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TC50 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



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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	tery 7000mAh 3.8V	
Battery Life	14 hours	
Charging Time	<4 hours (fast charge)	
	Communication	
Wi-Fi	Communication IEEE 802.11a/b/g/n 2.4G&5G	
Wi-Fi Cellular Mode	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby FDD-LTE B1/B3/B5/B7/B8	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby FDD-LTE B1/B3/B5/B7/B8 TD-LTE B38/B39/B40/B41	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby FDD-LTE B1/B3/B5/B7/B8 TD-LTE B38/B39/B40/B41 TDSCDMA B34/B39	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby FDD-LTE B1/B3/B5/B7/B8 TD-LTE B38/B39/B40/B41 TDSCDMA B34/B39 WCDMA B1/B2/B5/B8	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby 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	
Wi-Fi Cellular Mode SIM1 & SIM2	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby 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	
Wi-Fi Cellular Mode SIM1 & SIM2 Bluetooth	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby 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 BT4.1 (BLE)	
Wi-Fi Cellular Mode SIM1 & SIM2 Bluetooth USB	Communication IEEE 802.11a/b/g/n 2.4G&5G Dual SIM Dual Standby 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 BT4.1 (BLE) USB Type-C (supports OTG)	
Wi-Fi Cellular Mode SIM1 & SIM2 Bluetooth USB NFC	CommunicationIEEE 802.11a/b/g/n 2.4G&5GDual SIM Dual StandbyFDD-LTE B1/B3/B5/B7/B8TD-LTE B38/B39/B40/B41TDSCDMA B34/B39WCDMA B1/B2/B5/B8CDMA1x/CDMA2000 BC0/BC1GSM B2/B3/B5/B8BT4.1 (BLE)USB Type-C (supports OTG)Protocol of ISO14443A/B, and ISO15693	



GNSS	GPS/GLONASS/BeiDou		
Sensors:	G-Sensor, Compass, Light-Sensor, Gyro		
	Physical		
Dimension	207mmx84mmx20mm		
Weight	370g (include battery)		
	Reliability		
Operating Temperature	-20°C ~ +55°C		
Storage Temperature	-30°C ~ +70°C		
Humidity	5% ~ 95%		
Dustproof & Waterproof	IP68		
Shock	1.5m drop onto concrete		







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.

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





• 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 \times 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

		98% 🕻 14:49			98% 🛿 14:50
° -	•	0	1	•	
* *	*	8	R	*	2
wellcores_tp 👻	Bluetooth 👻	Do not disturb 👻	Mobile data	Airplane mode	Cast
X		0	<u>ل</u> ظ		
Flashlight	Portrait	Battery saver	Screenshot		
	••			-	
Wed, Jun 30		• • •	Wed, Jun 30	/	• •
Android System			Android System		
USB debugging com Tap to disable USB o	nected debugging.		USB debugging conn Tap to disable USB d	ected ebugging.	
Android System •	USB for file transfer	~	Android System • U	JSB for file transfer v	
	111		LEY	11/1	
A	0		A	0	

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 <u>support@tersus-gnss.com</u>.

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.

Smart Phone Flash Tool(Runtime Tra File Options Window Help	cce Mode) – 🗆 X
	Wglcome Formgt Download Readback Memory Iest
вм	Download Stop
	Download-Agent
	Scatter-loading File Scatter-loading
MediaTek	Pirmware Upgrade Image: Control of the second
	0% 0 B/s 0 Bytes High Speed 0:00

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.

Smart Phone Flash Tool(Runtime Trace Mode) File Options Window Help Welcome Format Download Readback Memory Test 0 Download Stop Download-Agent 1812.00.000\SP_Flash_Tool_exe_Windows_v5.1812.00.000\MTK_AllInOne_DA.bin 🗧 choose Open Download Agent File X MT6763 → × ↑ 📕 « SP_FI... > SP_Flash_Tool ... (5 V 组织 • 新建文件夹 2 1 文档 * ^ 名称 修改日期 ► 图片 * codecs 2021/7/13 14:26 Mfgtools_V2.0. imageformats 2021/7/13 14:26 TC50 sqldrivers 2021/7/13 14:26 DA PL.bin 2018/3/28 11:54 ■ TC50固件升级 DA_PL_CRYPTO20.bin 2018/3/28 11:54 1 批次测试用例 DA_SWSEC.bin 2018/3/28 11:54 OneDrive DA_SWSEC_CRYPTO20.bin 2018/3/28 11:54 MTK_AllInOne_DA.bin 2018/3/28 11:54 ■ 此电脑 × < 1 50044 文件名(N): MTK_AllInOne_DA.bin Bin File (*.bin) v 打开(O) 取消

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.



Smart Phone Flash T	Fool(Runtime Trace Mode) —
e Options Window	Help
	Welcome Format Download Readback Memory Test Download Stop
MT6763	Download-Agent [v5.1812.00.000\SP_Flash_Tool_exe_Windows_v5.1812.00.000\MTK_AllInOne_DA.bin] [choose Scatter-loading File [E:\TC50 尚件升级\SN50_USBU_20210612_twocell_newpa_Overseas_(jingrong)\MT676\) [choose
	Image: Subscription of the state of t
	组织 ▼ 新建文件夹
	SP_flash_Tool_€ TC50 批次测试用例
	OneDrive
	文件名(N): MT6763_Android_scatter v Map File (*.txt) v 打开(O) 取消



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.



) owi	nload-Agent			MTK_AllInOne_DA.b	n	Download Agen
Sca	tter-loadin	g File		_omcat_VER_0020	_20181120\TF_MT673	Scatter-load
Fir	mware Vpgra	de 🗾				
~	Name	Begin Address	End Address	Region	Location	
2	preloader	0x000000000000000000000000000000000000	0x000000000023c4f	EMMC_BOOT_1		F_MT67
2		0x0000000001-800000	0x00000000016881eF	EMMC_USER		
	boot	0x000000001d80000	0x00000000260c527	EMMC_USER		N\TF_MT67:
~	recovery	0x0000000002480000	0x0000000036f852b	EMINIC_USER		ENVIE_MI673
\leq	logo	0x000000003d80000	0x000000003dede8f	EMMC_USER		EN\TF_MT67
\leq	secro	0x000000005200000	0x0000000005220ff	EMMC_USER		ENITE_MITE
2	tee1	0x000000006000000	0x000000000600edff	EMMC_USER		N\TF_MT67
\sim	tee2	0x000000005500000	0x00000000550edff	EMMC_USER		EN/TEMTO7
\leq	system	0x000000000b000000	0x00000000d62dc0e7	EMMC_USER		EN\TF_MT67
	cache	0x0000030a5000030	0x00000000e590012f	EMMC_USER		ENVTF_MT67
\leq	userdata	0x00000000fe000000	0x00000001023574b3	EMMC_USER		N\TF_MT67

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.



🔚 Computer Management

🔶 🙋 🖬 🔽 🛒 💭
Computer Management (Local System Tools Computer Management (Local System Tools Computer Manager Shared Folders Cocal Users and Groups Cocal Users and Cocal Users and Cocal Users Cocal Users and Cocal Users Cocal Users and Cocal Users Cocal Users and Cocal Users and Cocal Users Cocal Users and Cocal Users and Cocal Users and Cocal Users Cocal Users and Cocal Use

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.		
\wedge	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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