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Personal / Asset Tracker

ST3940

User Manual




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Disclaimer

We, at Suntech, announce that this document and all other related products (i.e. device, firmware, and software) have been developed by the company, Suntech International Ltd., which is hereinafter referred to as "Suntech". The information in this manual is believed to be accurate and reliable at the time of releasing. We, at Suntech, also assume no responsibility for any damage or loss resulting from the use of this manual, and expressly disclaim any liability or damages for loss of data, loss of use, and property damage of any kind, direct, incidental or consequential, in regard to or arising out of the performance or form of the materials presented herein or in any software program(s) that may accompany this document. When this document is released, it is most compatible with a specified firmware version. Now that the functionalities of the devices are being developed and improved continuously from time to time by Suntech, any alteration on the protocol, the firmware functions, the hardware specifications of the product is subject to change without prior notice.

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Document Amendments

When it comes to the firmware version column with specific firmware number, any amendment(s) on the comments column should be made on this relevant firmware version (and the versions thereafter). Before applying any changes made in this protocol, you are required to make sure that you have upgraded the firmware suitable for the specified version.



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Revision History

Rev. No.	Date	Contents of Revision	FirmwareNumber reflecting the latest revision	Author
1.00	02 July. 2018	Initial writing	303	Wilson

1. Introduction

ST690: Personal / Asset Tracking Device



The ST690 with its holder is a waterproof (IP66compliant) hard-cased ultra-mini tracking device to be used for various purposes like an asset tracker or a personal tracker.

Without any efforts for connecting wires, the ST3940 (hereinafter referred to as 'device') works autonomously with its built-in battery. If users want to track an object with the ST3940, all they have to do is just simply put it into the box or the carry bag where the object is contained. And then, users can track the locations of such an object and receive an alert if the object enters or leaves a pre-defined zone.

This non-wiring device is so small that it can be hidden after being placed. So, the waterproof ST3940 is suitable for covert tracking even in rainy weather conditions. The ST3940 is ideal for tracking various objects such as vehicles (especially small vehicles or motorcycles), boats and valuable fixed/moving assets like



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expensive merchandises, computers, electronic products, machinery and so on.

In addition to 3-axis acceleration sensor, the ST690 has various functionalities such as ultralow-power consumption algorithms and motion checking.

*In case the ST690 is placed inside a metal container, it may not work.

2. Key Features

- **New technology and the latest GPS Chipset**
- **UMTS/HSDPA 800/850/900/1900/2100 MHz 3GPP Release 8**
- **GSM 850/1900MHz and 900/1800 MHz**
- **SMS/GPRS communications**
- **Report when the battery is in a low status**
- **Periodic reporting in real time**
- **Built-in motion detector for alarming**
- **ST3940 with its Cradle→Waterproof in compliance with IP66**
- **ST3940 without its Cradle → Waterproof in compliance with IP65**
- **Baby's palm-sized versatile mini tracker**
- **Fixed asset tracking in real time with Standby Current →less than 8uA.**



2-1. GSM/GPRS Specifications

Item	Description
Battery	Rechargeable 3.7V, Li-ion Battery- 1500mAh
Motion Detection	Built-in 3-axis Acceleration sensor
Standby time Standby Time with GSM "On/Off" Standby Time with GSM "On"	*with 1,500mA/h Li-ion battery less than 8uA Report once a day: 400days 3 minute reporting: 114 hours 5 minute reporting: 162 hours 10 minute reporting: 235 hours 30 minute reporting: 335 hours <i>*The measurements were made only under good GPS and GPRS signals.</i>
Frequency/ Sensitivity	GSM 850 / EGSM 900MHz -104dBm DCS1800 / PCS1900MHz -102dBm
Temperature Range	-20°C ~ +60°C *Caution ! Please pay a careful attention that the vehicle shall NOT be left under direct sunlight for long time in hot weather. There is a risk of battery explosion at hot temperature.
User Interface	Power Button, SOS Button, Charger Adaptor, Charger & Setting Cable
LED Indicator	GPRS, GPS, Charging status
GPRS	Multi-slot Class 12 Support all 4 coding schemes (CS-1, CS-2, CS-3 and CS-4)
'SyncTrak' for PC	Mini USB cable
Dimensions	50.5(W) x 75(L) x 22.5(T) mm 55.9(W) x88.3(L) x 35.6(T) mm (with cradle)
Weight	88g, 200g (with cradle)



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Approval	CE, FCC
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2-2. GPS Specifications

Item	Description
Receiver Type	56-channel U-blox7 engine GPS & QZSS L1 C/A, GLONASS L1OF, Galileo* E1B/L1, Compass* ready SBAS: WAAS, EGNOS, MSAS
Update Rate	10Hz
Accuracy¹⁾	Position 2.5m CEP SBAS 2.0m CEP
Acquisition²⁾	TCXO Cold starts 26s 1s (Assist Now Autonomous) Aided start<1s Hot start<1s
Sensitivity³⁾	Tracking -162dBm Reacquisition -160dBm Cold start -148dBm
Back-up Supply	Voltage range : 2.5V to 3.6V
Antenna type	Patch Antenna
Operating Temperature	-20 ~+80°C

*1) All SV @ -130 dBm

*2) It depends on aiding data connection speed and latency

*3) The 3 figures were measured with a good active antenna.



2-3. Operational Features

Item	Description
Configuration	either by SMS or PC
Parameter Change	either by SMS or GPRS
Command /Control	either by SMS or GPRS
Reporting	either by GPRS or SMS (as a back-up)
GPRS Communication	TCP/UDP,SMS
GPRS Connection	either always connected or upon needed
Basic Data reported	NMEA location, Speed, Course, GPS signal status Message No., Accumulated moving (travelling) distance
Data Storage	up to 2,000 locations in case of transmission failure or cost issue
Reporting	Possible to make a cyclic location report at an adjustable interval only when command comes
Back-up Reporting	possible (Dual IP reporting or Backup SMS reporting)
Power down	Sleep on network(less than 26mA) Deep sleep on no network (less than 8uA):
How to upgrade Firmware	by OTA (Over-The-Air) or PC tool.

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3. Accessories

The ST690 has two accessories:

- Wall Charger
- USB Cable (for charging and setting)

4. How to insert SIM card by step

There are 5 steps in inserting a SIM card into the ST690 as shown below in the pictures.

Step 1.:Please, unscrew SIM cover.

Step2.:Please, insert SIM #1.



Step 3.: Please, insert SIM #2.

Step 4.: Please, insert SIM #3



Step 5.:Please,make an assembly with the SIM cover.



5. CHARGING BATTERY

It is highly recommended that the rechargeable battery should be charged completely before using the device. Connect the ST690 to its charger cable supplied by Suntech and charge it for 7 hours.



< Charging Status indicated on the battery LED >

- Red blinking twice: under 10% of the full capacity
- Red blinking: under 30% of the full capacity
- Orange blinking: 30% to 80%
- Green blinking: Almost charged
- Green lighting: Completely charged

<Status of Charging Mode indicated on the battery LED>

As soon as the charger is connected with the device which has been turned off, the GPS LED will be turned on and continue

<Charging Error>

When an error occurs while the battery is being charged the red LED and the green LED blink by turns. In this case, please disconnect the charger cable and try to do charging again by reconnecting the cable. If this error occurs continuously, please replace the battery or contact Suntech.

<Caution!!>

The ST3940 (device) should be charged by using the USB cable that Suntech provides the user with. In such a case, however, Suntech does not guarantee that charging the device can be done completely. It is highly recommended that the users, in charging the device, should use the battery charger provided by Suntech.



6. Appearance



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7. How to operate

The ST3940, a multifunctional battery-powered mini GPS tracker, is ideal for tracking personnel, valuable assets like merchandises that are delivered by putting it onto an object.

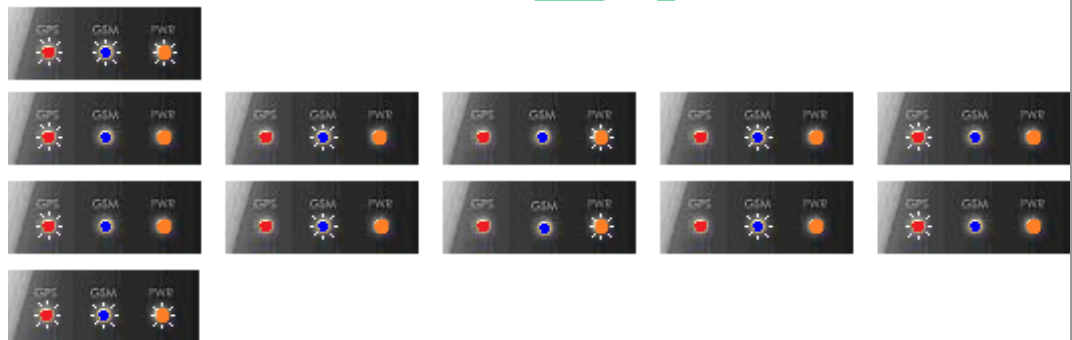
While tracking, it reports location information about the object at a predefined interval and alerts if it detects motion of the object. Because it is powered by battery, its user should charge the battery fully prior to using and should turn it off when tracking is finished.

Users are required to set the reporting timing of the device at an interval with more than 10 minutes in order to save the endurance time of the battery.

Power

Turn On

If you press POWER button for more than 3 seconds, the device will be turned on. When the power is on, LEDs blink as below.



Turn Off

If you press the POWER button till all of the LEDs are turned on, the device goes to shutdown. After the power is turned off, no LED blinks or lightens.



** If you use an ST3940 device model which is powered by the External Battery, this function does **NOT** work.*



Charging Mode

Turn On

As soon as a device in a status of power off is connected with a charger, only charging the device starts being processed. But, GSM session does not work. GPS LED is on. The battery indicator continuously blinks.



If you press 'power button' of the device for more than 2 seconds in a mode of charging, the device will turn to be in a mode of normal operation.

Device might be in an operational mode using its built-in battery. While this device is being charged and if you press the 'power button' of this device for more than 2 seconds, the mode of the device will change to a charging a mode.

Red LED

GPS status indicator

Right after the device is turned on, the red LED starts to blink as below. Five (5) minutes after the red LED starts to blink, it is turned off automatically to save battery. If you press the power button again, the red LED will be on just for short time, for some seconds, to show you the current status of the GPS connectivity.

- Fixed : 1 time
- No fixed: 2 times.
- GPS error: 4 times.

Exclusive Mode of Battery Charging

The red LED continues to be in the status of 'On' while the device is being connected to the battery charger.



**Blue& Red
LEDs
(2 colors)**

GSM network & Operating Status indicator

Right after the device is turned on, the blue LED starts to blink as below. Five (5) minutes after the blue LED starts to blink, it is turned off automatically to save battery. If you press the power button again, the blue LED will be on just for short time, for some seconds, to show you the current status of the GSM network connectivity.

- Network OK: 1 time
- Server communication Error : 2 times
- GPRS Communication Error : 3 times
- No GSM (= not connected with the GSM network): 4 times.
- SIM PIN Locked : 5 times
- Impossible to connect with the GSM network : 6 times
- No SIM Error (= an error when SIM is not available) : 7 times

In addition to the status described above, the blue LED continues to blink either if the device has an error of SIM Locking or if it does not have a SIM. .

If you press 'power button' of device shortly, the Red LED indicates the operation status of the device by showing number of blinking as below.

- 1 time of blinking means → status of Power Off
- 2 times of blinking mean → status of hibernation
- 3 times of blinking mean → status of Power Off and battery discharged. It means that it is time to charge the battery



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Battery LEDs (3 colors)	<p><u>Battery indicator</u></p> <p>Normally, it blinks shortly to indicate the battery level for user as described below.</p> <ul style="list-style-type: none">● Red LED blinks twice shortly. →under 10% of the full capacity● Red LED blinks. →under30% of the full capacity.● Orange LED blinks. →30% to80%● Green LED blinks. →Almost charged● Green LED is on. → Charging has been completed. <p>During the charging time, the battery LED blinks continuously. But, the battery LED is turned on when charging the battery is completed.</p>
Protocol Watchdog	<p>If the PDP or GPRS connection keeps going invalid status for a while about 40 minutes up to 1 hour, then the device will be reboot and recover the data communication in case that the problem was not caused by the network side.</p>

8. Contacts

Manufacture: Suntech International Ltd.

Manufacturer Address: (Gasan-dong, Greatvally), B-1506, 32, Digital-ro9-gil, Geumchongu, Seoul, Korea

- The End of the document -

FCC Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC RF Exposure Information

It is designed and manufactured not to exceed the exposure limits for radiofrequency (RF) energy set by the Federal Communications Commission (FCC) of the U.S. Government. The FCC requires wireless devices to comply with a safety limit of 1.6 watts per kilogram (1.6 W/kg).

For typical operations, this device has been tested and meets FCC RF exposure guidelines. Use of other accessories may not ensure compliance with FCC RF exposure guidelines. The maximum Body-worn SAR value for this device as reported to the FCC is 1.456 W/Kg and this device has been tested to a separation distance of 0.5 cm.

For more information about RF exposure, please visit the FCC website at www.fcc.gov