Customer FAQ

Trimble TSC510 Controller

The Trimble® TSC510 controller is an update to the original TSC5 field data collector. It is designed primarily for precision field data collection, stakeout, layout, and other general field tasks. The TSC510 retains popular features of the TSC5, such as its full keyboard, 5-inch screen, ergonomic form factor, and all-day battery life, while offering significant enhancements.

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Key features

What are the key features of the TSC510?

The key features of the TSC510, in order of priority, include its keyboard, cost, size/weight, battery life, and ruggedness.

It also features robust radio and instrument communications, including:

- USB Type-C for power and communications.
- WiFi/Bluetooth connectivity.
- Empower Module capability for various radios and accessories.
- WWAN (cellular) functionality for data only.
- NFC capabilities. Additional summary features include:
- Android 14 operating system, which is upgradeable.
- 8 GB RAM and 128 GB storage
- Support for a supplemental, hot-swappable Li-ion battery.
- Support for all GNSS constellations, including GPS, GLONASS, Galileo, BeiDou, and QZSS.
- A touchscreen display that supports finger, stylus, and glove input.
- A rear 16 MP camera with autofocus and LED flash.
- An IP68 rating for protection against dust and water.
- Compliance with MIL-STD-810H for ruggedness.
- Programmable function keys.
- A 2-year hardware warranty.

What is new with the TSC510?

The TSC510 brings several significant updates and enhancements, including:

- An improved, 3x faster processor, the Qualcomm QCS6490 SoC, compared to the TSC5's Qualcomm Snapdragon SDA660. This SoC is planned to remain in the product longevity program until July 2036.
- Enhanced IP68 rating for superior protection against submersion and dust intrusion.

- The convenience of Android Quick Share for easier file transfers.
    - It runs the Android 14 operating system.
- Support for an optional user-replaceable Li-35 battery, which nearly doubles the battery life.
- Worldwide, 4G LTE & 3G UMTS networks are supported.
- Wi-Fi 6 (802.11ax) for faster wireless connectivity.
- Bluetooth 5.2 with BLE 5 and Class 1 range.
- Integrated NFC NXP PN-7160 supporting Reader/Writer Mode for applications like user authentication and peer-to-peer data exchange.

What are the differences between TSC510, TSC7 and TSC5?

The TSC510 is part of the Trimble TSC continuum, building on the legacy of previous models like the TSC5 and TSC7.

- The TSC510 is an update to the TSC5, retaining its 5-inch screen and full keyboard. The TSC5 originally ran on Android 10, while the TSC510 runs on the newer Android 14 operating system.
- The TSC510 features an improved, 3x faster Qualcomm QCS6490 processor compared to the TSC5's Snapdragon SDA660.
- The TSC510 also offers more RAM (8GB) and more internal storage (128GB) than the TSC5, which typically had 4GB RAM and 64GB storage (implied by the upgrade).
- The TSC510 has an enhanced IP68 rating.
- Unlike the TSC7, which has a larger 7-inch screen and runs on Windows 10 Pro, the TSC510 maintains the 5-inch screen and utilizes the Android operating system.
- The TSC510 explicitly supports Trimble Forensics Capture software, which the TSC7 (and potentially the TSC5) did not support due to landscape screen orientation.

Physical specifications

What are the environmental performance characteristics of the TSC510?

The TSC510 is built for rugged field use with robust environmental performance characteristics. It holds an IP68 rating, providing protection against both dust and submersion in water. It also meets

military specification MIL-STD-810H for protection against drops, temperature shock, solar exposure, humidity, salt spray, and vibration, allowing operation in extreme temperatures and altitudes.

Specific environmental capabilities include:

- Operating temperature: -30°C to +60°C (-22°F to +140°F). It MUST power on from at least -20°C, with all peripheral functionality.
- Storage temperature: -40°C to +70°C (-40°F to +158°F).
- AC adapter/charging temperature: 0°C to +45°C (32°F to 113°F).
- Humidity: 90% RH at a temperature cycle of 30°C to +60°C (86°F to 140°F).
- Transit Drop: The device passes a 1.22 m (4 ft) drop test onto both plywood and concrete surfaces, for 6 faces at low (-30°C) and high (+60°C) temperatures. These tests are also performed with an Empower module attached.
- Ball Drop: It passes a test where a 50 mm steel ball is dropped from 0.5 m onto the touch panel surface at 5 specified locations (center and all 4 corners of the viewing area).
- Vibration: It passes General Minimum Integrity and Loose Cargo tests.
- Altitude: It passes low pressure altitude operation at 30,000 ft (at 5°C) and low pressure altitude storage at 40,000 ft (at -30°C).
- Fluid Contamination: The device can withstand exposure to various fluids including rain water, salt water, turpentine, hydrogen peroxide, sunscreen, insect repellent, isopropyl alcohol, Windex, carbonated beverages, hot coffee, and tea.

Which screws are intended to be removed by users?

Only Phillips (cross tip) screws are intended to be unscrewed by users. These are specifically used to attach modules and the cover of the optional battery/SIM card slot. It is important not to attempt to remove any other screws as this could damage the water and/or dust-tight sealing and void the warranty. Other screws should only be removed by Trimble Authorized Service Providers (ASPs). For the TSC510, user-serviceable items MUST use Phillips #1 drive type screws, which should be retained or captive to prevent loss.

Inside the box - What is included in the TSC510 packout?

The standard TSC510 packout includes:

- x1 screen protector
- x1 USB-C cable
- x1 stylus and 2 tips
- x1 carrying case
- x1 hand strap

Accessories

What optional accessories are available for the TSC510?

The following optional accessories are available for the TSC510:

- TSC5/TSC7 shoulder sling
- TSC5 Pole mount bracket
- TSC5/TSC7 quick release pole mount clamp with adjustable arm
- Universal USB-C 65W wall charger
- USB-A (male) to USB-C (male) data transfer cable
- USB-A (male) to USB-C (female) adapter
- Vehicle charger
- Empower modules (including 2.4GHz radio, barcode, and RFID)
- Li-35 battery (user-replaceable, supplemental battery)
- Replacement accessories such as charger kits (with AC power adapter, regional plugs, and USB-C to USB-C cable), glass screen protectors, styli & tethers, handstraps, and carry cases are also available.

Does the TSC510 fit into existing hard carry cases?

The TSC510 is the same form factor as the TSC5 and will fit into legacy and new hard cases.

How does the pole mount work?

The pole mount is an optional accessory for the TSC510. It typically consists of three main components:

- The TSC510-facing custom bracket mount, which attaches to the controller using 4 screws provided in the package. This bracket mount is designed to "snap" easily onto the controller by placing a hook into the mount point above the battery door and pushing firmly into place with a spring mechanism. It is removed by pulling down the spring mechanism and lifting up.
- The adjustable arm, which attaches to the custom TSC510 bracket. It has multiple mounting positions to adjust the proximity of the TSC510 to the pole and includes a connector compatible with other Trimble mounting products, including the quick release clamp. The arm can be configured for left or right-hand usage by unscrewing and rotating the cradle plate.
- The pole-facing part (quick release clamp), which connects to the adjustable arm and includes the pole clamp. This part is compact for storage within a 10 cm (4”) pipe.

When the pole bracket mount and adjustable arm are attached to the TSC510, the device "snaps" easily into the cradle of the pole clamp assembly. To remove the TSC510 from the pole clamp, a lever on the back of the locking mechanism is pulled to release the device. The Empower module MUST NOT interfere with the pole mounting method when attached.

How do I attach and use the handstraps on the TSC510?

The handstrap can be attached to either the left or right side of the device, based on personal preference. To ensure a good fit:

- Thread one end of the ribbon through the top handstrap slot, from the center towards the top of the device.
- Pull the ribbon back towards the center and feed it up, over, and down through the lock buckle, then pull it tight.
- Repeat steps 1 and 2 for the other end of the handstrap through the bottom handstrap slot. A small blunt tool can be used to push ribbons through the slots if needed, but a sharp tool should be avoided. When properly attached, the device should sit firmly in your hand. The hand strap is designed to be easy to add and remove (in less than a minute), configurable for both left and right-hand use, and allow for secure holding while operating controls.

How do I attach and use the shoulder sling with the TSC510?

The optional shoulder sling is provided with two rings for attachment to the TSC510's mounting points. It offers an alternative to attaching it to the handstrap's rings. The sling can be attached to either the lower or upper mounting points, or crosswise. It's even possible to create a simple harness using two shoulder slings. The shoulder sling is also compatible with the TSC5 protective carry case by connecting to D-Rings on either side of the case, allowing it to be used as a shoulder bag. The shoulder strap is designed to be easy to add and remove in less than a minute.

What are the Empower modules?

The optional Trimble Empower modules are designed to provide additional functions such as robotic radio, sub-meter GNSS, RFID scanning, or barcode reading. These modules are user-exchangeable and are compatible with various Trimble controllers, including the TSC7, T7, Nomad 5, T100, and TSC5. The TSC510 MUST allow for the attachment of a single Empower module.

To attach an Empower module to the TSC510:

- Ensure the device is powered off or in Sleep state before installation or removal.
- Hook the Empower module onto the back of the device, making sure the slots on the top of the device align with those on the module.
- Using a Philips #1 screwdriver, tighten the two captive screws at the bottom of the Empower module to secure it. Do not overtighten.
- After installing or removing an Empower module, you will need to re-calibrate the compass. All Empower software is pre-installed on the TSC5, and since the TSC510 is an Android device, software updates are available via Google Play. When an Empower module is fitted, the device MUST be stable for use with the keypad or touchscreen. The attachment of the module MUST NOT compromise any mechanical or environmental protection requirements of the device.

Does the TSC510 require Empower module covers?

No, the TSC510 is designed to be fully sealed against dust and water ingress and therefore does not require a cover for the Empower module slot.

Keyboard

What keyboard options are available? Can I change the keyboard?

The TSC510 implements a full alphanumeric QWERTY layout keyboard. Currently, there is one QWERTY keyboard layout available. If the keyboard is damaged, it can be replaced by a Trimble Authorized Service Provider. The keypad is designed to be usable with typical work gloves.

How many function keys does the TSC510 have?

The TSC510 has programmable function keys. These include 11 physical F-keys, with F1-F5 located near the D-pad and F6-F11 below the numeric keypad. F12 is accessible via the Fn modifier key in combination with the F11 key. The keypad also implements arrow keys and an Action key for navigating user interfaces.

How do I set up function keys and what can they do?

The function keys on the TSC510 can be configured within Trimble Access or other 3rd party software applications. However, they cannot be configured directly within the Android OS settings.

Is the keyboard backlit?

Yes, the TSC510 has an adjustable backlit keyboard. The keypad characters MUST be easily visible in dim lighting conditions, and the brightness MUST be relatively uniform across all keys. The backlight can be adjusted manually or automatically through Settings > System > Physical keyboard > Built-in Keyboard. For automatic adjustment, the TSC510 uses the ambient light sensor on the display. It is designed to turn on when the user starts typing and makes use of ambient light sensor feedback. Disabling the keypad backlight can help save battery power.

On-Screen keyboard

The TSC510's Android operating system includes an on-screen keyboard. However, because the TSC510 has a full physical keyboard, the on-screen keyboard is disabled by default. To activate it, you can navigate to Settings > System > Keyboard > Physical Keyboard > Use on-screen keyboard.

Once activated, the on-screen keyboard will appear in most applications and operating system functions when focus goes to an input field requiring text entry. It can be dismissed by pressing the Back key. The operating system does not provide a way to manually open the on-screen keyboard using physical key combinations.

Screen

What is important to know about projective capacitive touchscreens?

The TSC510 features a projective capacitive multi-touch touchscreen that is highly responsive to the touch of a finger, as well as a capacitive stylus. This allows for easy zooming into images or data if the software supports a multi-touch user interface. Since capacitive touchscreens rely on the user being a conductor, if you are wearing gloves (e.g., in very cold weather), Trimble recommends using gloves specifically designed for capacitive touchscreens or using the stylus. The touchscreen is also designed to work in the rain, but in heavy rain or when wiping the screen, false contacts may occur. Using a screen protector with finger mode can help mitigate false contacts in the rain. To wipe the display, you can use the "Clean Screen" function combination (Fn+1) and press any key to unlock the touchscreen. Alternatively, you can briefly press the power key to put the device in suspend mode. The touch panel performance is designed for accurate pointing, aiming, and manipulation of on-screen elements. It MUST implement two-finger single touch even under rain conditions, with or without a glass screen protector.

How do I change the "Touch Modes"?

The TSC510 comes with a pre-installed Touch Panel Mode settings app which allows you to switch between stylus, finger, or (conductive) glove modes.

You can access these settings quickly from the Quick Settings Menu:

- Swipe down on the Notifications bar at the top of the Home screen to access Quick Settings. You may need to swipe down a second time or swipe left to access other pages.
- Tap the touch mode icon to cycle through Finger, Stylus, and Glove modes, or press and hold the app icon to open the full Settings page. You can also navigate to Settings > Display > Touch Panel Mode to select or switch between these modes. When using the device in the rain, it is recommended to use Finger mode with a screen protector installed.

- Why do I have to change touch screen modes when switching between finger and stylus?
- The capacitive touchscreen of the TSC510 responds differently to the distinct characteristics of fingers, styli, and gloves. For optimal response and accuracy, Trimble recommends that you select the appropriate mode (Finger, Stylus, or Glove) when switching between them.

If I lose my stylus, can I use a non-Trimble stylus?

Yes, a wide variety of 3rd party capacitive touch styli with a rubber tip will work with the TSC510. However, the stylus available as an accessory from Trimble is specifically tuned for the TSC510 display and is designed to fit into the device's stylus holder. While other styli may work, Trimble cannot guarantee their performance and recommends ordering a replacement Trimble stylus if necessary. The TSC510 MUST have integrated storage for the stylus and tether attachment points. The stylus MUST be usable by both left and right-handed operators and remain accessible even when the device is attached to the pole bracket or other accessories.

Do I have to use Trimble-provided gloves for my touchscreen to work?

No, you do not have to use Trimble-provided gloves. However, you do need to use gloves that are designed for use on projective capacitive touchscreens. There are many touchscreen-compatible safety gloves available, as Trimble does not provide them.

Do I need a screen protector?

Yes, Trimble strongly recommends using a screen protector. While the TSC510's screen is made of hardened glass and is highly resistant to abrasion and impact damage, it may still show scratches over time without a protector. The screen protector not only provides long-term protection but also shields the screen from UV radiation and improves response in the rain. A screen protector is provided in the box with the TSC510 and is also available as an accessory.

How do I apply the screen protector?

To install a screen protector on your TSC510, it is crucial to make sure the screen is clean before application to avoid visible dust or dirt that could degrade your display experience.

1. Place the device on a clean, flat surface and ensure your hands are clean.

2. Clean the touchscreen with the supplied alcohol wipe.
3. Polish and dry the screen using the lint-free cleaning cloth provided.
4. Remove any dust specs with the supplied dust sticker.
5. Remove the protective film from the screen protector.
6. Align the screen protector with the bottom of the glass display, using the "TSC510" badge at the top of the keyboard as a guide, leaving a small, evenly spaced gap around all edges. It should line up evenly with the label and the device's edges.
7. Carefully lay the screen protector down. If misaligned, you can gently lift and realign it. Once positioned, press softly in the center to allow the adhesive surface to grip naturally.
8. If any bubbles remain, gently smooth them towards the edges of the screen protector using the provided cloth.

How do I lock the screen rotation?

The TSC510 is equipped with orientation sensors that can detect whether your device is in portrait or landscape orientation. The Android operating system can automatically adjust the display to match the device's orientation, or you can choose to lock the orientation. The screen is in landscape mode by default.

To manage screen rotation:

1. Swipe down from the top of the screen to access the Quick Settings bar.
2. If auto-rotate is turned off, the icon will show "Portrait" or "Landscape." Tap it to turn auto-rotate On.
3. If auto-rotate is turned on, the auto-rotate icon is visible. You can tap it to toggle auto-rotate Off.

To lock the orientation, first orientate the device to your desired Portrait or Landscape mode, then tap the auto-rotate icon to turn it off and lock the device in that chosen orientation.
It is generally recommended to keep the device in auto-rotate off mode as it is primarily designed to work this way, and this setting helps to save battery power. Only enable auto-rotate if a specific application you are using requires it and does not support landscape mode.
Software

Is there a flashlight app?

The TSC510's camera LED can be used as a flashlight (torch). You can access this feature by swiping down from the Status bar and tapping the Flashlight icon to toggle it on and off. Additionally, many free flashlight applications are available for download from Google Play.

How do I capture screensnaps?

You can capture a screenshot on the TSC510 using two methods:

- Press Fn + 0 (PRTSCR) simultaneously to copy a screenshot of what is currently visible on the screen.
- Alternatively, hold down the Power key, and then tap "Screenshot" from the options that appear. Screenshots are saved to the Files > Pictures > Screenshots folder on the device.

What software is supported on the TSC510?

The TSC510 is compatible with key Trimble field software and other Android applications:

- Trimble Access Field Software (version 2021.00 and later).
- Trimble Siteworks Software (version 1.40 and later).
- Trimble Forensics Capture software.
- Android-based 3rd party apps available on Google Play. Trimble Access and Siteworks software can be installed on the same TSC510 device.

Is Trimble Access or Siteworks pre-installed on the TSC510?

No, Trimble Access and Trimble Siteworks are not pre-installed with the operating system on the TSC510 and are sold separately. They are easily installed using the Trimble Installation Manager.

Is Trimble Installation Manager pre-installed on the TSC510?

Yes, Trimble Installation Manager (TIM) is pre-installed on the TSC510. It is designed to automatically check for updates. TIM is used to update Trimble software like Trimble Access.

How do I install Trimble Access or Siteworks?

Trimble Access and Trimble Siteworks are installed using the Trimble Installation Manager (TIM), which comes pre-installed on the TSC510.

To install the software:

- Connect the TSC510 to the Internet.
- Open the Trimble Installation Manager application on the device.
- TIM will automatically check for updates. You may need to set permissions to allow the Trimble software to update. A software license is required to use these applications.

Are Trimble Access job files from TSC7/TSC5 compatible with TSC510?

Yes, Trimble Access job files are compatible across devices. They are not specific to a particular controller or operating system.

Is SX10/SX12 scanning support on the horizon for Android devices?

The SX12 is compatible with Windows Controllers running Trimble Access 2021.00 or later.

Which GNSS receivers and Total Stations are supported with TSC510 using Access software?

The TSC510 is designed to support a wide range of Trimble instruments:

- It supports all GNSS Systems.
- It supports all legacy and future Empower modules.
- It supports all Mechanical Total Stations.
- It supports all Robotic Total Stations.

Operating system

What operating system is installed on the TSC510?

The TSC510 is powered by the Android 14 operating system. This OS is Google Mobile Services (GMS) certified through an independent lab, ensuring it will be kept up to date with the latest security patches according to Google Android requirements. The GMS certification also enables the TSC510 to run any Android application available on Google Play, as well as supported Trimble software.

How does the operating system language provisioning feature work?

When you turn on the TSC510 for the first time, you will be prompted to select your desired language, similar to the process on any standard Android device. The primary localization is English (United States), with others to be determined.

How can I restart the TSC510?

If your TSC510 becomes unresponsive and is no longer responding to touchscreen or keyboard input, you may need to force it to restart.

- To restart the device, press and hold the Power key until the "Power Off" and "Restart" options appear on the screen. Then, tap "Restart".

NOTE: Forcing a restart by holding down the Power key directly removes power to the CPU, which means any unsaved files and settings might be lost. The power button also provides immediate feedback (less than 0.2 seconds) to the user via haptics, LED, or screen notification upon pressing it for power on or resuming from sleep.

How can I reset the TSC510 operating system back to factory settings?

If restarting your device does not resolve an issue, a factory reset may help.
WARNINGS: A factory reset will wipe all data from the device and return it to its original factory settings. While data stored in your Google Account will be restored, all apps and their associated data will be uninstalled.
Your device is protected, and after a factory reset, you will need to enter your Google username and password associated with the device. If you do not have this information, you will be unable to complete the setup process and use the device.

Erasing data can take some time, so ensure the device is plugged into a power source before beginning.

To perform a factory reset:

- Open Settings > System > Advanced.
- Tap Reset options, then select Erase all data (factory reset).
- Follow the on-screen instructions, which may require you to enter your unlock pattern, PIN, or password. Once the device has finished erasing, you will be prompted to go through the new device setup process. The OS on the TSC510 allows the user to perform a Factory Data Reset even if the device fails to boot into Android.

Can I prevent operating system updates from happening at any time?

The TSC510 runs the Android OS, which typically does not push frequent, mandatory updates from Google. Trimble will release an OS update approximately every 90 days, and you will be notified on the controller. You can then choose to install the update at your convenience. Trimble recommends keeping the operating system updated as it includes bug fixes, enhancements, and security updates from Google, which reduces vulnerability to cyber-attacks and improves the Android OS. Security updates are deployed to devices from the Google Over the Air (GOTA) server, over Wi-Fi or WWAN.

How do I set up a Google Enterprise ‘G Suite’ account?

For more information on setting up a Google Enterprise 'G Suite' account, you should refer to the Support Note available at: https://www.trimble.com/globalTRLTAB.aspx?nav=Collection-130786.

Can I load 3rd party Android apps on the TSC510?

Yes, you can install any application available on Google Play on the TSC510.

Does TSC510 have an anti-theft feature?

If you have added a Google account to your TSC510, you can utilize the Google Find My Device app to help locate a lost or stolen device and lock it until you recover it. This app, downloadable from Google Play (https://play.google.com/store/apps/details?id=com.google.android.apps.adm), allows you to see your TSC510's location on a map (or its last known location if current isn't available). It also provides options to erase the device or lock it with a custom message and contact number on the lock screen. Find My Device is part of Google Play Protect. Many other 3rd party anti-theft apps are also available on Google Play.

Data transfer & cable connections

How do I find and transfer my files, pictures and screenshots that are saved to internal storage or on a connected USB drive or computer?

Files located on the TSC510, or on connected devices such as a USB drive or another computer, can be found using the Files application, which is pre-installed on the device. Specifically, photos on the TSC510 are located under Files/TSC5/Pictures, and screenshots are found under Files/TSC5/Pictures/Screenshots. Files and data can be transferred to and from the TSC510 using the following methods:

- Via USB-C memory stick or storage drive.
- Via USB-C cable connected to a PC or laptop.
- Using cloud-based file sync service software and cloud storage (requires a Wi-Fi or cellular data connection). The TSC510 also includes the convenience of Android Quick Share for file transfers.

What type of cable connections does TSC510 support?

The TSC510 includes a USB Type-C connector that serves as the sole charging source for the battery installed in the device and supports data transfer. The device comes with a USB Type-C to USB Type-C cable for charging and data transfer.

The USB Type-C port on the TSC510 provides:

- USB 2.0 as a minimum, with USB 3.2 Gen 1 (Superspeed 5Gbps) preferred for data transfer.
- USB-PD (Power Delivery), for fast battery charging. The internal power supply complies with USB-PD2.0.
- Dual Role Data (DRD), functioning as both a Host and Client.
- Dual Role Power (DRP), with a minimum output of 5V/1.5A, and 5V/3A preferred. The port is accessible without tools. The TSC510 also provides functionality to detect moisture or foreign particles in the USB Type-C connector, preventing charging and alerting the user when detected. Similarly, it detects over-temperature of the connector (above 95°C), preventing charging until the temperature drops below 85°C. The USB-C connector implements a dual screw locking mechanism for USB Type-C cables as per the USB.org Locking Connector Specification.

Can I use a 3rd party USB cable to connect my TSC510 to my desktop PC / laptop?

Yes, USB Type-C cables commonly used for many modern mobile devices will work with the TSC510. However, Trimble recommends using the cable that is shipped with the controller as not all 3rd party cables are high quality and could cause issues with proper charging and data transfer. You can also use an adapter to convert the USB Type-C port on the TSC510 to a USB Type-A female port for use with USB Type-A accessories like memory drives. While a USB Type-C to USB Type-A cable can connect the TSC510 to a computer with only a USB-A port, this type of cable cannot be used to charge the device.

Can I replace the I/O block?

No, the I/O boot is not user-replaceable. If the USB-C port becomes damaged, it can be replaced at a Trimble Regional Service Center (RSC) or a Trimble Authorized Service Provider (ASP). The USB-C connector is designed to be serviceable by authorized service centers without needing to replace the mainboard.

Does TSC510 have an SD card slot?

No, there is no SD card slot on the TSC510.

Is Windows Mobile Device Center compatible with the TSC510?

No, Microsoft® ActiveSync and Windows Mobile Device Center are designed for devices running the Windows Mobile operating system and are not supported on devices running the Android operating system, such as the TSC510.

Power

What does the status LED indicate?

The TSC510 includes a battery charging LED on the front panel.

Its indications are:

- Solid green LED: Battery fully charged.
- Solid amber LED: Battery charging normally.
- Solid red LED: Battery charging error (or permanent error when disconnected from charging source). When disconnected from a charging source, all LEDs are off, except for a solid red LED in case of a permanent error. The LED indications are designed to be viewable in bright sunlight.

How do I change batteries?

The TSC510 is designed with internal rechargeable Li-Ion batteries that are not user-removable. They can be replaced at Trimble Regional Service Centers and Trimble Authorized Service Providers. The device also supports an optional user-replaceable battery accessory (Amar Li-35). This external battery can be inserted or removed by unscrewing the battery cover on the back of the device with a Philips screwdriver. The field-removable battery is also designed to be protected from environmental damage when not inserted in the device and can withstand drops of up to 1.2m onto concrete. It can visually show its current state of charge when external to the device.

Can I charge the batteries in my TSC510?

Yes, the TSC510 can charge its batteries. The USB Type-C connector is the sole charging source for the battery installed in the device. The internal power supply of the TSC510 complies with USB-PD2.0 charging, even when the battery is in a critical undervoltage state. While not prescribed what exact USB-PD voltages or currents the device accepts, it MUST meet the required charging times when fast charging. The TSC510 can also be charged by non-PD USB sources, such as DCP, SDP, and CDP Type-A sources, though charging will be slower with these. The device MUST be able to charge batteries at ambient temperatures between 0°C and 45°C.

What is the internal battery's capacity, battery life and charging time?

The internal Li-Ion batteries have a nominal capacity of 4600mAh / 7.26V. The TSC510 is designed to meet the following runtimes with either the internal battery pack or a field-removable battery:

- Device in use: A fully charged battery MUST support the following runtimes at room temperature (23°C):
    - GNSS RTK Workflow: >9 hours.
    - Robotic Total Station Workflow: >9 hours.
    - Heavy Stress Usage: >2 hours.
- Device in Standby: A fully charged battery MUST support a sleep state of at least >1 week at room temperature (23°C) with Wi-Fi and Bluetooth operating.
- Device powered off: A fully charged battery MUST retain a state of charge of >=25% after 90 days.

For charging time, the TSC510 MUST be able to charge the battery from 0% to 50% in 2 hours and to 100% in 4 hours when the device is not in use. It also MUST be able to charge the battery while the system is in use.

Is it normal for the battery to get warm?

Yes, it is normal for any battery to get warm while charging. However, it is important to note that batteries should not be charged at temperatures below +32°F (0°C) or above +104°F (+40°C) to

avoid impacting battery longevity and performance. You should also avoid charging batteries inside a hot vehicle (e.g., parked in the sun) as temperatures can quickly exceed the specified range.

Can I use a power bank to charge the TSC510?

Yes, you can use a power bank to charge the TSC510. A typical power bank provides 5V through its USB port. The TSC510 charger is a 5V/9V, 3A USB-PD compliant charger with a Type C connector. If your power bank has at least a 27W output and a USB Type C cable, it will charge the TSC510 effectively. If the power output of the power bank is less than 27W, charging will be slower. If it is more than 27W, it will not charge any faster.

Why are the batteries arriving "dead"? / My device will not turn on!

Your TSC510 may be in "Shelf Mode" when it arrives, which is a low-power state designed to prevent battery degradation during shipping or long-term storage. The TSC510 will "wake up" once it is plugged in and begins charging. A user option MUST be provided to put the batteries (internal and field removable) into this low power shipping mode for long term storage.

Will using WWAN impact my battery life?

Yes, using the WWAN (cellular) feature will impact your battery life. Battery life is influenced by various factors, including the software applications in use, other active wireless features (Bluetooth, Wi-Fi, GPS), exposure to extreme heat or cold, the age of the batteries, and battery storage and charging routines. Since the WWAN feature requires power, it will consume energy from the batteries when the device is not plugged into an electrical outlet. Typically, you can expect your battery run times to be impacted by anywhere from less than 10% to as much as 20%, depending on transmit and receive times, and standby time.

How do I maximize battery life?

The Android 10 operating system, which the TSC510's Android 14 builds upon, includes features to help maximize battery run time. Here are practical suggestions to reduce power consumption and extend battery life:

- Use Battery Saver mode: This mode turns off or restricts background activity, some visual effects, and other high-power features. To activate, swipe down from the Status bar, tap the Battery Saver icon, then tap "TURN ON".
- Keep Battery optimization on: This ensures apps use the device’s battery only when necessary. It is on by default.
- Avoid high-drain activities: Minimize heavy screen use or extensive data processing.
- Turn off wireless radios when not in use: This includes Bluetooth, Wi-Fi, and WWAN (cellular). You can turn off Bluetooth or enable Airplane mode from Quick Settings. Wi-Fi and WWAN settings are found under Settings > Network & Internet.
- Limit location data: Turn on GPS battery saving mode or turn off Location services when not needed.
- Limit automatic syncing: Turn off auto-sync for your Google account and apps, and deselect unnecessary items in Settings > Accounts.
- Unplug USB devices: Many USB devices draw power simply by being connected.
- Turn off Empower modules: If you won't be using them for a prolonged period, turn them off via the Empower Hub app.
- Decrease display brightness: Adjust the display brightness to the lowest comfortable level via Settings > Display, or by using Fn + 4 keys on the keypad.
- Turn off screen rotation: Leaving auto-rotate off can save battery power.
- Disable keypad backlight: If you are not working in low light, turn off the keypad backlight in Settings > System > Languages & input > Physical keyboard > Built-in Keyboard.
- Turn off the handheld: When not in use, power off the device by pressing and holding the Power key until the Power menu appears, then tap "Power Off."
- Use Sleep State: Reduce the screen turn-off time by configuring the device settings. Briefly pressing the Power key forces the device into Sleep state. You can set the screen timeout in Settings > Display > Advanced > Screen timeout.

Bluetooth, Wi-Fi & cellular connectivity

What wireless connectivity does TSC510 support?

The TSC510 supports comprehensive wireless connectivity options:

- Worldwide 4G LTE & 3G UMTS networks, in regions where available. It is AT&T, Verizon & T-Mobile certified in the United States.
- Wi-Fi 6 (802.11a/b/g/n/ac/ax) operating on both 2.4 GHz and 5.0 GHz bands. It also supports Wi-Fi Direct and security modes like WPA3, WPA2, WPA & WEP.
- Bluetooth® 5.2, including BLE 5 and Class 1 for both BR (Basic Rate) and EDR (Enhanced Data Rate). It supports audio input/output via off-the-shelf Bluetooth headsets and can connect to at least 5 devices simultaneously. It has a 1 Mbps application layer throughput at a 100m range outdoors with clear line of sight. The Bluetooth connection is not dependent on device orientation. It MUST pass BT SIG certification.
- NFC (Near-Field Communication) NXP PN-7160, supporting Reader/Writer Mode for reading/writing NFC cards and Peer-to-Peer mode for data exchange with other NFC peers.

Can TSC510 be used for voice calls?

No, the TSC510 controller has a cellular modem that supports data only, not voice calling. While the cellular data connection can be used for data transfer, SMS, or MMS, voice calls are not directly supported. However, you can use video calling applications and services for VoIP, such as Skype or the pre-installed Google Duo application. It's noted that this might not be optimal for video calls due to the rear-facing camera, but it could be used for voice-only calls.

Which cellular networks are supported with the TSC510?

The TSC510 has worldwide 4G support, in addition to compatibility with 3G networks where available. It is AT&T & Verizon certified in the United States. The WWAN module (Sierra Wireless EM7590) supports LTE 4G & UMTS 3G network operation, specifically LTE Advanced Pro Cat-13 with 3G fallback. It is PTCRB & GCF certified and operates with lower networks if LTE is not available. Users can select WWAN carrier network connections manually or opt for automatic selection.

What SIM card is supported with the TSC510?

The TSC510 controller requires a NanoSIM card (4FF). The SIM card is externally accessible, although tools may be required to change it. The design should prohibit users from inserting the

wrong size SIM or inserting it in the incorrect orientation. An image is implemented on the device to show the correct SIM insertion orientation.

How do I change the SIM card?

You will need a data plan and a NanoSIM card from your local cellular service provider to use cellular data. Do not replace the SIM card while outdoors, as water, dust, dirt, or debris may collect inside the SIM card bay and cause performance issues.

To change the SIM card:

1. If the device is on, turn it off by pressing and holding the Power key, then tapping "Power Off".
2. Using a Philips screwdriver, loosen the four screws to remove the cover from the back of the device.
3. Pre open the NanoSIM card door using a coin or the tool located on the stylus tether (do not remove the door completely). The SIM card holder is a push-push type.
4. Slide the NanoSIM card into the slot in the orientation shown on the NanoSIM door.
5. Close the NanoSIM door, ensuring it clicks shut.
6. Replace the cover and tighten the four screws using the Philips screwdriver.

How can I use the TSC510 Wi-Fi capability?

The TSC510 has an integrated Wi-Fi wireless Local Area Network (WLAN) radio that allows it to receive data anywhere within the range of a Wi-Fi access point. A Wi-Fi connection can be used to connect to the Internet at broadband speeds through an access point. The TSC510 supports Wi-Fi Direct for peer-to-peer connectivity. It also supports various security modes, including WPA3, WPA2, WPA, and WEP. The TSC510 can function as a Wi-Fi hotspot. The Wi-Fi module's on/off status MUST be controllable by the user. NOTE: An active Wi-Fi connection increases power consumption, and the battery will discharge more rapidly depending on factors like proximity to the access point, total data sent/received, and upload/download activity.

How can I use the Bluetooth capability?

The TSC510 features an integrated Class 1 Bluetooth® radio with Bluetooth 5.2 Classic & BLE 5, allowing for cable-free connections to other Bluetooth devices within a range of up to 100 meters. Using a Bluetooth connection, you can communicate with other Bluetooth-enabled devices such as mobile phones, desktop computers, and various peripheral devices instead of using USB connections. The Bluetooth module supports audio input and output via off-the-shelf Bluetooth headsets. It is capable of connecting to at least 5 devices simultaneously. The Bluetooth connection ability is designed to be not dependent on the orientation of the device. The TSC510 can also function as a Bluetooth hotspot (i.e., a WWAN to Bluetooth Bridge). NOTE: An active Bluetooth connection will increase power consumption, leading to a more rapid battery discharge. Usage patterns and frequency of communication will affect the exact impact.

Can I connect to any Bluetooth device?

To pair the TSC510 with a Bluetooth device, that device MUST have a Bluetooth PIN (for example, 0000 or 1234). For security reasons, the TSC510 cannot connect to older Bluetooth devices that do not require a PIN. If, for any reason, you cannot connect via Bluetooth (e.g., with a Trimble R10 or Trimble R2 receiver), you can often connect instead over Wi-Fi using the IP address 192.168.142.1. Otherwise, refer to the receiver manual for specific connection instructions.

Accelerometer & compass

How do I enable the accelerometer and electronic compass?

The TSC510 supports several integrated sensors that are active and accessible by applications.

These include:

- Magnetic heading (Compass). It has an additional accuracy requirement of ± 10° (95% confidence, ±2 standard deviations). The OS and applications provide for calibration of the compass with the user's magnetic environment and setting the declination of the user's location.

- 3-axis Accelerometer.
- 3-axis Gyroscope.
- Ambient Light Sensor. The OS provides an auto backlight mode that responds to this sensor, ensuring the adjustment is not noticeable to the user. The keypad backlight is also connected to the ambient light sensor.
- SAR sensor.
- Temperature sensor on the keypad and LCD.
- You can browse Google Play for free 3rd party applications that allow you to view sensor output.

GNSS

Does the TSC510 have internal GNSS?

Yes, the TSC510 has an integrated GNSS receiver (Sierra Wireless EM7590).

What level of GPS accuracy can I expect with the TSC510?

The TSC510's integrated GNSS receiver is designed to have an accuracy of <5m HRMS (Horizontal Root Mean Square) typical in ‘open’ and ‘light’ canopy conditions. It supports GPS L1 C/A and GLONASS constellations at a minimum, and SHOULD support Beidou and Galileo constellations. The GNSS subsystem is required to meet Android CDD requirements for GPS sensors, including a Fast TTFF (Time To First Fix) of <10s, which may necessitate Assisted or Predicted GNSS techniques. GNSS Measurement and Pseudorange information are also available.

Can I post-process the GNSS data from the internal GNSS receiver?

No, if you require GNSS raw data for post-processing, you will need to use an external GNSS receiver. The internal GNSS receiver of the TSC510 does not provide raw data for this purpose.

Can I use an external GNSS antenna with the TSC510?

No, the TSC510's internal receiver does not have an external antenna connector. For advanced GNSS setups, you can use a Trimble Catalyst antenna or survey-grade receivers.

Can I use an external GNSS receiver with the TSC510?

Yes, you can use most Trimble GNSS receivers with the TSC510. However, legacy receivers may not work. It is important to research the specifications and connection options of the receiver you intend to use or contact your Trimble Distribution Partner for compatibility information. If you plan to connect via Bluetooth, ensure the receiver is capable of using a Bluetooth PIN, as older receivers that do not require a PIN may not connect due to modern Android operating system security expectations. The TSC510 supports all GNSS Systems.

How do I get location data into applications?

Location data on the TSC510 can be received from your Wi-Fi or WWAN network, or from the device’s internal GNSS receiver. To obtain a more accurate location, particularly when using Maps and other applications, you can turn on Google Location Services.

To do this:

- Swipe down from the top of the screen and then touch and hold the Location icon.
- Alternatively, go to Settings > Location, then tap Advanced > Google Location Accuracy and toggle "Improve Location Accuracy" on or off. You can also choose which applications use the TSC510's location. From the Location icon in Quick Settings, tap "App permission" to manage access levels (e.g., "Allowed all the time," "Allowed only while in use," "Ask every time") for different apps.
- Camera

What are the functions of the integrated digital camera?

The TSC510 includes a rear-facing (field-facing) 16 megapixel camera with autofocus and an LED flash, which supports geotagging. It does not have a front-facing camera. The camera provides features such as digital zoom and exposure control. It has an image capture speed of less than 2

seconds at 3264x2448 resolution. The camera can also record video at a minimum of 1080p (1920×1080) at 30 frames per second. The LED flash can be used to capture images and videos in dark environments or as a general torch. Its on/off/auto setting can be controlled from the camera application, and the flash LED color is natural white. The flash is capable of illuminating dark objects at 2 meters, with uniform brightness without saturating the image, even when an Empower module or other accessories are connected. The camera and LED are designed to not be obstructed by modules, hands, or accessories.

Can photos captured with the TSC510 be tagged with the location?

Yes, photos and videos captured with the TSC510 can be geotagged with the location. To enable this feature, you need to turn On the setting for GPS location within the Camera settings. When a picture is taken from a GIS application (e.g., as a picture attribute), the position will be recorded in the EXIF metadata.

Factory warranty

How long is the factory warranty period on a TSC510?

The TSC510 includes a standard 24-month (2-year) manufacturer's warranty. For other components, the battery typically has a 12-month warranty, and all other accessories have a 90-day warranty.

For more information

For additional details regarding the TSC510, you can refer to the Trimble Field Systems Help Portal (https://help.fieldsystems.trimble.com/portal/home.htm) for Quick Start Guides and User Manuals. For general support and sales inquiries, contact your local Trimble Distribution Partner or sales representative.