User Manual

Version V1.3-20221129

Tersus TC50 Controller
User Manual

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Revision History

Version	Revision Date	Change summary
1.0	20210714	Initial Release
1.1	20211117	Upgrade section 1.2
1.2	20221129	Upgrade section 1.2
1.3	20221129	Add MIL specification

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1. Introduction

This chapter mainly introduces the overview and specification of the Tersus TC50 Controller.

1.1   Overview

The Tersus TC50 Controller is a rugged multi-functional data controller with design of 5 inch sunlight readable HD touch screen and an alphanumerical keypad. Equipped with powerful processor and android operating system, it is perfect to adapt with Tersus survey software. With professional IP68 rating, it is robust and reliable for harsh operating conditions. The large capacity lithium battery guarantees more than 10 hours of field working for a whole day of multiple surveying tasks.

Figure 1.1 TC50 controller

1.2 Specification

Table 1 TC50 technical specification

System	
Operating System	Android 8.1
CPU	MT6763 Octa-Core 2.0GHz
Memory	4GB RAM + 64GB ROM
External storage	Micro SD, up to 128GB
Display	5'' sunlight-readable capacitive touch screen
Resolution	720x1280
Camera	5MP front, 13MP rear
Flash Light	High light Flash LED
Electrical	
Battery	7000mAh 3.8V
Battery Life	14 hours
Charging Time	<4 hours (fast charge)
Communication	
Wi-Fi	IEEE 802.11a/b/g/n 2.4G&5G
Cellular Mode	Dual SIM Dual Standby
SIM1 & SIM2	FDD-LTE B1/B3/B5/B7/B8
	TD-LTE B38/B39/B40/B41
	TDSCDMA B34/B39
	WCDMA B1/B2/B5/B8
	CDMA1x/CDMA2000 BC0/BC1
	GSM B2/B3/B5/B8
Bluetooth	BT4.1 (BLE)
USB	USB Type-C (supports OTG)
NFC	Protocol of ISO14443A/B, and ISO15693
	Readable Distance 0~5cm

GNSS	GPS/GLONASS/BeiDou
Sensors:	G-Sensor, Compass, Light-Sensor, Gyro
Physical	
Dimension	207mmx84mmx20mm
Weight	370g (include battery)
Reliability	
Operating Temperature	-10°C ~ +60°C
Storage Temperature	-30°C ~ +70°C
Humidity	5% ~ 95%
Dustproof & Waterproof	IP68
Shock	1.5m drop onto concrete
Vibration	MIL-STD-810G

Figure 1.2 TC50 outlook

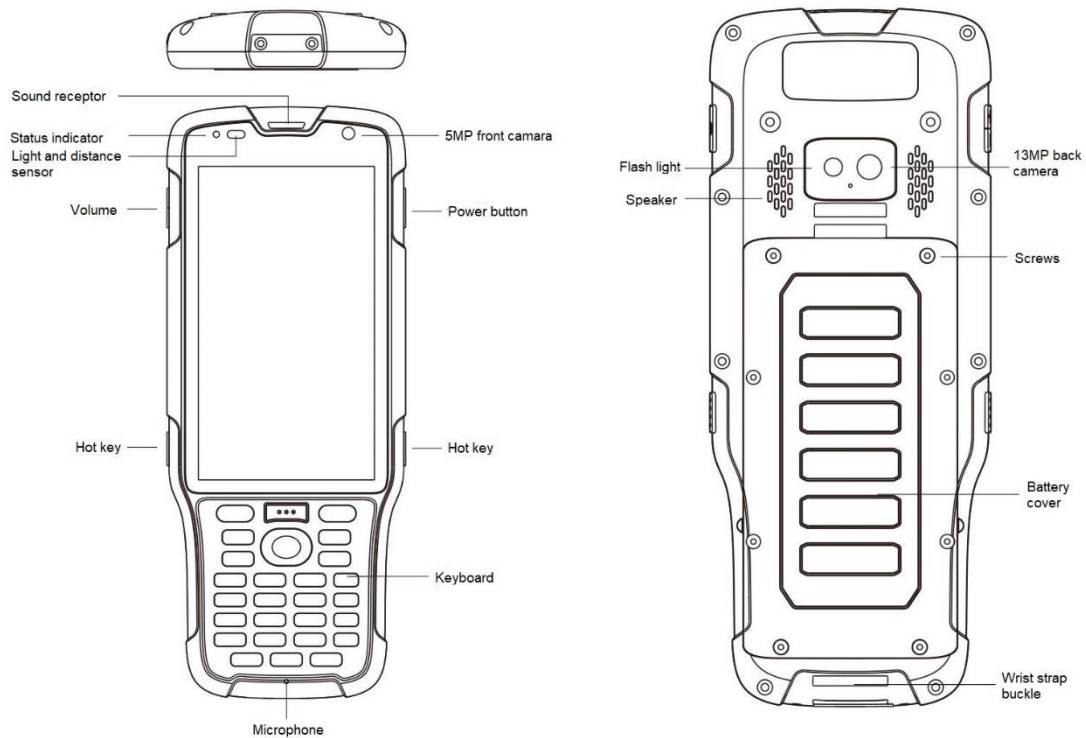## 1.3   Accessories of TC50 Controller

The accessories of TC50 Controller are listed below.

TC50 Lithium Battery (3.8V/7000mAh)

Figure 1.3 TC50 Lithium Battery

TC50 Charger (5V/1.67A, 7V/1.67A, 9V/1.67A)

Figure 1.4 TC50 Charger

Type-C Cable

Figure 1.5 Type-C Cable

Functions: 1. Connect to the USB port of computer for data downloading;

2. Connect to the charger to charge TC50 controller.

2. General Operation

This chapter introduces how to use Tersus TC50 Controller.

2.1 Starting to use TC50 controller

Power on: Press and hold the power button for 3 seconds

Power off: Press and hold the power button for 3 seconds, select 'Power Off' in the menu option.

Reboot: Press and hold the power button for 2 seconds and click "Restart" in the menu option.

Forced restart: Press and hold the power button for 8 seconds to force the controller to restart.

Introduction of functional keys：

- **Menu Key:** Select to show applications that was used recently.

- **Home Key:** Return to home screen. To view recent application, press and hold the home key.

- **Back Key:** Return to previous screen.

- **APP Key:** Quick start Nuwa application.

- **Blue Positioning** 📍 **Key:** Perform the function of starting measurement in the Survey and Stakeout interface of Nuwa application.

- **Yellow Bulb　Key：** Control the screen on and off.

- **ENTER Key:** Execute the function of confirming in Nuwa application.

2.2 Charge the battery

Before using the product for the first time, it is recommended to charge the

battery. If the battery is depleted, it can be activated by the charger.

Note: The charger should be kept close to the main socket and easily plugged in.

⚠	Warning: Use specified charger and battery only.

2.3   Insert SIM card and SD card

Please note the direction of the card notch when inserting the card, inserting a non-standard card may cause damage to the SIM card slot of the controller.

The controller cannot support two CDMA cards at the same time, when two CDMA cards are installed at the same time, only one card can use the 4G network, the other card will not be able to register the network.

To install the SIM card you need to open the battery cover, remove the battery and open the SIM card cover.
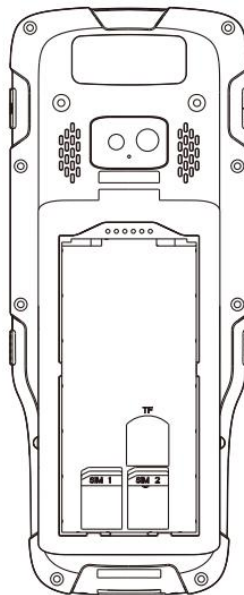

Figure 2.1 Insert SIM card and SD card

Note: Please power off the controller before plug in or pull out the SIM card.

2.4 Using of touch screen

Single Click: To select an icon. For example, click dial to open the keypad which will be displayed on the screen.

Double Click: To zoom-in or zoom-out. For example, to zoom-in or out of a photo, click twice when viewing a photo or browsing on the internet.

Hold: press and hold the screen, icon or input box to get more operation options.

1) Long-Time Click a picture in the gallery list interface, the status bar prompts to select a picture, you select to share or delete it.

2) Long-Time Click the blanks of home screen to add home screen widgets.

3) Long-Time Click the blanks of home screen wallpaper sources can be selected.

4) Long-Time Click the blanks of home screen to home settings.

Slide Upward: Slide up on the main screen (or click the upward arrow icon) to view more applications.

Slide Downward: Slide down on any interface to open the status bar and message board.

Slide Left and Right: Slide left and right on the main screen to switch the desktop interface.

2.5 Home screen operations

You can use various functions of the controller screen through the touch screen. Three functional keys are at the bottom of the screen, 'Return' & 'Home' & 'Used Applications'. Click the icons to open the applications. View all applications by sliding up the home screen.

The controller has a default screen. You can add multiple screens. After adding multiple screens, about scratching the screen to switch the screen between each other, and at any point of a long blank screen to add widgets, wallpaper settings, enter the settings.

Figure 2.2 Home screen

◆ **Create shortcuts and widgets**

Click the main screen and then Pop-up list of application. Click and hold the application icon which you want to add a shortcut. Interface blue transparent box will pop up analog screen area. Drag the application icon to the area you want to place, release the hand that add. To add widgets the same way as add a shortcut can be used. Applications and widgets interface switching mode, you can click application and widget or slide the screen. As shown the following figure:
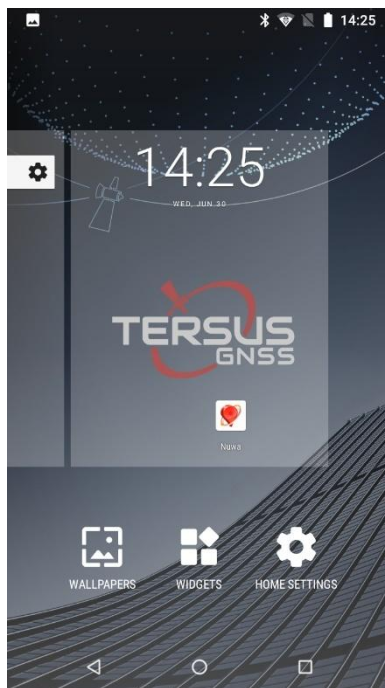

Figure 2.3 Main screen
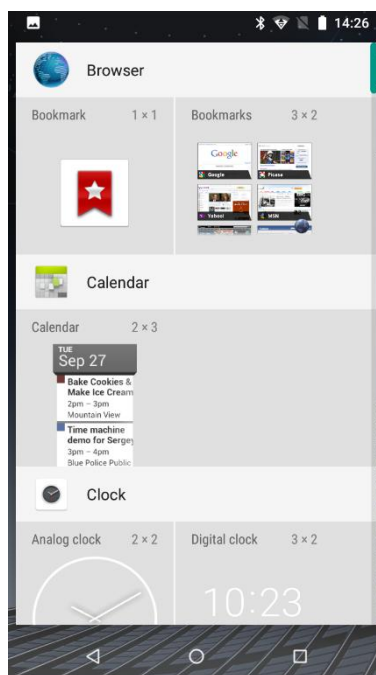
Figure 2.4 List of applications

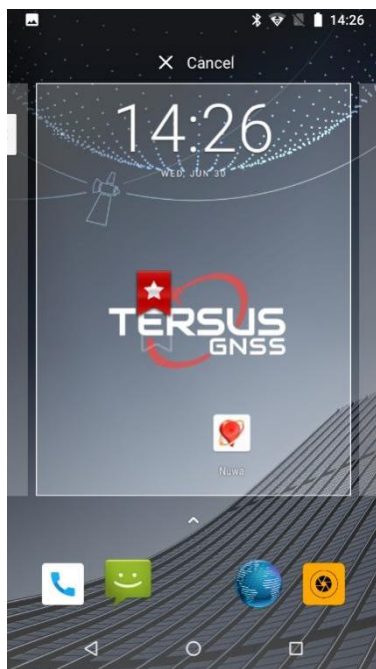Figure 2.5 Choose the applications or widgets to be added

Figure 2.6 Drag the icon to the area

Figure 2.7 Release hand and icon is added

◆ **Delete the shortcuts and widgets**

To delete an object, tap and hold the object, then drag it towards the top of the
screen X Remove . When the object becomes gray let go of it and the
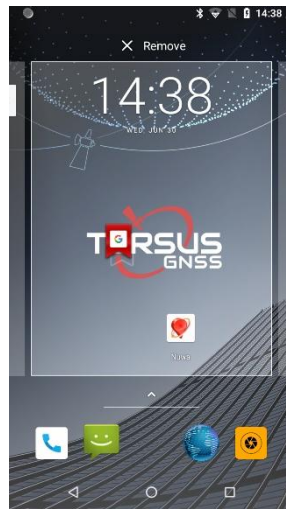selected object will be deleted.

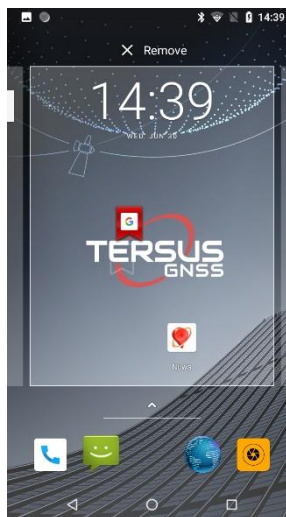Figure 2.8 Tap the icon to be deleted
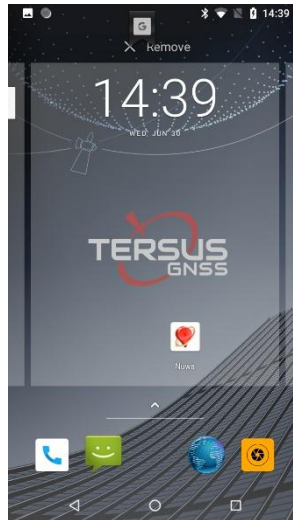

Figure 2.9 Hold and drag the icon

Figure 2.10 The object becomes gray

Figure 2.11 The shortcut is deleted

◆ **Lock the screen**

Lock the controller in order to avoid useless operation and to save the battery by press the power button.

The controller will automatically lock when it is not being used for some time.

◆ **Set wallpaper**

Long press Home screen, pop up 'wallpapers', 'widgets' and 'home settings' button. Click the "wallpaper" button to enter the screen wallpaper setup. Slide the bottom of the screen wallpaper zoom view can be switched wallpaper. After Select to set wallpaper, click "Set wallpaper" that wallpaper setting is completed. As shown the following figure:
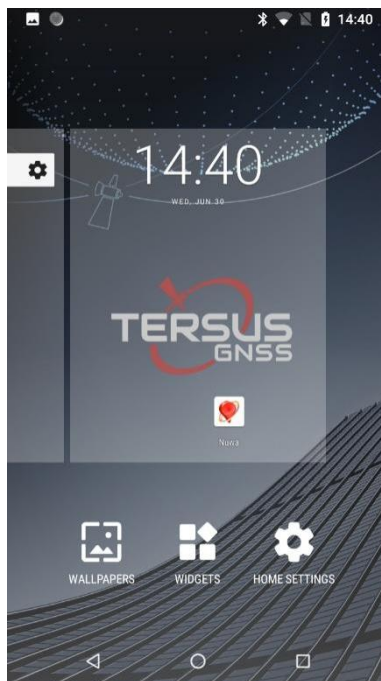

Figure 2.12 Home screen

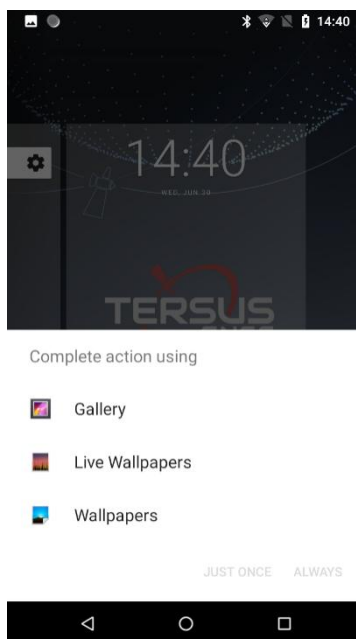Figure 2.13 Wallpapers & Widgets & Home Settings

Figure 2.14 Select wallpapers from various resources

◆ **Unlock the controller**

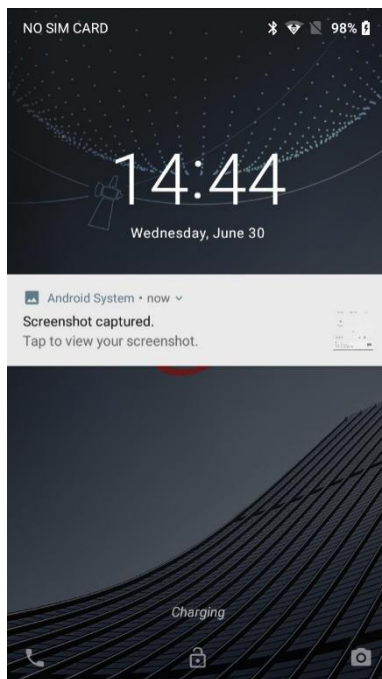Press the power button to enter the unlocking interface, then slide upward

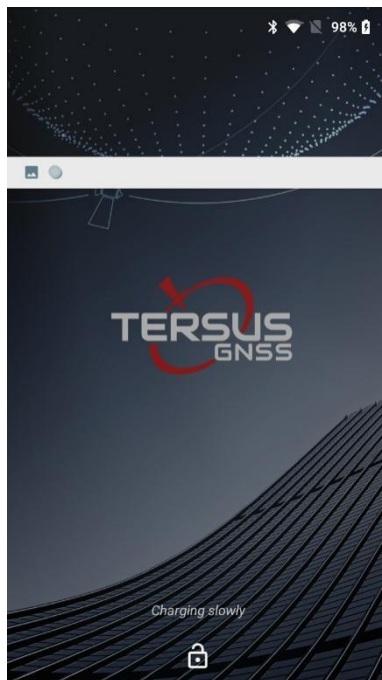and unlock.

Figure 2.15 Locked home screen

Figure 2.16 Slide up

Figure 2.17 Unlocked home screen

◆ **Message board**

Drag the status bar of any screen can open the message board. Click the unfold icon ⌄ in the upper right corner or slid down to bring up various functions setting interface. Click setting icon ✿ to enter Setting interface. As shown the following figure:
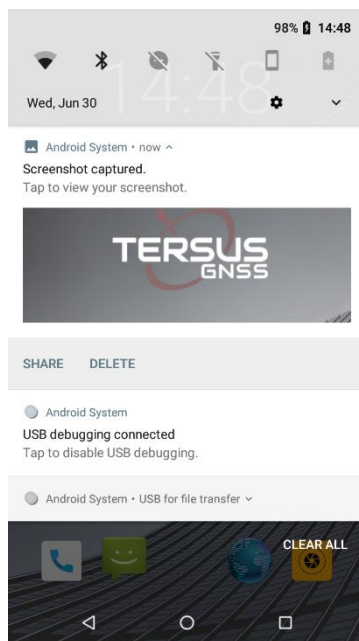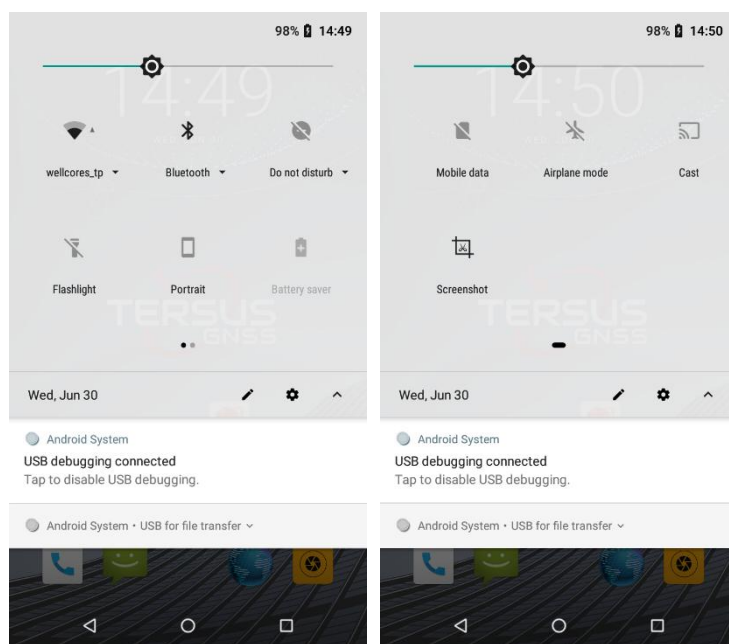
Figure 2.18 Status bar on the screen
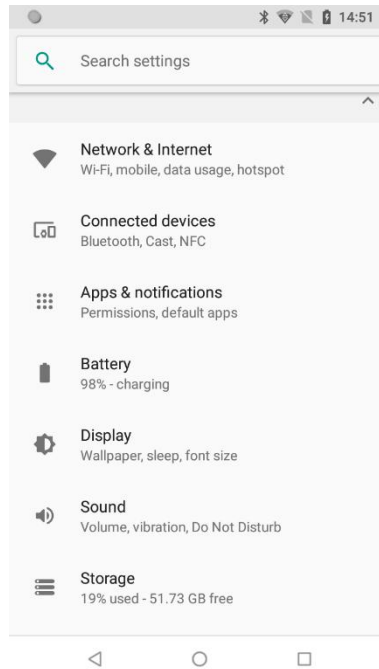

Figure 2.19 Message board

Figure 2.20 Settings interface

◆ **Manage applications**

Install applications: Found in the file manager to install the software (. APK), then follow the prompts step by step installation

Uninstall application: Enter **Settings**->**Apps & notifications**, then will be able manage and remove installed applications.

◆ **Recently used applications**

Press the key at the right bottom of the screen, the screen will display a window which shows your recently used applications. Click the icon to open the application.
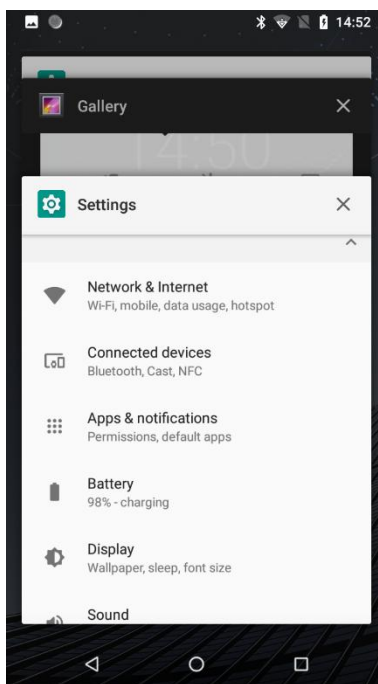
Figure 2.20 the key at the right bottom

Figure 2.21 Recently used applications

2.6 Extend battery life

Some functions may use up more power, which eventually shorten the battery life. You could:

● Close all the wireless connection when not in use Bluetooth, Wi-Fi or GPS.

● Reduce the brightness and shorten the screen timeout to save battery, or press power key to shut down the screen when the controller is not in use.

● Close any automatically synchronized applications such as Email, calendar, contacts and other.

● Some applications which are downloaded could also shorten the battery life.

2.7 Firmware upgrade

Please follow below detailed steps to upgrade firmware for TC50 controller. The firmware file can be downloaded on Tersus official website or obtained from Tersus Technical Support via email support@tersus-gnss.com.

Ensure the TC50 controller is in the **POWER OFF** state, plug the mini USB cable and connect it to the computer. If the mini USB cable is already connected, please unplug the cable and reconnect it to the TC50 controller. Please use desktop computer to connect to the TC50 controller to upgrade. When laptop is connected, it may not enter the download mode automatically, because the download port may not be recognized.

2.7.1 Install the driver

When using Windows7 system, please install the driver (DriverInstall.exe) manually. Right click choosing 'Run as administrator' to install the driver on the computer. Restart the computer after the installation is completed.

When using Windows10 system, the driver will be installed automatically if the computer is connected to the internet.

2.7.2 Configure upgrade tool and upgrade firmware

Unzip the upgrade tool (SP_Flash_Tool_exe_Windows) in a folder, find the execution file (flash_tool.exe) and double click to open it which is shown as below.
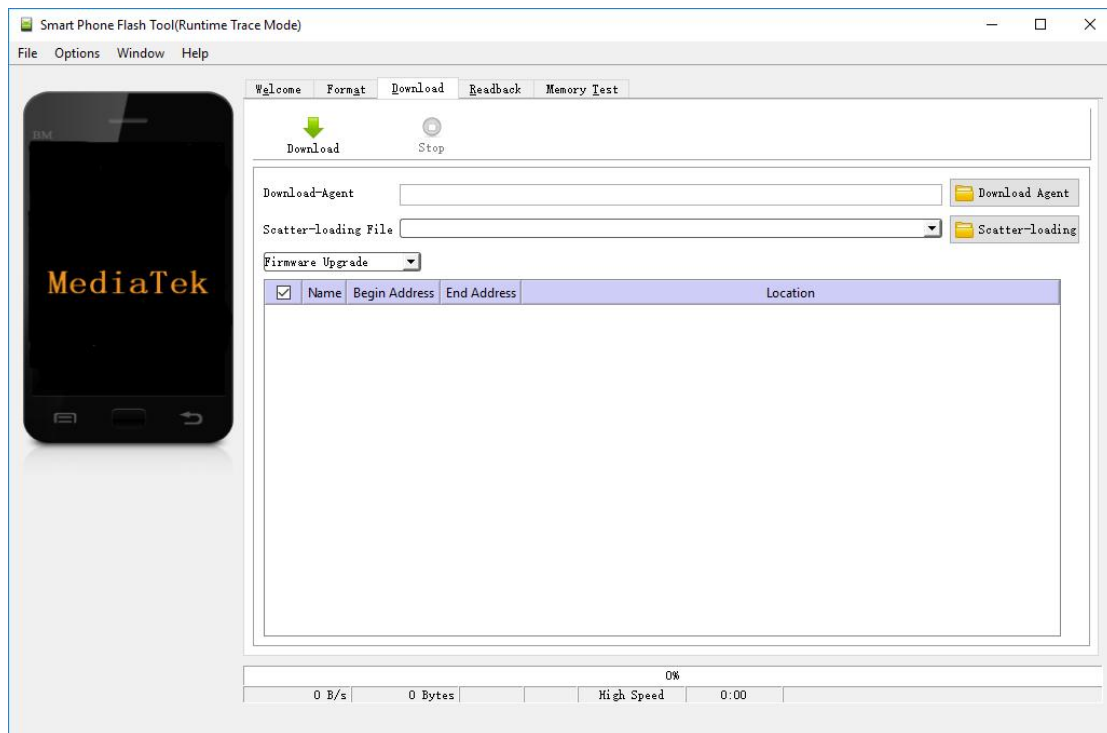

Figure 2.22 Flash tool interface

If the prompt pops up as shown below, click ok.

Figure 2.23 Prompt

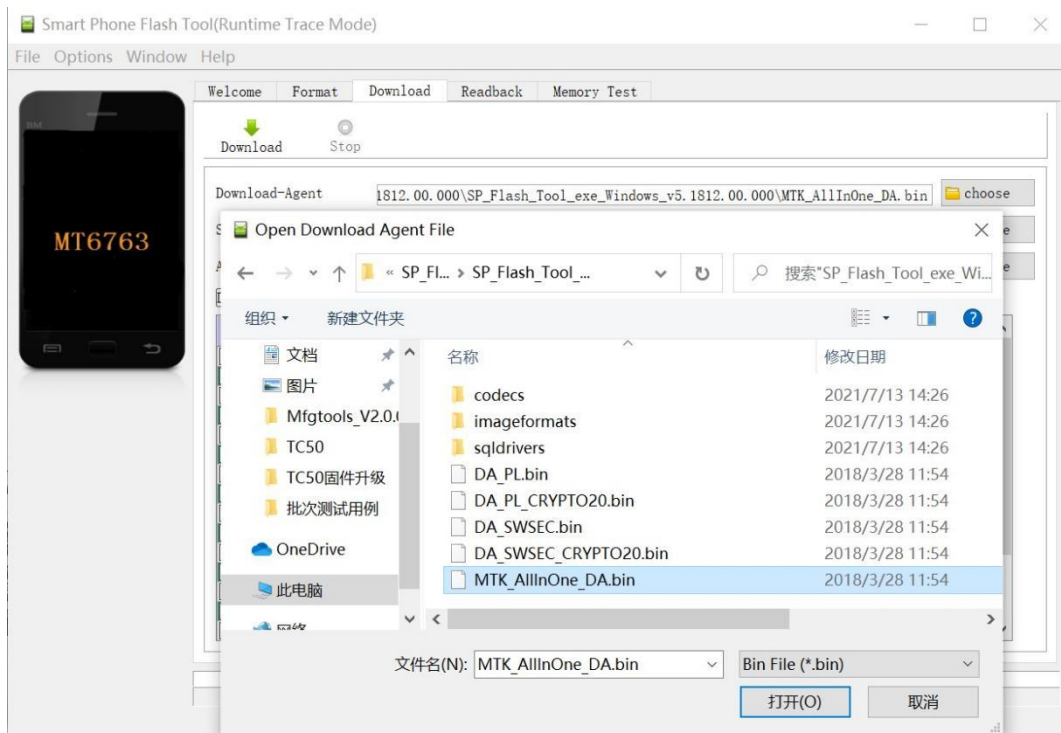Click [Download Agent], select [MTK_AllInOne_DA.bin] file in the flash tool folder which is shown as below.

Figure 2.24 Select file for Download Agent

Click [Scatter-loading], select the scatter file 〔MT6763_Android_scatter.txt〕in the upgrade file folder which is unzipped from the firmware zip file in advance.
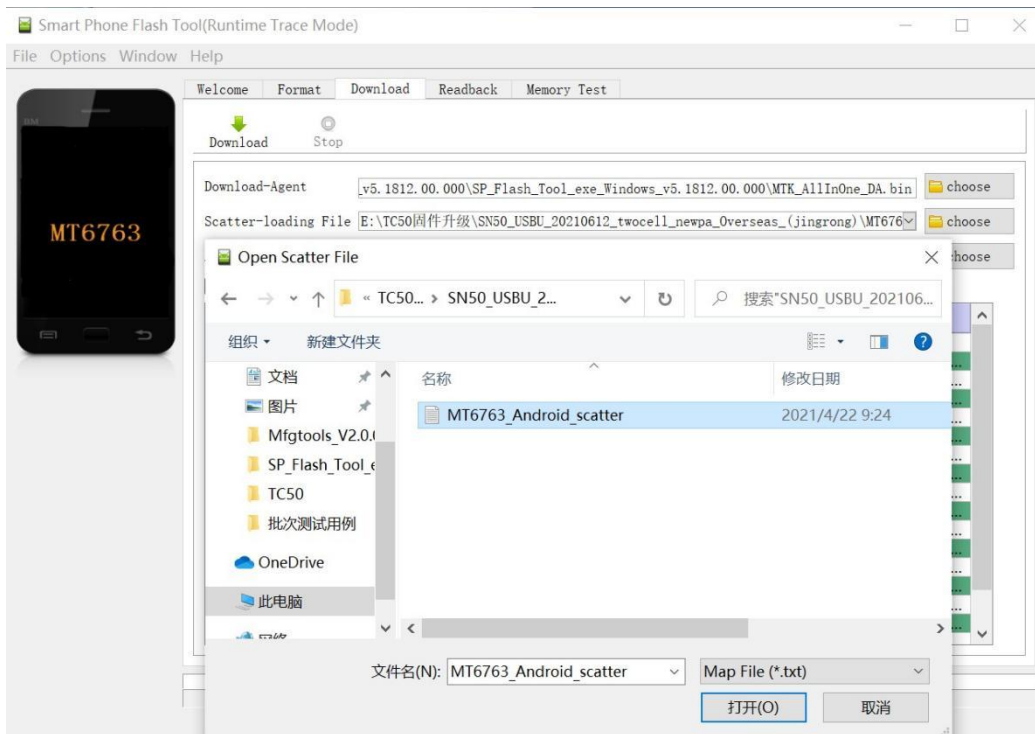
Figure 2.25 Load Scatter file

Select [Download Only] as the upgrade mode which is shown as below.
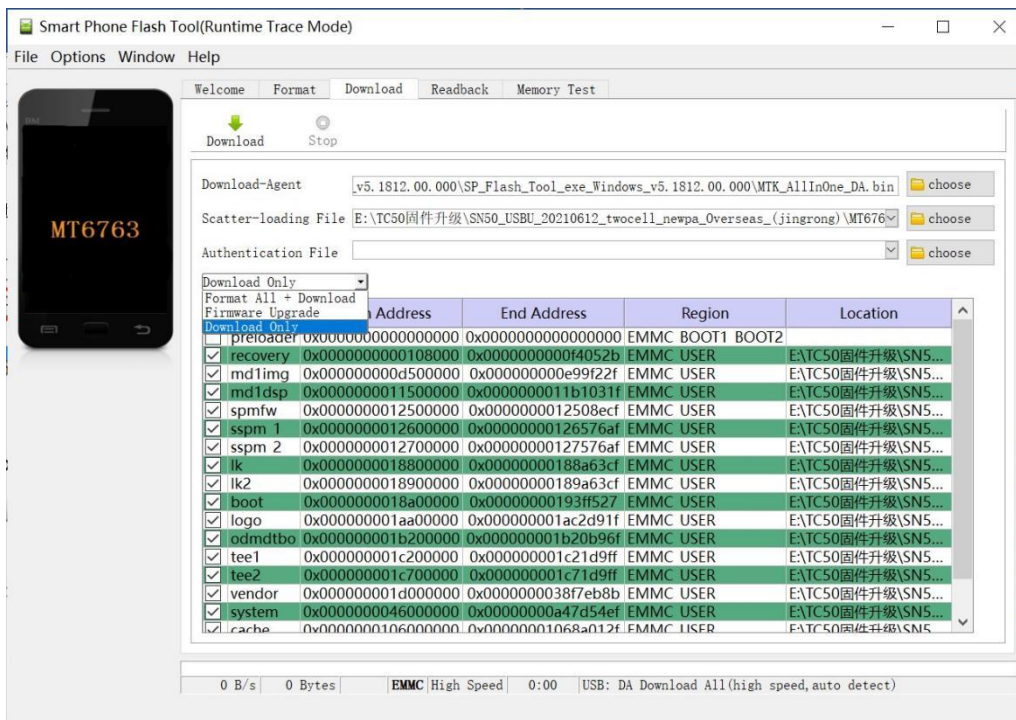

Figure 2.26 Select Firmware Upgrade mode

Click [Download], and the [Download] becomes gray to enter to downloading

status.

Figure 2.27 Click Download button

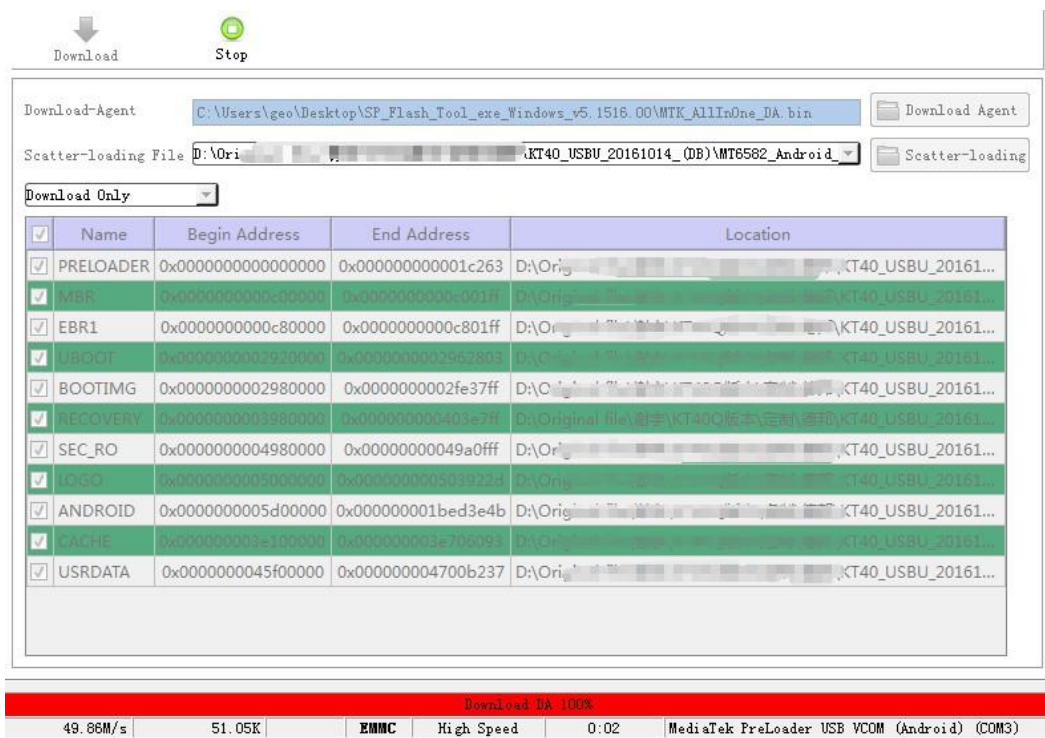After the download process is completed, the upgrading starts automatically.

Figure 2.28 Upgrading is ready to start

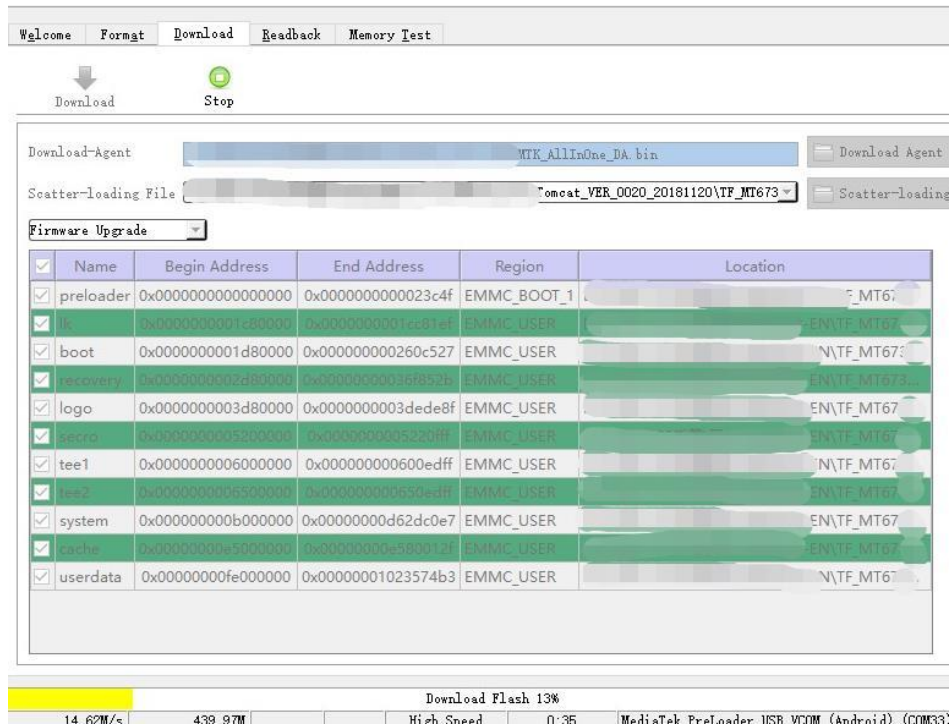The upgrading is in progress.

Figure 2.29 Upgrading in progress

When the upgrading is completed, it will prompt out 'OK' to indicate that the upgrading is completed.
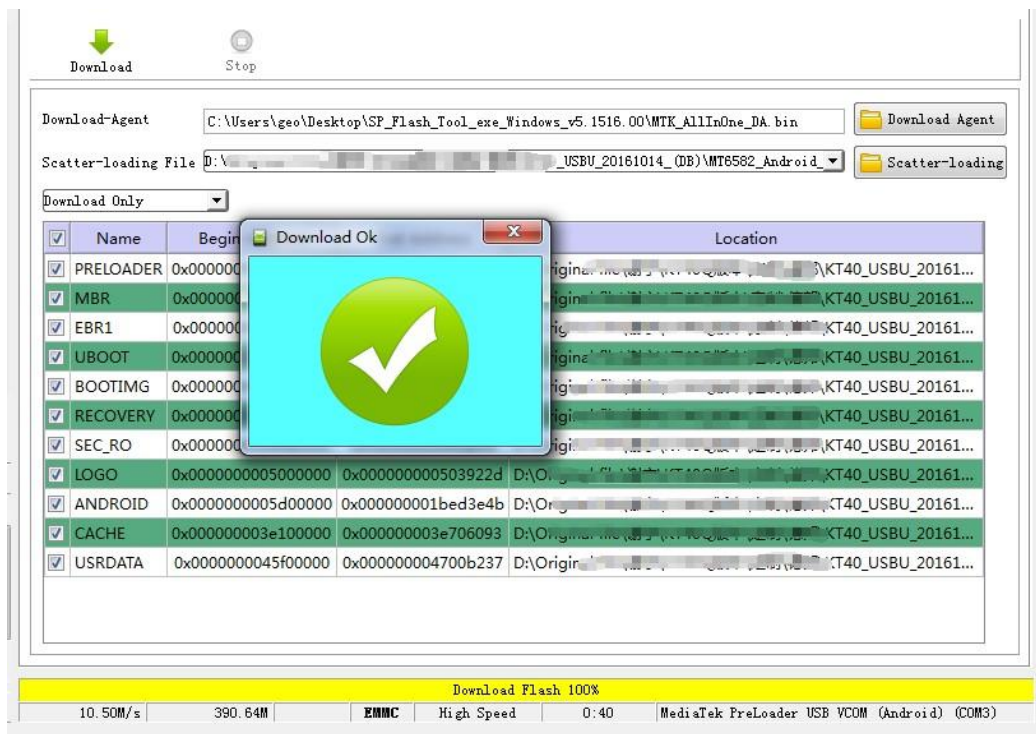

Figure 2.30 Upgrading is completed

Unplug the mini USB cable from TC50 Controller, power on the TC50 Controller for normal usage.

2.7.2.1 Issues of upgrading failure

In the power-off state, and the mini USB cable is plugged to be ready for upgrading, it is not in the download mode to upgrade automatically in fact. At this time, it is needed to check the Computer Management whether there is download port. Because in the power-off state, it automatically enters the download state within a few seconds when plugging the mini USB cable, however it enters charging status after a few seconds. Therefore, if the computer cannot recognize the download port, it is necessary to unplug and plug the mini USB cable.

The following figure shows that the computer recognizes the download port. Restart computer if there is still not download port recognized by unplugging and plugging USB cable.
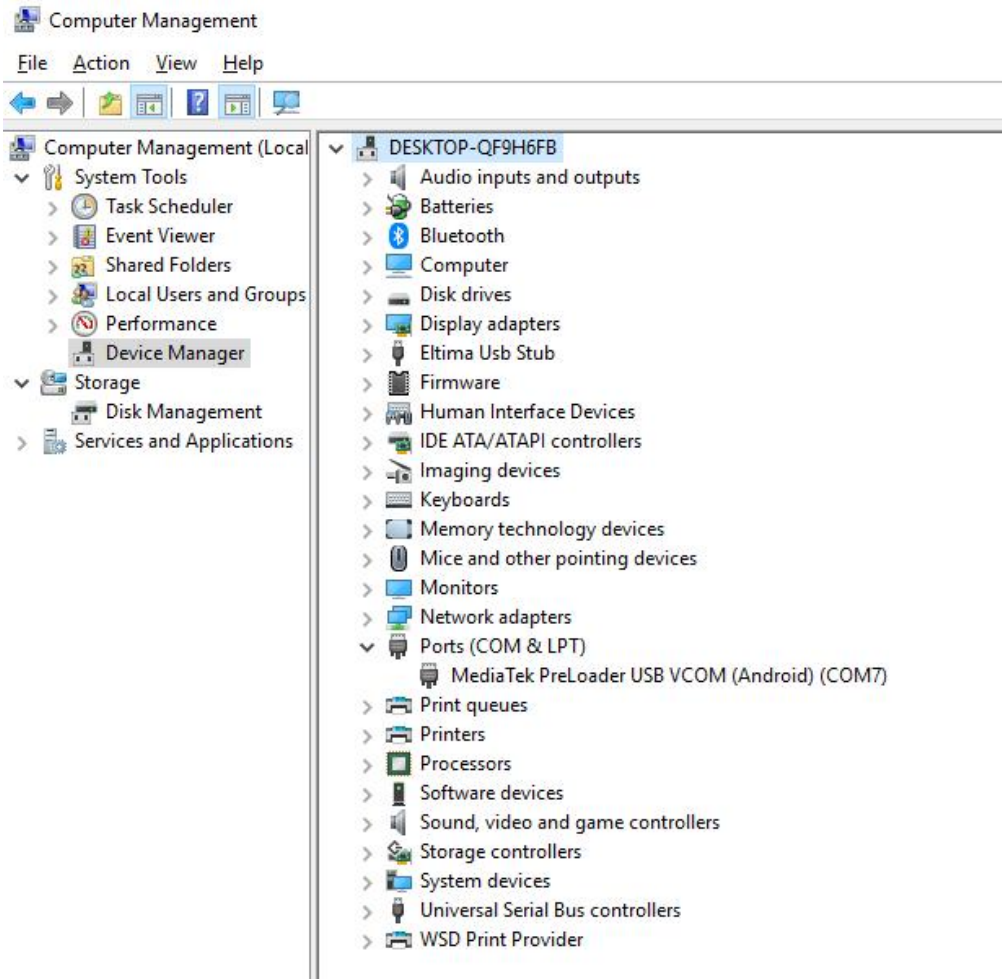
Figure 2.31 Download port is recognized in the Computer Management

2.8   Cautions

The controller should be used in an environment of -20°C to 55°C and stored at temperatures between -30°C and 70°C.

High or low temperatures will affect the performance on the device and may cause damage to the device and the battery.

Please charge the device at temperatures between -5°C and 35°C to avoid degradation of battery performance and reduced standby time.

Please DO NOT use unofficial ROMs or crack the system files of the device, as this may cause security risks and we will not be responsible for this.

☢	Electromagnetic Radiation! This product has an electromagnetic radiation specific absorption rate (SAR) maximum of ≤ 2.0 W/kg. Users with implanted pacemakers, hearing aids, cochlear implants etc. should follow medical advice when using this product.
⚠	Safety Warning! The following actions may cause battery safety hazards and lead to safety problems during normal use of the equipment. ● Dismantling the battery yourself; ● Forcibly squeezing or puncturing the device; ● Repairing the device through unofficial channels; ● Charging with non-standard chargers and cables; ● Putting the device in a microwave oven, on a fire, or near other heat sources.

3. Terminology

DC	Direct Current
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LED	Light Emitting Diode
NFC	Near Field Communication
RAM	Random Access Memory
ROM	Read-Only Memory
SD card	Secure Digital Memory Card
SN	Serial Number
SIM	Subscriber Identification Module
USB	Universal Serial BUS

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