NAVTELECOM
TELEMATICS SYSTEMS

DATASHEET

GPS/GLONASS TRACKING EQUIPMENT
S-2651(M), S-2653(M), S-2654

Moscow, Russia
2022

Purpose of the System

SIGNAL S-2651(M), S-2653(M) и S-2654 (hereinafter SIGNAL) manufactured by Navtelecom LLC, are GPS-GSM based vehicle tracking system for vehicle monitoring.

SIGNAL system is designed for:

- vehicle monitoring: location, track, mileage, fuel consumption, engine hours;
- processing and transmitting of data to the server from devices such as tachograph, tire pressure monitoring system, CAN bus adapter, refrigerator controller, RFID tag reader, passenger flow counters;
- reading of the parameters from CAN bus, processing and transmitting it to the server;
- monitoring the temperature using temperature sensors;
- monitoring and controlling of current situation in the vehicle using connected camera;
- driving style determination (EcoDriving);
- accident detection in accordance with acceleration thresholds or Addiction Severity Index (ASI);
- emergency informing about vehicle hijacking;
- emergency informing about attacks on the driver or passengers and other accidents;
- remote control of connected devices and vehicle systems, such as a siren, engine and door lock system, etc.
- two-way communication with the vehicle driver;
- automatically informing of passengers about stops (entrances and exits from geofences) using the information board and loadspeaker.

You can find more detailed information about SIGNAL devices on the website www.navtelecom.ru on the Equipment tab.

Standard Delivery Kit

#	Item description	Quantity, pcs
1	SIGNAL device unit	1
2	GLONASS/GPS-antenna	1
3	GSM-antenna	1
4	Fuse 1A	2
5	Fuse holder	1
6	Microfit-14 connector with power wires	1
7	Microfit-6 connector	1
8	Microfit-4 connector	1
9	Set of 10 connection wires	1
10	Datasheet	1 (optional)
11	MiniUSB cable	1 (optional)
12	Individual package	1 (optional)

Technical Specifications

GSM/GPRS/Bluetooth			
	S-2651(M)	**S-2653(M)**	**S-2654(M)**
3G-modem	no	no	yes
Frequency bands	GSM 850, EGSM 900, DCS 1800, PCS 1900	GSM 850, EGSM 900, DCS 1800, PCS 1900	GSM (GPRS) 900, 1800 UMTS (HSPA) 900, 1200
IP-stacks	TCP, UDP	TCP, UDP	TCP, UDP
Transmitting power	Class 4 (2W) in GSM 850 and EGSM 900; Class 1 (1W) in DCS 1800 and PCS 1900	Class 4 (2W) in GSM 850 and EGSM 900; Class 1 (1W) in DCS 1800 and PCS 1900	Class 3 (0,25 W, 24 dBm) UMTS
Max GPRS data downlink/uplink transfer, kbps	85,6	85,6	5,76/7,2
Number of SIM cards	2	2	2
SIM card holder #1	external with ejector (Molex), miniSIM	external with ejector (Molex), miniSIM	external with ejector (Molex), miniSIM
SIM card holder #2	internal, nanoSIM	internal, nanoSIM	internal, nanoSIM
eSIM[1]	2	2	2
Bluetooth 4.0	yes	yes	no
GNSS			
Supported navigation systems	GLONASS/GPS/Beidou	GLONASS/GPS/Beidou	GLONASS/GPS/Beidou
Receiver type	tracking: 33, acquisition: 99	tracking: 33, acquisition: 99	tracking: 33, acquisition: 99
Sensitivity (in laboratory conditions)	tracking: -165 dBm cold start: -148 dBm	tracking: -165 dBm cold start: -148 dBm	tracking: -165 dBm cold start: -148 dBm
Time-To-First-Fix (for GPS and GLONASS systems with a signal of -130 dBm)	cold start: <35 s warm start: <30 s hot start: <1 s	cold start: <35 s warm start: <30 s hot start: <1 s	cold start: <35 s warm start: <30 s hot start: <1 s
Accuracy (50% CEP, 24 hours in static mode, with signal levels -130 dBm), m	2.5 (horizontal position), 5 (vertical position)	2.5 (horizontal position), 5 (vertical position)	2.5 (horizontal position), 5 (vertical position)
Speed accuracy, m/s	0,1	0,1	0,1
Receiver update rate, Hz	1	1	1
Power Supply			
Supply voltage, V[2]	9,5…47	9,5…47	9,5…47
Overvoltage protection up to 200 V	yes	yes	yes
Current consumption at 12 V voltage in operating mode on average[2], mA	80	80	80
Current consumption at 12 V voltage with turned off GLONASS and GSM modules, no more than, mA	30	30	30
Maximum current consumption at 12 V voltage in operating mode with charged battery, no more than, mA	200	200	200
Reverse polarity protection	yes	yes	yes
Backup battery[4]	Li-Po 3,7 V, at least 800 mAh	Li-Po 3,7 V, at least 800 mAh	Li-Po 3,7 V, at least 800 mAh
Battery protection from recharge, full discharge, short circuit[5]	yes	yes	yes
Battery of the RTC clock and the navigation module	yes	yes	yes
RTC keeping time and ephemerides retention time (when the power is off and the backup is discharged), at least, days	5	5	5
Battery charging with USB	yes	yes	yes
Inputs			

Inputs protection from power surges, V	up to 200	up to 200	Up to 200
Total number of universal (analog, digital, pulse, frequency) inputs	6	6	6
Number of pulse-frequency inputs used for frequency fuel level sensors connection or for rectangular pulses calculation	up to 6 (of the total number)	up to 6 (of the total number)	up to 6 (of the total number)
Impulse inputs voltage range, Hz	1 – 3000	1 – 3000	1 – 3000
Number of analog inputs, configured as digital	up to 6 (of the total number)	up to 6 (of the total number)	up to 6 (of the total number)
Analog inputs voltage range, V	0…31	0…31	0…31
Built-in pull-up resistor for digital inputs	yes	yes	yes
Inputs protection from power surges, V	up to 200	up to 200	up to 200
Outputs			
Digital outputs	4	4	4
Maximum current, mA	500	500	500
Maximum voltage, V	48	48	48
Interfaces			
USB interface	yes	yes	yes
RS-485 interface	yes	yes	yes
RS-232 interface	yes	no	yes
CAN interface	1	2	1
1-Wire interface	yes	yes	yes
Device Memory			
Memory capacity, Mb	8	8	32
Number of records in the memory (buffer type) with a packet size not less than 127 bytes	up to 51700	up to 51700	up to 236000
Period of data recording in the internal storage device, s	1 — 3600 and/or upon the event	1 — 3600 and/or upon the event	1 — 3600 and/or upon the event
MicroSD card support (up to 32 Gb)	yes	yes	yes
Telemetry record to microSD card	yes	yes	yes
Number of records on the microSD card	no less than 2 000 000 per 1 Gb	no less than 2 000 000 per 1 Gb	no less than 2 000 000 per 1 Gb
Accelerometer			
Accelerometer	yes	yes	yes
Maximum allowable shock overload, g	+/-24	+/-24	+/-24
Accelerometer accuracy (in the range of +/-24g less than %)	0,5	0,5	0,5
Accelerometer calibration	yes	yes	yes
Setup and Management			
USB interface for configuration, management and data transfer	yes	yes	yes
Configuration and management of the device with NTC Configurator program	yes	yes	yes
Configuration and management of the device via SMS and Internet channels	yes	yes	yes
Automatic firmware update	yes	yes	yes
OTA firmware update	yes	yes	yes
Tone control and GPRS, SMS and DTMF control	yes	yes	yes
Data transmission			

GSM, SMS, GPRS data transferring	yes	yes	yes
Optional selection of transmitted parameters to save traffic	yes	yes	yes
Sending information in roaming only about the current state with the following unloading of data to the server in the home network	yes	yes	yes
Setting the roaming priority operator list	yes	yes	yes
Automatic detection of operator settings based on SIM card data	yes	yes	yes
EGTS protocol support	yes	yes	yes
FLEX, FLEX 2.0, FLEX 3.0 protocols support	yes	yes	yes
Number of servers (IP addresses) to which data can be transmitted	3	3	3
Resending telemetry for the period to the server by SMS or Internet command	yes	yes	yes
User and debug logs for GSM, GPS and interfaces	yes	yes	yes
TCP and UDP transport protocols support	yes	yes	yes
Number of phone numbers for SMS notification	5	5	5
Functionality			
EcoDriving	yes	yes	yes
Towing detection	yes	yes	yes
Accident detection in accordance with acceleration thresholds or Addiction Severity Index (ASI)	yes	yes	yes
Generating and sending accident profile to the server	yes	yes	yes
Immobilizer function using Proximity card driver identification system and 1-Wire interface	yes	yes	yes
Energy saving mode	yes	yes	yes
Device operation on the timer or by the calendar	yes	yes	yes
Security modes	yes	yes	yes
GSM jammer detector	yes	yes	yes
GNSS jammer detector	yes	yes	yes
Sending SMS about speeding event	yes	yes	yes
Determining the engine operation time and calculating engine hours by the external voltage level	yes	yes	yes
Selection of sensors used to calculate engine hours	yes	yes	yes
Tachometer with engine speed calculation	yes	yes	yes
Providing LBS information from the three nearest cell towers	yes	yes	yes
AES128 data encryption	yes	yes	yes
Mileage algorithm based on terrain	yes	yes	yes
Selection of sensors involved in coordinate processing	yes	yes	yes
Setting the degree of data averaging for the fuel sensors	yes	yes	yes
Stopping work with fuel sensors under specified conditions (decrease in external voltage, turn off the ignition, engine shutdown)	yes	yes	yes
Setting output operating mode (permanent, single, periodic)	yes	yes	yes
Digital fuel level sensors connection by RS-232 interface[6]	yes	yes	yes
Number of connected fuel sensors via RS-485 interface, no more than	16	16	16

Calibration of the fuel sensor in the device	yes	yes	yes
Simultaneous operation with two different devices on the digital interface (not all combinations of devices are allowed)	yes	yes	yes
MODBUS RTU protocol support	yes	yes	yes
Operation with RFID readers Escort Radius, ADM20, Mielta and LLS-compatible	yes	yes	yes
Output of NMEA data to the digital interface	yes	yes (on RS-485)	yes
CAN interface with J1939 standard	yes	yes	yes
CAN interface with other protocols support by decoding files	yes	yes	yes
Parsing CAN parameters by user settings	yes	yes	yes
J1708 protocol support via RS-485 interface	yes	yes	yes
CAN-LOG and CAN-FMS adapters support[6]	yes	yes[6]	yes
DTA-CAN CAN adapter support	yes	yes	no
Support of wireless headset for two-way communication with the driver	yes	yes	no
Bluetooth connection of up to 4 wireless fuel level sensors (ESCORT TD-BLE, TECHNOTON DUT-E, GL-TV)	yes	yes	no
Bluetooth connection of up to 4 wireless temperature and humidity sensors (ADM31, ESCORT TL-BLE)	yes	yes	no
Bluetooth connection of ADM32 wireless tilt angel sensor	yes	yes	no
Bluetooth connection of TECHNOTON GNOM DDE wireless axle load sensor	yes	yes	no
Bluetooth connection of TECHNOTON DFM wireless fuel consumption sensor	yes	yes	no
Bluetooth connection of ELM327 diagnostic adapter	yes	yes	no
Transparent mode[7]	yes	yes	yes
Unloading of ddd-files from Shtrikh, Mercuriy, VDO Continental, Atol tachographs[8]	yes	yes	yes
Sending events on changing the tachograph status	yes	yes	yes
Working with driver display DV-01	yes	yes	yes
Displaying text messages received from the server or via SMS on the driver display	yes	yes	yes
Autoinformer function	yes	yes	yes
Working with electronic display ITLINE and INTEGRAL	yes	yes	yes
Displaying information about the current route, current and next stops on the driver display	yes	yes	yes
Speed limiting in geofences	yes	yes	yes
Displaying information about speed mode and warnings about speeding on the driver display	yes	yes	yes
Displaying information about the amount of fuel in liters from the fuel sensor on the driver display	yes	yes	yes
Working with passenger flow counters PP-01 and Avtokonduktor	yes	yes	yes
Camera connection support, sending pictures to server by server request	yes	yes	yes
Working with TPMS Pressure Pro, TPMS 6-13 (from Parkmaster), B-Tag (from Bridgestone), TM508T22U and TD 18, 20, 21	yes	yes[6]	yes
Working with breathalyzer Alcogran AM-525	yes	yes[6]	yes
Interface for connecting digital temperature sensors	1-Wire	1-Wire	1-Wire

Number of connected digital temperature sensors, no more than	8	8	8
Generating events on temperature decrease/increase	yes	yes	yes
Reading TouchMemory key codes via 1-Wire bus and identifying drivers	yes	yes	yes
Maximum number of TouchMemory key codes stored in the device memory without SD card	510	510	510
Connecting microphone and speaker for hands-free communication with the driver and microphone listening	yes	yes	yes
Resistance and power of the connected speaker	4 ohm - 1.5 to 5 W 8 ohm - 1.0 to 3 W	4 ohm - 1.5 to 5 W 8 ohm - 1.0 to 3 W	4 ohm - 1.5 to 5 W 8 ohm - 1.0 to 3 W
Connecting buzzer to the output for incoming call notification	yes	yes	yes
Environmental Specifications			
Ingress Protection Rating	IP54	IP54	IP54
Storage temperature with battery[9], °C	0 … +40	0 … +40	0 … +40
Storage temperature without battery, °C	-40 … +85	-40 … +85	-40 … +85
Operating temperature with battery[10], °C	-20 … +60	-20 … +60	-20 … +60
Operating temperature without battery, °C	-40 … +85	-40 … +85	-40 … +85
Battery charge temperature, °C	0 … +50	0 … +50	0 … +50
Maximum operating humidity at 35 °C, %	95	95	95
Maximum allowable shock overload, g	24	24	24
External GLONASS/GPS and GSM antennas	yes	yes	yes
Interface for connection to computer	miniUSB	miniUSB	miniUSB
Connectors for GLONASS /GPS and GSM antennas	SMA	SMA	SMA
Interface connectors	Microfit-14, Microfit-6, Microfit-4	Microfit-14, Microfit-6, Microfit-4	Microfit-14, Microfit-6, Microfit-4
Housing material	ABS plastic	ABS plastic	ABS plastic
Tamper button	yes (only in S-2651-M)	yes (only in S-2653-M)	yes
Dimensions with connectors, mm	105x78x20,5	105x78x20,5	105x78x20,5
Weight, kg	0,097	0,097	0,097

[1] Optional.

[2] When the maximum operating voltage is exceeded, power protection is activated. In this case, device continues to work from backup battery (if any).

[3] Working with GPRS in poor communication conditions, the peak (~10ms) consumption of the device can exceed 500 mA.

[4] Attention! Lithium polymer battery (Li-Po) is used in the device. The following rules must be observed during its operation: do not heat, keep away from heat sources, do not throw the battery into fire, do not expose to direct sunlight. Do not operate the device powered by a lithium-polymer (Li-Po) battery in conditions of high humidity, at high and low ambient temperatures. Operation is permitted under conditions specified by the manufacturer. Do not impact, deform, disassemble, close contacts.

[5] Battery protection function blocks the charge at low temperatures and at temperatures above +50 °C.

[6] Only when using an RS-232/RS-485 interface converter.

[7] To connect SIGNAL devices to Atol Drive 5 tachographs, an additional UART/RS-232 converter is required.

[8] Mode in which information received via the RS-232 and RS-485 interfaces is not processed by the device, but buffered and transmitted to the server as "yes".

[9] When the device is stored and used outside the specified temperatures, it is recommended to turn it off and remove the battery from the device to avoid damage to the battery and to the device.

[10] When working with a device with backup battery outside the temperatures in the Environmental Specifications section, it may lead to irreversible change in the properties of the Li-Po battery, decrease in capacity, current output, etc.

You can find more detailed technical information in the Operations manual for the SIGNAL device.

Warranty

The manufacturer guarantees the compliance of the SIGNAL product with the requirements of the technical specifications TU 26.30.50-002-82520404-2010 (identical to 4372-002-82520404-2010) subject to the consumer observing the storage, transportation, installation and operation rules established by the current set of operational documentation. The device enclosure has a dustproof and a dropproof execution of IP54 type according to the system of classification of the enclosure protection levels of electrical equipment from the penetration of solid objects and water.

The warranty period for the product is 3 years. The warranty for the Li-Po battery is provided separately and amounted to 1 year.

The warranty starts on the date of sale.

During the warranty period, the manufacturing company undertakes to carry out a free repair of the SIGNAL device, subject to the customer complies with the rules of transportation, storage, installation and operation.

The present warranty is valid only upon presentation of complete, correct and legibly filled passport (showing serial number, name, date of sale of the SIGNAL product, presence of the trade organization seal, signature of the buyer about the familiarity with the warranty terms and the operating rules) with the SIGNAL product itself.

The manufacturing company shall not guarantee the software and the hardware compatibility of the SIGNAL product with software and equipment not included in the delivery set, except as specified in the Operating manual.

The manufacturing company is not liable for the possible material, moral and other damage, suffered by the owner of the SIGNAL product and/or the third-party as a result of the violation of requirements of the Operating manual during use, storage or transportation of the product.

Rubbing marks and other minor damages to the SIGNAL product surfaces that do not affect its technical characteristics and that were appeared as a result of its normal use do not result in loss of the right to warranty services.

The life of the equipment with the exception of the built-in accumulator and batteries is 10 years.

The present guarantee does not apply to:

- documentation and packaging materials supplied with the SIGNAL product;
- modernization of the SIGNAL product.

This warranty does not cover following cases:

- defects of the SIGNAL device are caused by the violation of rules for its operation, storage or transportation;
- defects of the SIGNAL device are caused by the direct or indirect effects of mechanical forces, chemical, thermal or physical effects, radiation, aggressive or neutral liquids, gases or other factors, toxic or biological environments and any other effects of artificial or natural origin of a destructive nature;
- repair, maintenance or upgrading of the SIGNAL device was made by persons non-authorized by the manufacturer;
- defects of the SIGNAL device are caused by the force majeure circumstances which the manufacturing company could not foresee, control and prevent;
- if there are no or damaged warranty seals or stickers set up in the SIGNAL product by the manufacturing company or the service center authorized by the manufacturing company;
- defects of the SIGNAL device are caused by its joint use with an equipment or a software that are not included in the delivery set, unless otherwise specified in the Operating manual;
- defects of the SIGNAL device are caused by its operation as part of a set of defective equipment.