

Product FAQ

TRIMBLE GEOSPATIAL

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TRIMBLE TDC650 GNSS HANDHELD

What is the TDC650 handheld?

The Trimble® TDC650 handheld is an ultra-rugged, all-in-one smartphone and high accuracy GNSS data collector. It features an array of powerful features such as a bright 6-inch display, 2.2 GHz processor, Android™ 10 operating system, and large memory and storage. For high-accuracy positioning virtually anywhere in the world, the TDC650 supports L band and can connect to Trimble FieldPoint RTX service. The TDC650 handheld is completely customizable with Google Mobile Services and is compatible with Trimble TerraFlex™ software, Trimble Penmap® for Android software, as well as third-party Android compatible apps such as Esri® ArcGIS® Field Maps. With an enhanced all-day battery, 4G LTE connectivity, Bluetooth® 4.1, and durable exterior, this next generation TDC650 handheld is a powerful, comprehensive solution for reliable communication and data collection.



What are the key features of the TDC650 handheld?

High accuracy GNSS receiver, 6-inch touch screen, two cameras (front and back), up-to-date connectivity, dependable ruggedness, high processing power, high capacity replaceable battery, Android 10 operating system.

Operating System

What operating systems does TDC650 handheld support?

The TDC650 handheld is powered by the Android 10 operating system. This is an open and fully GMS-certified operating system enabling you to run any application, for example, Trimble TerraFlex, and third party applications such as Esri ArcGIS Field Maps, etc.

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How do I activate Android 10 on the TDC650 handheld?

The Android 10 operating system will guide you through the configuration process the first time you turn on the handheld. This process takes a few minutes. You should set up a Google account and user. After the initial setup, you can change the user settings and most of the other settings through the Settings menu

Inside the box

What is in the TDC650 handheld packout?

The TDC650 handheld packout includes the following items:

- Handheld with battery
- USB-C data cord
- Screen protector
- Hand strap
- A/C charger
- Quick start guide
- Pouch
- Monopole adaptor
- Battery opener tool
- Screwdriver for hand strap hooks installation

What optional accessories are available for the TDC650 handheld?

Pole mount, monopole, screen protector, AC adapter, spare batteries, external antenna, and Dual Battery Charger.

For more information, contact your Trimble dealer.

What is the TDC650 Android version?

TDC650 runs on the Android 10 operating system.

How long will security patches for the TDC650 be provided?

Android security updates provided until December 2024.

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What is Google Over-The-Air?

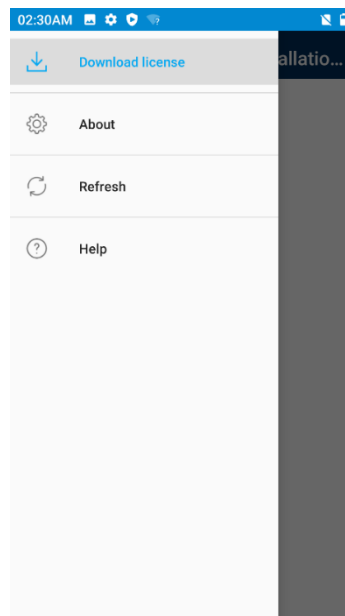
Google Over-The-Air (OTA) supports OS/Firmware updates to be pushed to the end-user rather than to manually connect and update. TDC650 supports GOTA and the user will be prompted automatically when connected to the internet if a new security version of the Android operating system is available. The upgrade will be done automatically over the air.

Software application

What is the TIM application?

Trimble Installation Manager (TIM) is preinstalled on TDC650 and will replace the GNSS loader which was used for TDC600. It will be used to install TDC650 configurations and upgrade the GNSS firmware if needed

- Install Accuracy configuration on TDC650. Start Trimble Installation Manager and select "Download license".



- Any configuration assigned to this device by the Trimble distributor in Virtual WareHouse will be listed here. Select the corresponding line to install the configuration on TDC650.

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How to enable Mock location on TDC650?

Enable Mock Location in order for location-aware apps to have access to accurate positioning.

- Activate Developer mode: Settings/About Device, Tap 7 times on "Build number"
- Access to Developer options: Settings/System/Advanced/Developer options
- Activate Mock Locations: in Developer options/DEBUGGING/Select Mock location app.

For TDC650, TMM should be selected (app available on Google Play) for use with 3rd party applications.

Is the TDC650 handheld ruggedized?

TDC650 handhelds are designed for ruggedness:

- Operating temperature: -20° to +55°C (-4 to 131°F) (6), (7)
- Storage temperature: -40° to +70°C without battery (-40 to 158°F) (6)
- Humidity: 5% to 90% RH, non-condensing. According to MIL-STD-810H 507.6
- Water & dust proof: IP67 (IEC 60529)
- Salt fog (MIL STD 810H method 509.7)
- Free drop: 1.2 m (39ft), 10 drops (2 faces, 4 edges and 4 corners) on concrete
- Shocks: MIL STD 810G (fig 516.6-10 Procedure I)
- Vibration: MIL-STD-810G (fig 514.6CI-Cat4)
- Altitude: MIL-STD-810G-2014 Method 500.5

Accelerometer

How do I enable the accelerometer and electronic compass?

The orientation sensors are active and applications can access and use the sensors. To see the sensor output, free tools are available from the Google Play Store.

SIM Card

What size is the SIM card?

The TDC650 handheld requires a NanoSIM. TDC650 has two slots for SIM cards.

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How do I change the SD and SIM card?

The SIM card and SD card slots are located underneath the battery cover on the back of the device.

1. Turn off the handheld.
2. In a dust-free indoor environment, remove the battery cover on the back of the device, push the two top slides down, and push the four side locks down to the unlocked position.
3. Remove the battery; push the battery lock left to the unlocked position, then lift the battery out left-side first.
4. Insert one or two SIM cards into the SIM card slots; make sure you insert the card correctly as illustrated on the sticker, taking note of the direction of the notched corner.
5. If necessary insert a MicroSD memory card, metal contacts down, in the slot above the SIM card slots.
6. Replace the battery and push the battery lock right to the locked position.
7. Replace the battery cover and lock it into place.

Screen

Do I need a screen protector?

Yes. Trimble strongly recommends using a screen protector. One screen protector is installed on TDC650 handheld out of the box, you just need to remove the protection mask.

One more screen protector is also provided in the TDC650 box as a spare.

How do I apply the screen protector?

Make sure the screen is clean before you apply the screen protector; any dust or dirt between the screen and screen protector will be visible and degrade your display experience.

1. Place the device on a clean, flat surface.
2. Clean the touchscreen with a damp cloth, alcohol wipe, or similar.
3. Remove the protective film from the screen protector.
4. Align the screen protector with the glass portion of the display. The screen protector should line up evenly with the edges of the device.
5. Carefully lay the screen protector on the screen. If you make a mistake and the glass looks off-center, you can gently lift the screen protector up and realign it. Then, once the protector is on the screen, give it a soft press in the center and allow the adhesive surface to grip the screen naturally.

6. If there are any bubbles remaining, use a cloth to gently smooth them toward the edges of the screen protector.

How do I lock the screen rotation?

Go to Settings / Display / Advanced and tap the Auto-rotate screen to toggle the rotation lock on/off.

What is important to know about capacitive touchscreens?

Capacitive touchscreens are very common in today's tablet computers and smartphones. The TDC650 handheld has a capacitive touchscreen that is highly responsive to the touch of a finger. You can easily zoom into images or data (if the software used supports a dual touch user interface).

The capacitive touchscreen is based on the user being a conductor to enable the touchscreen properties. If you are using gloves, such as during very cold weather, Trimble recommends using gloves that are designed for capacitive touchscreens, or the stylus.

To enable the Glove mode, go to Settings/Accessibility/Glove mode and check the box

The capacitive screen does also work in rain. However, in heavy rain or when wiping the screen, false contacts may happen. To wipe the screen and avoid false contacts the touch input on the screen can be deactivated with a key on the physical keypad.

Handstrap

How do I attach and use the handstrap of the TDC650?

- Screw the top and bottom hand strap attachments to the back of the handheld
- Feed the hand strap ribbon ends through the attachments.
- Pull one end of the ribbon back towards the center of the hand strap and velcro it to the strap. Repeat with the other ribbon end.
- Secure the hand strap wrap in place.

Connectivity

Can the TDC650 handheld be used for voice calls?

Yes, the TDC650 handheld supports voice call capabilities in Carrier Networks which allow Voice capability.

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Which are the cellular networks supported by TDC650?

It is difficult for us to give a detailed list of supported networks but TDC650 will run on most of the LTE cellular networks worldwide. Note that TDC650 is not specifically PTCRB certified even if the cellular component is the same as TDC600 which is PTCRB certified.

How can I switch between two mobile networks with the TDC650 handheld?

The TDC650 handheld has two nanoSIM slots that can be used for connection between two separate mobile carriers. To switch between networks, go to Settings / Network & Internet / Mobile network / select the preferred SIM SLOT 1 or SIM SLOT 2.

How can I transfer data with my TDC650 handheld?

Data can be transferred from the TDC650 handheld using the following methods:

- Via cloud-based file sync services (for example, Trimble Connect, Dropbox, Microsoft OneCloud, Google Drive sync, or with other cloud-based apps) over Wi-Fi or 4G.
- Via Wi-Fi connection using a wireless LAN connection to an access point
- Via Bluetooth using the file explorer application, by selecting the file to transfer and clicking on the share icon, then on Bluetooth icon
- Via USB cable to a laptop computer

How can I use the TDC650 handheld Wi-Fi capability?

The TDC650 handheld has integrated Wi-Fi that can be used 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.

NOTE: When there is an active connection to a Wi-Fi access point, power consumption increases and the battery will discharge more rapidly.

How can I use the Bluetooth capability?

The TDC650 handheld has an integrated Bluetooth® radio to establish cable-free connections to other Bluetooth devices that are within 10 meters.

Using a Bluetooth connection, you can communicate with other Bluetooth-enabled devices such as mobile phones, desktop computers and more. You can also communicate with Bluetooth-enabled peripheral devices instead of using USB connections.

NOTE: When there is an active connection to another Bluetooth device, power consumption increases and the battery will discharge more rapidly. Individual usage patterns will vary by device and the frequency of the Bluetooth communications

What type of cable connections does the TDC650 handheld support?

The TDC650 handheld has a USB type C data transfer cable.

How can I reset my TDC650 handheld?

Go to Settings / System / Reset / Factory data reset. Note, this will erase all data from the device.

How do I update the Android operating system?

Go to Settings / System / System update / Check for update and update the system if it is not up to date.

Power

Will using WWAN impact my battery life?

Yes. However, battery life is a complex calculation, based on a variety of factors that include software applications in use, wireless features in use (Bluetooth, Wi-Fi, cellular modem), exposure to extreme heat or cold, age of the batteries, and battery storage and charging routines. Using the WWAN feature requires power and that comes from the battery when the device is not plugged into an electrical outlet.

Battery removal

There is no hot-swap capability on the TDC650 so removing the battery will irremediably switch off the unit.

- First unlock the 6 lockers, 2 at the top and 2 on each side.
- Please use the battery opener provided with the product or any other tool. This is much easier and safer for your nails.
- Removing the battery is needed to install a SIM card or an SD card memory.
- Unlock the locker and insert the tool on the left side.

How do I change the battery?

Do the following:

1. In a dust-free indoor environment, remove the battery cover on the back of the device—push the two top slides down, and push the four side locks down to the unlocked position.

2. Remove the battery; push the battery lock left to the unlocked position, then lift the battery out left-side first.
3. Replace the battery and push the battery lock right to the locked position.
4. Replace the battery cover and lock it into place.

Why are the batteries arriving "dead"?

The batteries are not dead but in sleep mode. This prevents the batteries from degrading when shipping or being on a shelf. The batteries will "wake up" once charged in a TDC650 handheld or the charging dock (available as an accessory). The very first task after unpacking is to connect the AC power and charge the battery fully over a 4 hour time period

Can I charge the batteries in my TDC650 handheld?

Yes. The battery can be charged in the TDC650 handheld. A stand-alone Dual Battery Charger accessory is available if additional power is needed to support longer use days or to support workflows that require more than one battery.

How do I maximize battery life?

Ways to reduce power consumption and extend the battery life are:

- Battery Saver (Android 10 battery settings)
- Minimize the Power & sleep timeout settings (Settings > Display > Advanced)
- Reduce the display backlight (Settings > Display or pull-down Quick Settings and drag slider)
- Lock screen rotation
- Turn off unneeded radios (Wi-Fi, WWAN, Bluetooth)
- Change sync settings (Settings > Users & Accounts > Automatically sync data). Deselect the items you don't need.

How to save battery life on TDC650

Long press on power is necessary to switch all components off and then stop consuming power. In sleep mode (short press) only the display is off but all GNSS functions are still alive.

Dual battery charger

No hot swap function unfortunately but still the possibility to have an additional battery always fully charged in hands

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GNSS

TDC650 GNSS, how does it work?

The TDC650 is fitted with two distinct GNSS location providers:

- The u-blox Android GNSS (low accuracy)
- The Trimble high-accuracy GNSS module

All location settings from the Android settings menu, only impact the Android GNSS, not the high-accuracy Trimble GNSS module, which should be controlled directly from the GIS or Survey application or with the Trimble Mobile Manager (TMM) application.

When starting the TDC650, by default both the Android GNSS and the high-accuracy GNSS module are running. At this stage, any application you will be using will receive low-accuracy positions from the Android GNSS, and only from it.

High-accuracy positions will be made available and used only if TMM—the specific mock location provider—is started. High-accuracy positioning will also be available for an application supporting direct access to the high-accuracy GNSS module. This will be the case with TerraFlex, Trimble Access, or Penmap (through TPSDK). As soon as TMM, or any TPSDK-based application, is started, the Android GNSS is made idle and the displayed location settings in Android are all irrelevant.

Start/Stop Receiver and application

It is recommended to start the TDC650 GNSS receiver outside with a maximum of satellites in view. That way the start time will be optimized and the risk of false initialization will be eliminated.

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When starting TDC650, GNSS reception is activated automatically and will remain on, even when the receiver is made idle. So it is important to switch the TDC650 off when not used in order to save battery life. Note: Leaving the TDC650 in sleep mode does not turn off the receiver to save battery.

Can I use an external GNSS antenna with my TDC650 handheld?

Yes, an external GNSS antenna can be connected to a TDC650 external antenna connector.

What are the different TDC650 configurations available for sale?

There are 4 different TDC650 configurations available:

- Meter (standalone GPS L1 only)
- Sub-meter (Full GNSS L1/L2, RTK, 30/30 accuracy)
- Decimeter (Full GNSS L1/L2, RTK, 7/2 accuracy)
- Centimeter (Full GNSS L1/L2, full RTK)

These configurations differ from each other because each offers a specific default achievable accuracy (all other functions are exactly the same: L1/L2, full GNSS, etc., except for the Meter version which is L1 GPS only).

Except for the Meter configuration which does not use any correction (autonomous/standalone only), all others, from 30 cm to cm, require a correction source from VRS for example.

Applying a better accuracy configuration will enable the new accuracy on TDC650, whatever the previous lower accuracy.

The option management is made through the SGIM app (where you can also check what the currently installed accuracy option is). If several are installed this is always the highest accuracy that is applied.

Which corrections source can be used with TDC650?

TDC650 is able to handle any type of corrections except UHF ones. It can be SBAS, NTRIP, Direct IP or RTX (both from the Internet or L Band). The supported formats of corrections are: ATOM, CMR, CMR+, RTCM, CMRx and sCMRx.

Depending on the installed TDC650 accuracy configuration, the GNSS engine is set to deliver the corresponding accuracy whatever the format of the correction stream.

What is the TDC650 Accuracy performance?

Accuracy of the different versions, both in real time and for post-processing.

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| | Corrections stream supported | Accuracy H/V RMS (Internal antenna, open sky) | Post Processing TerraFlex Std/cm option |
|------------------|------------------------------|---|---|
| TDC650 Meter | No | 80 cm | Need long occupations and very short base lines |
| TDC650 Sub meter | Ntrip/RTX | 30/30 | 30 cm/1 cm |
| TDC650 dm | Ntrip | 7/2 | 30 cm/1 cm |
| TDC650 cm | Ntrip | 1 /2 cm | 30 cm/1 cm |

The best accuracy option installed on the receiver will always be applied.

Monopole

Use of the Monopole for accurate logging

The use of the monopole in conjunction with the TDC650 is a very efficient way to guarantee the accuracy of the collected features, while keeping maximum product portability.



TDC650 is shipped with an accessory to be mounted to the back of the antenna part in order to adapt on the monopole.

GNSS Antenna Height with Monopole

In order to use the TDC650 on the monopole you need to install the monopole adapter to the back of the TDC650 unit. This adaptor is provided in the TDC650 standard package. See above.

When used on top of the monopole accessory (see picture) the TDC650 can deliver accurate vertical coordinates because the monopole gives the TDC650 excellent vertical stability. When the monopole is used, the antenna height (H) you need to specify in your application (MobileMapper Field or Survey Mobile) is the length of the monopole (read the graduation directly



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on the monopole). For all Android applications using SSpace as interface, and when the monopole is used, you should enable Use monopole on the SSpace Settings screen. The application will automatically add together “H” and the distance (d) from the base of the monopole adapter to the phase center so that the application uses the real height of the GNSS antenna phase center above the ground.

Camera Logging

What is the benefit of the “Camera logging” workflow?

In order to make accurate logging possible with the TDC650, while still holding the receiver in your hand, we have implemented in TerraFlex and PenMap applications a special workflow consisting of using the rear camera to better aim at a point. When you are ready to log a point you may touch




to get a real view of the ground, as seen by your device’s rear camera. The camera view will show you something like this:



You then have to orientate your device so that the two crosshairs become concentric and green in color, meaning the TDC650 device is leveled. Then gently move the device horizontally so that the two crosshairs aim at the desired ground



point.

When you are precisely over the target, touch the  button located in the title bar, at the top right of the screen.

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Be sure you keep the crosshairs green throughout the data collection otherwise the point logging will be aborted. This is especially critical if you have chosen a long averaging time. At the end of the data collection, TerraFlex comes back to the previous screen where you should save all the data logged by pressing:



Why is TDC650 Rear Camera Calibration Required?

One important use of the TDC650 rear camera is to provide an accurate view of the ground below the TDC650 to Trimble data collection application in order to limit errors when logging features with the device in hand. In order to mitigate the possible misalignment of the camera with the body of the TDC650 unit and then a bias in the measurement, Trimble has developed a special calibration procedure. This procedure is described in detail in the TDC650 manual. It is using a special utility called CamCal.

External Antenna

Can TDC650 be used with an external antenna?

Yes. In order to improve and secure data collection specifically in difficult conditions like Urban or shaded locations, it is possible to use an external antenna connected to TDC650: the Trimble Zephyr 3.

The external antenna cable (P/N 116795) and TDC650 pole bracket (P/N 129115) are available to mount TDC650 on a pole with external antenna.

TIPS and tricks

How do I capture screen snaps?

Power key + Volume Down will save a screen capture to the My Pictures / Screenshots folder.

How many function keys does the TDC650 handheld have?

The TDC650 handheld has 4 physical F-keys (function keys). They are located at the bottom of the screen on the front of the device, and one on the left side of the device.

What can I do with the function keys on the TDC650 handheld?

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The function keys can be programmed to open any application for quick access. To program the desired functionality, go to Settings / Keymap and apply the desired application in the proposed list to each key. Volume keys can also be used as function keys.

Could TDC650 pictures be tagged with the position?

Yes, when taking a picture with TDC650 from a GIS application (Picture attribute), then the position will be recorded in the EXIF metadata.

How can I reset my TDC650 handheld?

Go to Settings / System / Advanced / Reset options / Factory reset / Erase all data. Note, this will erase all data from the device.

How do I update the Android operating system?

Go to Settings / System / Advanced / System update / Check for update and update the system if it is not up to date.

Factory warranty

Trimble TDC650 has a 2 years factory warranty.

For more information

For more information, contact your local Trimble Distribution Partner.

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