

Product Installation Guide and specification

On-board Wireless Terminal SR10006

FCC ID: 2AWCT-SR10006

SiRun (Beijing) Technology Co., Ltd.

Product Name	On-board Wireless Terminal
Model	SR10006
Subject	Specification
Identifier	Note about identifier of this document: TBOX-SR10006 represents “4G TBOX products of SiRun”
Description	This document describes hardware requirement of this product and general functional requirements, non-functional requirements, interface requirements and environment demands for software.
Applicable Readers	SiRun’s Project Managers, all developers and testers of the project team, and other relevant personnel.

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Chapter One Introduction

1.1 Product Name

4G-T-BOX of SiRun (Beijing) Technology Co., Ltd. (TBOX-SR10006),
SiRun 4G-TBOX for short.

1.2 Product Background

As IoT industry develops rapidly, a new generation of technologies of big data, cloud computing, AI etc. have deeply combined with areas of auto traffic etc. With a multi-dimensional exchange network of V2V, V2I, V2H, V2C gradually forming, intelligence level of cars constantly improving, technologies like auto driving, comprehensive information service and intelligent transportation rapidly developing, Telematics industry has become the hotspot and focus for international competition.

SiRun (Beijing) Technology Co., Ltd. (SR) is a high-tech enterprise specialized in R&D, sales and operation of Telematics platform. Its T-BOX product is one of the most advanced and stable terminal products within industry. SR has rich successful experience in providing end-2-end solution for passenger vehicle, EV, commercial vehicle as well as motor cycles.

1.3 References

Changchai Farm Machinery T-box Requirements-20180802

Yueda Farm Machinery T-box Requirements-20180820

SiRun EV 2G TBOX Requirements 2018.06.05

1.4 Terminology, Acronyms

Terminology and	English	Description
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Acronyms		
TBOX	Telematics BOX	On-board Terminal
Modem		4G-LTE
BT		Bluetooth Technology
RTC		Real Time Clock
OTA		Custom Upgrade
KL.15		Ignition(Ignition POS 2)
KL.30		Battery Positive
KL.31		Remote Information Processing Controller
TSP	Telematics Service Provider	Remote Information Processing Service Provider
ICM	Instrument Cluster Module	Information Processing Center (Instrument Cluster)
BCM	Body Control Module	Body Control Module
IHU	Infotainment Head Unit	Infotainment Head Unit
EMS	Engine Management System	Engine Management System
PS	Passive Start	One-key Start System
CPU	Central Processing Unit	Central Processing Unit
GSM	Global System for Mobile Communication	Global System for Mobile Communication
neGPS	Global Positioning System	Global Positioning System
GPRS	General Packet Radio Service	General packet Radio service technology, refers to how the product transmits data wirelessly.
APP	Application	Application
USB	Universal Serial Bus	Universal Serial Bus
EMC	Electro Magnetic Compatibility	Electro Magnetic Compatibility
CAN	Controller Area Network	Controller Area Network
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
TBD	To Be Determined	To Be Determined
R	Receive	Receive
T	Transmit	Transmit

Chapter Two Overview

2.1 Objective

TBOX-SR10006 provides communication connection for TU and platform systems of most car models. It offers business functions of collecting real time data from real cars, GPS data acquisition, 4G communication function, OTA IF function, power management, and battery management etc. This document aims to describe TBOX function specification and only focuses on its communication function while working with other modules.

2.2 Scope

This document applies for the whole life cycle of TBOX-SR10006 Telematics remote control products.

2.3 TBOX-SR10006 System Structure

TBOX-SR10006 hardware system structure is shown in Figure 2.1.

The CDMA/LTE antenna was detachable mode, In order to comply with RF Exposure requirements, the CDMA/LTE antenna of this device must be installed to provide the required separation distance from the human body at all times. The Vehicle manufacturer should consider the regulation compliance again if the antenna was changed.

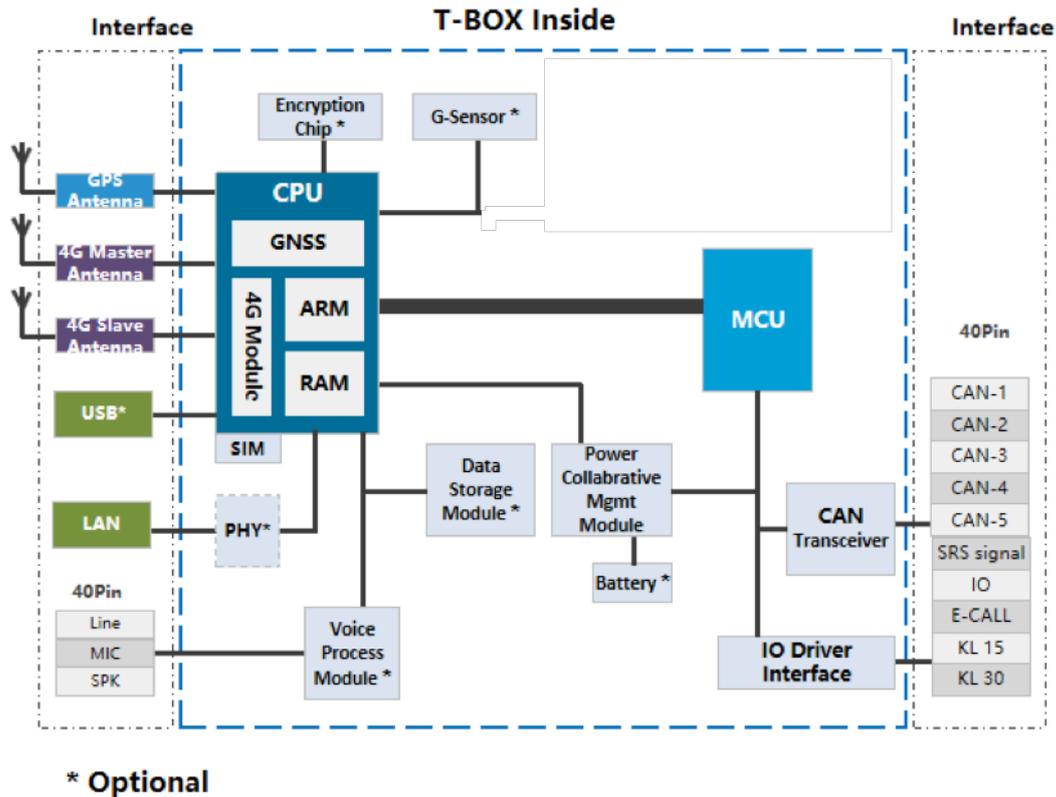
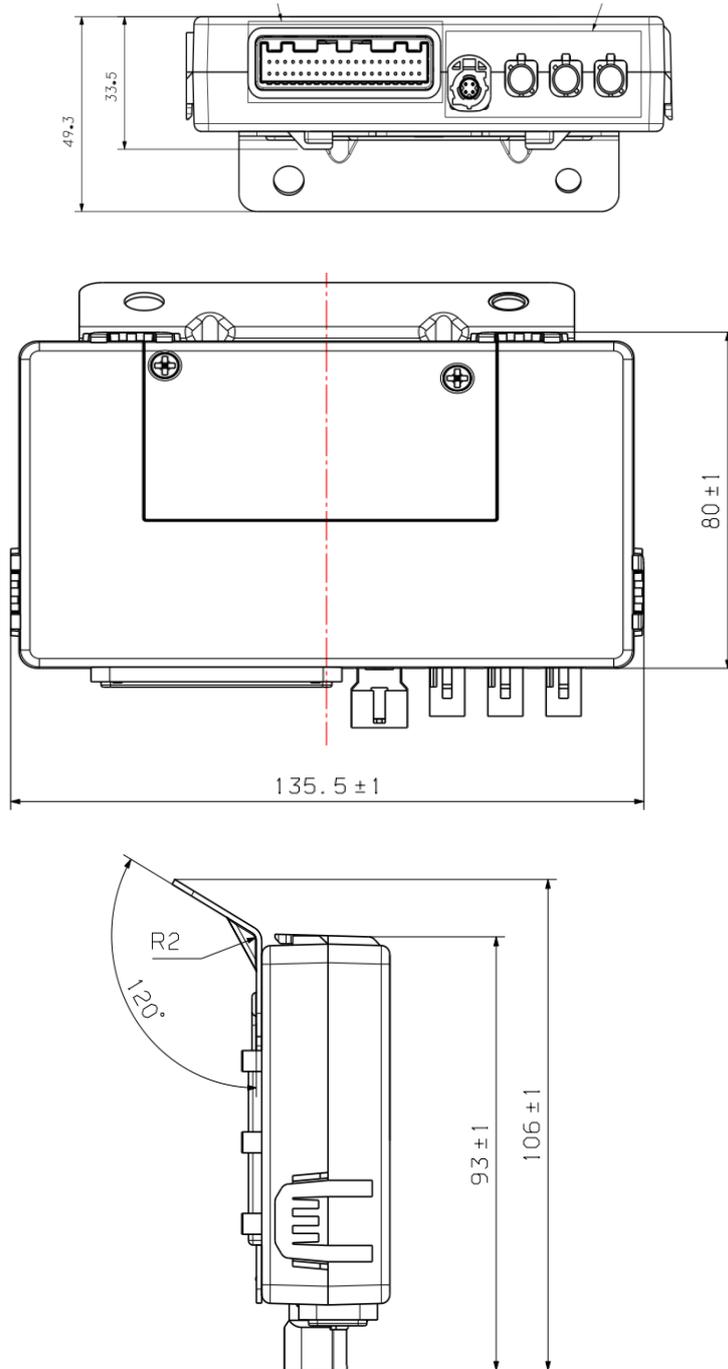


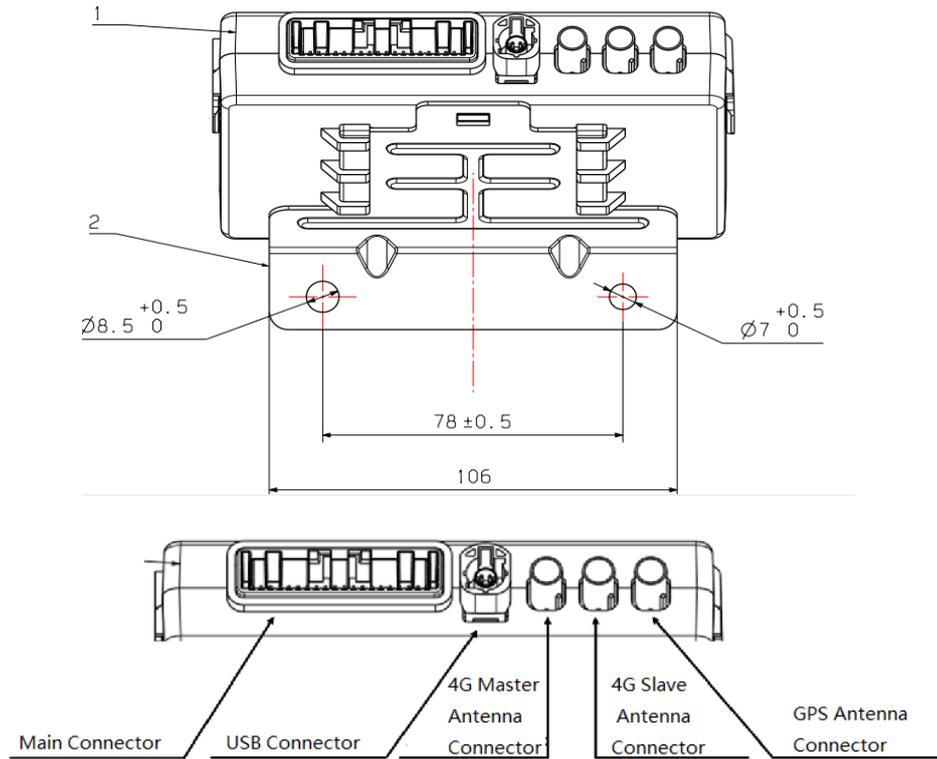
Figure 2.1 TBOX-SR10006 System Structure

Chapter Three TBOX-SR10006 Hardware Specification

3.1 TBOX-SR10006 External Dimension

Category	Description	Note
Size (mm)	137x76x24	
Weight	About 140g (standby battery not included)	





Connector Name	Connector Type	Brand
Master Connector	Tyco Electronics025 Series 40P(PCB H-TYPE) CAP HSG ASSY 1318384	
GPS ANT Connector	FAKRA C	
4G Master ANT Connector	FAKRA D	
4G Slave ANT Connector	FAKRA K	
USB	HSD, Plug-in Model: 0-1823071, Wiring Harness Model: D4K10A-1D5A5-D	

Figure 3.1 TBOX-S1 Appearance

3.2 TBOX-SR10006 Hardware Details

TBOX-SR10006 component list includes: T-BOX Unit, T-BOX three-in-one antenna (optional), standby battery(optional).Product details, component material list and craft equipment list for reference.

A. Product Details

Product Package No.	Product Name	No.	Part No.	Part Name	Qty	Material		Note
						Texture	Weight(g)	
Ww								

	1	7925010001 -T1	T-BOX Unit	1	PC+ABS,PCBA etc.	<300g	
	2	7925040001 -T1	T-BOX Three-in-one Antenna	1	PCBA ect.	<200g	Optional
	3	7925060001 -T1	Standby Battery	1	/	About 36g	Optional
<p>Note:1.product disassembled to after-sales status. Weight in this list represents the target of initial design and weight of the final sample pieces shall subject to tooling samples.</p>							

B. Component Materials

Assembly Part No.	Assembly Part Name	Sub Part No.	Sub Part Name	Material Name	Material Trademark	Material Spec	Supplier	Raw Material Supplier	Executive standard	Moulding Technics or Postprocessing	Note
7925010001 -T1	T-BOX	1	CPU	EC20		Industrial Grade					
		2				Vehicle Standard					
		3	BT			Vehicle Standard					
		4	GPS Module			Vehicle Standard					
		5	CAN			Vehicle Standard					
		6	EMMC			Vehicle Standard					
		7	DDR			Vehicle Standard					
		8	Clock			Vehicle Standard					5个

		9	Switch			Vehicle Standard					
		10	Power Chip			Vehicle Standard					
		11	Power Chip			Vehicle Standard					
		12	Power Chip			Vehicle Standard					
		13	Security Chip			Vehicle Standard					
		14	Patch SIM Card			Vehicle Standard					
		15									
		16									
		17									
		18									
		19									
		20									
		21									
		22									
		23									
		24	Resistance , Capacitor, Inductance , Crystal Oscillator	/		/	/				
		25	Battery Connector								
		26	GPS Connector			Vehicle Standard	Fak re				
		27	4G Main Connector			Vehicle Standard	Fak re				
		28	4G Deputy Connector			Vehicle Standard	Fak re				
		29	40PIN Main Connector			/	TY CO				
		30									
		31	PCB(4 layers)								

		32	Bolt								
		33	Upper Cover								
		34	Lower Cover								
		35	Battery Cover								
		36	Bracket								
7925060001-T1	Backup Battery	37	Backup Battery				FD K				
7925040001-T1	T-BOX 3-in-1 Antenna	38	T-BOX 2-in-1 Antenna								

C. Process Equipment List

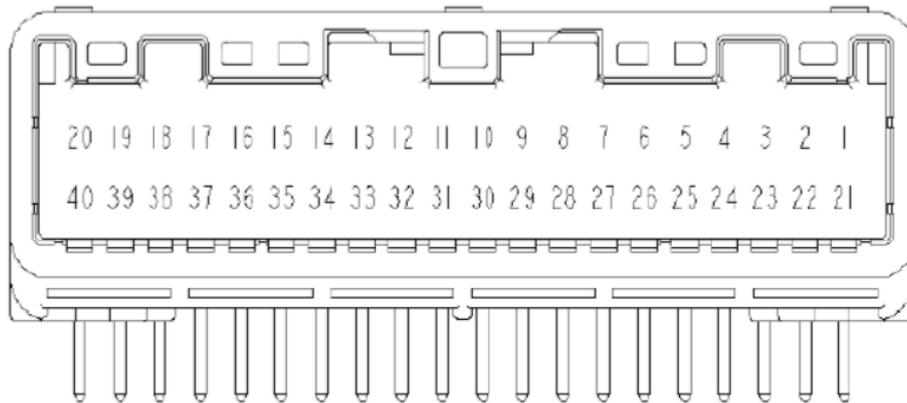
Product Package No.:							Product Name:			
No.	Tooling Name	Mould	Tongs	Test Tool	Measuring Tool	Qty.	Manufacturer	Manufacturer Contact	Note	
1	Hardware support mould	√				1	Runpu			
2	Upper Cover Moduld	√				1	Runpu			
3	Lower Cover Mould	√				1	Runpu			
4	Battery Cover Mould	√				1	Runpu			
5	Furnace Tongs		√			1	Shenzhen Xiangshen Technology			

6	Assembly Tong		√			1	BD Star		
7	Steel Mesh					1	Kunshan Lutaixing		Used in SMT not the four equipment in the list

3.3 TBOX-SR10006 Hardware Connector

Requirement

3.3.1 Main Connector 40 PIN Definition



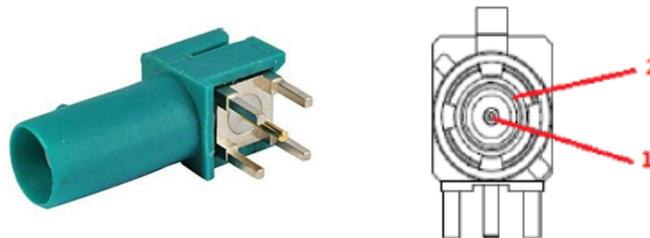
Model: Tyco Electronics025 Series 1318384

*Means Functions Requires Specific Customization

Pin	Name	Type	Signal Description	Pin	Name	Type	Signal Description
1	KL15 NC *	I	Ignition Signal	21	NC		
2	NC			22	NC		
3	GND	P		23	NC		
4	NC			24	NC		
5	MIC_GND	P	MIC GND	25	MIC_OUT	O	MIC Output
	MIC_OUT-	O	MIC Output minus		MIC_OUT+	O	MIC Output plus
6	MIC_IN+	I	MIC Input plus	26	MIC_IN-	I	MIC Input minus
	MIC_IN	I	MIC Input		MIC_GND	P	MIC GND
7	GND	P		27	Input2	I	Digital Signal Input(12V)
					ADC*	I	Analog Signal Input
8	LINE_OUT	O	Line Out to FICM	28	LINE_GND	P	Line GND
9	Speaker+	O	Audio Output minus to External Speaker	29	Speaker-	O	Audio Output minus to External Speaker
10	BTN_GND	P	External Button GND	30	Input1	I	Digital Signal Input(12V)
11	SRS	I	Airbag Deployed Signal	31	ADC*	I	Analog Signal Input
12	LED_GND	P	External LED GND	32	E-CALL	I	External Button of E-CALL
13	Output1	O	Digital Signal Output (12V)	33	MUTE	O	Mute Signal to FICM (12V)
14	Output2	O	Digital Signal Output (12V)	34	LED2	O	Digital Signal Output (4V) for b-call status
15	RS232_RX	I	RXD of RS232	35	LED1	O	Digital Signal Output (4V) for e-call status
16	HSCAN4_L	I/O	CAN_L of High Speed CAN4	36	RS232_TX	O	TXD of RS232
17	HSCAN3_H	I/O	CAN_H of High Speed CAN3	37	HSCAN4_H	I/O	CAN_H of High Speed CAN4
18	HSCAN2_L	I/O	CAN_L of High Speed CAN2	38	HSCAN3_L	I/O	CAN_L of High Speed CAN3
19	HSCAN1_H	I/O	CAN_H of High Speed CAN1	39	HSCAN2_H	I/O	CAN_H of High Speed CAN2
20	KL30	P	Main Power Input Plus	40	HSCAN1_L	I/O	CAN_L of High Speed CAN1
					KL.31	P	Main Power Input GND

Figure 3.2 TBOX-S1 40pin Wiring Diagram

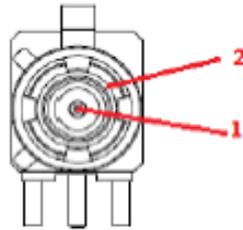
3.3.2 GPS Connector



Model: Fakra Code C male

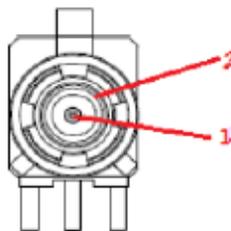
Pin No.	Pin Name	IO Type	Signal Description	Description
1	RF	I	3.3V DC BIAS	50ohms
2	GND	P	-	-

3.3.3 4G Connector



4G Main Radio Frequency Connector Model: Fakra Code D male

Pin No.	Pin Name	IO Type	Signal Description	Description
1	RF	I/O	RF Signal	50ohms
2	GND	P	-	-



4G Deputy Radio Frequency Connector Model: FAKRA Code K male

Pin No.	Pin Name	IO Type	Signal Description	Description
1	RF	I/O	RF Signal	50ohms
2	GND	P	-	-

3.4 TBOX-SR10006 Executive Standard

National/Industrial Standard

Standards	Name of Standards	Standard Type	Others
GB/T 32960-2016	Technical Specifications for Remote Service and Management System for Electric Vehicles	National Standard	
GB/T 2423.23	Environmental Testing for Electric and Electronic Products Test Q:Seal	National Standard	
GB/T 2828.1	Sampling Procedures for Inspection by Attributes Part One: Sampling Schemes Indexed by Acceptance Quality Limit	National Standard	
ISO 7637-3	Road Vehicles—Electrical Disturbances from Conduction and Coupling Part Three: Capacitance Coupling For Lines Other than	ISO Standard	EMC Standard

	Power Supply Line		
ISO 10605	Road Vehicles-Test Methods for Electrical Disturbances from Electro Static Discharge	ISO Standard	EMC Standard
ISO 11452-2	Road Vehicles-Component Test Methods for Electrical Disturbances From Narrow-band Radiated Electromagnetic Energy Part Two: Absorber-lined Chamber	ISO Standard	EMC Standard
ISO 11452-4	Road Vehicles-Component Test Methods for Electrical Disturbances From Narrow-band Radiated Electromagnetic Energy Part Four: Static Current Emission	ISO Standard	EMC Standard
ISO 20653	Road Vehicles-Degrees of Protection (IP-Code)-Protection of Electrical Equipment against Foreign Objects, Water and Access	ISO Standard	EMC Standard
CISPR 25-2007	Radio Disturbance Characteristics for the Protection of Receivers Used on Board Vehicles, Boats and on Devices---Limits and Methods of Measurement	CISPR Standard	EMC Standard
2000/53/EC	End of Life Vehicles	Relevant Regulation	
2005/64/EC	Type-Approval of Motor Vehicles with regard to Their Reusability, Recyclability, and Recoverability	Relevant Regulation	
1907/2006/EC	Registration, Evaluation, Authorization and Restriction of Chemicals	Relevant Regulation	

Note: In case of contradiction of technical standards, the following priority order shall be followed (listed from high priority level to low)

- 1) Legal Provisions
- 2) Enterprise Standard
- 3) Drawing and 3D Data
- 4) Simulation test
- 5) National and International Standards (DIN, EN, ISO etc.)

The above inspection test standards shall subject to the final DVP files signed between the two parties.

3.5 TBOX-SR10006 Performance

3.5.1 Brief Introduction

MCU Module	Working Frequency 132MHZ, RAM 128KB, Support 6 CAN Maximumly
EC20 Module	A7 ARM Architecture, Working Frequency 1.2GHZ, RAM 256MB, Linux OS. All but China Telecom 2G/3G is supported,

	Uploading Frequency Adjustable, Can Support 1time/S at most.
CAN	Support Boch CAN2.0, ISO11898-2, ISO15765, ISO14229 BUS Specification, Meet OEM Certification Requirement
GPS	GPS and BD Dual Module Positioning, Positioning Error< 2.5m, Hot Start<1S, Cool Start<35S;
Storage	8G, Expandable
Sleep	Standby Mode, Support Waking up Tbox via CAN network, SMS, ring or BT, Waking Up time<100mS
Supply Voltage	9-16V DC
Power Consumption	Static Current<5ma
Running Environment	
Temperature	-30°C to +70°C(without using wifi function); -20°C to +70°C(wifi being used)
Humidity	5%~95%RH(No Condensation)
Certification	SRRC, EMC/EMI
Environment Protection	Passed RoHS Certification, PP Standard No.: TL 52388
IP52	(Supplement)
Resistance to Mechanical Vibration	Meet requirements of Clause 4.1 in GB/T 28046.3-2011
Resistance to Mechanical Shock	Shall meet clause 4.2 in based on installation place of the on-board terminal
Shell Protection	Relevant Function shall Meet A Grade Defined in GB/T 28046.1-2011
Low Temperature	Meet 5.1.1 in GB/T 28046.4-2011

Performance	
High Temperature Performance	Meet 5.1.2 in GB/T 28046.4-2011
Temperature Gradient Performance	Meet 5.2 in GB/T 28046.4-2011
Thermal cycling performance	Meet Requirements of Experiment 1 in 5.6 of GB/T 28046.4-2011

3.5.2 Performance Parameter of Important Modules

Parameter	说明
Transmitted Power	<ul style="list-style-type: none"> ● Class 4 (33dBm±2dB) for GSM900 ● Class 1 (30dBm±2dB) for DCS1800 ● Class E2 (27dBm±3dB) for GSM900 8-PSK ● Class E2 (26dBm±3dB) for DCS1800 8-PSK ● Class 3 (24dBm±1dB) for CDMA BC0 ● Class 3 (24dBm+1/-3dB) for WCDMA bands 1,8 ● Class 3 (24dBm+1/-3dB) for TD-SCDMA bands 34,39 ● Class 3 (23dBm±2dB) for LTE FDD bands 1,3,8 ● Class 3 (23dBm±2dB) for LTE TDD bands 38,39,40,41
LTE Feature	<ul style="list-style-type: none"> ● Operating Frequency range for US: LTE Band 5: Tx: 824~849 MHz Rx:869 ~894MHz LTE Band 40: Tx: 2305~2315MHz and 2350~2360 MHz Rx: 2305~2315MHz and 2350~2360 MHz LTE Band 41: Tx: 2555~2655MHz Rx: 2555~2655MHz ● Support non-CA CAT4 Maximum ● Support 1.4~20MHz RF Broadband ● Down Link Support Multiple User MIMO ● FDD: Maximum Uplink Rate 50Mbps, Maximum Downlink Rate 150Mbps ● TDD: Maximum Uplink Rate 35Mbps, Maximum Downlink Rate 130Mbps
WCDMA Feature	<ul style="list-style-type: none"> ● Support 3GPP R8 DC-HSPA+ ● Support 16-QAM, 64-QAM and QPSK modulation ● 3GPP R6 CAT6 HSUPA: Maximum Uplink Rate 5.76Mbps

	<ul style="list-style-type: none"> ● 3GPP R8 CAT24 DC-HSPA+: Maximum Downlink Rate 42Mbps
TD-SCDMA Feature	<ul style="list-style-type: none"> ● Support CCSA Release3 ● Maximum Uplink Rate 2.2Mbps, Maximum Downlink Rate 4.2Mbps
CDMA Feature	<ul style="list-style-type: none"> ● Operating Frequency range for US: Tx:824.70~848.31MHz Rx:869.70~893.31MHz ● Support CDMA 1X Advanced, 1XEV-DO0/-DOrA ● Maximum Uplink Rate 1.8Mbps, Maximum Downlink Rate 3.1Mbps
GSM Feature	<p>R99: CSD Transmission Speed 9.6kbps, 14.4kbps</p> <p>GPRS: Support GPRS multi-slot class 12(12 by Default) Coded Format CS-1/CS-2/CS-3 and CS-4 4 Rx Time Slot Maximumly for Each Frame</p> <p>EDGE: Support EDGE multi-slot class 12(12 by Default) Support GMSK and 8-PSK Downlink Coded Format: CS 1-4 and MCS 1-9 Uplink Coded Format: CS 1-4 and MCS 1-9</p>
Network Protocol Feature	<ul style="list-style-type: none"> ● Text and PDU Mode ● Point to Point MO and MT ● Short Message Cell Broadcast ● SMS Storage: Stored in Module by Default
USIM Interface	<ul style="list-style-type: none"> ● Support USIM/SIM: 1.8V and 3V
Audio Feature	<ul style="list-style-type: none"> ● Support One Digital Audio Interface: PCM Interface ● GSM: HR/FR/EFR/AMR/AMR-WB ● WCMDA: AMR/AMR-WB ● LTE: AMR/AMR-WB ● Support Echo Cancel and Noise Suppression
PCM Interface	<ul style="list-style-type: none"> ● Used for Audio, needs external Codec Chip ● Support 8 Bit A-law, u-law and 16 Bit Linear Coding Format ● Support Long Frame Model and Short Frame Model ● Support Master Mode and Slave Mode, Only be Used as Master Mode under Long Frame
USB Interface	<ul style="list-style-type: none"> ● Compatible with USB2.0 Features(Only Support Slave Mode),Largest Data Transmission Rate is 480Mbps ● Used for AT command, data transmission, GNSS NMEA output, software debugging and software upgrade ● USB Drive: Support Windows XP,Windows Vista, Windows 7, Windows 8/8.1, Windows CE 5.0/6.0/7.0, Linux 2.6 or higher edition, Android 2.3/4.0/4.2/4.4/5.0
Serial Port	<p>Master Serial Port: Used for AT command and Data Transmission</p>

	Maximum Baud Rate is 921600bps, 115200bps by Default Support RTS and CTS Hardware Flow Control Debug Serial Port: Used for Linux Control, log Output Baud Rate is 115200bps	
Rx-Diversity	<ul style="list-style-type: none"> ● Support LTE/WCDMARx-Diversity 	
GNSS Features	<ul style="list-style-type: none"> ● Qualcomm Gen8C-Lite ● Protocol: NMEA 0183 	
GPS	Receiving Type	55 Channel, L1 Frequency Band, C/A Code
	Cool Start	35s
	Warm Start	1.5s
	Horizontal Accuracy	1.5m
	Tracking Sensitivity	-157dBm
	Acquisition Sensitivity	-146dBm
	1pps Accuracy	Average Value 100ms
	Capture Power Consumption	54mA
	Navigation Power Consumption	33mA
	Update Frequency	1Hz

Federal Communications Commission (FCC) Statement

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.

15.21

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

15.105(b)

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 or more 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.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter, the antenna of this device must be installed to provide separation distance 25cm from the human body at all times.