MeiG SRM825N-NA Module

User Manual

Important Notice

Copyright Notice

Statement of No Guarantee

Disclaimer

1   Introduction

This document defines SRM825N module air interface and hardware interface for connecting the module to applications of customers.

This document can help customers quickly understand the interface specifications, electrical characteristics, mechanical specifications and related product information of SRM825N module. With the help of this document, according to our application manual and user guide, customers can quickly apply SRM825N module to wireless applications.

1.1   Safety Instructions

By complying with the following safety principles, you can ensure personal safety and protect the products and working environment from potential damage:

	Driving safety first! When you drive, do not use handheld mobile terminal device unless it has a hands-free function. Please stop the car before calling!
	Please turn off the mobile terminal device before boarding. The wireless function of mobile terminal shall not be turned on in the aircraft to prevent interference with the aircraft communication system. Ignoring this reminder may affect flying safety or even violate the law.
	In hospitals or health care facilities, pay attention to whether there are restrictions on the use of mobile terminal device. RF interference will cause medical equipment to be abnormal, so mobile terminal device may need to be turned off.
	Mobile terminal device cannot always be effectively connected, for example, if the mobile device has no expense or the SIM is invalid. When you encounter the above situations in an emergency, please make an emergency call, meanwhile, ensure that your device is turned on and in an area with sufficient signal strength.
	Your mobile terminal device will receive and transmit radio frequency signals when it is turned on. There will be radio frequency interference when it is close to TV, radio, computer or other electronic equipment.

Please keep mobile device away from inflammable gases. Please turn off the mobile terminal device when you are near a fueling station, oil depot, chemical plant or explosion site. There will be potential safety hazards when operating electronic equipment in any place with potential explosion hazard.

1.2   Purpose of the Document

This document mainly describes the hardware interface and structural characteristics of the SRM825N wireless module, and guides users to embed the SRM825N module in the design of various application terminals.

1.3   FCC Statement

Federal Communication Commission Interference 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。

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.

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

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20** cm between the radiator & your body.

1.4 Important Notice to OEM integrators

1. This module is limited to OEM installation ONLY.

2. This module is limited to installation in fixed applications, according to Part 2.1091(b).

3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations.

4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s).The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

Note:

notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify to MeiG Smart Technology Co., Ltd. that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the USI, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application

End Product Labeling

When the module is installed in the host device, the FCC/IC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: 2APJ4-SRM825NNA",The FCC ID can be used only when all FCC mpliance requirements are met.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual

This device is intended only for OEM integrators under the following conditions: (For module device use) 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

2   Product Overview

2.1   Basic Description

The MeiG Smart SRM825N module is a 5G NR Sub-6GHz module specially designed for IoT and eMBB applications. It integrates Qualcomm's latest generation of Snapdragon SDX62 baseband chip. Complies with 3GPP Release 16 standards and can support independent two types of network deployments: SA and NSA. For different target regions, different sub-models are designed to support a variety of 3G/4G/5G network standards, which can cover the 5G commercial network frequency bands of major regions and operators around the world.

At the same time, the SRM825N module supports Qualcomm I Z a t ™ Gen 9 positioning technology, a built-in multi-constellation high-precision GNSS receiver, can support GPS/GLONASS/BeiDou/Galileo/QZSS, and can provide fast and accurate positioning services.

SRM825N supports a wealth of industry standard interfaces to facilitate peripheral expansion, supports USB3.1, PCIe3.0, GPIO, PCM and other interfaces, compatible with multiple types of operating systems (Android, Linux, Windows 7/8/10 and other operating systems)), built-in rich network protocols, with interface standards, simple baseboard design, easier assembly and other advantages, can be widely used in CPE home gateways, high-definition TV, AR/VR, industrial routers, set-top boxes, vehicle terminals, video surveillance, industrial Internet and other fields.

2.2   Product Overview

The following table lists the frequency bands supported by SRM825N-NA sub-model:

Table 1   Frequency Bands Supported by SRM825N Module

Product	Description
SRM825N-NA	● 5G NR NSA: N2/N5/N7/N12/N13/N14/N25/N38/N41/N48/N66/N71/N77/N78 ● 5G NR SA: N2/N5/N7/N12/N13/N14/N25/N38/N41/N48/N66/N71/N77/N78 ● LTE FDD: B2/B4/B5/B7/B12/B13/B14/B17/B25/B26/B66/B71 ● LTE TDD: B38/B41/B42/B43/B48 ● WCDMA: B2/B4/B5 ● Support digital voice (optional)

Table 2   Main Features of the Module

Parameter	Description
Power supply	● VIN supply voltage range: 3.135V ~ 4.4V (3.135V only guarantees the module function, but does not guarantee the RF performance. The lowest voltage to meet the RF performance requires 3.3V) ● Typical supply voltage: 3.8V
Transmitting power	● Class 2 (26dBm+2/-3dB) for 5G NR; SRM825N-NA: N41/N77/N78; ● Class 2 (26dBm+2/-3dB) for 4G; SRM825N-NA: B41 ● Class 3 (23dBm±2.7dB) for LTE bands and 5G NR;

	SRM825N-NA: LTE FDD: B2/B4/B5/B7/B12/B13/B14/B17/B25/B26/B66/B71 LTE TDD: B38/B42/B43/B48 5G NR : N2/N5/N7/N12/N13/N14/N25/N38/N48/N66/N71 ● Class 3 (24dBm+1.7/-3.7dB) for WCDMA bands; SRM825N-NA:B2/B4/B5
LTE features	● Supports a maximum of 5CA CAT19 ● Support 1.4 ~ 20 MHZ radio frequency bandwidth ● Supports DL 4X4 MIMO: SRM825N-NA: B2/B4/B7/B25/B66/B38/B41/B42/B43/B48 ● Supports the following modulation types: Uplink: QPSK, 16QAM, 64QAM and 256QAM Downlink: QPSK, 16QAM, 64QAM, and 256QAM ● The maximum uplink rate is 200Mbps, and the maximum downlink rate is 1.6 Gbps
WCDMA features	● Support 3GPP DC-HSPA+ ● Support 16-QAM, 64-QAM and QPSK modulation ● 3GPP R6 CAT6 HSUPA: Max uplink rate 5.76Mbps ● 3GPP R8 CAT24 DC-HSPA+: Max downlink rate 42Mbps
5G NR features	● Supports the 3GPP R16 standard, supporting SA/NSA ● Supports the following modulation types: Uplink: π/2-BPSK, QPSK, 16QAM, 64QAM, and 256QAM Downlink: QPSK, 16QAM, 64QAM and 256QAM ● Support MIMO: U UL 2x2 MIMO: SRM825N-NA: N41/N48/N77/N78 DL 4x4 MIMO: SRM825N-NA: N2/N7/N25/N38/N48/N66/N77/N78 ● SUB 6G Supports SCS 15 kHz (FDD) and 30 kHz (TDD) ● Supports SRS: SA 2T4R: SRM825N_NA:N41/N77/N78 NSA 1T4R: SRM825N_NA:N41/N77/N78 ● The Sub6 SA mode provides a maximum uplink rate of 900 Mbit/s and a maximum downlink rate of 2.4 Gbps
Network protocol features	● Support TCP/UDP/PPP/PING/NITZ/QMI protocol ● Support PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol)
Short Message Service (SMS)	● Text and PDU modes ● Point-to-point MO and MT ● Short message storage: stored in the module by default
USIM card interface	● Support USIM/SIM card: 1.8V and 3V, USIM2 compatible with eSIM (2*2)
Audio features	● Support 1 digital audio interface: PCM interface ● WCDMA: AMR/AMR-WB ● LTE: AMR/AMR-WB ● 5G NR: AMR/AMR-WB
PCM interface	● For audio use, external codec chip is required ● Support 8-bit A-law, u-law and 16-bit linear coding formats

- Support long frame mode and short frame mode
- Support master and slave modes, but it can only be used as master mode in long frames

USB interface	- Compatible with USB3.1 gen2 feature (only supporting slave mode), max. data transmission rate 10.0Gbps - Used for AT command, data transmission, GNSS NMEA output, software debugging and upgrade USB driver: support Windows7, Windows 8/8.1, Windows10, Linux 2.6 or higher versions, Android2.3/4.0/4.2/4.4/5.0/5.1/6.0/7.0/8.0/9.0/10.0
GNSS features	- Qualcomm Gen9C-Lite - Protocol: NMEA 0183
RX-diversity	Support 5G NR/LTE/WCDMA diversity
AT command	Compliant with 3GPP TS 27.007, 27.005, newly add MeiG AT command
Network indication	WWAN_LED# pin indicates the status of the RF network
Antenna interface	- ANT0, ANT1, ANT2, ANT3 - GNSS antenna interface ANT_GNSS
Physical properties	- Size: 30.0*52.0*2.3mm - Weight: <8g
Temperature range	- Normal working temperature: -30℃ ～ +75℃ - Extended working temperature: -40℃ ～ +85℃ - Storage temperature: -45℃ ～ +90℃
Software upgrade	USB interface upgrade, FOTA upgrade
RoHS	All parts are fully compliant with EU RoHS standard

3.3 Power Supply

3.3.1 Pin Description

The description in this section is related to the power supply. The interfaces involved include the following:

Table 3   Power related interface

Pin name	Pin number	Description	Min. Value	Typical Value	Max. Value	Unit
VIN	2,4,70,72,74	PI	3.135	3.8	4.4	V
GND	3,5,11,27,33,39,45,51,57,71, 73	Ground	-	0	-	V

3.11 Antenna Interface

3.11.1 Antenna Definition

SRM825N module provides 5 antenna pins, which are: GNSS, ANT0, ANT1, ANT2, ANT3, as shown in the table below.

Table 4 Antenna Pin Assignment

ANT_port	ANT_GNSS	ANT0(TRX)	ANT1(TRX)	ANT2(TRX)	ANT3(RX)
Band	GNSS L1	LB DRX MHB TRX0 N41 TRX0 N48/N77/78 PRX1	MHB PRX1 N41 PRX1 N48/N77/78 TRX0	LB TRX MHB DRX N41 TRX1 N48/N77/78 DRX1	MHB DRX1 N41 DRX1 N48/N77/78 DRX0/TRX1
Frequency	1559-1610MHz	600-2690MHz 3300-5000MHz	1452-2690MHz 3300-5000MHz	600-2690MHz 3300-5000MHz	1452-2690MHz 3300-5000MHz

Notes:

1. RF informations:

MHB:

FDD: B2/B4/B7/B25/B66

TDD: B38/B41

NR: N2/N7/N25/N38/N41/N66

WCDMA:B2 B4

LB:

FDD: B5/B12/B13/B14/B17/B26/B71

NR: N5/N12/N13/N14/N71；

WCDMA: B5；

UHB:

LTE: B42/B43/B48；

NR: N48 N77 N78；

2. Antenna scheme

This module does not support the UL CA and ENDC between LB+LB and MHB+MHB.

MHB band registration TRX is connected to ANT0, TRX1 is connected to ANT2, DRX and MIMO are connected to ANT1/2/3;

LB band registration TRX is connected to ANT2, DRX to ANT0;

N77/N78/N79 (B42) registered TX0 to ANT1, TX1 to ANT3, DRX and MIMO to ANT0/2/3;

3. **The location of antenna onSRM825N below:**

Figure 1 SRM825N Antenna Location Map

4. **Antenna Installation**

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

(2) The transmitter module may not be co-located with any other transmitter or antenna.

(3) Only antennas of the same type and with equal or less gains as shown below may be used with this module. Other types of antennas and/or higher gain antennas may require additional authorization for operation.

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization

Table 5 Antenna Requirements

Type	Requirement
WCDMA/ /TDD-LTE/FDD-LTE/5G_sub6	VSWR: < 2
	Gain (dBi): 1
	Max input power (W): 2W
	Input impedance: (ohm) 50
	Polarization: Vertical
	Loss when inserting cable: < 1.5dB (WCDMA B2/B4/B5, LTE B2/B4/B5/B12/B13/B14/B17/B25/B26/B66/B71)
	Loss when inserting cable: < 2dB (LTE B7/B38/B41/B42/B43/B48) (5G_sub6 N41/N48/N77/N78)

4   Electrical characteristics

4.1 Limit Voltage Range

The limit voltage range refers to the module supply voltage and the maximum voltage range that the digital and analog input / output interfaces can withstand. Work outside this range may cause damage to this product.

It is recommended that the lowest voltage of the module low voltage test RF index is 3.3V. If the voltage is lower than this range to 3.135V, the RF index of the module cannot be guaranteed, only the function can be guaranteed.

SRM825N limit voltage range is shown in the table below.

Table 6   Limit operating voltage range

Parameter	Description	Min.	Typical	Max.	Unit
VIN	SRM825N voltage	3.135	3.8	4.4	V
	RMS average current	0		2	A
GPIO	Digital IO level voltage	-0.3	1.8	2.0	V
	shutdown mode voltage	-0.25		0.25	V

4.2 Temperature Range

SRM825N is recommended to work in-30~75℃ environment. It is suggested that end user should consider temperature control under a severe environment. Also need to pay attention to limited operating temperature range of the module, more than the temperature conditions, RF indicators will be overweight. The module application terminal should be stored within storage temperature condition, Modules beyond this range may not work properly or be damaged.

Table 7   Temperature Range

Parameter	Description	Min.	Typical	Max.
Working temperature	-30	+25	+75	℃
Extended operating temperature	-40~-30		+75~+85	℃
Storage temperature	-45		+90	℃

4.3 Electrical Characteristics of Interface Operating State

VL: logic low level;

VH: logic high level.

Table 8   Logic Levels of Ordinary Digital IO Signals

Signal	VL		VH		Unit
	Min	Max	Min	Max	
Digital Input	-0.3	0.3*Vpin_min	0.65*Vpin_max	Vpin_max	V
Digital Output	GND	0.2	Vpin_min-0.2	Vpin	V

Remarks:

Vpin_min=1.45V, Vpin_max=2.0V (Vpin Digital interface high level, Vpin=1.8V)

Table 9   Electrical Characteristics of Power Supply in Working Status

Parameter	I/O	Min.	Typical	Max.	Unit
VIN	PI	3.135	3.8	4.4	V
USIM_VDD	PO	1.7/2.75	1.8/2.85	1.9/2.95	V

4.5　Environmental Reliability Requirements

Table 10   Environmental Reliability Requirements

Test Item	Test Conditions
Cryogenic storage	Temperature -45℃, shut down mode for 48 hours, Tc (sample recovery time) : 2h
High temp storage	Temperature +90℃, shut down mode for 48 hours, Tc (sample recovery time) : 2h
Low temp running	Temperature -40℃, working for 48 hours, Tc (sample recovery time) : 2h
High temp running	Temperature +85℃, working for 48 hours, Tc (sample recovery time) : 2h

Recommend the RF Connector Assembly

Manual insertion of coaxial cable plug schematic diagram is shown below, θ must be 90°.
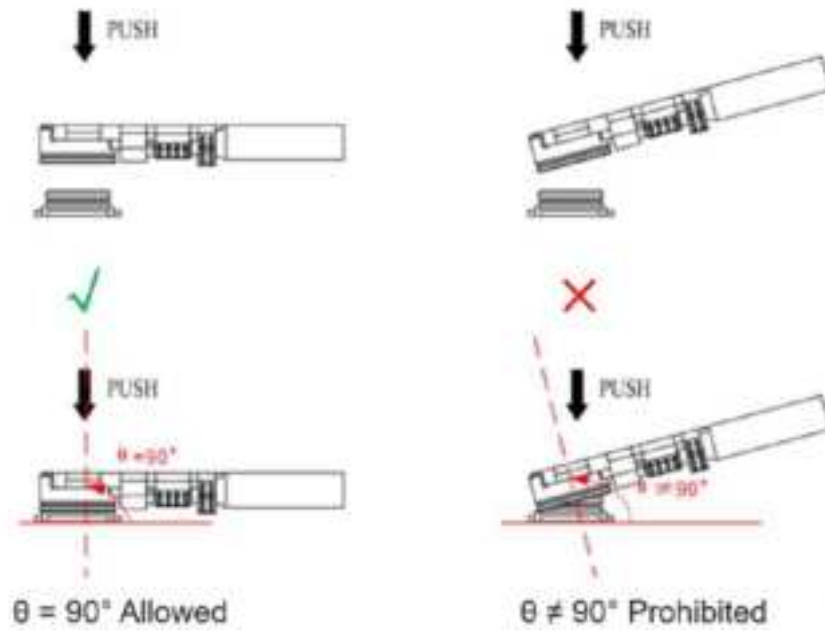
Figure 2   Schematic diagram of inserting coaxial cable plug

Manually pull coaxial cable plug diagram is shown below, θ must be 90°.
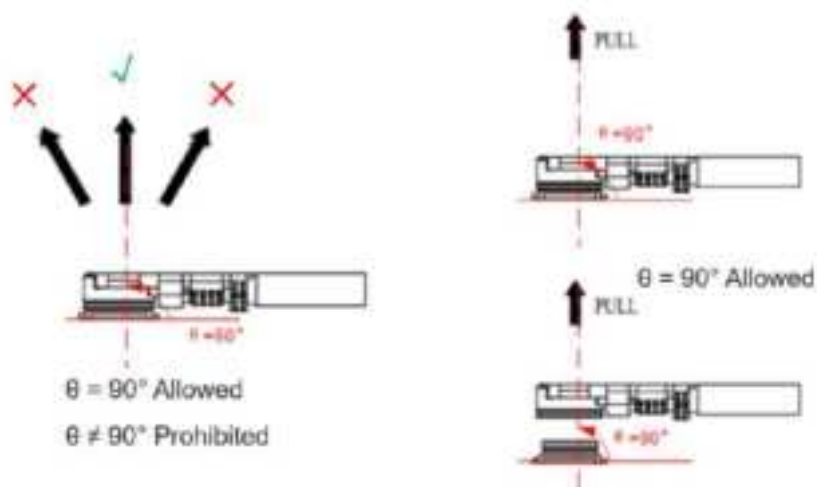

Figure 3   Schematic diagram of pulling out coaxial cable plug

3.11.4   Fixture Inserts and Unplugs Coaxial Cable Plug

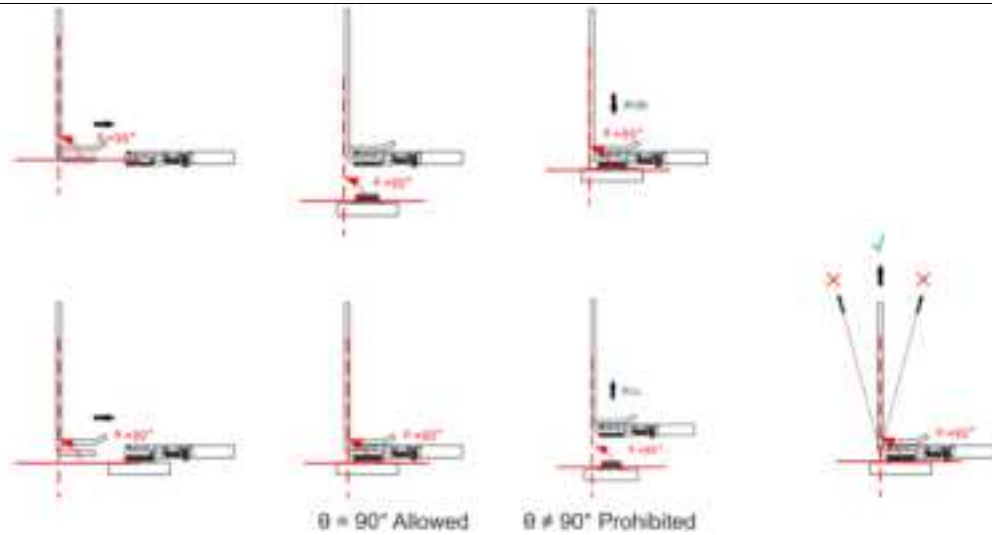Fixture inserts and unplugs coaxial cable plug schematic diagram is as follows, θ must be 90°

θ = 90° Allowed   θ ≠ 90° Prohibited

Figure 4   Schematic diagram of fixture plugging and unplugging coaxial cable plug

3.11.5   Recommend RF Connectors and Cable Manufacturers

For more details, please visit http://www.ectsz.com.