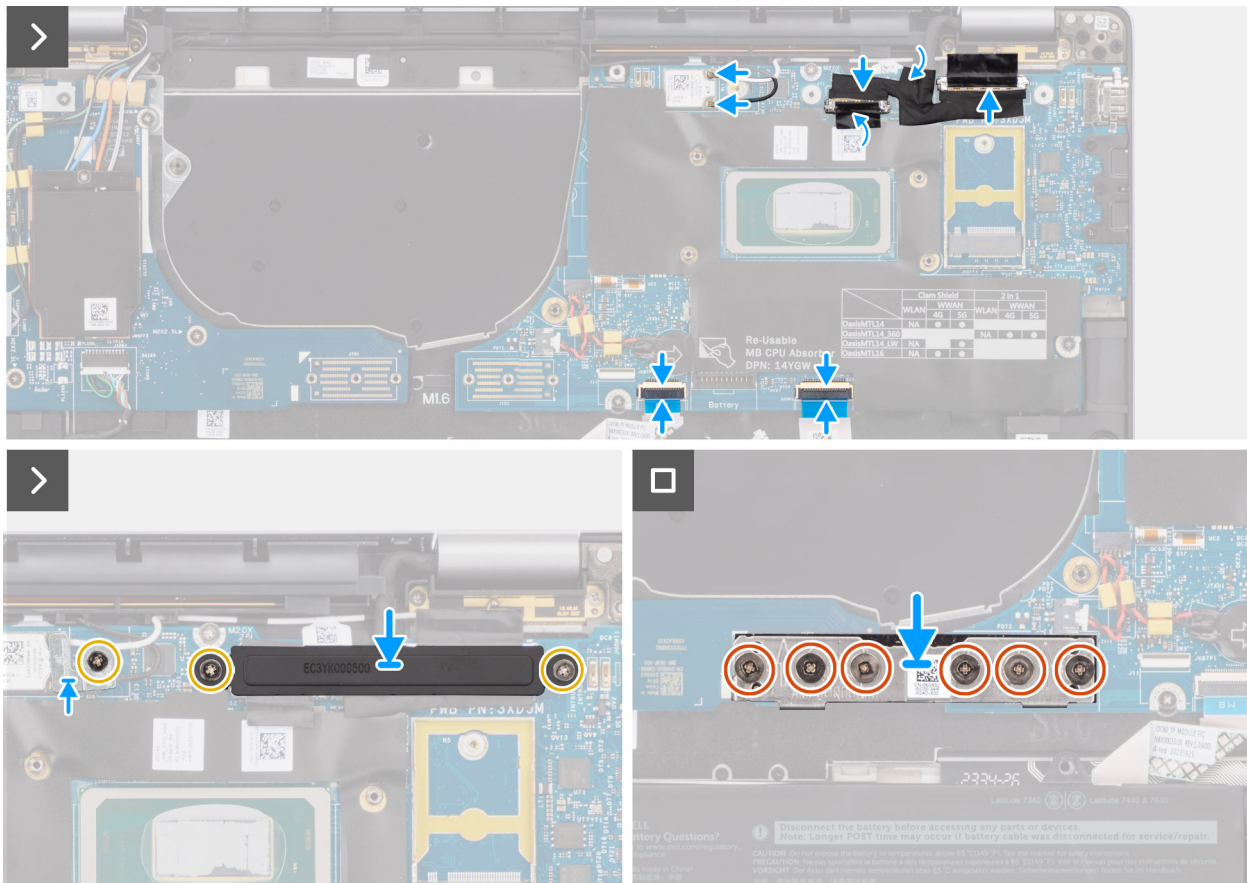


Figure 56. Installing the system board

Steps

1. Place the system board into the respective slot on the palm-rest and keyboard assembly.
 - i NOTE:** Transfer the reusable WLAN absorbers to the new system board while replacing the system board.
2. Replace the three screws (M2x2.5) securing the system board in place.
3. Connect the (1) camera cable, (2) display cable, (3) Click pad flexible flat cable, and (4) USH daughterboard flexible flat cable (for models shipped with a USH daughterboard) on the system board.
4. Replace the I/O daughterboard bridge connector board on the computer.
 - i NOTE:** When reinstalling the I/O daughterboard bridge connector board align the connector so that the arrows etched on the connector are pointed upward towards the heat-sink and fan assembly.
 - i NOTE:** When reinstalling the I/O daughterboard bridge connector board secure the six screws (M2x4) in sequential order (1 > 2 > 3 > 4 > 5 > 6) marked on the FPC.
5. Replace the six screws (M2x4) securing the I/O daughterboard bridge connector board in place.
6. Align and place the display cable bracket on the computer.
7. Replace the two screws (M2x2) securing the display cable bracket on the system board.
8. Connect the WLAN Main and Aux antenna to the WLAN module.
9. Replace the WLAN module bracket on the computer.
10. Replace the single screw (M2x2) screw securing the WLAN module bracket in place.

Next steps

1. Install the [heat-sink](#).
2. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
3. Install the [M.2 2230 solid-state drive](#).
4. Install the [base cover](#).

5. Follow the procedure in [After working inside your computer](#).

WLAN-antenna module


Removing the WLAN-antenna module

 **CAUTION:** The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [M.2 SSD](#).
4. Remove the [WWAN card](#).
5. Remove the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
6. Remove the [heat sink](#).

About this task

 **NOTE:** This procedure applies only to computers shipped with a WLAN-antenna module that is installed on the palm-rest and keyboard assembly.

The following images indicate the location of the WLAN-antenna module and provide a visual representation of the removal procedure.

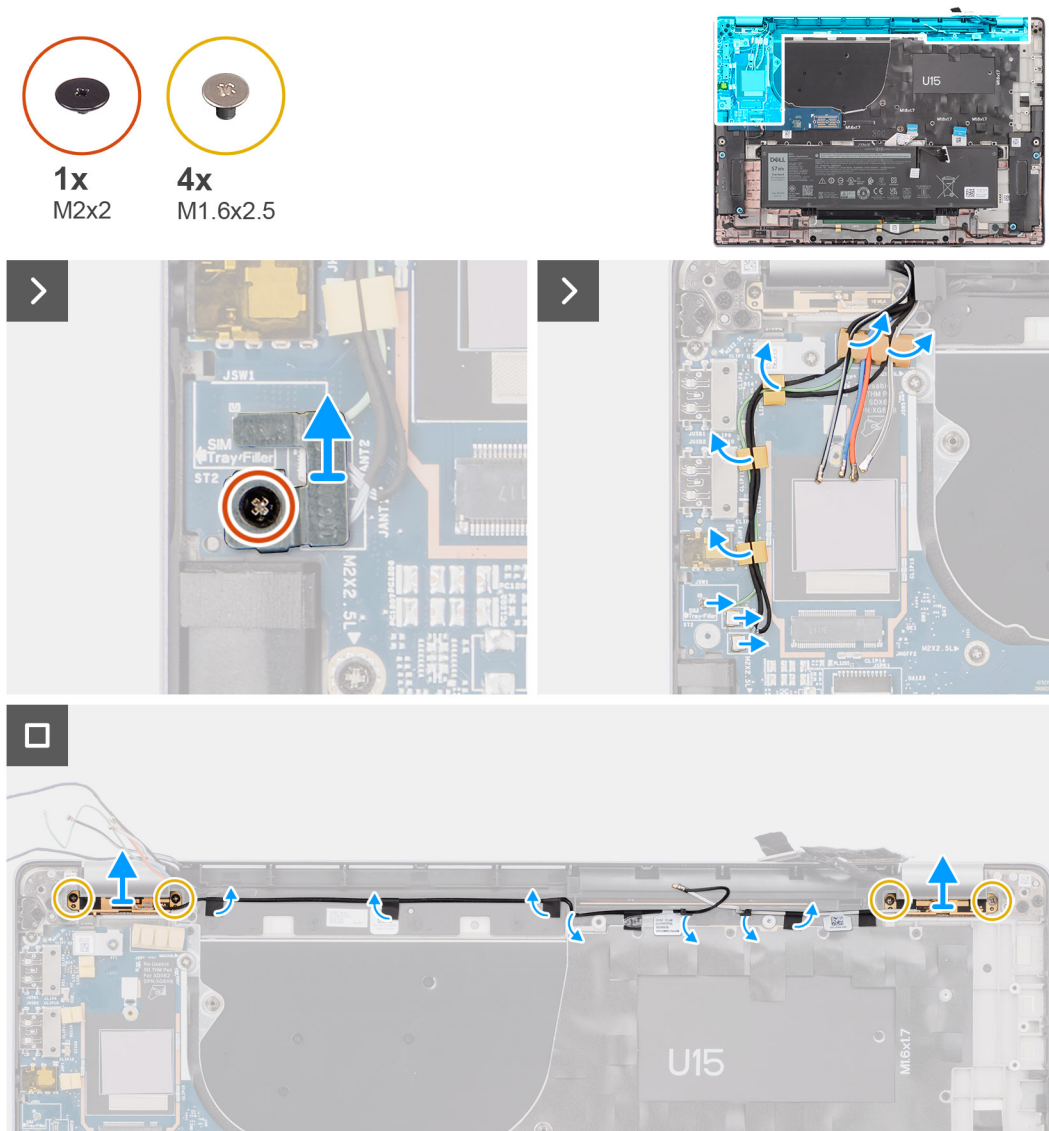


Figure 57. Removing the WLAN-antenna module

Steps

1. For computers shipped with WWAN antennas, remove the single screw (M2x2) that secure the Darwin antenna cable bracket to the system board.
2. Remove the Darwin antenna cable bracket from the system board.
3. Unroute the two Darwin antenna cables, and green P-sensor cable from the routing guide on the I/O daughterboard.
4. Peel off the pieces of tape securing the black WLAN Aux antenna cable on the system board.
5. Unroute the white WLAN Main antenna cable and black WLAN Aux antenna cable from the routing guides on the palm rest.
6. Remove the four screws (M1.6x2.5) that secure the WLAN-antenna module bracket from the system board.
7. Slide and remove the WLAN-antenna module from the WLAN-antenna module slot on the system board.

Installing the WLAN-antenna module

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the WLAN-antenna module and provide a visual representation of the installation procedure.

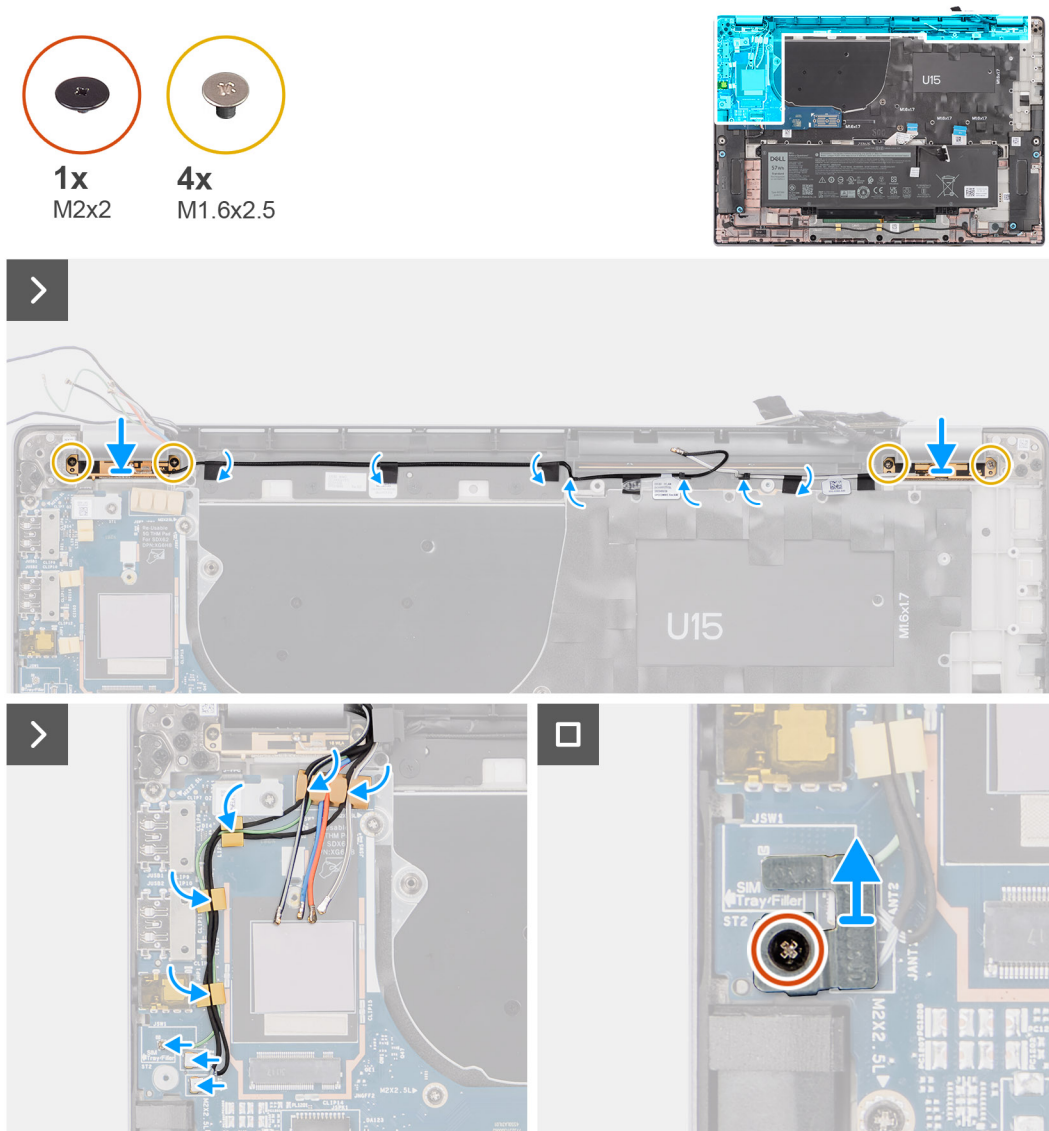


Figure 58. Installing the WLAN-antenna module

Steps

1. Slide and replace the WLAN-antenna module to the WLAN-antenna module slot on the system board.
2. Route the WLAN-antenna cables from the routing guides on the system board.
3. Replace the four screws (M1.6x2.5) that secure the WLAN-antenna module bracket on the system board.
4. Peel back the pieces of tape securing the black WLAN Aux antenna cable on the system board.
5. Connect the antenna cables to the connectors.
6. Connect the two Darwin antenna cables, and green P-sensor cable from the routing guide on the I/O daughterboard.
7. Align and place the Darwin antenna cable bracket on the system board.
8. For computers shipped with WWAN antennas, replace the single screw (M2x2) that secure the Darwin antenna cable bracket on the system board.

Next steps

1. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
2. Install the [heat sink](#).

3. Install the [WWAN card](#).
4. Install the [M.2 SSD](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).


I/O daughterboard


Removing the I/O daughterboard


 **CAUTION:** The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [WWAN card](#).

 **NOTE:** This procedure applies only to the computers shipped with a WWAN card installed.

 **NOTE:** For models that are shipped without a WWAN card, a WWAN shielding cover and WWAN bracket will be preinstalled to the computer. As a result, follow the steps in the WWAN Card section to remove the shielding cover and WWAN bracket before removing the I/O daughterboard.

 **NOTE:** For models with WWAN configuration, the SIM card tray MUST be removed before removing the I/O daughterboard.

About this task

 **CAUTION:** Remove the system board before removing the I/O daughterboard as a part of the I/O daughterboard is underneath the system board.

 **CAUTION:** Do not try to remove the I/O daughterboard along with the system board.

The following image indicates the location of the I/O daughterboard and provides a visual representation of the removal procedure.

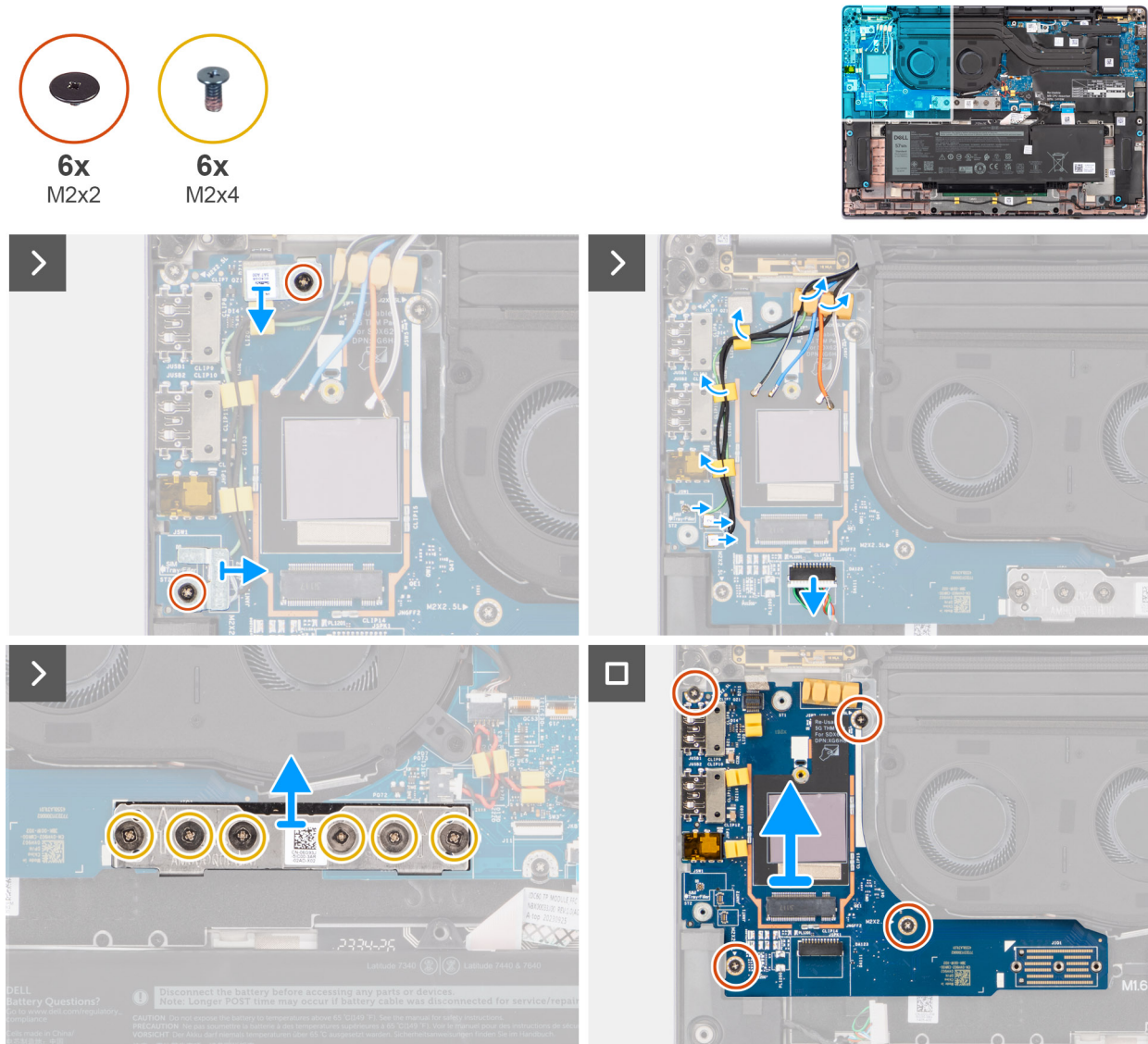


Figure 59. Removing the I/O daughterboard

Steps

1. Remove the single screw (M2x2) screw that secures the 4G WWAN card extension bracket to the palm-rest and keyboard assembly for the models that are shipped with a 4G WWAN card.
2. Remove the 4G WWAN card bracket from the computer for the models shipped with a 4G WWAN card.
3. Remove the single screw (M2x2) that secures the Darwin antenna cable bracket to the palm-rest and keyboard assembly.
4. Remove the Darwin antenna cable bracket from the computer.
5. Unroute the two Darwin antenna cables, and green P-sensor cable from the routing guide on the I/O daughterboard.
6. Disconnect the antenna cables from the connectors.
7. Remove the single screw (M2x2) that secures the fingerprint reader bracket to the palm-rest and keyboard assembly.
8. Remove the fingerprint reader bracket from the computer for the models shipped with a fingerprint reader.
9. Remove the fingerprint reader bracket from the computer.
10. Disconnect the fingerprint reader FPC from the I/O daughterboard.
11. Disconnect the speaker cable from the I/O daughterboard.
12. Remove the six screws (M2x4) that secures the I/O daughterboard bridge connector board to the palm-rest and keyboard assembly.

NOTE: Orient the I/O daughterboard bridge connection board so that the arrows etched on the connector point upwards when reinstalling it.

13. Remove the bridge connector board from the computer.

NOTE: When reinstalling the I/O daughterboard bridge connector board secure the six screws (M2x4) in sequential order (1 > 2 > 3 > 4 > 5 > 6) marked on the FPC.

14. Remove the four screws (M2x2.5) securing the I/O daughterboard to the palm-rest and keyboard assembly.

15. Use a plastic scribe to lift the I/O daughterboard out of its compartment from the gap in its top side and remove it from the computer.

16. Peel the WWAN thermal pad that is affixed to the WWAN card compartment and move it to the new I/O daughterboard if you are replacing the I/O daughterboard for models that are shipped with 5G WWAN card.

17. Lift and remove the I/O daughterboard from the palm-rest and keyboard assembly.

NOTE: The thermal pad sticker adhered onto the WWAN card compartment must be peeled off and transferred over to the replacement I/O daughterboard.

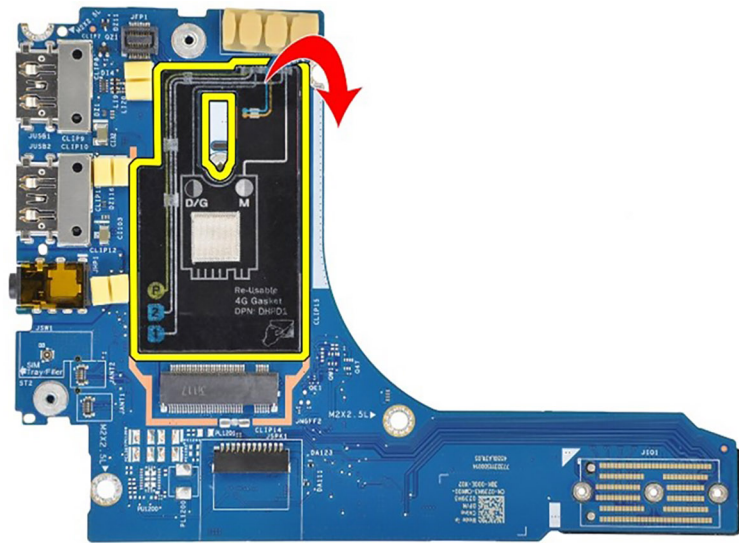


Figure 60. Latitude 7650 4G WWAN Configuration (Gasket Sticker)

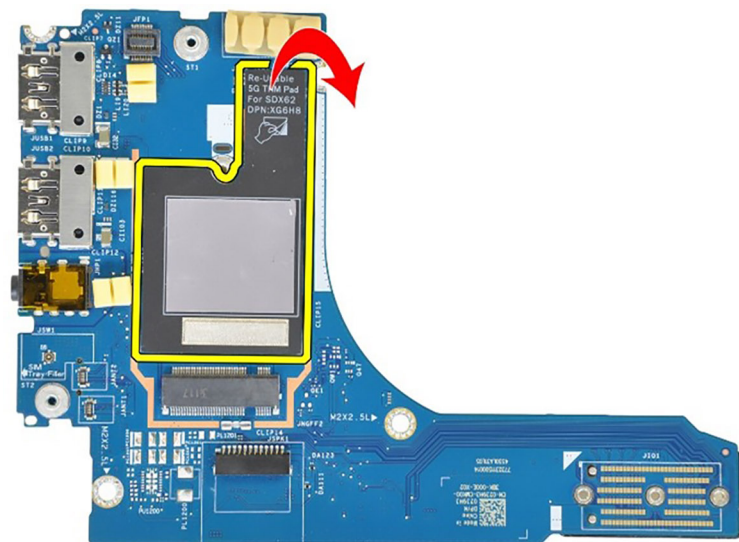


Figure 61. Latitude 7650 5G WWAN Configuration (Thermal Pad Sticker)

Installing the I/O daughterboard

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

NOTE: When replacing an I/O daughterboard for models shipped with a 4G WWAN card, the 4G WWAN card extension bracket and 4G gasket sticker must be removed and transferred over to the replacement I/O daughterboard.

NOTE: When replacing an I/O daughterboard for models shipped with a 5G WWAN card, the thermal pad sticker adhered onto the WWAN card compartment must be peeled off and transferred over to the replacement I/O daughterboard.

About this task

The following image indicates the location of the I/O daughterboard and provides a visual representation of the installation procedure.

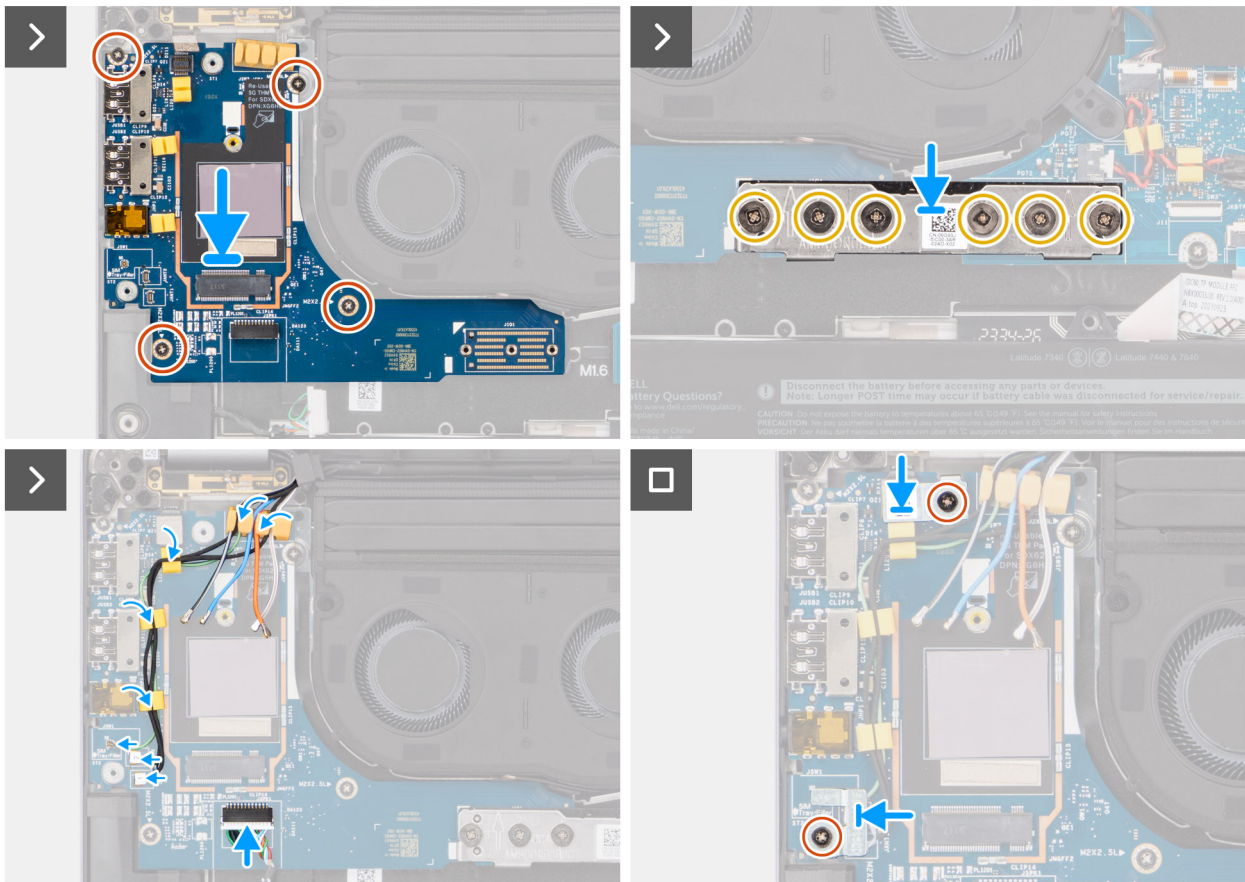
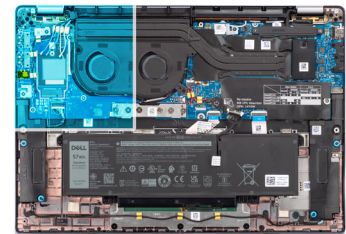
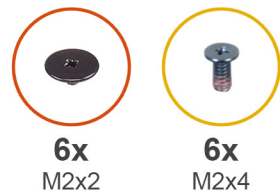





Figure 62. Installing the I/O daughterboard

Steps

1. Adhere the WWAN thermal pad that is affixed to the WWAN card compartment and move it to the new I/O daughterboard if you are replacing the I/O daughterboard for models that are shipped with 5G WWAN card.
2. Place the I/O daughterboard in its compartment from the gap in its top side and place it on the computer.
3. Replace the four screws (M2x2.5) securing the I/O daughterboard to palm-rest and keyboard assembly.
4. Replace the bridge connector board from the computer.
 -  **NOTE:** Orient the I/O daughterboard bridge connection board so that the arrows etched on the connector point upward towards the heat-sink and fan assembly when re-installing it.
 -  **NOTE:** When re-installing the I/O daughterboard bridge connector board secure the six screws (M2x4) in sequential order (1 > 2 > 3 > 4 > 5 > 6) marked on the FPC.
5. Replace the six screws (M2x4) that secures the I/O daughterboard bridge connector board to palm-rest and keyboard assembly.
6. Connect the speaker cable from the I/O daughterboard.
7. Connect the fingerprint reader FPC from the I/O daughterboard.
8. Align and place the fingerprint reader bracket to the computer.
9. Replace the fingerprint reader bracket from the computer for the models shipped with a fingerprint reader.
10. Replace the single screw (M2x2) that secures the fingerprint reader bracket to palm-rest and keyboard assembly.
11. Connect the antenna cables to the connectors.
12. Route the two Darwin antenna cables, and green P-sensor cable from the routing guide on the I/O daughterboard.
13. Align and place the Darwin antenna cable bracket on the computer.
14. Replace the single screw (M2x2) that secures the Darwin antenna cable bracket to palm-rest and keyboard assembly.
15. Replace the 4G WWAN card bracket from the computer for the models that are shipped with a 4G WWAN card.
16. Replace the single screw (M2x2) screw that secures the 4G WWAN card extension bracket to palm-rest and keyboard assembly for the models shipped with a 4G WWAN card.

Next steps

1. Install the [WWAN card](#).
 -  **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Power button with optional fingerprint reader



Removing the power button with optional fingerprint reader

 **CAUTION:** The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [WWAN card](#).
4. Remove the [I/O daughterboard](#).

About this task

-  **NOTE:** When removing the system board to replace or access other parts, the system board can be removed and installed with the heat sink attached to simplify the procedure and preserve the thermal bond between the system board and heat sink.
-  **NOTE:** For computers shipped with a fingerprint reader, the power button includes a fingerprint reader module.

The following images indicate the location of the power button with an optional fingerprint reader and provide a visual representation of the removal procedure.

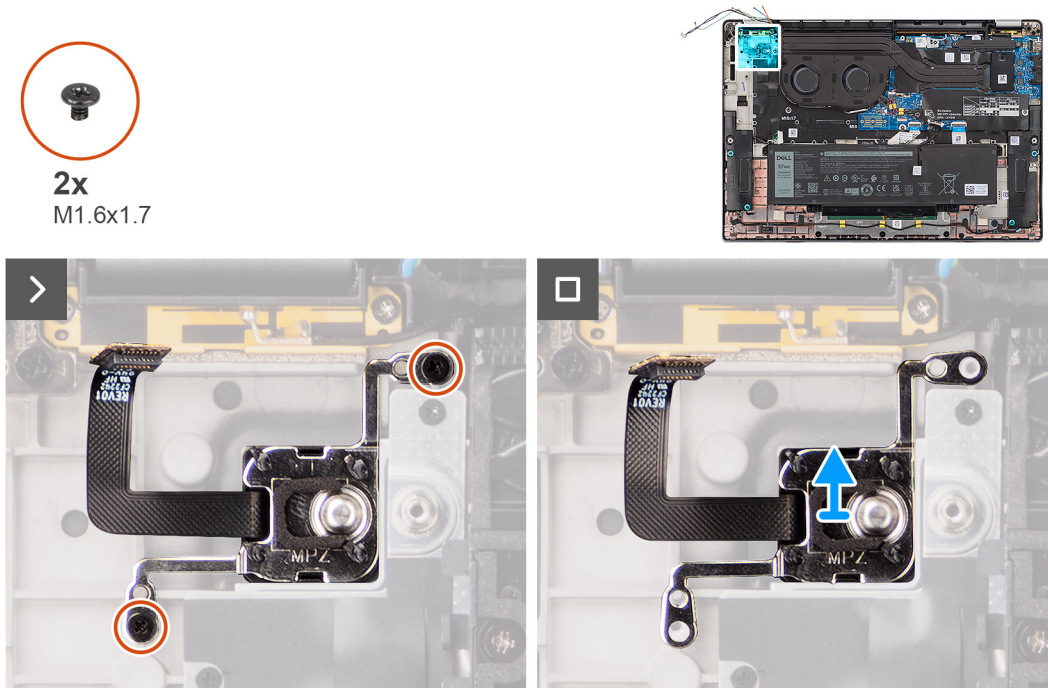


Figure 63. Removing the power button with optional fingerprint reader

Steps

1. Remove the two screws (M1.6x1.7) that secure the power button to the palm-rest and keyboard assembly.
2. Peel the fingerprint reader flexible printed circuits from the connector on the palm-rest and keyboard assembly.
NOTE: This step applies only to computers shipped with the power button with the fingerprint reader installed.
3. Lift the power button off the slot on the palm-rest and keyboard assembly.

Installing the power button with optional fingerprint reader

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the power button with an optional fingerprint reader and provide a visual representation of the installation procedure.



2x
M1.6x1.7

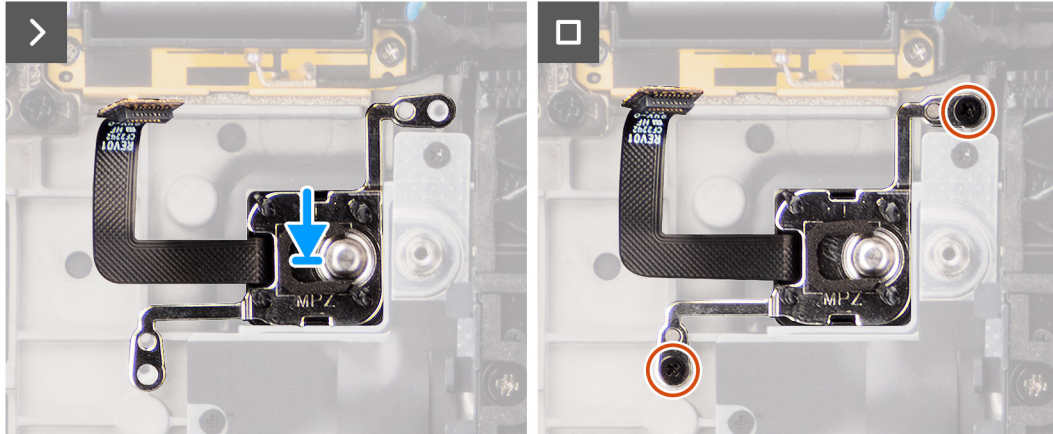
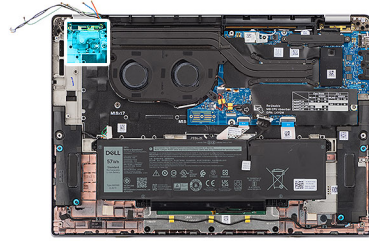


Figure 64. Installing the power button with optional fingerprint reader

Steps

1. Place the power button into its slot on the palm-rest and keyboard assembly.
2. Adhere the fingerprint reader flexible printed circuits to the connector on the palm-rest and keyboard assembly.
i **NOTE:** This step applies only to computers shipped with a power button with the fingerprint reader installed.
3. Align the screw hole on the power button with an optional fingerprint reader to the screw hole on the palm-rest and keyboard assembly.
4. Replace the two screws (M1.6x1.7) to secure the power button to the palm-rest and keyboard assembly.

Next steps

1. Install the [I/O daughterboard](#).
2. Install the [WWAN card](#).
i **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.
3. Install the [base cover](#).
4. Follow the procedure in [After working inside your computer](#).

Keyboard

Removing the keyboard

⚠ CAUTION: The information in this removal section is intended for authorized service technicians only.

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [solid-state drive](#).
4. Remove the [WWAN card](#).

NOTE: This procedure applies only to computers shipped with a WWAN card installed.

5. Remove the 2-cell battery or the 3-cell battery, whichever is applicable.
6. Remove the heat-sink.
7. Remove the speakers.
8. Remove the I/O daughterboard.
9. Remove the Power button.
10. Remove the system board.

NOTE: When removing the system board to replace or access other parts, the system board can be removed and installed with the heat sink attached to simplify the procedure and preserve the thermal bond between the system board and heat sink.

About this task

The following images indicate the location of the keyboard and provide a visual representation of the removal procedure.

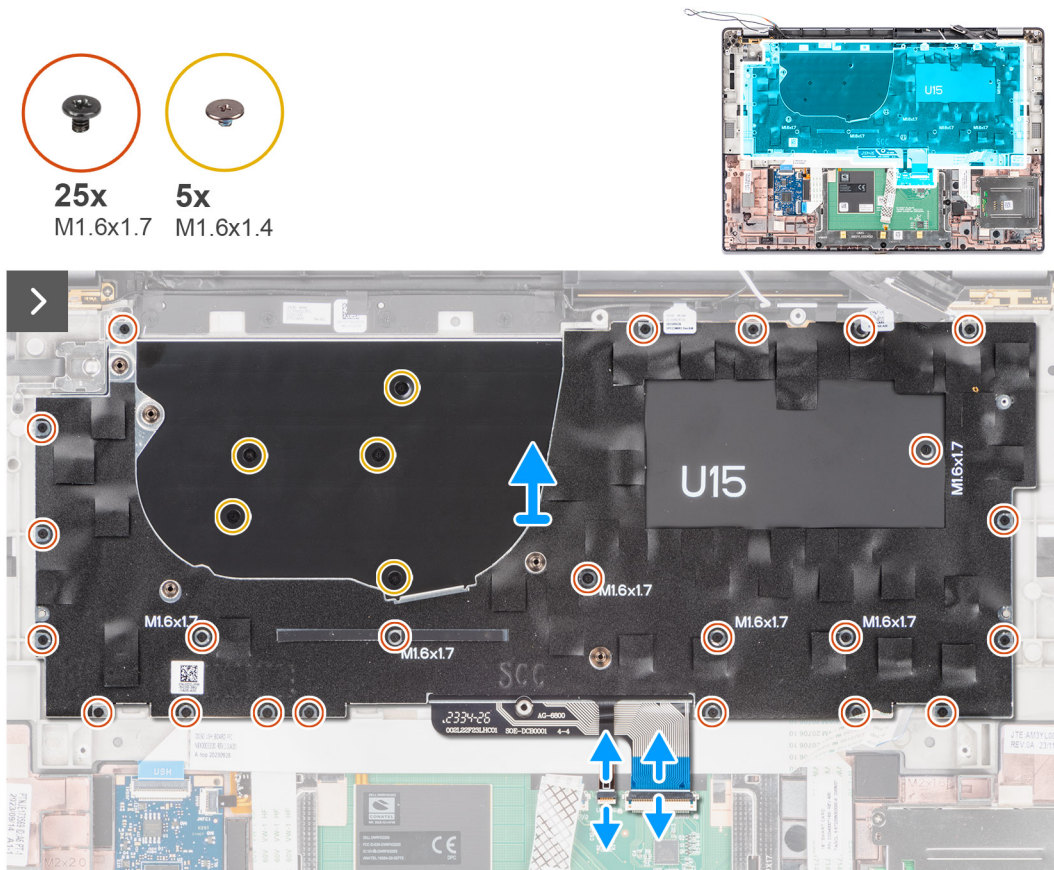


Figure 65. Removing the keyboard



Figure 66. Removing the keyboard

Steps

1. Peel the USH daughterboard flexible flat cable from the back of the keyboard.
 - NOTE:** This step applies only to computers shipped with a USH daughterboard installed.
2. Open the latch and disconnect the keyboard and keyboard backlight flat cable from the connector on the click pad.
3. Peel off the pieces of tape securing the WLAN main and aux antenna cables on the keyboard bracket.
4. Remove the twenty-five screws (M1.6x1.7) securing the keyboard assembly to the computer.
5. Carefully lift the keyboard assembly to remove it from the computer.
6. Separate the keyboard from the keyboard support plate.
 - NOTE:** If the keyboard support plate is replaced, transfer the re-usable rubber filler (for WLAN, 4G WWAN) or thermal pad (for 5G WWAN) over to the new keyboard support plate.

Installing the keyboard

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following images indicate the location of the keyboard and provide a visual representation of the installation procedure.



Figure 67. Installing the keyboard

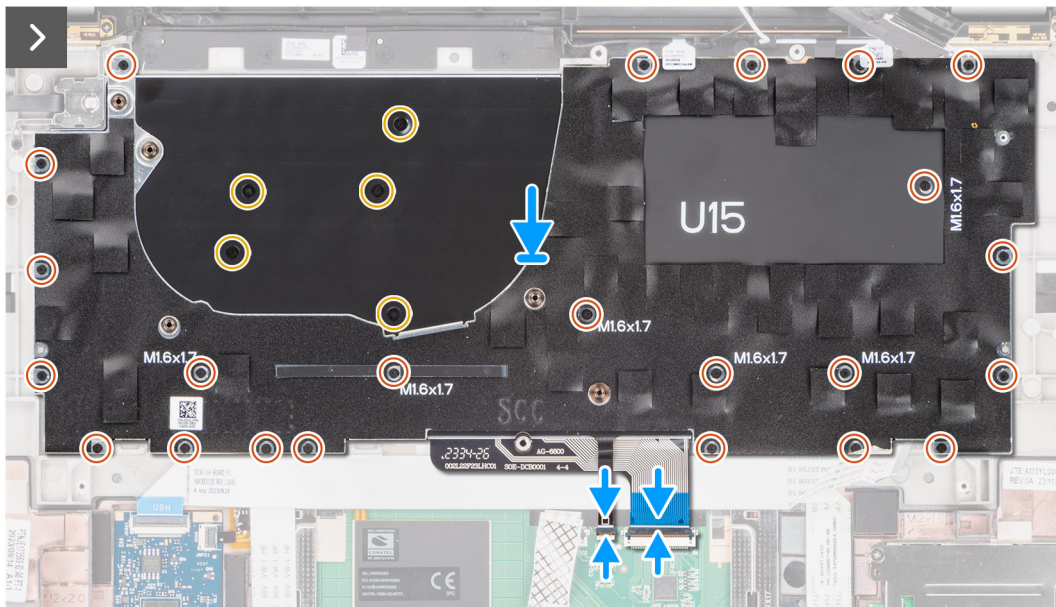



Figure 68. Installing the keyboard

Steps


1. Align the screw holes on the keyboard to the screw holes on the keyboard support plate and place the keyboard on the keyboard support plate.
2. Align and place the keyboard assembly in to its slot in the computer.
3. Replace the twenty-five screws (M1.6x1.7) securing the keyboard assembly to the computer.

4. Peel back the pieces of tape securing the WLAN main and aux antenna cables on the keyboard bracket.
5. Connect the keyboard and keyboard backlight flat cable to the back of the click pad.
6. Adhere the USH daughterboard flexible flat cable to the back of the keyboard.

 **NOTE:** This step applies only to computers shipped with a USH daughterboard installed.

Next steps

1. Follow the procedure in [Before working inside your computer](#).
2. Install the [system board](#).
3. Install the [Power button](#).
4. Install the [I/O daughterboard](#).
5. Install the [speakers](#).
6. Install the [heat-sink](#).
7. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
8. Install the [WWAN card](#).

 **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.

9. Install the [solid-state drive](#).
10. Install the [base cover](#).

Palm-rest assembly

Removing the palm-rest assembly


 **CAUTION:** The information in this removal section is intended for authorized service technicians only.

Prerequisites


1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [M.2 2230 solid-state drive](#).
4. Remove the [WWAN card](#), if applicable.

 **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.


5. Remove the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
6. Remove the [heat-sink](#).
7. Remove the [WLAN-antenna module](#).


 **NOTE:** This procedure applies only to computers shipped with a WLAN-antenna module that is installed on the palm-rest and keyboard assembly.

8. Remove the [display assembly](#).
9. Remove the [speakers](#).
10. Remove the [system board](#).
11. Remove the [I/O daughterboard](#).
12. Remove the [power button](#).
13. Remove the [keyboard](#).

 **NOTE:** When removing the system board to replace or access other parts, the system board can be removed and installed with the heat sink attached to simplify the procedure and preserve the thermal bond between the system board and heat sink.

About this task

 **NOTE:** The palm-rest assembly cannot be further disassembled once all the pre-removal parts procedures are completed. If the keyboard is malfunctioning and is required to be replaced, replace the entire palm-rest assembly.

 **NOTE:** The smart card reader is a replaceable component for the models with security configurations.

The image below shows the palm-rest assembly after the pre-removal parts procedures have been performed for any palm-rest assembly replacement.

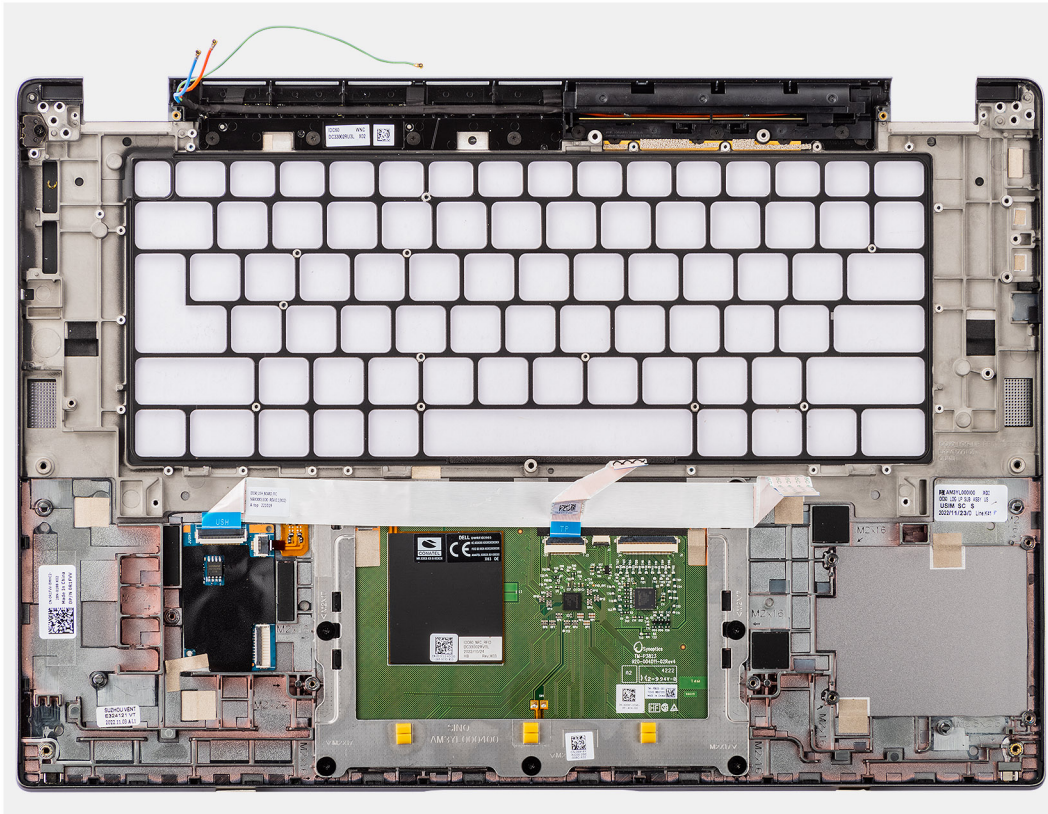


Figure 69. Removing the palm-rest assembly

Steps

1. For computers shipped with a carbon fiber palm-rest, use a fine-tipped instrument to push the nanoSIM outwards to remove it from its slot on the palm-rest assembly.
2. After performing the pre-requisites, you are left with the palm-rest assembly.

Installing the palm-rest assembly

CAUTION: The information in this installation section is intended for authorized service technicians only.

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The following image indicates the location of the palm-rest assembly and provides a visual representation of the installation procedure.

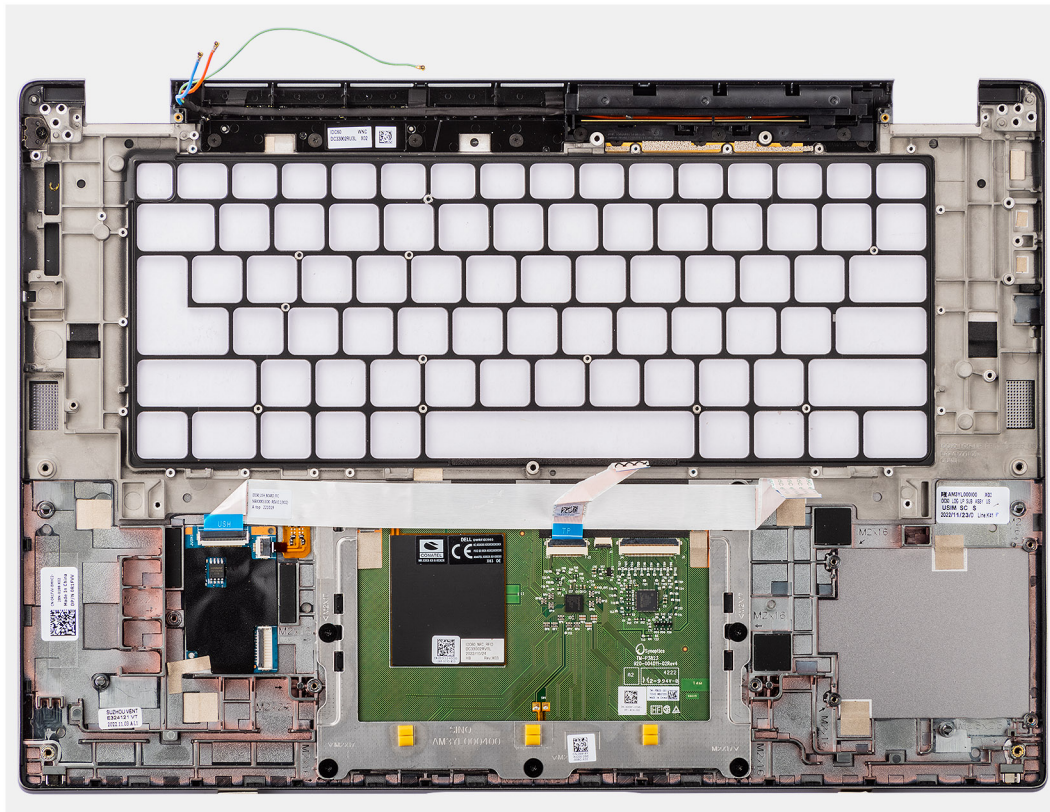


Figure 70. Installing the palm-rest assembly

Steps

1. For computers shipped with a carbon fiber palm-rest, align to the slot on the palm-rest assembly.
2. Place the palm-rest assembly on a flat surface and perform the post-requisites to install the palm-rest assembly.

Next steps

1. Install the [keyboard](#).
2. Install the [power button](#).
3. Install the [I/O daughterboard](#).
4. Install the [system board](#).
5. Install the [speakers](#).
6. Install the [display assembly](#).
7. Install the [WLAN-antenna module](#), if applicable.
i **NOTE:** This procedure applies only to computers shipped with a WLAN-antenna module that is installed on the palm-rest and keyboard assembly.
8. Install the [heat-sink](#).
9. Install the [2-cell battery](#) or the [3-cell battery](#), whichever is applicable.
10. Install the [WWAN card](#).
i **NOTE:** This procedure applies only to computers shipped with a WWAN card installed.
11. Install the [M.2 2230 solid-state drive](#).
12. Install the [base cover](#).
13. Follow the procedure in [After working inside your computer](#).

Graphics

Table 30. Intel Arc Graphics specifications





Intel Arc Graphics specifications	Values
Bus type	Integrated graphics  NOTE: Intel Arc Graphics uses the computers memory as video memory.
Memory type	Shared system memory
Graphics level	i5/i7
Memory interface	64 Gbps, Unified Memory Architecture
Estimated maximum power consumption (TDP)	28 W (H-series) included in the CPU power
Overlay planes	Yes
Operating systems graphics/ video API support	DirectX 12 Ultimate, OpenGL 4.6
Maximum color depth	10 bits
Maximum vertical refresh rate	Up to 120 Hz  NOTE: The refresh rate depends on the resolution.
External ports	HDMI 2.1 port, DisplayPort 2.1 over USB Type-C
Multiple display support	Up to four displays including laptop display.

Table 31. Intel Graphics specifications

Intel Graphics specifications	Values
Bus type	Integrated graphics  NOTE: Intel Arc Graphics uses the computers memory as video memory.
Memory type	Shared system memory
Graphics level	i5/i7
Memory interface	64 Gbps, Unified Memory Architecture
Estimated maximum power consumption (TDP)	15 W (U-series)/28 W (H-series), included in the CPU power
Overlay planes	Yes
Operating systems graphics/ video API support	DirectX 12 Ultimate, OpenGL 4.6
Maximum color depth	10 bits
Maximum vertical refresh rate	Up to 120 Hz  NOTE: The refresh rate depends on the resolution.
External ports	HDMI 2.1 port, DisplayPort 2.1 over USB Type-C
Multiple display support	Up to four displays including laptop display.

Software

This chapter details the supported operating systems along with instructions on how to install the drivers.

Operating system

Your Latitude 7650 supports the following operating systems:

- Windows 11 22H2
- Windows 11 23H2
- Ubuntu Linux 22.04 LTS

Drivers and downloads

When troubleshooting, downloading, or installing drivers, it is recommended that you read the Dell Knowledge Base article [Drivers and Downloads FAQs 000123347](#).

BIOS Setup

CAUTION: Unless you are an expert computer user, do not change the settings in the BIOS Setup. Certain changes can make your computer work incorrectly.

NOTE: Depending on the computer and its installed devices, the items that are listed in this section may or may not be displayed.

NOTE: Before you change the settings in BIOS Setup, it is recommended that you note down the original settings for future reference.

Use BIOS Setup for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the size of the storage device.
- Change the system configuration information.
- Set or change a user-selectable option, such as the user password, type of hard drive installed, and enabling or disabling base devices.

Entering BIOS setup program

About this task

Turn on (or restart) your computer and press F2 immediately.

Navigation keys


NOTE: For most of the System Setup options, changes that you make are recorded but do not take effect until you restart the computer.

Table 32. Navigation keys


Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Selects a value in the selected field (if applicable) or follows the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
Tab	Moves to the next focus area. NOTE: For the standard graphical user interface only.
Esc	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restart the computer.

F12 One Time Boot menu

To enter the One Time Boot menu, turn on your computer, and then press F12 immediately.

 **NOTE:** It is recommended to shut down the computer, if it is on.

The F12 One Time Boot menu displays the devices that you can boot from including the diagnostic option. The boot menu options are:

- Removable Drive (if available)
- STXXXX Drive (if available)
 -  **NOTE:** XXX denotes the SATA drive number.
- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics

The boot sequence screen also displays the option to access System Setup.

View Advanced Setup options

About this task

Some BIOS Setup options are only visible by enabling **Advanced Setup** mode, which is disabled by default.

 **NOTE:** BIOS Setup options, including **Advanced Setup** options, are described in [System setup options](#).

To enable Advanced Setup


Steps

1. Enter BIOS Setup.
The Overview menu appears.
2. Click the **Advanced Setup** option to move it to the **ON** mode.
Advanced BIOS Setup options are visible.

View Service options

About this task

Service options are hidden by default and only visible by entering a hotkey command.

 **NOTE:** Service options are described in [System setup options](#).

To view Service options:

Steps

1. Enter BIOS Setup.
The Overview menu appears.
2. Enter the hotkey combination **Ctrl +Alt + s** to view the **Service** options.
Service options are visible.

System setup options


 **NOTE:** Depending on your computer and its installed devices, the items that are listed in this section may or may not be displayed.

Table 33. System setup options—Overview menu

Overview	
Latitude 7650	
BIOS Version	Displays the BIOS version number.

Table 33. System setup options—Overview menu (continued)

Overview	
Service Tag	Displays the Service Tag of the computer.
Asset Tag	Displays the Asset Tag of the computer.
Manufacture Date	Displays the manufacture date of the computer.
Ownership Date	Displays the ownership date of the computer.
Express Service Code	Displays the Express Service Code of the computer.
Ownership Tag	Displays the Ownership Tag of the computer.
Signed Firmware Update	Displays whether the Signed Firmware Update is enabled on your computer. By default, the Signed Firmware Update option is enabled.
Battery Information	
Primary	Displays the primary battery of the computer.
Battery Level	Displays the battery level of the computer.
Battery State	Displays the battery state of the computer.
Health	Displays the battery health of the computer.
AC Adapter	Displays whether an AC adapter is connected. If connected, displays the type of AC adapter that is connected.
Battery Life Type	Displays the life type of the battery.
Processor Information	
Processor Type	Displays the processor type.
Maximum Clock Speed	Displays the maximum processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.
Current Clock Speed	Displays the current processor clock speed.
Core Count	Displays the number of cores on the processor.
Processor ID	Displays the processor identification code.
Processor L2 Cache	Displays the processor L2 Cache size.
Processor L3 Cache	Displays the processor L3 Cache size.
Microcode Version	Displays the microcode version.
Intel Hyper-Threading Capable	Displays whether the processor is Hyper-Threading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.
Memory Information	
Memory Installed	Displays the total computer memory installed.
Memory Available	Displays the total computer memory available.
Memory Speed	Displays the memory speed.
Memory Channel Mode	Displays single or dual channel mode.
Memory Technology	Displays the technology that is used for the memory.
Devices Information	
Panel Type	Displays the Panel Type of the computer.
Panel Revision	Displays the Panel Revision of the computer.
Video Controller	Displays the video controller type of the computer.

Table 33. System setup options—Overview menu (continued)

Overview	
Video Memory	Displays the video memory information of the computer.
Wi-Fi Device	Displays the wireless device information of the computer.
Native Resolution	Displays the native resolution of the computer.
Video BIOS Version	Displays the video BIOS version of the computer.
Audio Controller	Displays the audio controller information of the computer.
Bluetooth Device	Displays the Bluetooth device information of the computer.
Pass Through MAC Address	Displays the MAC address of the video pass-through.
Cellular Device	Displays the Cellular Device that is used in the computer.

Table 34. System setup options—Boot Configuration menu

Boot Configuration	
Boot Sequence	
Boot Mode: UEFI only	Displays the boot mode of the computer.
Boot Sequence	Displays the boot sequence.
Enable PXE Boot Priority	Enables or disables the PXE Boot Priority. By default, the PXE Boot Priority option is disabled.
Secure Boot	Secure Boot is a method of guaranteeing the integrity of the boot path by performing additional validation of the operating system and PCI add-in cards. The computer stops booting to the operating system when a component is not authenticated during the boot process. Secure Boot can be enabled in BIOS setup or using management interfaces like Dell Command Configure, but can only be disabled from BIOS setup.
Enable Secure Boot	Enables the computer to boot using only validated boot software. By default, the Enable Secure Boot option is enabled. For additional security, Dell Technologies recommends keeping the Secure Boot option enabled to ensure that the UEFI firmware validates the operating system during the boot process. i NOTE: For Secure Boot to be enabled, the computer is required to be in UEFI boot mode and the Enable Legacy Option ROMs option is required to be turned off.
Enable Microsoft UEFI CA	When disabled, the UEFI CA is removed from the BIOS UEFI Secure Boot database. i NOTE: When disabled, the Microsoft UEFI CA could render your computer unable to boot, computer graphics may not function, some devices may not function properly, and the computer could become unrecoverable. By default, the Enable Microsoft UEFI CA option is enabled. For additional security, Dell Technologies recommends keeping the Microsoft UEFI CA option enabled to ensure the broadest compatibility with devices and operating systems.
Secure Boot Mode	Enables or disables the Secure Boot operation mode. By default, the Deployed Mode is selected. i NOTE: Deployed Mode should be selected for normal operation of Secure Boot.
Expert Key Management	

Table 34. System setup options—Boot Configuration menu (continued)

Boot Configuration	
Enable Custom Mode	Enables or disables the keys in the PK, KEK, db, and dbx security key databases to be modified. By default, the Enable Custom Mode option is disabled.
Custom Mode Key Management	Selects the custom values for expert key management. By default, the PK option is selected.

Table 35. System setup options—Integrated Devices menu

Integrated Devices	
Date/Time	
Date	Sets the computer date in MM/DD/YYYY format. Changes to the date format take effect immediately.
Time	Sets the computer time in HH/MM/SS 24-hour format. You can switch between a 12-hour and 24-hour clock. Changes to the time format take effect immediately.
Camera	
Enable Camera	Enables the camera. By default, the Enable Camera option is enabled. i NOTE: Depending on the configuration ordered, the camera setup option may not be available.
Audio	
Enable Audio	Enables all integrated audio controller. By default, all the options are enabled.
Enable Microphone	Enables the microphone. By default, the Enable Microphone option is enabled. i NOTE: Depending on the configuration ordered, the microphone setup option may not be available.
Enable Internal Speaker	Enables the internal speaker. By default, the Enable Internal Speaker option is enabled.
USB/Thunderbolt Configuration	
Enable USB Boot Support	Enables booting from USB mass storage devices that are connected to external USB ports. By default, the Enable USB Boot Support option is enabled.
Enable External USB Ports	Enables the external USB ports. By default, the Enable External USB Ports option is enabled.
Enable Thunderbolt Technology Support	
Enable Thunderbolt Technology Support	Enables the associated ports and adapters for Thunderbolt Technology support. By default, the Enable Thunderbolt Technology Support option is enabled.
Enable Thunderbolt Boot Support	
Enable Thunderbolt Boot Support	Enables the Thunderbolt adapter-peripheral device and USB devices that are connected to the Thunderbolt adapter to be used during BIOS Preboot. By default, the Enable Thunderbolt Boot Support option is disabled.

Table 35. System setup options—Integrated Devices menu (continued)

Integrated Devices	
Enable Thunderbolt (and PCIe behind TBT) pre-boot modules	Enables the PCIe devices that are connected through a Thunderbolt adapter to run the PCIe devices UEFI Option ROM (if present) during preboot. By default, the Enable Thunderbolt (and PCIe behind TBT) pre-boot modules option is disabled.
Disable USB4 PCIe Tunneling	Disables the USB4 PCIe Tunneling option. By default, the Disable USB4 PCIe Tunneling option is disabled.
Video/Power only on Type-C Ports	Enables or disables the Type-C port functionality to video or only power. By default, the Video/Power only on Type-C Ports option is disabled.
Type-C Dock	
Type-C Dock Override	Enables or disables to use connected Type-C Dell Dock to provide data stream with external USB ports disabled. When Type-C Dock override is enabled, the Video/Audio/LAN submenu is activated. By default, the Type-C Dock Override option is enabled.
Type-C Dock Audio	Enables or disables the usage of audio inputs and outputs from the connected Type-C Dell docking station. By default, the Type-C Dock Audio option is enabled.
Type-C Dock LAN	Enables or disables the usage of LAN on the external ports of the connected Type-C Dell docking station. By default, the Type-C Dock LAN option is enabled.
Miscellaneous Devices	
Enable Fingerprint Reader Device	Enables the Fingerprint Reader Device option. By default, the Enable Fingerprint Reader Device option is enabled.
Unobtrusive Mode	
Enable Unobtrusive Mode	Enables the Unobtrusive Mode. By default, the Unobtrusive Mode option is disabled.

Table 36. System setup options—Storage menu

Storage	
SATA/NVMe Operation	
SATA/NVMe Operation	Sets the operating mode of the integrated SATA hard drive controller. By default, the RAID On option is selected. The storage device is configured for AHCI/NVMe mode.
Storage Interface	
Port Enablement	Enables or disables the M.2 PCIe SSD option. By default, the M.2 PCIe SSD option is enabled.
Enable SMART Reporting	Enables or disables the SMART Reporting. By default, the SMART Reporting option is disabled.
Drive Information	Displays the information of onboard drives.

Table 37. System setup options—Display menu

Display	
Display Brightness	
Brightness on battery power	Enables to set the screen brightness when the computer is running on battery power. By default, the screen brightness is set to 50 when the computer is running on battery power.
Brightness on AC power	Enables to set the screen brightness when the computer is running on AC power. By default, the screen brightness is set to 100 when the computer is running on AC power.
Full Screen Logo	Enables or disables the computer to display a full-screen logo, if the image matches screen resolution. By default, the Full Screen Logo option is disabled.

Table 38. System setup options—Connection menu

Connection	
Wireless Device Enable	
WLAN	Enables or disables the internal WLAN device. By default, the WLAN option enabled.
Bluetooth	Enables or disables the internal Bluetooth device. By default, the Bluetooth option enabled.
Contactless smartcard/NFC	Enables or disables the Contactless smartcard/NFC device. By default, the Contactless smartcard/NFC option enabled.
Enable UEFI Network Stack	Enables or disables the UEFI Network Stack and controls the onboard LAN Controller. By default, the Enable UEFI Network Stack option is enabled.
Wireless Radio Control	
Control WLAN Radio	Enables to sense the connection of the computer to a wired network and then disables the selected wireless radios (WLAN and/or WWAN). Upon disconnection from the wired network, the selected wireless radios are reenabled. By default, the Control WLAN Radio option is disabled.
HTTP(s) Boot Feature	
HTTP(s) Boot	Enables or disables the HTTP(s) Boot capabilities. By default, the HTTP(s) Boot option enabled.
HTTP(s) Boot Modes	Enables or disables the HTTP(s) Boot modes. By default, the Auto Mode option is enabled.

Table 39. System setup options—Power menu

Power	
Battery Configuration	Enables or disables the computer to run on battery during peak power usage hours. Use the table Custom Charge Start and Custom Charge Stop , to prevent AC power usage between certain times of each day. By default, the Adaptive option is selected. Battery settings are adaptively optimized based on your typical battery usage pattern.

Table 39. System setup options—Power menu (continued)

Power	
Advanced Configuration	
Enable Advanced Battery Charge Configuration	Enables Advanced Battery Charge Configuration from the beginning of the day to a specified work period. When enabled, Advanced Battery Charged maximizes battery health while still supporting heavy use during the work day. By default, the Enable Advanced Battery Charge Configuration option is disabled.
Peak Shift	
Enable Peak Shift	Enables the computer to run on battery during peak power usage hours. By default, the Enable Peak Shift option is disabled.
Type-C Connector Power	
Type-C Connector Power	Enables the maximum power that can be drawn from the Type-C connector. By default, the 7.5 Watts option is disabled.
USB PowerShare	
Enable USB PowerShare	Enables or disables the USB PowerShare. By default, the USB PowerShare option is enabled.
Thermal Management	
	Enables or disables cooling of fan and manages processor heat to adjust the computer performance, noise, and temperature. By default, the Optimized option is selected. Standard setting for balanced performance, noise, and temperature.
USB Wake Support	
Wake on Dell USB-C Dock	When enabled, connecting a Dell USB-C Dock wakes the computer from Standby, Hibernate, and Power Off. By default, the Wake on Dell USB-C Dock option is enabled.
Block Sleep	
	Enables or disables the computer from entering Sleep (S3) mode in the operating system. By default, the Block Sleep option is disabled. i NOTE: When enabled, the computer does not go to Sleep, Intel Rapid Start is disabled automatically, and the operating system power option is blank if it was set to Sleep.
Lid Switch	
Enable Lid Switch	Enables or disables the Lid Switch. By default, the Enable Lid Switch option is enabled.
Power On Lid Open	When enabled, it allows the computer to turn on from the off state whenever the lid is opened. By default, the Power On Lid Open option is enabled.
Intel Speed Shift Technology	
	Enables or disables the Intel Speed Shift Technology support. When enabled, the operating system selects the appropriate processor performance automatically. By default, the Intel Speed Shift Technology option is enabled.

Table 40. System setup options—Security menu

Security	
Intel Platform Trust Technology (PTT)	<p>Intel PTT is a firmware-based Trusted Platform Module (fTPM) device that is part of Intel chipsets. It provides credential storage and key management that can replace the equivalent functionality of a discrete TPM chip.</p> <p>NOTE: The options that are listed apply to computers with a discrete Trusted Platform Module (TPM).</p>
PTT On	<p>Enables or disables the Intel PTT option.</p> <p>By default, the PTT On option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the PTT On option enabled.</p>
Physical Presence Interface (PPI) Bypass for Clear Commands	<p>The PPI Bypass for Clear Commands option allows the operating system to manage certain aspects of PTT. When enabled, you are not prompted to confirm changes to the PTT configuration.</p> <p>By default, the PPI Bypass for Clear Commands option is disabled.</p> <p>For additional security, Dell Technologies recommends keeping the PPI Bypass for Clear Commands option disabled.</p>
Clear	<p>When enabled, the Clear option clears the information that is stored in the PTT fTPM after exiting the computer's BIOS. This option returns to the disabled state when the computer restarts.</p> <p>By default, the Clear option is disabled.</p> <p>Dell Technologies recommends enabling the Clear option only when PTT fTPM data needs to be cleared.</p>
Intel Total Memory Encryption	
Multi-Key Total Memory Encryption (Up to 16 keys)	<p>When enabled, it protects memory from physical attacks.</p> <p>By default, the Multi-Key Total Memory Encryption (Up to 16 keys) option is disabled.</p>
Chassis intrusion	
Chassis Intrusion Detection	<p>The chassis intrusion detection enables a physical switch that triggers an event when the computer cover is opened.</p> <p>When set to Enabled, a notification is displayed on the next boot and the event is logged in the BIOS Events log.</p> <p>When set to On-Silent, the event is logged in the BIOS Events log, but no notification is displayed.</p> <p>When set to Disabled, no notification is displayed and no event is logged in the BIOS Events log.</p> <p>By default, the Chassis Intrusion Detection option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the Chassis Intrusion Detection option enabled.</p>
Block Boot Until Cleared	<p>Enables or disables the Block Boot Until Cleared option.</p> <p>By default, the Block Boot Until Cleared option is enabled.</p> <p>NOTE: When enabled, the computer does not boot until the chassis intrusion is cleared. If the administrator password is set, Setup has to be unlocked before the warning can be cleared.</p>
SMM Security Mitigation	<p>Enables or disables additional UEFI SMM Security Mitigation protections. This option uses the Windows SMM Security Mitigations Table (WSMT) to confirm to the operating system that security best practices have been implemented by the UEFI firmware.</p>

Table 40. System setup options—Security menu (continued)




Security	
	<p>By default, the SMM Security Mitigation option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the SMM Security Mitigation option enabled unless you have a specific application which is not compatible.</p> <p> NOTE: This feature may cause compatibility issues or loss of functionality with some legacy tools and applications.</p>
Data Wipe on Next Boot	
Start Data Wipe	<p>Data Wipe is a secure wipe operation that deletes information from a storage device.</p> <p> CAUTION: The secure Data Wipe operation deletes information in a way that it cannot be reconstructed.</p> <p>Commands such as delete and format in the operating system may remove files from showing up in the file system. However, they can be reconstructed through forensic means as they are still represented on the physical media. Data Wipe prevents this reconstruction and is not recoverable.</p> <p>When enabled, the data wipe option will prompt to wipe any storage devices that are connected to the computer on the next boot.</p> <p>By default, the Start Data Wipe option is disabled.</p>
Absolute	<p>Absolute Software provides various cyber security solutions, some requiring software preloaded on Dell computers and integrated into the BIOS. To use these features, you must enable the Absolute BIOS setting and contact Absolute for configuration and activation.</p> <p>By default, the Absolute option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the Absolute option enabled.</p> <p> NOTE: When the Absolute features are activated, the Absolute integration cannot be disabled from the BIOS setup screen.</p>
UEFI Boot Path Security	<p>Enables or disables the computer to prompt the user to enter the Administrator password (if set) when booting to a UEFI boot path device from the F12 boot menu.</p> <p>By default, the Always Except Internal HDD option is enabled.</p>
Firmware Device Tamper Detection	<p>Allows you to control the firmware device tamper detection feature. This feature notifies the user when the firmware device is tampered. When enabled, a screen warning messages are displayed on the computer and a tamper detection event is logged in the BIOS Events log. The computer fails to reboot until the event is cleared.</p> <p>By default, the Firmware Device Tamper Detection option is silent.</p> <p>For additional security, Dell Technologies recommends keeping the Firmware Device Tamper Detection option enabled.</p>
Clear Firmware Device Tamper Detection	<p>Allows you to clear the firmware device tamper detection feature. This feature notifies the user when the firmware device is tampered. When enabled, a screen warning messages are displayed on the computer and a tamper detection event is logged in the BIOS Events log. The computer fails to reboot until the event is cleared.</p> <p>By default, the Firmware Device Tamper Detection option is disabled.</p> <p>For additional security, Dell Technologies recommends keeping the Firmware Device Tamper Detection option enabled.</p>

Table 41. System setup options—Passwords menu

Passwords	
Administrator Password	<p>The Administrator Password prevents unauthorized access to the BIOS Setup options. Once the administrator password is set, the BIOS setup options can only be modified after providing the correct password.</p> <p>The following rules and dependencies apply to the Administrator Password -</p> <ul style="list-style-type: none"> • The administrator password cannot be set if computer and/or internal hard drive passwords are previously set. • The administrator password can be used in place of the computer and/or internal hard drive passwords. • When set, the administrator password must be provided during a firmware update. • Clearing the administrator password also clears the computer password (if set). <p>Dell Technologies recommends using an administrator password to prevent unauthorized changes to BIOS setup options.</p>
System Password	<p>The System Password prevents the computer from booting to an operating system without entering the correct password.</p> <p>The following rules and dependencies apply when the System Password is used -</p> <ul style="list-style-type: none"> • The computer shuts down when idle for approximately 10 minutes at the computer password prompt. • The computer shuts down after three incorrect attempts to enter the computer password. • The computer shuts down when the Esc key is pressed at the System Password prompt. • The computer password is not prompted when the computer resumes from standby mode. <p>Dell Technologies recommends using the computer password in situations where it is likely that a computer may be lost or stolen.</p>
M.2 PCIe SSD-0	
Hard Drive Password	<p>The Hard Drive Password can be set to prevent unauthorized access of the data stored on the hard drive. The computer prompts for the hard drive password during boot in order to unlock the drive. A password-secured hard drive stays locked even when removed from the computer or placed into another computer. It prevents an attacker from accessing data on the drive without authorization.</p> <p>The following rules and dependencies apply when the Hard Drive Password is used -</p> <ul style="list-style-type: none"> • The hard drive password option cannot be accessed when a hard drive is disabled in the BIOS setup. • The computer shuts down when idle for approximately 10 minutes at the hard drive password prompt. • The computer shuts down after three incorrect attempts to enter the hard drive password and treats the hard drive as not available. • The hard drive does not accept password unlock attempts after five incorrect attempts to enter the hard drive password from the BIOS Setup. The hard drive password must be reset for the new password unlock attempts. • The computer treats the hard drive as not available when the Esc key is pressed at the hard drive password prompt. • The hard drive password is not prompted when the computer resumes from standby mode. When the hard drive is unlocked by the user before the computer goes into standby mode, it remains unlocked after the computer resumes from standby mode. • If the computer and hard drive passwords are set to the same value, the hard drive unlocks after the correct computer password is entered.

Table 41. System setup options—Passwords menu (continued)




Passwords	
	<p>Dell Technologies recommends using a hard drive password to protect unauthorized data access.</p>
Owner Password	<p>The Owner Password is typically used when a computer is loaned or leased, and the end user sets their own computer or hard drive password. The Owner Password can provide override access to unlock the computer when it is returned. The Owner Password cannot be set using BIOS Setup. System lessors are given a tool which enables them to configure the Owner Password.</p> <p>The following rules and dependencies apply when the Owner Password is used -</p> <ul style="list-style-type: none"> • The owner password cannot be set when the administrator password is already set. • The owner password can be used in place of the administrator, computer, or hard drive passwords. <p> NOTE: The hard drive password must have been set on the computer with the owner password.</p> <p>Dell Technologies recommends that only computer lessors use the owner password.</p>
Strong Password	<p>The Strong Password feature enforces stricter rules for administrator, owner, and computer passwords.</p> <p>When enabled, the following rules are enforced -</p> <ul style="list-style-type: none"> • The minimum length of the password is set to eight characters. • The password is required to include at least one upper case and one lower case character. <p> NOTE: These requirements do not affect the hard drive password.</p> <p>By default, the Strong Password option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the Strong Password option enabled as it requires passwords to be more complex.</p>
Password Configuration	<p>The Password configuration page includes several options for changing the requirements of BIOS passwords. You can modify the minimum and maximum length of the passwords and require passwords to contain certain character classes (upper case, lower case, digit, special character).</p> <p>Dell Technologies recommends setting the minimum password length to at least eight characters.</p>
Password Bypass	<p>The Password Bypass option allows the computer to reboot from the operating system without entering the computer or hard drive password. If the computer has already booted to the operating system, it is presumed that the user has already entered the correct computer or hard drive password.</p> <p> NOTE: This option does not remove the requirement to enter the password after shutting down.</p> <p>By default, the Password Bypass option is enabled.</p> <p>For additional security, Dell Technologies recommends keeping the Password Bypass option enabled.</p>
Password Changes	
Allow Non-Admin Password Changes	<p>The Allow Non-Admin Password Changes option in BIOS setup allows an end user to set or change the computer or hard drive passwords without entering the administrator password. This gives an administrator control over the BIOS settings but enables an end user to provide their own password.</p> <p>By default, the Allow Non-Admin Password Changes option is disabled.</p> <p>For additional security, Dell Technologies recommends keeping the Allow Non-Admin Password Changes option disabled.</p>

Table 41. System setup options—Passwords menu (continued)

Passwords	
Non-Admin Setup Changes	<p>The Non-Admin Setup Changes option allows an end user to configure the wireless devices without requiring the administrator password.</p> <p>By default, the Non-Admin Setup Changes option is disabled.</p> <p>For additional security, Dell Technologies recommends keeping the Non-Admin Setup Changes option disabled.</p>
Admin Setup Lockout	<p>The Admin Setup Lockout option prevents an end user from even viewing the BIOS setup configuration without first entering the administrator password (if set).</p> <p>By default, the Admin Setup Lockout option is disabled.</p> <p>For additional security, Dell Technologies recommends keeping the Admin Setup Lockout option disabled.</p>
Master Password Lockout	
Enable Master Password Lockout	<p>The Master Password Lockout setting allows you to disable the Recovery Password feature. If the computer, administrator, or hard drive password is forgotten, the computer becomes unusable.</p> <p>i NOTE: When the owner password is set, the Master Password Lockout option is not available.</p> <p>i NOTE: When an internal hard drive password is set, it must first be cleared before Master Password Lockout can be changed.</p> <p>By default, the Enable Master Password Lockout option is disabled.</p> <p>Dell does not recommend enabling the Master Password Lockout unless you have implemented your own password recovery computer.</p>
Enable Master Password Lockout	<p>The Master Password Lockout setting allows you to disable the Recovery Password feature. If the computer, administrator, or hard drive password is forgotten, the computer becomes unusable.</p> <p>i NOTE: When the owner password is set, the Master Password Lockout option is not available.</p> <p>i NOTE: When an internal hard drive password is set, it must first be cleared before Master Password Lockout can be changed.</p> <p>By default, the Enable Master Password Lockout option is disabled.</p> <p>Dell does not recommend enabling the Master Password Lockout unless you have implemented your own password recovery computer.</p>

Table 42. System setup options—Update, Recovery menu

Update, Recovery	
UEFI Capsule Firmware Updates	
Enable UEFI Capsule Firmware Updates	<p>Enables or disables BIOS updates through UEFI capsule update packages.</p> <p>i NOTE: Disabling this option blocks the BIOS updates from services such as Microsoft Windows Update and Linux Vendor Firmware Service (LVFS).</p> <p>By default, the Enable UEFI Capsule Firmware Updates option is enabled.</p>
BIOS Recovery from Hard Drive	<p>Enables or disables the user to recover from certain corrupted BIOS conditions from a recovery file on the user primary hard drive or an external USB key.</p> <p>By default, the BIOS Recovery from Hard Drive option is enabled.</p> <p>i NOTE: BIOS Recovery from Hard Drive is not available for self-encrypting drives (SED).</p>

Table 42. System setup options—Update, Recovery menu (continued)

Update, Recovery	
	<p>i NOTE: BIOS recovery is designed to fix the main BIOS block and cannot work if the Boot Block is damaged. In addition, this feature cannot work in the event of EC corruption, ME corruption, or a hardware issue. The recovery image must exist on an unencrypted partition on the drive.</p>
BIOS Downgrade	
Allow BIOS Downgrade	<p>Controls flashing of the computer firmware to previous revisions.</p> <p>By default, the Allow BIOS Downgrade option is enabled.</p>
SupportAssist OS Recovery	
	<p>Enables or disables the boot flow for SupportAssist OS Recovery tool in the event of certain computer errors.</p> <p>By default, the SupportAssist OS Recovery option is enabled.</p>
BIOSConnect	
	<p>Enables or disables cloud Service operating system recovery if the main operating system fails to boot with the number of failures equal to or greater than the value specified by the Auto operating system Recovery Threshold setup option and local Service operating system does not boot or is not installed.</p> <p>By default, the BIOSConnect option is enabled.</p>
Dell Auto OS Recovery Threshold	
	<p>Allows you to control the automatic boot flow for SupportAssist System Resolution Console and for Dell operating system Recovery Tool.</p> <p>By default, the Dell Auto OS Recovery Threshold value is set to 2.</p>

Table 43. System setup options—System Management menu

System Management	
Service Tag	
	Displays the Service Tag of the computer.
Asset Tag	
	<p>Creates a computer Asset Tag that can be used by an IT administrator to uniquely identify a particular computer.</p> <p>i NOTE: Once set in BIOS, the Asset Tag cannot be changed.</p>
AC Behavior	
Wake on AC	<p>Enables or disables the computer to turn on and go to boot when AC power is supplied to the computer.</p> <p>By default, the Wake on AC option is disabled.</p>
Wake on LAN	<p>Enables or disables the computer to turn on by a special LAN signal.</p> <p>By default, the Wake on LAN option is disabled.</p>
Auto On Time	<p>Enable to set the computer to turn on automatically every day or on a preselected date and time. This option can be configured only if the Auto On Time is set to Everyday, Weekdays, or Selected Days.</p> <p>By default, the Auto On Time option is disabled.</p>
Diagnostics	
OS Agent Requests	
	<p>Enables or disables the computer of scheduling onboard diagnostics on a subsequent boot which can prevent or help from hardware related issues.</p> <p>By default, the OS Agent Requests option is enabled.</p>
Power-on-Self-Test Automatic Recovery	
	<p>Enable or disables to automatically recover the computer before completing the BIOS Power-On-Self-Test (POST).</p> <p>By default, the Power-on-Self-Test Automatic Recovery option is enabled.</p>

Table 43. System setup options—System Management menu (continued)

System Management	
Auto On Time	<p>Enable to set the computer to turn on automatically every day or on a preselected date and time. This option can be configured only if the Auto On Time is set to Everyday, Weekdays, or Selected Days.</p> <p>By default, the Auto On Time option is disabled.</p>

Table 44. System setup options—Keyboard menu

Keyboard	
Fn Lock Options	<p>Enables or disables the Fn Lock option.</p> <p>By default, the Fn Lock option is enabled.</p>
Lock Mode	<p>By default, the Lock Mode Secondary option is enabled. With this option, the F1-F12 keys scan the code for their secondary functions.</p>
Keyboard Illumination	<p>Configures the operating mode of the keyboard illumination feature.</p> <p>By default, the Dim option is selected.</p>
Keyboard Backlight Timeout on AC	<p>Sets the timeout value for the keyboard backlight when an AC adapter is connected to the computer.</p> <p>By default, the 10 seconds option is selected.</p>
Keyboard Backlight Timeout on Battery	<p>Sets the timeout value for the keyboard backlight when the computer is running only on the battery power. The keyboard backlight timeout value is only effective when the backlight is enabled.</p> <p>By default, the 10 seconds option is selected.</p>
Device Configuration HotKey Access	<p>Allows you to control whether you can access device configuration screens through hotkeys during computer startup.</p> <p>By default, the Device Configuration HotKey Access option is enabled.</p> <p>i NOTE: This setting controls only the Intel RAID (CTRL+I), MEBX (CTRL+P), and LSI RAID (CTRL+C) Option ROMs. Other preboot Option ROMs, which support entry using a key sequence, are not affected by this setting.</p>

Table 45. System setup options—Preboot Behavior menu

Preboot Behavior	
Adapter Warnings	
Enable Dock Warning Messages	<p>Enables the warning messages during boot when the adapters with less power capacity are detected.</p> <p>By default, the Enable Dock Warning Messages option is enabled.</p>
Warnings and Errors	<p>Enables or disables the action to be taken when a warning or error is encountered.</p> <p>By default, the Prompt on Warnings and Errors option is selected. Stop, prompt, and wait for user input when warnings or errors are detected.</p> <p>i NOTE: Errors deemed critical to the operation of the computer hardware stop the functioning of the computer.</p>
Extend BIOS POST Time	<p>Sets the BIOS POST (Power-On Self-Test) load time.</p> <p>By default, the 0 seconds option is selected.</p>
MAC Address Pass-Through	<p>Replaces the external NIC MAC address (in a supported dock or dongle) with the selected MAC address from the computer.</p> <p>By default, the System Unique MAC Address option is selected.</p>

Table 45. System setup options—Preboot Behavior menu (continued)

Preboot Behavior	
Sign of Life	
Early Keyboard Backlight	Keyboard Backlight Sign of Life. By default, the Early Keyboard Backlight option is enabled.

Table 46. System setup options—Virtualization menu

Virtualization Support	
Intel Virtualization Technology	
Enable Intel Virtualization Technology (VT)	When enabled, the computer can run a Virtual Machine Monitor (VMM). By default, the Enable Intel Virtualization Technology (VT) option is enabled.
VT for Direct I/O	
Enable Intel VT for Direct I/O	When enabled, the computer can perform Virtualization Technology for Direct I/O (VT-d). VT-d is an Intel method that provides virtualization for memory map I/O. By default, the Enable Intel VT for Direct I/O option is enabled.
Intel Trusted Execution Technology (TXT)	
Enable Intel Trusted Execution Technology (TXT)	Allows you to Measured Virtual Machine Monitor (MVMM) to utilize the additional hardware capabilities provided by Intel Trusted Execution Technology. By default, the Enable Intel Trusted Execution Technology (TXT) option is disabled.
DMA Protection	
Enable Pre-Boot DMA Support	Allows you to control the Pre-Boot DMA protection for both internal and external ports. This option does not directly enable DMA protection in the operating system. (i) NOTE: This option is not available when the virtualization setting for IOMMU is disabled (VT-d/AMD Vi). By default, the Enable Pre-Boot DMA Support option is enabled. For additional security, Dell Technologies recommends keeping the Enable Pre-Boot DMA Support option enabled. (i) NOTE: This option is provided only for compatibility purposes, since some older hardware is not DMA capable.
Enable OS Kernel DMA Support	Allows you to control the Kernel DMA protection for both internal and external ports. This option does not directly enable DMA protection in the operating system. For operating systems that support DMA protection, this setting indicates to the operating system that the BIOS supports the feature. (i) NOTE: This option is not available when the virtualization setting for IOMMU is disabled (VT-d/AMD Vi). By default, the Enable OS Kernel DMA Support option is enabled. (i) NOTE: This option is provided only for compatibility purposes, since some older hardware is not DMA capable.

Table 47. System setup options—Performance menu

Performance	
Multi-Core Support	

Table 47. System setup options—Performance menu (continued)

Performance	
Multiple Atom Cores	Enables to change the number of Atom cores available to the operating system. The default value is set to the maximum number of cores. By default, the All Cores option is selected.
Active Efficient Cores (E-Cores) Select	Enables to change the number of CPU E-Cores available on the OS. By default, the All Active option is selected.
Intel SpeedStep	
Enable Intel SpeedStep Technology	Enables the computer to dynamically adjust processor voltage and core frequency, decreasing average power consumption and heat production. By default, the Enable Intel SpeedStep Technology option is enabled.
C-State Control	
Enable C-State Control	Enables or disables the ability of the CPU to enter and exit low-power state. When disabled, it disables all C-states. When enabled, it enables all C-states that the chipset or platform allows. By default, the Enable C-State Control option is enabled.
Intel Turbo Boost Technology	
Enable Intel Turbo Boost Technology	Enables the Intel TurboBoost mode of the processor. When enabled, the Intel TurboBoost driver increases the performance of the CPU or graphics processor. By default, the Enable Intel Turbo Boost Technology option is enabled.
Intel Hyper-Threading Technology	
Enable Intel Hyper-Threading Technology	Enables the Intel Hyper-Threading mode of the processor. When enabled, the Intel Hyper-Threading increases the efficiency of the processor resources when multiple threads run on each core. By default, the Intel Hyper-Threading Technology option is enabled.


Table 48. System setup options—System Logs menu

System Logs	
BIOS Event Log	
Clear BIOS Event Log	Allows you to select option to keep or clear BIOS events logs. By default, the Keep Log option is selected.
Thermal Event Log	
Clear Thermal Event Log	Allows you to select option to keep or clear Thermal events logs. By default, the Keep Log option is selected.
Power Event Log	
Clear Power Event Log	Allows you to select option to keep or clear Power events logs. By default, the Keep Log option is selected.


Updating the BIOS

Updating the BIOS in Windows

About this task

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at www.dell.com/support.

Steps


1. Go to www.dell.com/support.
2. Click **Product support**. In the **Search support** box, enter the Service Tag of your computer, and then click **Search**.
 **NOTE:** If you do not have the Service Tag, use the SupportAssist feature to automatically identify your computer. You can also use the product ID or manually browse for your computer model.
3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.
6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. After the download is complete, browse the folder where you saved the BIOS update file.
8. Double-click the BIOS update file icon and follow the on-screen instructions.
For more information, search in the Knowledge Base Resource at www.dell.com/support.

Updating the BIOS in Linux and Ubuntu

To update the system BIOS on a computer that is installed with Linux or Ubuntu, see the knowledge base article [000131486](https://www.dell.com/support/000131486) at www.dell.com/support.

Updating the BIOS using the USB drive in Windows

About this task

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at www.dell.com/support.

Steps

1. Follow the procedure from step 1 to step 6 in [Updating the BIOS in Windows](#) to download the latest BIOS setup program file.
2. Create a bootable USB drive. For more information, search in the Knowledge Base Resource at www.dell.com/support.
3. Copy the BIOS setup program file to the bootable USB drive.
4. Connect the bootable USB drive to the computer that needs the BIOS update.
5. Restart the computer and press **F12**.
6. Select the USB drive from the **One Time Boot Menu**.
7. Type the BIOS setup program filename and press **Enter**.
The **BIOS Update Utility** appears.
8. Follow the on-screen instructions to complete the BIOS update.

Updating the BIOS from the F12 One-Time boot menu

Update your computer BIOS using the BIOS update.exe file that is copied to a FAT32 USB drive and booting from the F12 One-Time boot menu.

About this task

CAUTION: If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at www.dell.com/support.

BIOS Update

You can run the BIOS update file from Windows using a bootable USB drive or you can also update the BIOS from the F12 One-Time boot menu on the computer.

Most of the Dell computers built after 2012 have this capability, and you can confirm by booting your computer to the F12 One-Time Boot Menu to see if BIOS FLASH UPDATE is listed as a boot option for your computer. If the option is listed, then the BIOS supports this BIOS update option.

NOTE: Only computers with the BIOS Flash Update option in the F12 One-Time boot menu can use this function.

Updating from the One-Time boot menu

To update your BIOS from the F12 One-Time boot menu, you need the following:

- USB drive formatted to the FAT32 file system (key does not have to be bootable)
- BIOS executable file that you downloaded from the Dell Support website and copied to the root of the USB drive
- AC power adapter that is connected to the computer
- Functional computer battery to flash the BIOS

Perform the following steps to perform the BIOS update flash process from the F12 menu:

CAUTION: Do not turn off the computer during the BIOS update process. The computer may not boot if you turn off your computer.

Steps

1. From a turn off state, insert the USB drive where you copied the flash into a USB port of the computer.
2. Turn on the computer and press F12 to access the One-Time Boot Menu, select BIOS Update using the mouse or arrow keys then press Enter.
The flash BIOS menu is displayed.
3. Click **Flash from file**.
4. Select an external USB device.
5. Select the file and double-click the flash target file, and then click **Submit**.
6. Click **Update BIOS**. The computer restarts to flash the BIOS.
7. The computer will restart after the BIOS update is completed.


System and setup password

Table 49. System and setup password

Password type	Description
System password	Password that you must enter to log in to your system.
Setup password	Password that you must enter to access and make changes to the BIOS settings of your computer.

You can create a system password and a setup password to secure your computer.

 **CAUTION:** The password features provide a basic level of security for the data on your computer.

 **CAUTION:** Anyone can access the data that is stored on your computer, when not locked and left unattended.

 **NOTE:** System and setup password feature is disabled.

Assigning a System Setup password

Prerequisites

You can assign a new System or Admin Password only when the status is in **Not Set**.

About this task

To enter BIOS System Setup, press F2 immediately after a power-on or reboot.

Steps

1. In the **System BIOS** or **System Setup** screen, select **Security** and press Enter.
The **Security** screen is visible.
2. Select **System/Admin Password** and create a password in the **Enter the new password** field.
Use the following guidelines to assign the system password:
 - A password can have up to 32 characters.
 - At least one special character: "(! " # \$ % & ' * + , - . / : ; < = > ? @ [\] ^ _ ` { | })"
 - Numbers 0 to 9.
 - Upper case letters from A to Z.
 - Lower case letters from a to z.
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press Esc and save the changes as prompted by the message.
5. Press Y to save the changes.
The computer restarts.

Deleting or changing an existing system setup password


Prerequisites

Ensure that the **Password Status** is Unlocked (in the System Setup) before attempting to delete or change the existing System and/or Setup password. You cannot delete or change an existing System or Setup password, if the **Password Status** is Locked.

About this task

To enter the System Setup, press F2 immediately after a power-on or reboot.

Steps

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.
The **System Security** screen is displayed.
2. In the **System Security** screen, verify that the Password Status is **Unlocked**.
3. Select **System Password**, update, or delete the existing system password, and press Enter or Tab.
4. Select **Setup Password**, update, or delete the existing setup password, and press Enter or Tab.
 **NOTE:** If you change the System and/or Setup password, reenter the new password when prompted. If you delete the System and/or Setup password, confirm the deletion when prompted.
5. Press Esc. A message prompts you to save the changes.
6. Press Y to save the changes and exit from System Setup.
The computer restarts.

Clearing CMOS settings

About this task

CAUTION: Clearing CMOS settings resets the BIOS settings on your computer.

Steps

1. Remove the [base cover](#).
2. Disconnect the battery cable from the system board.
3. Remove the [coin-cell battery](#).
4. Wait for one minute.
5. Replace the [coin-cell battery](#).
6. Connect the battery cable to the system board.
7. Replace the [base cover](#).

Clearing BIOS (System Setup) and System passwords

About this task

To clear the system or BIOS passwords, contact Dell technical support as described at www.dell.com/contactdell.

NOTE: For information about how to reset Windows or application passwords, see the documentation accompanying Windows or your application.

Clearing Chassis Intrusion Alerts

A chassis intrusion switch identifies whenever the computer's base cover has been removed. You can enable alerts about any intrusions through the **Chassis Intrusion** option in the Security submenu of the BIOS setup menu.

Once enabled, the **Block Boot Until Cleared** feature allows you to select whether to prevent the bootup until the intrusion alert is resolved.

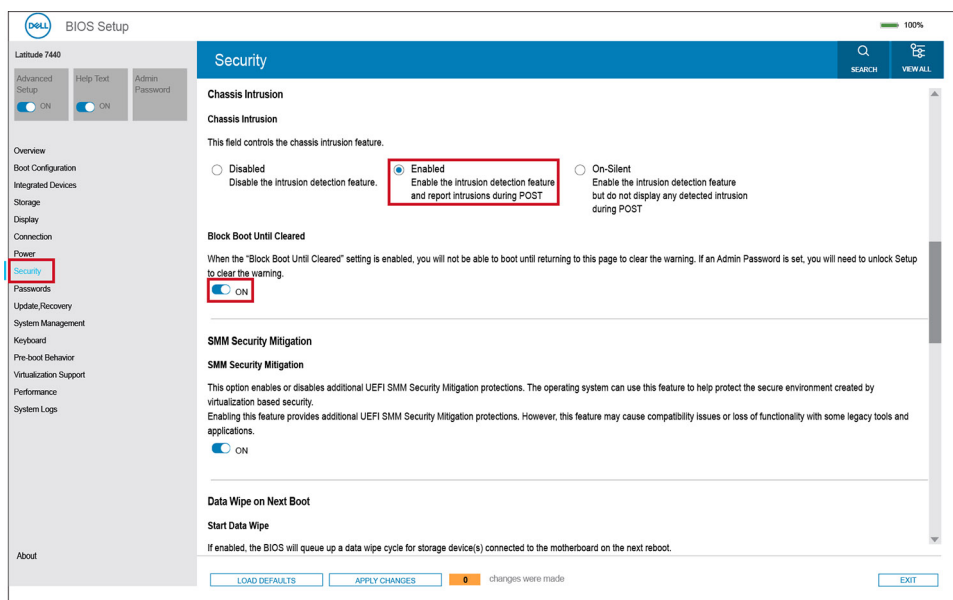


Figure 71. Block Boot Until Cleared

If **Block Boot Until Cleared** is set to **ON**, then you must select **BIOS-Setup** and clear the intrusion alert in order to boot up the computer normally.

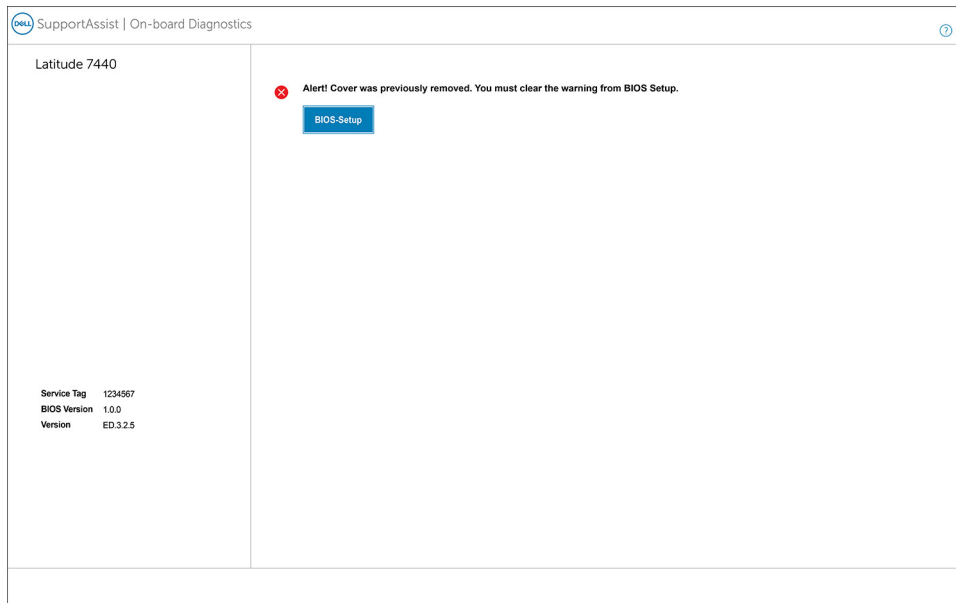


Figure 72. BIOS-Setup

When **Block Boot Until Cleared** is switch to **OFF**, you can choose either **Continue** to proceed with the normal computer boot-up or **BIOS-Setup** to clear the alert.

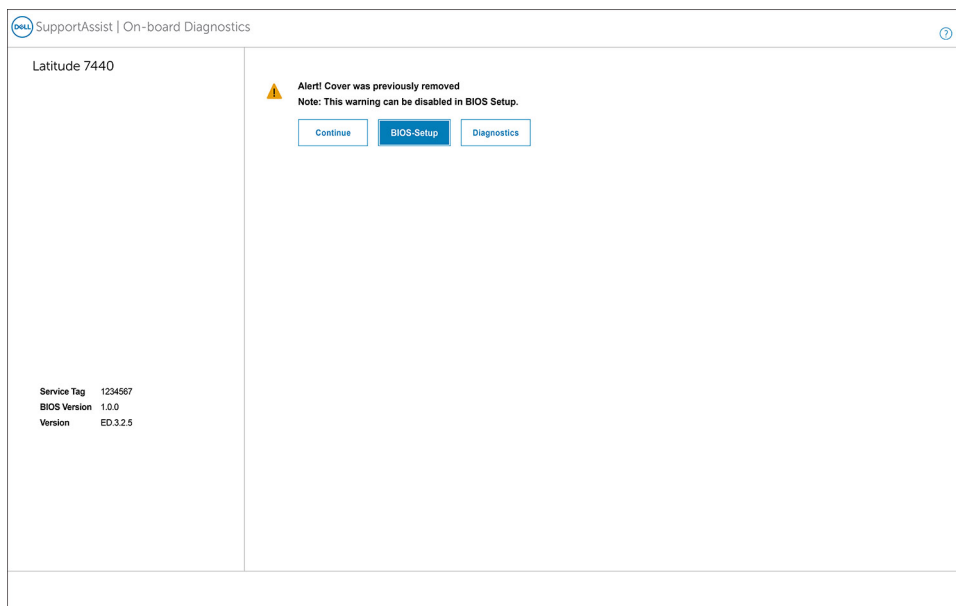


Figure 73. BIOS-Setup

NOTE: If the **Continue** option is selected, then you continue to see the alert each time the computer is turned on until the alert is cleared.

To clear the alert, select **ON** in the **Clear Intrusion Warning** field that is located within the **Security** sub-menu of the **BIOS setup** menu.

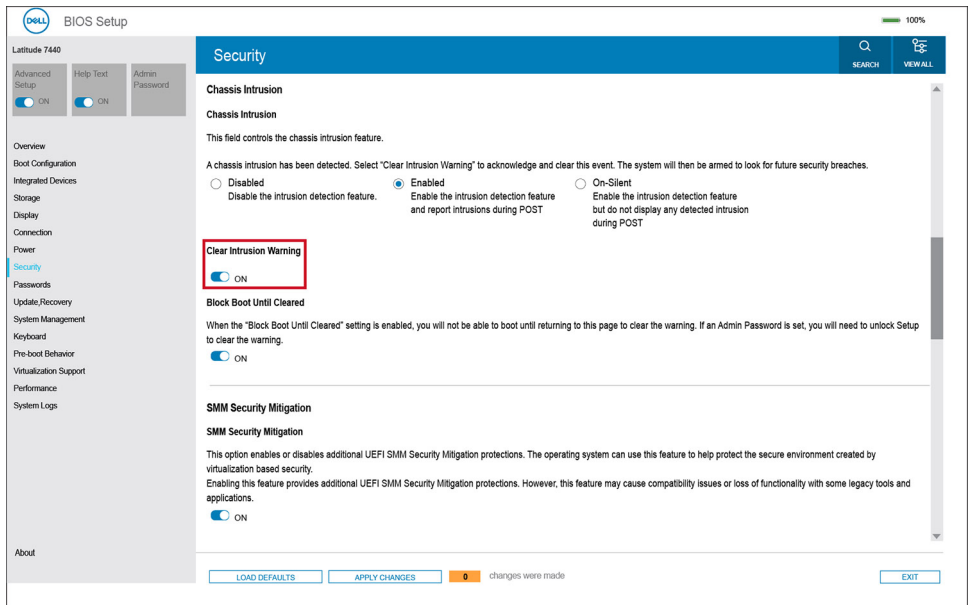


Figure 74. Clear Intrusion Warning

Troubleshooting

Handling swollen rechargeable Li-ion batteries

Like most laptops, Dell laptops use Lithium-ion batteries. One type of Lithium-ion battery is the rechargeable Li-ion battery. Rechargeable Li-ion batteries have increased in popularity in recent years and have become standard in the electronics industry due to customer preferences for a slim form factor (especially with newer ultra-thin laptops) and long battery life. Inherent to rechargeable Li-ion battery technology is the potential for swelling of the battery cells.

A swollen battery may impact the performance of the laptop. To prevent possible further damage to the device enclosure or internal components leading to malfunction, discontinue the use of the laptop and discharge it by disconnecting the AC adapter and letting the battery drain.

Swollen batteries should not be used and should be replaced and disposed of properly. We recommend contacting Dell product support for options to replace a swollen battery under the terms of the applicable warranty or service contract, including options for replacement by a Dell authorized service technician.

The guidelines for handling and replacing rechargeable Li-ion batteries are as follows:

- Exercise caution when handling rechargeable Li-ion batteries.
- Discharge the battery before removing it from the system. To discharge the battery, unplug the AC adapter from the system and operate the system only on battery power. When the system will no longer turn on when the power button is pressed, the battery is fully discharged.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any type to pry on or against the battery.
- If a battery gets stuck in a device as a result of swelling, do not try to free it as puncturing, bending, or crushing a battery can be dangerous.
- Do not attempt to reassemble a damaged or swollen battery into a laptop.
- Swollen batteries that are covered under warranty should be returned to Dell in an approved shipping container (provided by Dell)—this is to comply with transportation regulations. Swollen batteries that are not covered under warranty should be disposed of at an approved recycling center. Contact Dell product support at <https://www.dell.com/support> for assistance and further instructions.
- Using a non-Dell or incompatible battery may increase the risk of fire or explosion. Replace the battery only with a compatible battery purchased from Dell that is designed to work with your Dell computer. Do not use a battery from other computers with your computer. Always purchase genuine batteries from <https://www.dell.com> or otherwise directly from Dell.

Rechargeable Li-ion batteries can swell for various reasons such as age, number of charge cycles, or exposure to high heat. For more information about how to improve the performance and lifespan of the laptop battery and to minimize the possibility of occurrence of the issue, search Dell Laptop Battery in the Knowledge Base Resource at www.dell.com/support.

Locate the Service Tag or Express Service Code of your Dell computer

Your Dell computer is uniquely identified with a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, we recommend entering the Service Tag or Express Service Code at www.dell.com/support.


For more information about how to find the Service Tag for your computer, see [Locate the Service Tag on your computer](#).

Dell SupportAssist Pre-boot System Performance Check diagnostics

About this task

SupportAssist diagnostics (also known as system diagnostics) performs a complete check of your hardware. The Dell SupportAssist Pre-boot System Performance Check diagnostics is embedded with the BIOS and launched by the BIOS internally. The embedded system diagnostics provides options for particular devices or device groups allowing you to:

- Run tests automatically or in an interactive mode.
- Repeat the tests.
- Display or save test results.
- Run thorough tests to introduce additional test options to provide extra information about one or more failed devices.
- View status messages that inform you the tests are completed successfully.
- View error messages that inform you of problems encountered during testing.

 **NOTE:** Some tests for specific devices require user interaction. Always ensure that you are present at the computer terminal when the diagnostic tests are performed.

For more information, see the knowledge base article [000180971](#).

Running the SupportAssist Pre-Boot System Performance Check


Steps

1. Turn on your computer.
2. As the computer boots, press the F12 key as the Dell logo appears.
3. On the boot menu screen, select the **Diagnostics** option.
4. Click the arrow at the bottom left corner.
Diagnostics front page is displayed.
5. Click the arrow in the lower-right corner to go to the page listing.
The items that are detected are listed.
6. To run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
7. Select the device from the left pane and click **Run Tests**.
8. If there are any issues, error codes are displayed.
Note the error code and validation number and contact Dell.


Built-in self-test (BIST)

M-BIST

M-BIST (Built In Self-Test) is the system board built-in self-test diagnostics tool that improves the diagnostics accuracy of system board Embedded Controller (EC) failures.

 **NOTE:** M-BIST can be manually initiated before Power On Self-Test (POST).

How to run M-BIST

 **NOTE:** M-BIST must be initiated on the computer from a power-off state that is either connected to AC power or with a battery only.

1. Press and hold both the **M** key on the keyboard and the **power button** to initiate M-BIST.
2. The battery indicator LED may exhibit two states:
 - a. OFF: No fault was detected with the system board.
 - b. AMBER: Amber indicates a problem with the system board.

- If there is a failure with the system board, the battery status LED flashes one of the following error codes for 30 seconds:

Table 50. LED error codes

Blinking Pattern		Possible Problem
Amber	White	
2	1	CPU Failure
2	8	LCD Power Rail Failure
1	1	TPM Detection Failure
2	4	Memory/RAM failure

- If there is no failure with the system board, the LCD cycles through the solid color screens that are described in the LCD-BIST section for 30 seconds and then turn off.

LCD Power rail test (L-BIST)

L-BIST is an enhancement to the single LED error code diagnostics and is automatically initiated during POST. L-BIST will check the LCD power rail. If there is no power being supplied to the LCD (that is if the L-BIST circuit fails), the battery status LED flashes either an error code [2,8] or an error code [2,7].

NOTE: If L-BIST fails, LCD-BIST cannot function as no power will be supplied to the LCD.

How to invoke the L-BIST Test:

- Press the power button to start the computer.
- If the computer does not start up normally, look at the battery status LED:
 - If the battery status LED flashes an error code [2,7], the display cable may not be connected properly.
 - If the battery status LED flashes an error code [2,8], there is a failure on the LCD power rail of the system board, hence there is no power that is supplied to the LCD.
- For cases, when a [2,7] error code is shown, check to see if the display cable is properly connected.
- For cases when a [2,8] error code is shown, replace the system board.

LCD Built-in Self-Test (BIST)

Dell laptops have a built-in diagnostic tool that helps you determine if the screen abnormality you are experiencing is an inherent problem with the LCD (screen) of the Dell laptop or with the video card (GPU) and computer settings.

When you notice screen abnormalities like flickering, distortion, clarity issues, fuzzy or blurry image, horizontal or vertical lines, color fade and so on, it is always a good practice to isolate the LCD (screen) by running the Built-In Self-Test (BIST).

How to invoke the LCD BIST Test

- Power off the Dell laptop.
- Disconnect any peripherals that are connected to the laptop. Connect only the AC adapter (charger) to the laptop.
- Ensure that the LCD (screen) is clean (no dust particles on the surface of the screen).
- Press and hold the **D** key and **Power on** the laptop to enter LCD built-in self-test (BIST) mode. Continue to hold the D key until the computer boots up.
- The screen displays solid colors and change colors on the entire screen to white, black, red, green, and blue twice.
- Then it displays the colors white, black, and red.
- Carefully inspect the screen for abnormalities (any lines, fuzzy color, or distortion on the screen).
- At the end of the last solid color (red), the computer shuts down.

NOTE: Dell SupportAssist Preboot diagnostics upon launch initiates an LCD BIST first, expecting a user intervention to confirm functionality of the LCD.

System-diagnostic lights

This section lists the system-diagnostic lights of your Latitude 7650.

Table 51. System-diagnostic lights

Blinking pattern		Problem description	Suggested resolution
Amber	White		
1	1	TPM detection failure	Replace the system board.
1	2	Unrecoverable SPI Flash Failure	Replace the system board.
1	5	EC unable to program i-Fuse	Replace the system board.
1	6	Generic catch-all for ungraceful EC code flow errors	Disconnect all power source (AC, battery, coin cell) and drain flea power by pressing and holding down power button for 3-5 seconds.
1	7	Unsupported SPI Flash	Replace the system board.
1	8	Catastrophic error signal has tripped	Disconnect all power source (AC, battery, coin cell) and drain flea power by pressing and holding down the power button for 3~5 seconds.
2	1	CPU failure	<ul style="list-style-type: none"> • Run the Dell Support Assist/Dell Diagnostics tool. • If problem persists, replace the system board.
2	2	System board failure (included BIOS corruption or ROM error)	<ul style="list-style-type: none"> • Flash latest BIOS version • If problem persists, replace the system board.
2	3	No memory/RAM detected	<ul style="list-style-type: none"> • Confirm that the memory module is installed properly. • If problem persists, replace the memory module.
2	4	Memory/RAM failure	<ul style="list-style-type: none"> • Reset and swap memory modules among the slots. • If problem persists, replace the memory module.
2	5	Invalid memory installed	<ul style="list-style-type: none"> • Reset and swap memory modules among the slots. • If problem persists, replace the memory module.
2	6	System board/Chipset Error	Replace the system board.

Table 51. System-diagnostic lights (continued)

Blinking pattern		Problem description	Suggested resolution
Amber	White		
2	7	LCD failure (SBIOS message)	Replace the LCD module.
2	8	LCD failure (EC detection of power rail failure)	Replace the system board.
3	1	CMOS battery failure	<ul style="list-style-type: none"> Reset the main battery connection. If problem persists, replace the main battery.
3	2	PCI or Video card/chip failure	Replace the system board.
3	3	BIOS Recovery image not found	<ul style="list-style-type: none"> Flash latest BIOS version If problem persists, replace the system board.
3	4	BIOS Recovery image found but invalid	<ul style="list-style-type: none"> Flash latest BIOS version If problem persists, replace the system board.
3	5	Power rail failure	Replace the system board.
3	6	Flash corruption detected by SBIOS.	<ul style="list-style-type: none"> Press power button for over 25 seconds to do RTC reset. If problem persists, replace the system board. Disconnect all power source (AC, battery, coin cell) and drain flea power by pressing and holding down power button 3-5 seconds to ensure all power are drained. Run "BIOS recovery from USB", and the instructions are in the website Dell support. If problem persists, replace the system board.
3	7	Timeout waiting on ME to reply to HECI message.	Replace the system board.

NOTE: Blinking 3-3-3 LEDs on Lock LED (Caps-Lock or Num-Lock), Power button LED (without Fingerprint reader), and Diagnostic LED indicates failure to provide input during LCD panel test on Dell SupportAssist Pre-boot System Performance Check diagnostics.

Recovering the operating system

When your computer is unable to boot to the operating system even after repeated attempts, it automatically starts Dell SupportAssist OS Recovery.

Dell SupportAssist OS Recovery is a stand-alone tool that is preinstalled in all Dell computers that are installed with the Windows operating system. It consists of tools to diagnose and troubleshoot issues that may occur before your computer boots to the

operating system. It enables you to diagnose hardware issues, repair your computer, back up your files, or restore your computer to its factory state.

You can also download it from the Dell Support website to troubleshoot and fix your computer when it fails to boot into their primary operating system due to software or hardware failures.

For more information about the Dell SupportAssist OS Recovery, see *Dell SupportAssist OS Recovery User's Guide* at www.dell.com/serviceabilitytools. Click **SupportAssist** and then, click **SupportAssist OS Recovery**.

Real-Time Clock (RTC Reset)

The Real Time Clock (RTC) reset function allows you or the service technician to recover Dell computers from No POST/No Power/No Boot situations. The legacy jumper enabled RTC reset has been retired on these models.

Start the RTC reset with the computer powered off and connected to AC power. Press and hold the power button for thirty (30) seconds

. The computer RTC Reset occurs after you release the power button.

Backup media and recovery options

It is recommended to create a recovery drive to troubleshoot and fix problems that may occur with Windows. Dell proposes multiple options for recovering the Windows operating system on your Dell computer. For more information, see [Dell Windows Backup Media and Recovery Options](#).

Wi-Fi power cycle

About this task

If your computer is unable to access the Internet due to Wi-Fi connectivity issues a Wi-Fi power cycle procedure may be performed. The following procedure provides the instructions on how to conduct a Wi-Fi power cycle:

 **NOTE:** Some Internet Service Providers (ISPs) provide a modem or router combo device.

Steps

1. Turn off your computer.
2. Turn off the modem.
3. Turn off the wireless router.
4. Wait for 30 seconds.
5. Turn on the wireless router.
6. Turn on the modem.
7. Turn on your computer.

Drain residual flea power (perform hard reset)

About this task

Flea power is the residual static electricity that remains in the computer even after it has been powered off and the battery is removed.


For your safety, and to protect the sensitive electronic components in your computer, you are requested to drain residual flea power before removing or replacing any components in your computer.

Draining residual flea power, also known as a performing a "hard reset", is also a common troubleshooting step if your computer does not turn on or boot into the operating system.

Procedure to drain residual flea power (perform a hard reset)

Steps

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Remove the base cover.
4. Remove the battery.
5. Press and hold the power button for 20 seconds to drain the flea power.
6. Install the battery.
7. Install the base cover.
8. Connect the power adapter to your computer.
9. Turn on your computer.


 **NOTE:** For more information about performing a hard reset, search in the Knowledge Base Resource at www.dell.com/support.

Getting help and contacting Dell

Self-help resources


You can get information and help on Dell products and services using these self-help resources:


Table 52. Self-help resources

Self-help resources	Resource location
Information about Dell products and services	www.dell.com
Tips	
Contact Support	In Windows search, type <code>Contact Support</code> , and press Enter.
Online help for operating system	www.dell.com/support/windows www.dell.com/support/linux
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals, and documents.	Your Dell computer is uniquely identified by a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, enter the Service Tag or Express Service Code at www.dell.com/support . For more information about how to find the Service Tag for your computer, see Locate the Service Tag on your computer .
Dell knowledge base articles	<ol style="list-style-type: none"> 1. Go to www.dell.com/support. 2. On the menu bar at the top of the Support page, select Support > Knowledge Base. 3. In the Search field on the Knowledge Base page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.

Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see www.dell.com/contactdell.

 **NOTE:** Availability varies by country/region and product, and some services may not be available in your country/region.

 **NOTE:** If you do not have an active Internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell product catalog.