Overview

This document mainly introduces the operation of CMT2390F64-EB and CMT2391F128-EB. The evaluation platform is designed specifically for users to evaluate the performance of CMT2390F64 and CMT2391F128. As the controller kernel of CMT2390F64 / CMT2391F128 is a CM0 level single chip. This evaluation board can be regarded as its development board for various functions of CMT2390F64 / CMT2391F128 such as debugging, verification and testing.

The product models covered in this document are shown in the table below.

Table 1. Product Models Covered in This Document

Product Model	Frequency Range	Modulation Method	Chip Function	Configuration Method	Package
CMT2390F64 / CMT2391F128	113 – 960 MHz	OOK 2(G)FSK 4(G)FSK	Integrated high-performance RF transceiver sigle chip	SoC	QFN48

Remark:

1.   Users are recommended to read the relavant document of CMT2300A in advance for the RF kernel of CMT2390F64 / CMT2391F128 is adopted from CMT2310A.

2.   For more information about the function configuration of CMT2310A while using the evaluation board, please refer to the relevant application documents:

a)   AN235 CMT2310A FIFO and Packet Format Usage Guide；

b)   AN236 CMT2310A Register Description；

c)   AN237 CMT2310A Quick Start Guide；

d)   AN238 CMT2310A RF Parameter Configuration Guide；

e)   AN239 Using Guide for CMT2310A Auto-transceiver Function.

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1 Hardware Platform

The evaluation board is made up with CMT2390F64-EB/CMT2391F128-EB and LCD Shield.

● CMT2390F64-EB/CMT2391F128-EB is used as the evaluation board，and CMT2390F64 / CMT2391F128 is the development board for chip controller. The evaluation board is with functionality and performance evaluation by default and it can be used as the development board for getting to know CMT2390F64 / CMT2391F128.

■ It provides two average frquency band：434MHz and 868MHz，with +20dBm Tx power in Direct Tie matching mode;

■ CMT2390F64-EB/CMT2391F128-EB can also provide two types of standard single antenna (default) and antenna diversity (one PCB with different BOM, double Layout compatibility)

● LCD Shiled is plugged into the CMT2390F64-EB/CMT2391F128-EB. It is used as the man – machine interaction interface for it provides LCD screen and buttons.

1.1 CMT2390F64-EB/CMT2391F128-EB Introduction

Top view and introduction of the CMT2390F64-EB/CMT2391F128-EB are shown in the following figure.
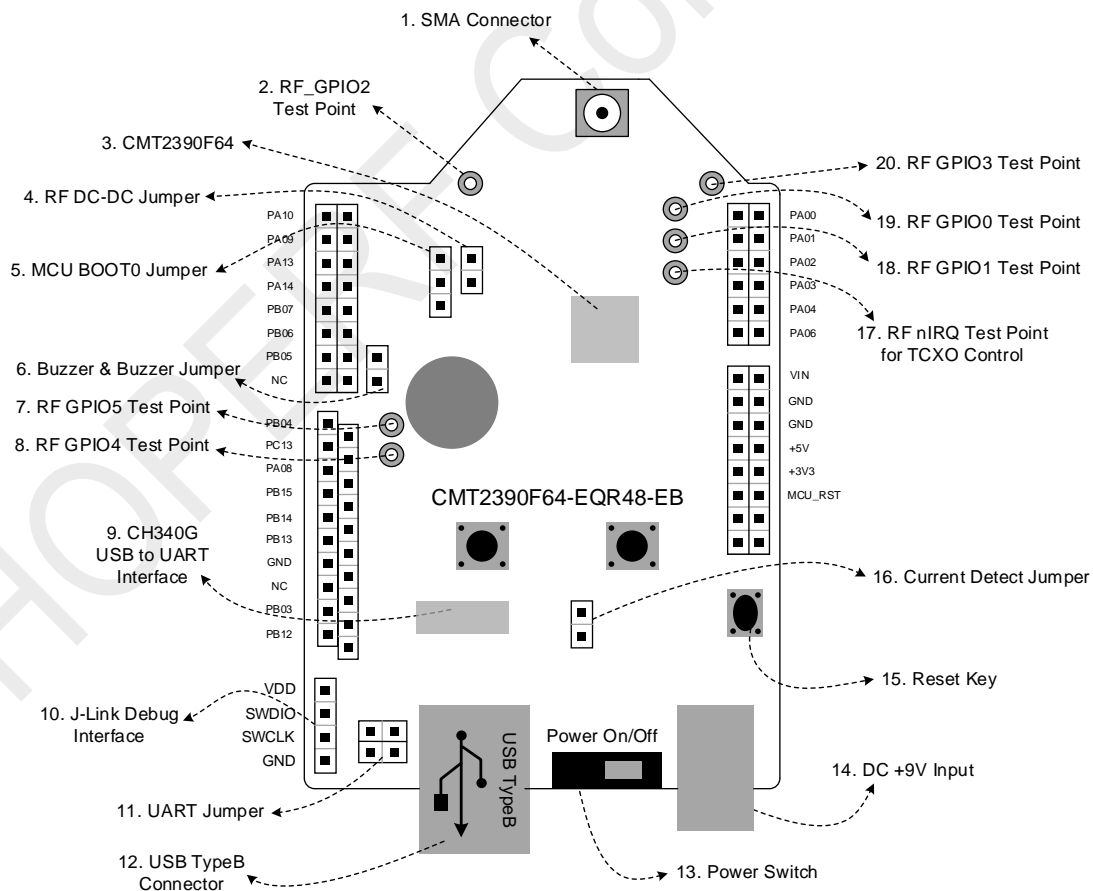
Figure 1-1. CMT2390F64-EB/CMT2391F128-EB Top View

Table 1-1. CMT2390F64-EB/CMT2391F128-EB Description

Number	Function	Description
1	SMA Connector	CMT2390F64 / CMT2391F128 connects to the antenna or test machine through the SMA interface after matching complete.
2	RF GPIO2 Test Point	RF GPIO2 test point Note： 1. RF GPIO2 do not connect to the controller GPIO port； 2. RF GPIO2 can also be output as a synchronous clock DCLK for data streams in receive mode；
3	CMT2390F64	CMT2390F64-EQR chip
4	RF DC-DC Select	The RF part of the CMT2390F64 / CMT2391F128 is embedded with DC-DC module. The DC-DC mode can either be enabled or disabled. It should be noted that this jumper is a hardware selection and should be used together with the control software. If the DC-DC module needs to be enabled, the software also needs to configure the corresponding register BUCK_SEL to 1 (located in Page1, address 0x01, Bit4). Note: The DC-DC only applies to the RF part, while not to power supply of controller part.
5	MCU BOOT0 Jumper	Jumper of CMT2390F64 / CMT2391F128 controller BOOT0
6	Buzzer & Buzzer Jumper	Board buzzer and the control port jumper
7	RF GPIO5 Test Point	RF GPIO5 test point *Note：RF GPIO5 is connected to controller PB04 port.*
8	RF GPIO4 Test Point	RF GPIO4 test point *Note：RF GPIO4 is connected to controller PC13 port.*
9	CH340G USB to UART Interface	CH340G USB to the chip interface of UART
10	J-link Debug Interface	J-link debug interface（SWD）
11	UART Jumper	MCU serial port（PA09、PA10） is connected to CH340G jumper.
12	USB TypeB Connector	USB interface，TypeB
13	Power Switch	Power switch (Switch between battery power and DC power)
14	DC +9V Input	Input interface of 9V direct current
15	Reset Key	Reset key of evaluation board
16	Current Detect	The power consumption of each working state of CMT2390F64 / CMT2391F128 can be carried out by the current test jumper.
17	RF nIRQ Test Point	RF nIRQ test point *Note：* *1. RF nIRQ is not connected to the controller GPIO port；* *RF nIRQ can be used as the power control pin of TCXO, EB makes common passive crystal and TCXO is treated as dual layout compatible processing. EB is defaulted as common passive crystal.*
18	RF GPIO1 Test Point	RF GPIO1 test point *1. RF GPIO1 is not connected to the MCU GPIO port；* *RF GPIO1 can also be used as a DOUT output for data streams in receive mode;*
19	RF GPIO0 Test Point	RF GPIO0 test point *1. RF GPIO0 is not connected to the MCU GPIO port；* *RF GPIO0 can also be used as a synchronous clock DCLK output for data streams in receive mode;*
20	RF GPIO3 Test Point	RF GPIO3 test point *1. RF GPIO3 is not connected to the MCU GPIO port；*

Number	Function	Description
		RF GPIO3 is one of the control terminal of antenna diversity；

Table 1-2. CMT2390F64-EB/CMT2391F128-EB Pin Function

Pin	QFN48-EB	LCD Shiled[1]	Pin	QFN48-EB	LCD Shiled
PA10	UART_RxD		PA00	PA00	LCD_SDIO
PA09	UART_TxD		PA01	PA01	LCD_RS
PA13	SWD_SLCK	LCD_LED	PA02	PA02	LCD_CS
PA14	SWD_SDIO		PA03	PA03	LCD_SCK
PB07	KEY1	S1	PA04	PA04	LCD_ROM_CS
PB06	KEY2	S2	PA06	PA06	LCD_ROM_SDIO
PB05	BUZZER		VIN		
NC	NC		GND		
PB04	RF_GPIO5		GND		
PC13	RF_GPIO4		+5V		
PA08	RF_CSB		+3V3		
PB15	RF_MISO		MCU_RESET		
PB14	RF_MOSI		NC	NC	
PB13	RF_SCK		NC	NC	
GND			PC14	32768Hz crystal	
NC	NC	LCD_RESET	PC15	32768Hz crystal	
PB03	PB03	S3			
PB12	PB12	S4			

Note: For more detail information, please refer to the CMT2390F64-EB/CMT2391F128-EB schematic diagram.

1.2 LCD Shiled Introduction

The following figure shows the top view and introduction of the LCD Shiled.
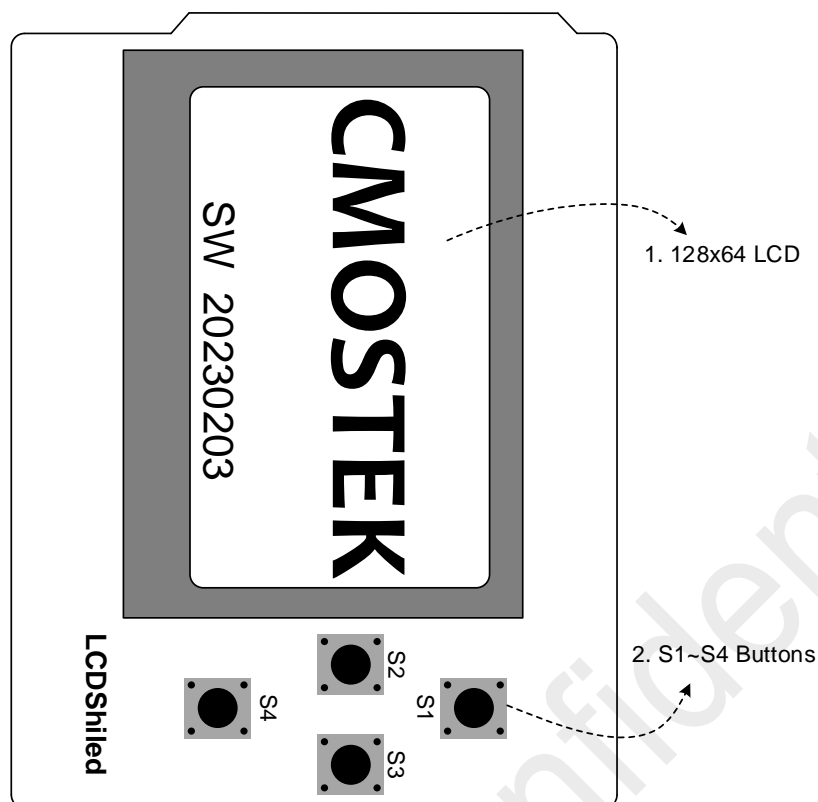
Figure 1-2. LCD Shiled Top View

Table 1-3. LCD Shiled Description

No.	Function	Description
1	128x64 LCD screen	
2	S1~S4 button	

2 Introduction for Parameter Setting

A firmware will be pre-burned around the chip before delivery for multiple functional test and evaluation (it needs to be used together with LCD shield display) for CMT2390F64-EB/CMT2391F128-EB or CMT2390F64-QFN48-EB. This firmware will be updated from time to time as functional changes, it can be downloaded from the official website of HOPE and it will be updated through J-Flash software from J-link debugger (the updated firmware is described in detail in Chapter 4 of this article). In this chapter, parameter setting menu of the factory firmware will be introduced in detail.

2.1 Startup Interface

● The startup interface is show in Fig. 2-1.
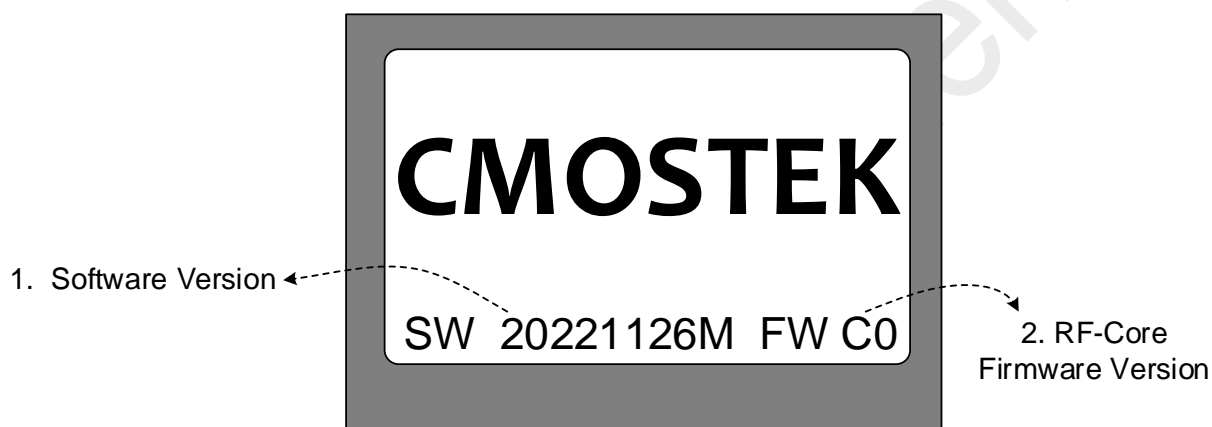
Figure 2-1. Startup Interface

No.	Function	Description
1	Software Version	Factory firmware（CMT2390F64 / CMT2391F128 burning software）version information, as shown in the above figure, it indicates that the current operation version is: 20221126
2	RF-Core Firmware Version	RF core firmware version, as shown in the above figure, it indicates the chip version is C0.

● The startup interface of RF indentified failed is shown as Fig 2-2 (chip abnormal)
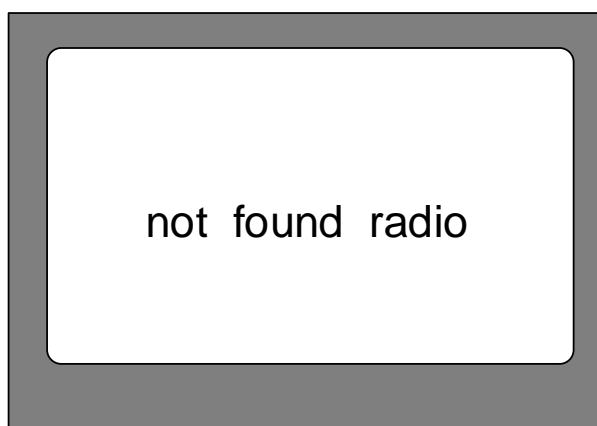
Figure 2-2. Startup Interface when RF Identification Failed

2.2 Main Menu Interface

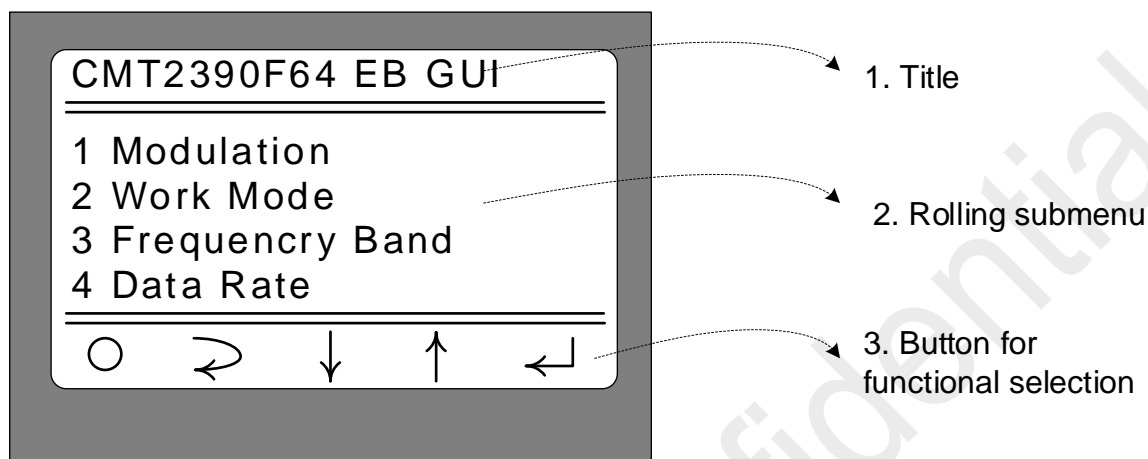The main menu interface will pop up 1 second after the startup interface, as shown in Figure 2-3.

Figure 2-3. Main Menu Interface

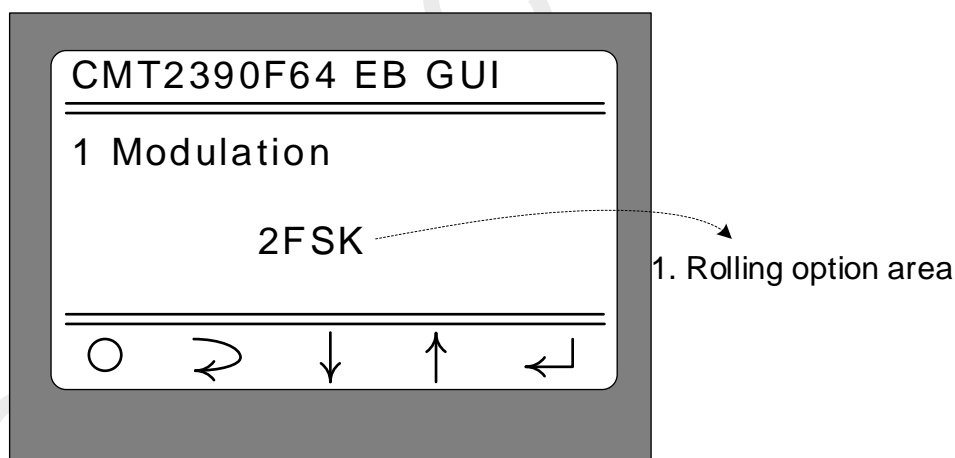| No.	Function	Description
1	Title	CMT2390F64 / CMT2391F128 EB GUI
2	Rolling submenu	15 submenu selections are shown in the area： 1.　Modulation（Modulation and demodulation mode selection） 2.　Work Mode（Working mode selection） 3.　Frequencry Band（Frequency band selection） 4.　Data Rate（Rate/frequency offset parameter selection） 5.　Tx Output Power（Transmission power selection） 6.　Preamble Length（Preamble length selection） 7.　Packet Length（Packet length selection） 8.　Coding Format（Coding format selection） 9.　CRC Select（CRC verification mode selection） 10. CRC Seed Value 11. CRC Result Inv 12. Packet Structure 13. Freq Space and Frequency Channel（Frequency offset and frequency channel signal interval setting） 14. Gaussian Select（Gaussian mode selection） 15. Payload Content 16. AFC Select 17. Dout Disable 18. Interval Select 19. XoCap Select 20. DC DC Enable Submenu 21. DC DC Freq 22. DC DC Voltage
3	Button for functional selection	The positions of S1 - S4 are corresponding to 5 signals.

No.	Function	Description
		○：It is corresponding to S2（left button），indicating that the firmware will enter into working state as parameters/modes set by the above menus with short press； ⇀：with no option； ↓：It is corresponding to S4（down button），indicating that the firmware will enter the next selection with short press； ↑：It is corresponding to S1（up button），indicating that the firmware will enter the above selection with short press； ↵：It is corresponding to S3（right button），indicating that the firmware will enter the current selection with short press；

Operation of the main menu interface：

1. Select the required modified submenu by short press the S4（↓）and S1（↑），the selected submenu

will flash accordingly.

2. Select the submenu respectively to set the corrsponding parameters by short press S3（↵）.

3. Enter into the corresponding working mode according to the setting by short press S2（○）.

2.3 Modulation Submenu

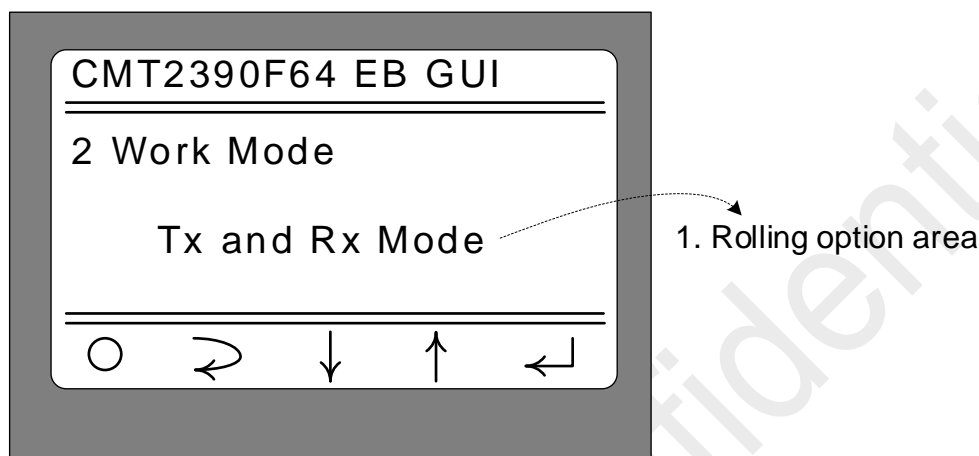Select submenu"1 Modulation"and press S3 to enter into the submenu shown as followed.

Figure 2-4. Modulation Submenu Interface

No.	Function	Description
1	Rolling option area	3 modulation and demodulation modes can be selected by short pressing S1 or S4. • OOK • 2FSK • 4FSK After selecting the corresponding modulation and demodulation modes, press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

2.4 Work Mode Submenu

Select submenu "2 Work Mode" and press S3 to enter into the submenu shown as followed.

```
CMT2390F64 EB GUI

2 Work Mode

    Tx and Rx Mode            1. Rolling option area

  ○    ⇄    ↓    ↑    ↵
```

Figure 2-5. Work Mode Submenu Interface

No.	Function	Description
1	Rolling option area	6 working modes can be selected by short pressing S1 or S4 ; • Sleep（only the RF part enters into sleep mode and the controller still at working mode, supporting interface operation） • CW Tx（enter into CW Tx mode） • Direct Rx（enter into direct Rx mode） • Only Tx Mode（enter into only Tx mode, unidirectional mode） • Only Rx Mode（enter into only Rx mode, unidirectional mode） • Tx and Rx Mode（enter into Tx and Rx mode – bidirectional mode） After selecting the corresponding modulation mode,short press S2 or S5 to confirm the selection and return to the upper menu (i.e. the main menu).

Note: In main menu state, the working mode is entered by short pressing S2 (○) in accordance with the selected modes in sub-menu.

2.5 Frequency Band Submenu

Select submenu "3 Frequencry Band" and press S3 to enter the submenu shown as followed.
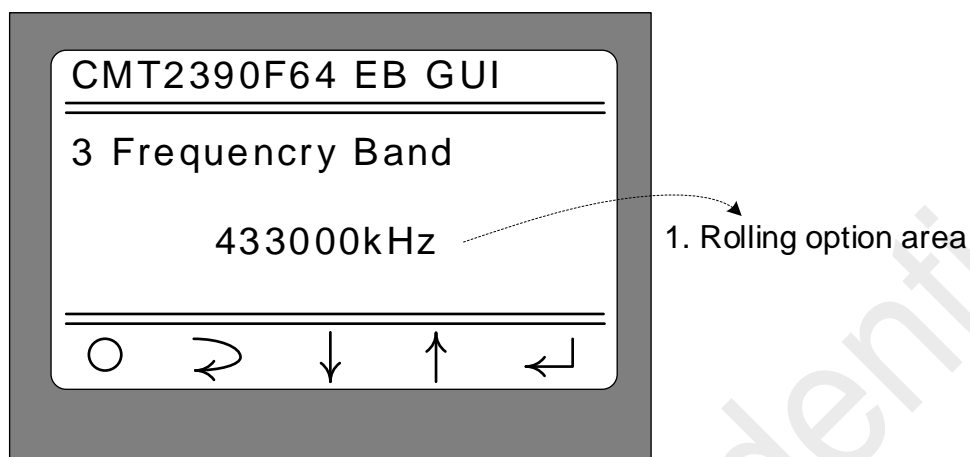

Figure 2-6. Frequencry Band Submenu Interface

No.	Function	Description
1	Rolling option area	The following 6 freqency band can be selected by short pressing S1 or S4: • 169000kHz（i.e. the start frequency is 169MHz） • 230000kHz（i.e. the start frequency is 230MHz） • 314000kHz（i.e. the start frequency is 314MHz） • 433000kHz（i.e. the start frequency is 433MHz） • 470000kHz（i.e. the start frequency is 470MHz） • 779000kHz （i.e. the start frequency is 779MHz） • 863000kHz（i.e. the start frequency is 863MHz） • 902000kHz（i.e. the start frequency is 902MHz） After selecting the corresponding modulation mode, press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

Note: The submenu is selected as the start frequency, because frequency offset can be achieved through ferq. Space and freq. Channel. For more information, please see at the Freq.Space and Freq. Channel submenu section.

2.6 Data Rate Submenu

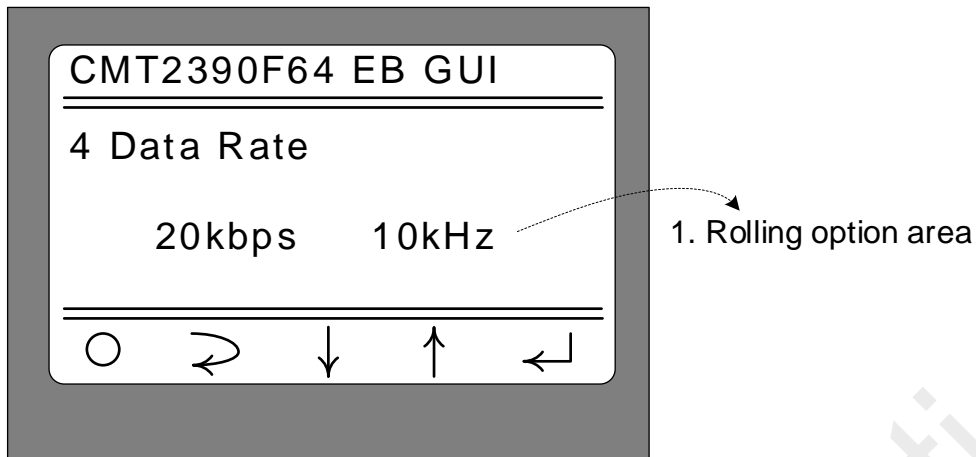Select the *4 Data Rate* and press *S3* to enter the submenu, as shown in Figure 2-7.

Figure 2-7. Data Rate Submenu Interface

No.	Function	Description
1	Rolling option area	Different data rate and frequency offset can combine differently according to different modulation modes by short pressing S1 or S4. ● OOK mode： – 5kbps – 50kbps – 100kbps – 200kbps – 300kbps ● 2FSK mode： – 10kbps, 5kHz（i.e. data rate is 10kbps，offset is +/-5kHz） – 10kbps, 5kHz – 20kbps, 10kHz – 50kbps, 25kHz – 100kbps, 50kHz – 200kbps, 100kHz – 500kbps, 250kHz – 2400kbps, 1200Hz ● 4FSK mode： – 10kbps, 10kHz（i.e. data rate is 10kbps, offset of the two outermost terminal is +/-10kHz） – 100kbps, 100kHz – 200kbps, 150kHz – 400kbps, 200kHz – 800kbps, 250kHz – 1Mbps, 250kHz – 1Mbps, 350kHz After selecting the corresponding modulation mode, short press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

Note：

1.   The combined parameters of rate/frequency offset provided in each modulation and demodulation mode are basically corresponding to the test parameters in the CMT2390F64 / CMT2391F128 data manual for the convenience of retest and confirm by users.

2.   For the rate/frequency offset combination parameters provided in each modulation and demodulation mode, all the configuration parameters are derived from RFPDK, and the crystal deviation is set at 10ppm. "2400bps，1200Hz" is output from 2ppm configuration. Therefore, when setting the configuration, it is necessary to ensure that the TCXO mode is used in a pair of CMT2390F64-EB/CMT2391F128-EB, or the frequency deviation between the two EB is very small, otherwise the communication effect will be affected and the performance will be misjudged indirectly.

2.7 Tx Output Power Submenu

Select the *5 Tx Output Power* and press *S3* to enter the submenu, as shown in Figure 2-8.
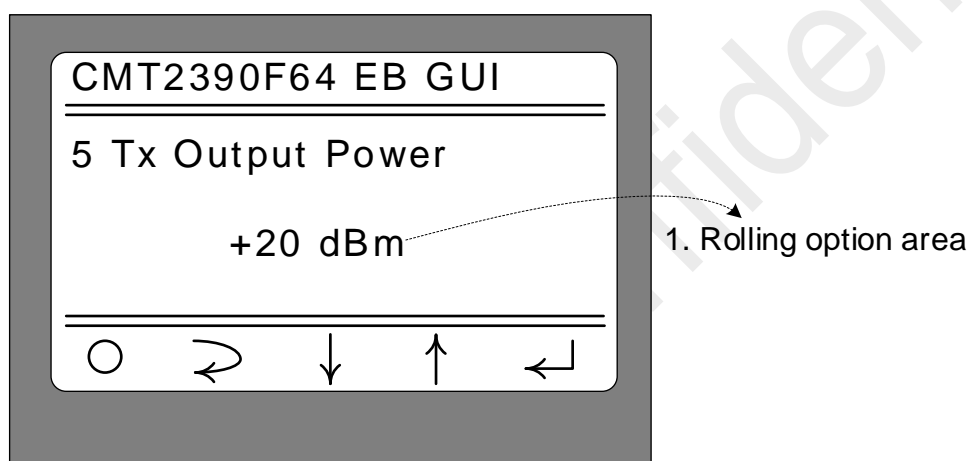

Figure 2-8. Tx Output Power Submenu Interface

No.	Function	Description
1	滚动选项区	In this area, different Tx power can be selected by short pressing S1 or S4： • -10dBm • -7dBm • -3dBm • 0dBm • +3dBm • +7dBm • +10dBm • +13dBm • +17dBm • +20dBm After selecting the corresponding modulation mode, short press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

Note：

1.   The matching parameters of CMT2390F64-EB/CMT2391F128-EB are different according to the frequency. For example, CMT2390F64-EB/CMT2391F128-EB -434MHz indicates that its optimal matching parameter patch component is at 434MHz frequency band; CMT2390F64-EB/CMT2391F128-EB-868MHz

indicates that its optimal matching parameter patch component is at 868MHz frequency band. Thus the accurate transmission power effect can be tested by selecting optimal working frequency band in accordance with the EM.

2.   The transmit power adjustment is applicable to the operating frequency band of 314MHz, 433MHz, 865MHz and 914MHz (click Frequencry Band on the menu). If the Tx power of 169MHz and 230MHz, donnot optimized, the presentation effect will be offset.

2.8 Preamble Length Submenu

Select the *6 Preamble Length* and press *S3* to enter the submenu, as shown in Figure 2-9.
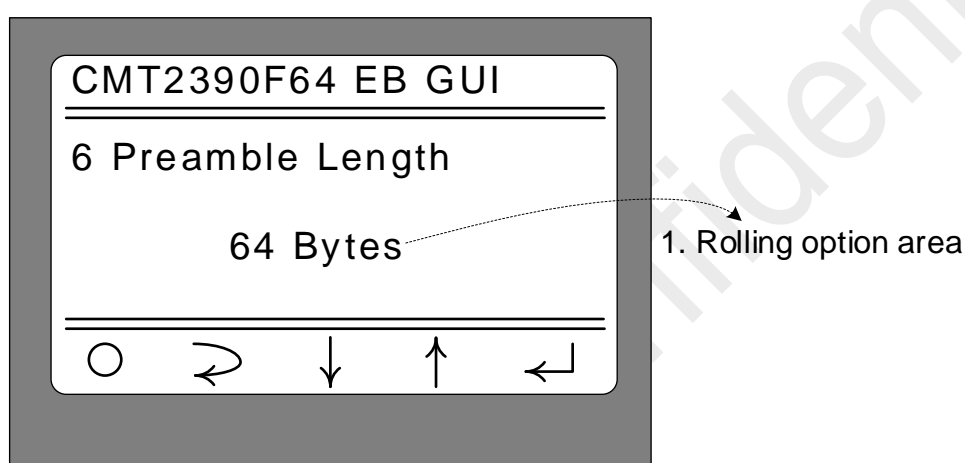

Figure 2-9. Preamble Length Submenu Interface

No.	Function	Description
1	Rolling option area	In this area different preamble length can be selected by short pressing S1 or S4： • 8 Bytes • 16 Bytes • 32 Bytes • 64 Bytes • 128 Bytes • 256 Bytes • 512 Bytes • 1024 Bytes After selecting the corresponding modulation mode, short press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

2.9 Packet Length Submenu

Select the *7 Packet Length* and press *S3* to enter the submenu, as shown in Figure 2-10.
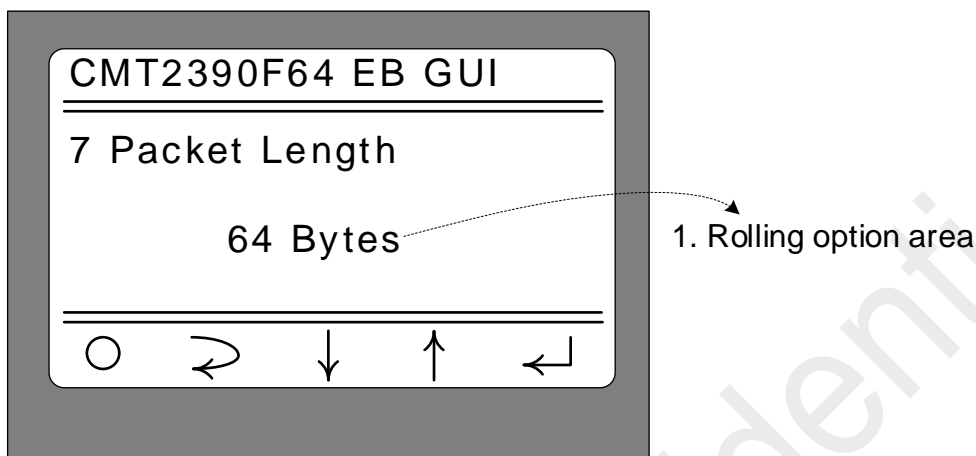
CMT2390F64 EB GUI

7 Packet Length

64 Bytes

1. Rolling option area

Figure 2-10. Packet Length Submenu Interface

No.	Function	Description
1	Rolling option area	In this area different Payload Length can be selected by short pressing S1 or S4： • 8 Bytes • 16 Bytes • 32 Bytes • 64 Bytes • 128 Bytes • 256 Bytes • 512 Bytes • 1024 Bytes After selecting the corresponding modulation mode, short press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

2.10   Coding Format Submenu

Select the *8 Coding Format* and press *S3* to enter the submenu, as shown in Figure 2-11.
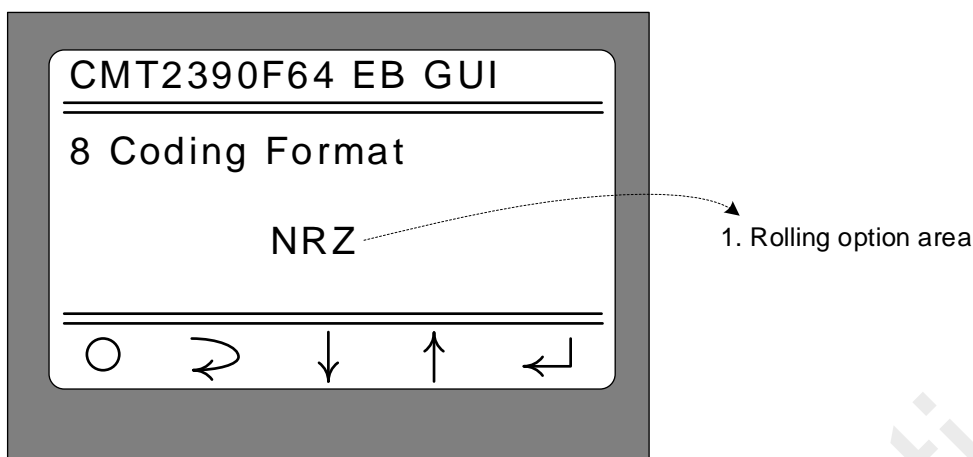
Figure 2-11. Coding Format Submenu Interface

No.	Function	Description
1	Rolling option area	In this area, different coding format can be selected by short pressing S1 or S4： • NRZ（Non-Return-Zero encoding） • Whitening（Whitening encoding） • Manchester（Manchester encoding） • FEC RSC • FEC NRNSC After selecting the corresponding modulation mode, press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

Note：

1.   The Whitening code is in the PN9-CCITT mode (according to the default option of RFPDK), and the Whitening Seed value is set to 0x01FF；

2.   The Manchester encoding uses logic_1=2′b01，logic_0=2′b10, and SyncWord enables the Manchester code；

3.   The FEC RSC and FECNRNSC are compatible to the specification defined by IEEE802.15.4g.

2.11   CRC Select Submenu

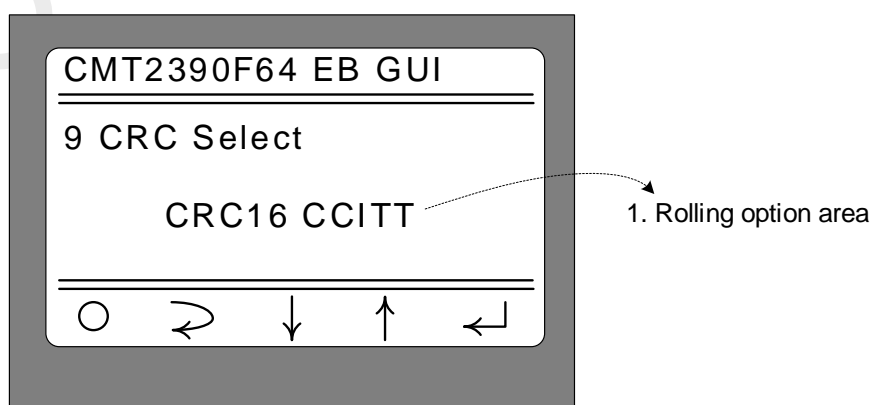Select the *9 CRC Select* and press *S3* to enter the submenu, as shown in Figure 2-12.

Figure 2-12. CRC Select Submenu Interface

No.	Function	Description
1	Rolling option area	In this area, different CRC verification format can be selected by short pressing S1 or S4： • CRC16-CCITT • CRC16-IBM • CRC32 0x04C11DB7 After selecting the corresponding modulation mode, press S2 or S3 to confirm the selection and return to the upper menu (i.e. the main menu).

Note：

1. *No matter which kind of CRC verification mode is selected, the Seed value of CRC is 0.：*

2. *If the Packet Length is relatively long, the CRC32 mode is recommended：*

2.12 CRC Seed Value Submenu

Select *10 CRC Seed Value* and press S3 to enter the submenu, as shown in Figure 2-13
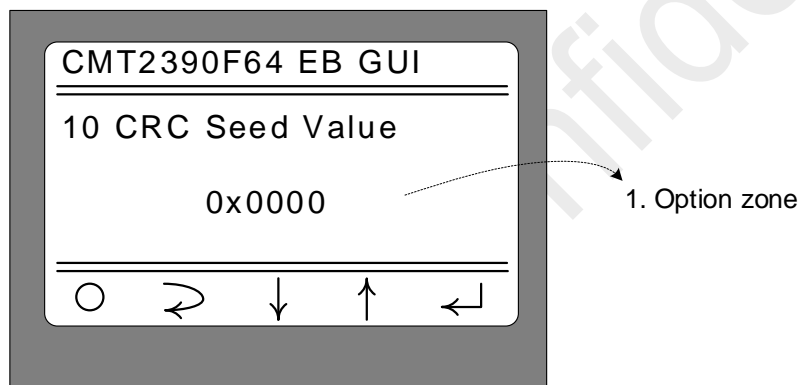

Figure 2-13. CRC Seed Value Submenu Interface

No.	Function	Description
1	Option area	Different CRC Seed Value can be selected by short pressing S1 or S4： ● If CRC is 16 bit, options are as followed： － 0x0000 － 0xFFFF － 0x1D0F ● If CRC is 32 bit, options are as followed： － 0x00000000 － 0xFFFFFFFF － 0x1D0F1D0F After selecting the corresponding modulation mode, press S2 or S3 to confirm and return to the upper menu (i.e. the main menu).

2.13 CRC Result Inv Submenu

Select *11 CRC Result Inv* and press S3 to enter the submenu, as shown in Figure 2-14.
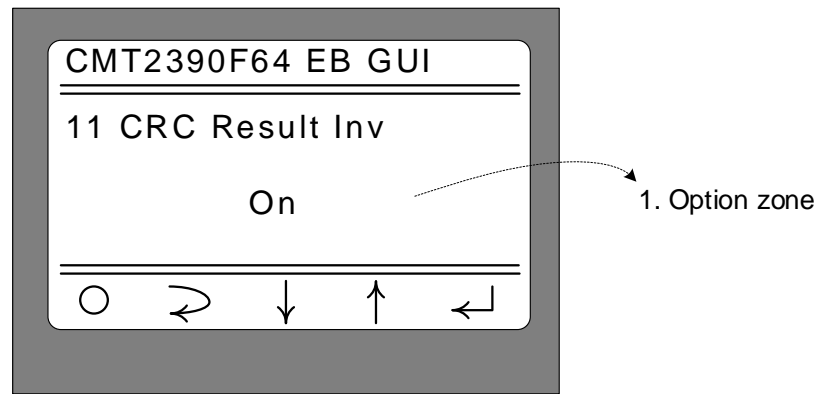
Figure 2-14. CRC Result Inv Submenu Interface

No.	Function	Description
1	Option zone	Different CRC Result Invert can be selected by short pressing S1 or S4 (the calculation of CRC value takes reverse)： ● On，indicates that the CRC calculation result value is reversed； ● Off，indicates that the CRC calculation result value is not reversed； After selecting the corresponding modulation mode, press S2 or S3 to confirm and return to the upper menu (i.e. the main menu).

2.14 Packet Structure

Chapters from 2.8 to 2.13 are related to the packet structure. Therefore, this section is mainly for describing the packet structure mode of the firmware, as shown in Figure 2-15.
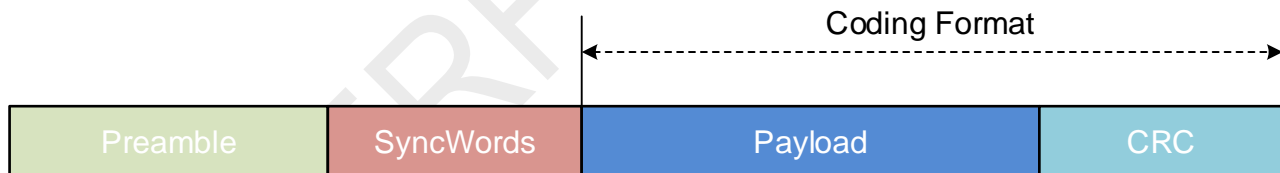

Figure 2-13. Packet Structure

1.   The test Packet adopts fixed-length packet mode. The Payload Length is configured by the 7 Packet Length submenu；

2.   The Preamble transmission Length of packet is set from the 6 Preamble Length submenu with unit of 8 bits. The Preamble values are configured as followed：

Modulation/Demodulation Mode	Preamble Value
OOK	0xAA
2FSK	0xAA
4FSK	0xCC

3. The SyncWords value of the test packet is set to 6 bytes and the value is 0x2DD42DD42DD4；

4. CRC mode is set by the "9 CRC Select" submenu；

5. The Payload content is filled randomly according the Packet length of the HC32L136 random module. Each time the Tx content is not fixed.

6. The Coding Format (content set by the 6 Coding Format submenu) affects the packet range, as shown in the figure above, which mainly applies to the Payload and CRC. Noted that when the encoding mode of the packet in this firmware uses Manchester encoding, the SyncWords also uses Manchester encoding.

7. In 4-FSK mode, the relationship of data mapping is the default configuration *8 'b11100100* of RFPDK, which means:

Frequency Deviation	-DEV	-DEV/3	+DEV/3	+DEV
Data Mapping	2'b00	2'b01	2'b10	2'b11

2.15   Frequencry Space and Frequencry Channel Submenu

The 12 Freq Space and 13 Freq Channel submenus are associated with each other and they aims to the RF Channel Settings. The 12 Freq Space sub-menu sets Frequencry Space, i.e. the channel interval value, with setting range from 0 to 255 in kHz unit. The 13 Freq Channel submenu sets the Frequencry Channel, i.e. the Channel signal, with setting range from 0 to 255. The transceiver frequency offset can be calculated through the formula showned as followed：

$$Frequencry\ Offset = Frequencry\_Space \times Frequencry\_Channel（kHz）$$

This Frequency Offset take the initial frequency set in the "3 Frequency Band". Since the maximum value of these two settings is 255, therefore the maximum Frequencry Offset can achieve in range from 0MHz to 65MHz with unit of kHz. For example, if the target frequency is 433.92MHz, then you can set the starting frequency to 433000kHz in the "3 Frequencry Band", and Frequencry Space value to 92, Frequencry Channel to 10.

Select the 12 Freq Space or 13 Freq Channel and press S3 to enter the submenu, as shown in Figure 2-16 or Figure 2-17.
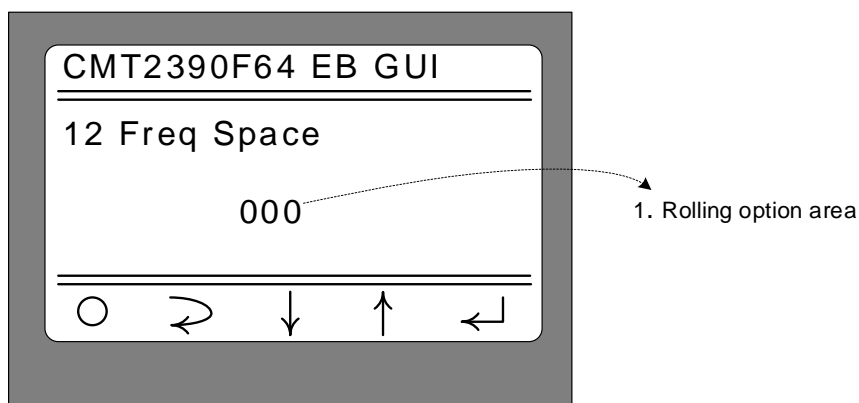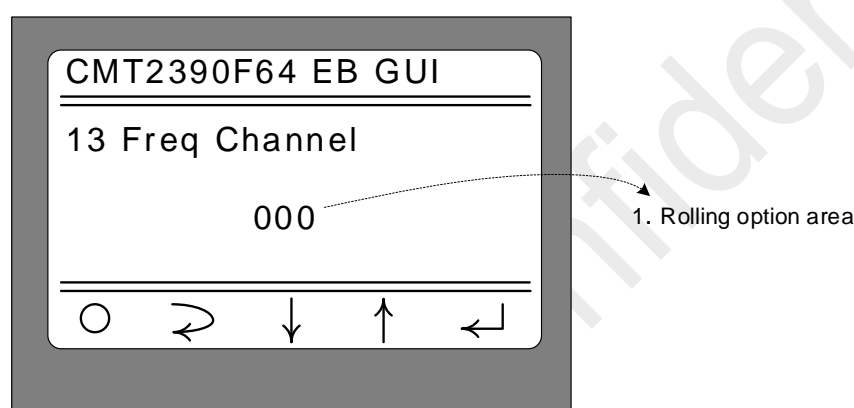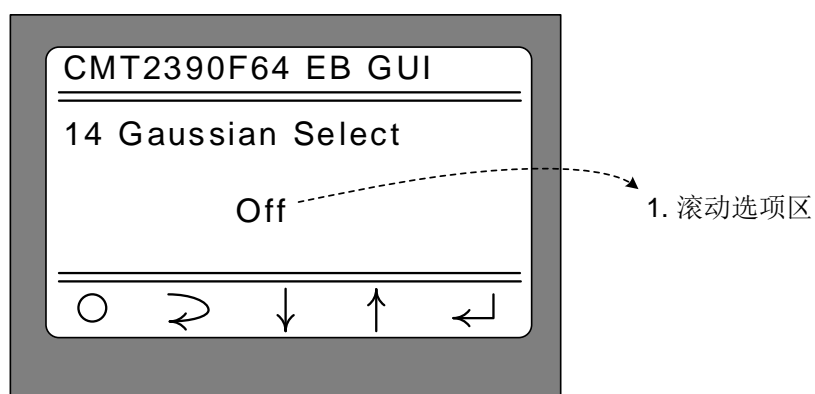
Figure 2-16. Freq Space Submenu Interface

Figure 2-17. Freq Channel Submenu Interface

No.	Function	Description
1	Rolling option area	In this area, the value of Frequencry Space or Frequencry Channel can be configured by pressing S4 （↓） and S1 （↑） ： • Short press S1 （↑） , the value will increased by 1 each time; If it reaches 255, it overflows 0； • Short press S4 (↓), the value will decreased by 1 each time; If it reaches 0, it wil turn to 255 at the next. • Long press S4 （↓） (hold on for 1~2 seconds), the value will automatically accumulate by 1 to 255 and it will overflow 0, and then continue to accumulate by 1 in cycle until loosing the S4 button; • Long press S1 （↑） (hold on for 1~2 seconds), the value will automatically decrease by 1 until 0, and it will overflow 255, and then continue to decrease by 1 in cycle until loosing the S1 button; After the operation, press S2 or S3 to confirm the current value and return to the upper menu (that is, the main menu).

2.16 Gaussian Select Submenu

Select *14 Gaussian Select* and press S3 to enter the submenu, as shown in figure 2-18.

Figure 2-18. Gaussian Select Submenu Interface

No.	Function	Description
1	Rolling option area	The options can be switched by short pressing S1 or S4： • Off，disable the Gaussian filter transmission； • BT03，enable the Gaussian filter transmission with BT coefficient as 0.3; • BT05，enable the Gaussian filter transmission with BT coefficient as 0.5; • BT08，enable the Gaussian filter transmission with BT coefficient as 0.8; • BT10，enable the Gaussian filter transmission with BT coefficient as 1.0; After selecting the corresponding modulation and demodulation mode, selection can be confirmed by short pressing S2 or S3, and return to the upper menu (that is, the main menu).

Note：

1. *After Gaussian transmission is enabled, 2FSK is 2GFSK modulation mode. 4FSK indicates the 4GFSK mode*；

2.17 Test Counter Submenu

Select the *15 Test Counter* and press S3 to enter the submenu, as shown in Figure 2-19.
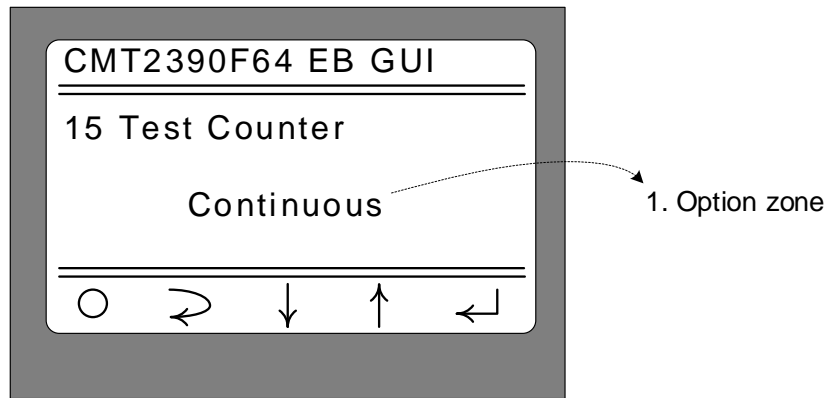
Figure 2-19. Test Counter Submenu Interface

No.	Function	Description
1	Rolling option area	Options can be switched by short pressing S1 or S4： • Continuous, no limit number of the active packet sending test； • 100, active packet sending test, limit of 100 times; • 200, active packet sending test, limit of 200 times; • 500, active packet sending test, limit of 500 times; • 1000, active packet sending test, limit of 1000 times; • 2000, active packet sending test, limit of 2000 times; • 5000, active packet sending test, limit of 5000 times; • 10000, active packet sending test, limit of 5000 times; After selecting the corresponding modulation and demodulation mode, selection can be confirmed by short pressing S2 or S3, and return to the upper menu (that is, the main menu).

2.18   Payload Content Submenu

Select the 16 Payload Content and press S3 to enter the submenu, as shown in Figure 2-20.
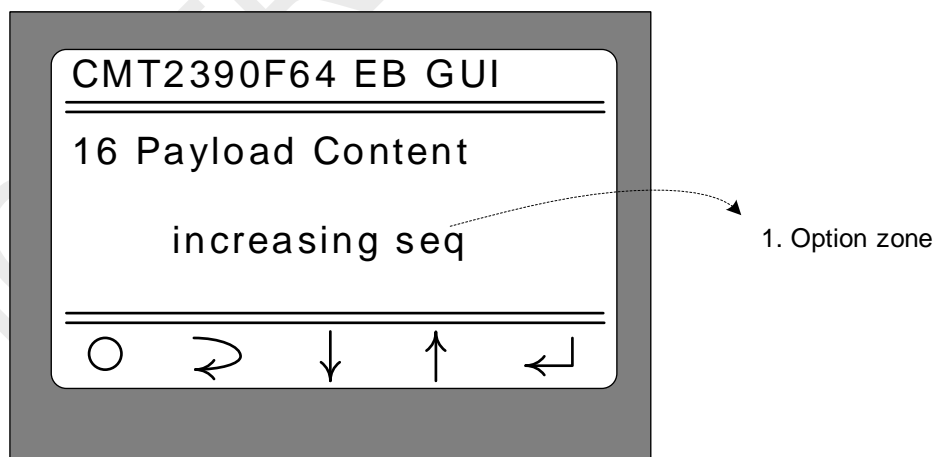

Figure 2-20. Payload Content Submenu Interface

No.	Function	Description
1	Rolling option area	Options can be switched by short pressing S1 or S4：

No.	Function	Description
		• Increasing seq：the contents of active packets are filled in an order sequence and started from 0 with increasing of 1 each time and overflow until it reaches 255, and then starts from 0 again; • random sequence：active packets are filled with random sequences; After selecting the corresponding modulation and demodulation mode, selection can be confirmed by short pressing S2 or S3, and return to the upper menu (that is, the main menu).

2.19 AFC Select Submenu

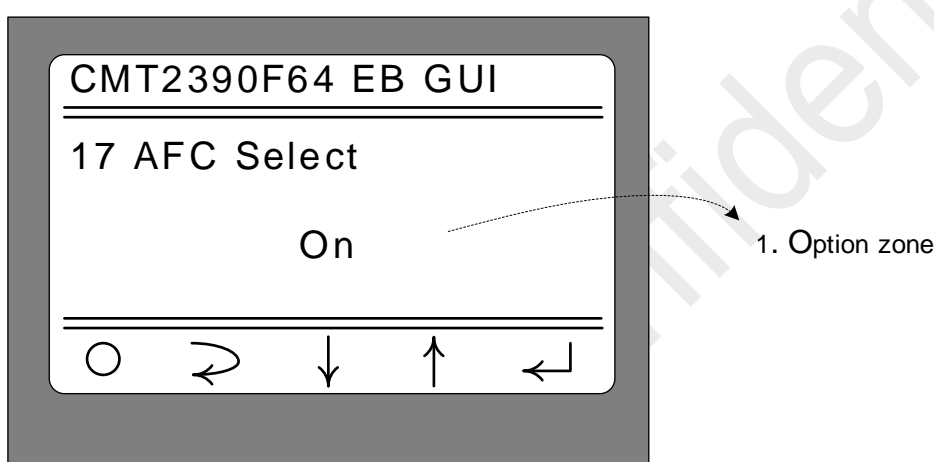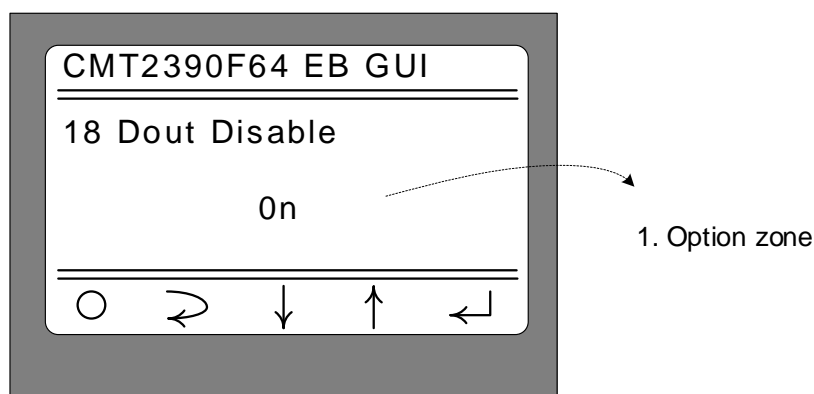Select the 17 AFC Select and press S3 to enter the submenu, as shown in Figure 2-21.

```
CMT2390F64 EB GUI
─────────────────────
17 AFC Select

          On              1. Option zone

─────────────────────
  ○   ⤺   ↓   ↑   ↵
```

Figure 2-21. AFC Select Submenu Interface

No.	Function	Description
1	Rolling option area	Options can be switched by short pressing S1 or S4： • On：Enable AFC function； • Off：Disable AFC function； After selecting the corresponding modulation and demodulation mode, selection can be confirmed by short pressing S2 or S3, and return to the upper menu (that is, the main menu).

2.20 Dout Disable Submenu

Select 18 Dout Disable and press S3 to enter the submenu, as shown in Figure 2-22.

Figure 2-22. Dout Disable Submenu Interface

No.	Function	Description
1	Option area	Options can be switched by short pressing S1 or S4： • On：Disable Dout function； • Off；Enable Dout function； After selecting the corresponding mode, selection can be confirmed by short pressing S2 or S3, and return to the upper menu (that is, the main menu).

Note：

1.   This function affects both the Dout and Dclk function, that is, the Dclk output of GPIO0 and Dout of GPIO1 are affected by this menu setting;

2.   If Work Mode is set to Direct Rx, make sure that the menu is Off; otherwise, it will fail to pass the BER test through GPIO1.

3.   If Work Mode is Only Tx Mode, Only Rx Mode, and Tx and Rx Mode, it is recommended to set this menu to On for reducing the noise caused by signal flipping of Dclk and Dout from GPIO0 and GPIO1.

2.21   Interval Select Submenu

Select 19 Interval Select and press S3 to enter the submenu, as shown in Figure 2-23.
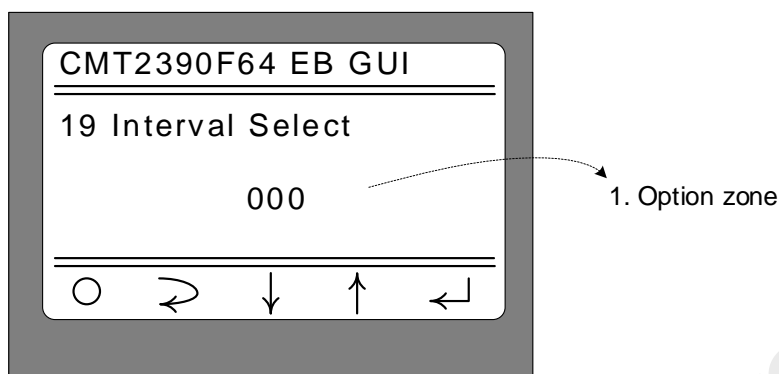

Figure 2-23. Interval Select Submenu Interface

No.	Function	Description
1	Option zone	The Interval value can be switched by short pressing S1 or S4： • Short press S1（↓）, the value will increased by 1 each time; If it reaches 255, it overflows 0； • Short press S4（↑）, the value will decreased by 1 each time; If it reaches 0, it overflows 255 at the next； • Long press S1（↓）(hold on for 1~2 seconds), the value will automatically accumulate by 1 to 255 and it will overflow 0, and then continue to accumulate by 1 in cycle until loosing the K3 button; • Long press S4（↑）(hold on for 1~2 seconds), the value will automatically decrease by 1 until 0, and next time it will overflow 255, and continue to decrease by 1 in cycle until loosing the S4 button; • After modifing the required data, press S2 or S3 to confirm and return to the upper menu (that is, the main menu). • The Interval value is the waiting time between packet transmission (applies to Only Tx Mode and active transmission Mode in Tx and Rx Mode), in unit of 10ms. For example, if Interval is set to 10, packets will be transmitted after 100ms.

2.22 XoCap Select Submenu

Select the "20 AFC Select" submenu and press S3 to enter into submenu, as shown in Fig 2-24.
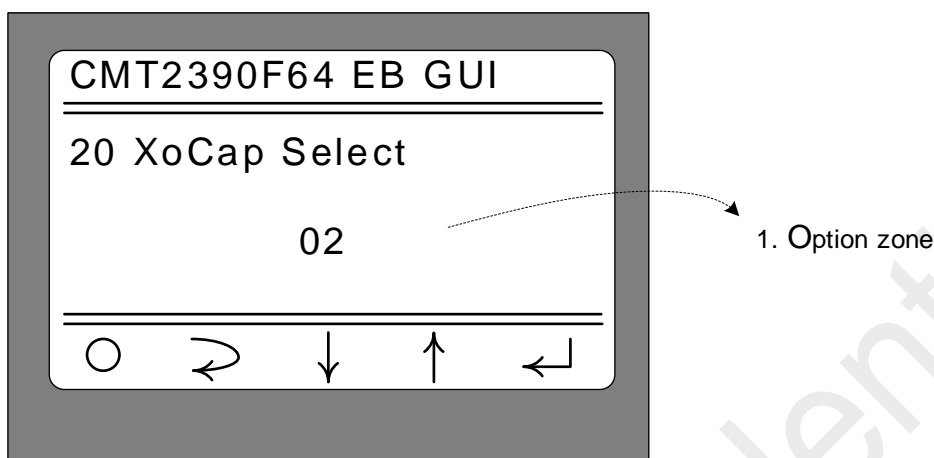
```
CMT2390F64 EB GUI

20 XoCap Select

        02                    1. Option zone

   ○    ⤺    ↓    ↑    ↵
```

Figure 2-24. XoCap Select Submenu Interface

No.	Function	Description
1	Rolling option area	Value of Xocap can be modified by short pressing S1 or S4： • Short press S4（↓），the value will decrease by 1; If it turns to 0 and press one more time, it will turn to 31; • Short press S1（↑），the value will increase by 1;If it reaches 31, press one more time and it will overflow to 0; Select the corresponding XoCap value and short press S2 or S3 to comfirm and return to the uper menu (i.e. main menu)

2.23 DC DC Enable Submenu

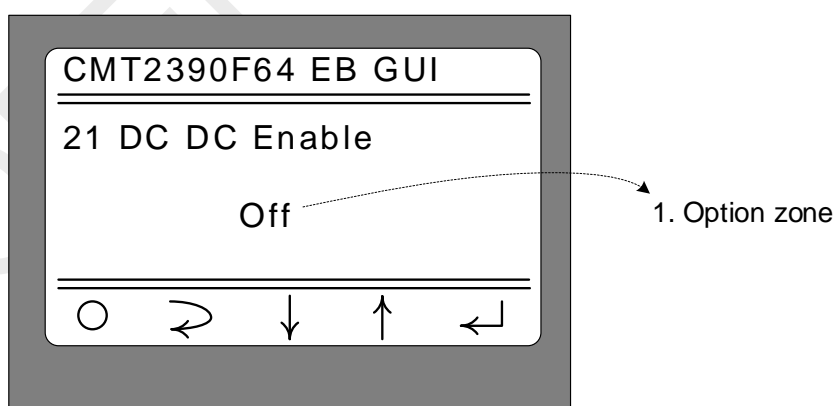Select the 21 DC DC Enable and press S3 to enter the submenu, as shown in Figure 2-25.

```
CMT2390F64 EB GUI

21 DC DC Enable

       Off                    1. Option zone

   ○    ⤺    ↓    ↑    ↵
```

Figure 2-25. DC DC Select Submenu Interface

No.	Function	Description
1	Rolling option area	The options can be switched by short pressing S1 or S4： • Off，disable the embedded DC DC module software configuration； • On，enable the embedded DC DC module software configuration； After selecting the corresponding modulation and demodulation mode, press S2 or S3 to confirm and return to the upper menu (that is, the main menu).

Note:

As mentioned above, the software configuration of DC-DC should be consistent with the hardware of CMT2310A-EM. That is, the DC-DC is enabled as both of the software configuration and jumper selection of EM module are enabled. If the software configuration is disabled, DC-DC is turned off as the EM module jumper.

2.24 DC DC Freq Submenu

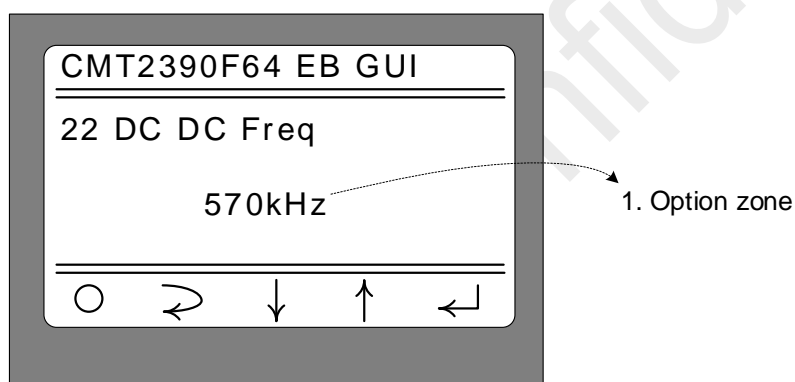Select the 22 DC DC Freq and press S3 to enter the submenu, as shown in Figure 2-26.

Figure 2-26. DC DC Freq Submenu Interface

No.	Function	Description
1	Option zone	The embeded DC DC module frequency in the software confoguration can be switched by short pressing S1 or S4： • 400kHz； • 500kHz； • 570kHz；（RFPDK default value） • 670kHz； • 800kHz； • 890kHz； • 1000kHz； • 1140kHz； After selecting the corresponding modulation and demodulation mode, press S2 or S3 to confirm and return to the upper menu (that is, the main menu).

2.25   DC DC Voltage Submenu

Select the 23 DC DC Voltage and press S3 to enter the submenu, as shown in Figure 2-27.
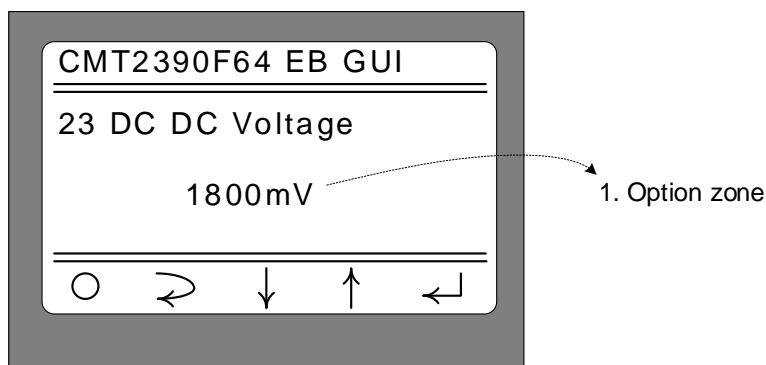
```
CMT2390F64 EB GUI

23 DC DC Voltage

       1800mV                    1. Option zone


  ○    ⇄    ↓    ↑    ↵
```

Figure 2-27. DC DC Voltage Submenu Interface

No.	Function	Description
1	Option zone	The embedded DC DC module output voltage in the software confoguration can be switched by short pressing S1 or S4： • 1800mV；（RFPDK default value） • 1900mV； • 2000mV； • 2100mV； After selecting the corresponding modulation and demodulation mode, press S2 or S3 to confirm and return to the upper menu

3 Working Mode Description

After setting the required parameters and mode according to the "Parameter Setting Menu" in Chapter 2, short press S2 "○" in main menu and it will work according to "2 Work Mode" submenu. The following will describe the operation of each mode.

3.1 Sleep Mode

Selecting "Sleep" mode and short pressing S2 "○" in main menu interface to enter Sleep working mode, as shown in Figure 3-1 below.
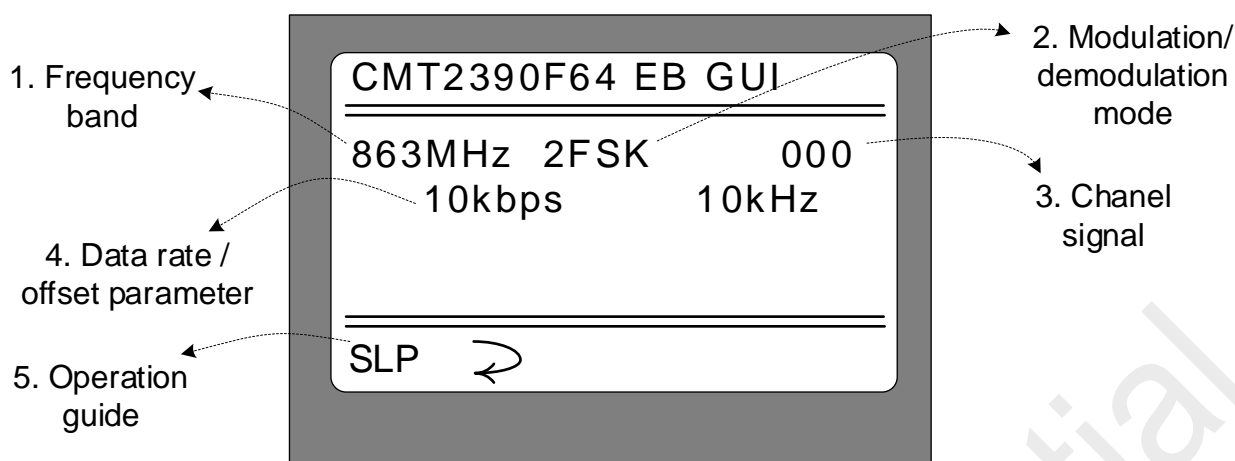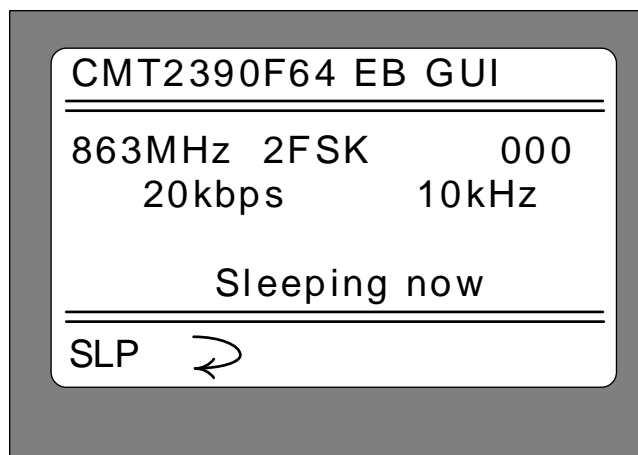
Figure 3-1. Sleep Mode Interface

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. That is, the operating frequency and starting frequency are 863MHz.
4	Data rate/frequency offset parameter	Display the data rate/frequency offset parameters currently set. As shown in the figure above, it indicates that the current setting rate is 10kbps and the frequency offset is +/-10khz.
5	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（SLP） to make the RF part of CMT2390F64 / CMT2391F128 enter into Sleep mode； • Short press S3（ ⮌ ）， and return to the upper menu（that is，the main menu）

Based on the operation shown in the above figure, short press S2 to make the RF part of CMT2390F64 / CMT2391F128 enter into Sleep mode and the interface is updated as shown in Figure 3-2 below.
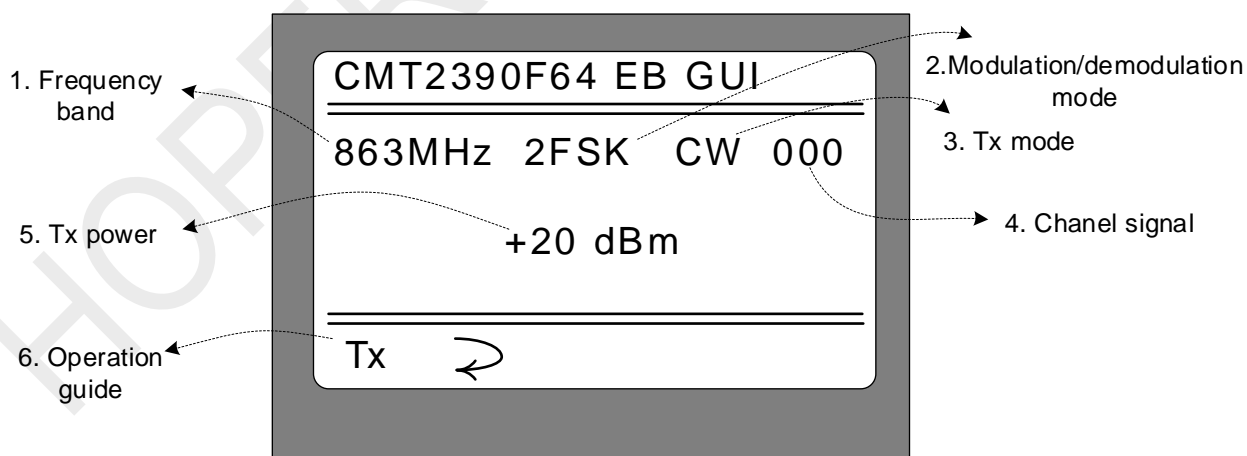
```
┌─────────────────────────────┐
│  CMT2390F64 EB GUI          │
│  ─────────────────────────  │
│  863MHz  2FSK        000    │
│      20kbps      10kHz      │
│                             │
│       Sleeping  now         │
│  ─────────────────────────  │
│  SLP    ↲                   │
└─────────────────────────────┘
```

Figure 3-2. Sleep Mode Interface（RF part enters into Sleep mode）

Note：

1.   In this interface, short pressing S2 again will not update the information while the firmware will send out Sleep command again；

2.   In this interface, short pressing S3 to make RF part of CMT2390F64 / CMT2391F128 exit Sleep mode and return to the upper menu (that is, the screen shown in Figure 3-1. To return to the main menu, short press S3 once again).
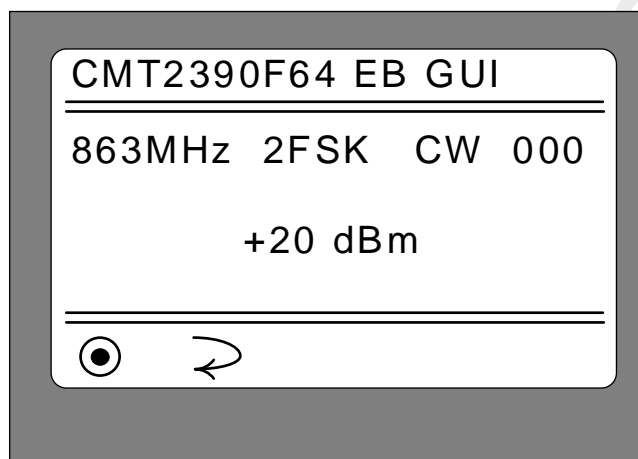
3.2 CW Tx Mode

After selecting "CW Tx" mode, short press S2 "○" in the main menu interface to enter the CW Tx working mode, as shown in Figure 3-3 below.

Figure 3-3. CW Tx Working Mode

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Tx mode	Display the current transmit mode. CW indicates the transmit carrier mode
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. Therefore, both of the operating frequency and starting frequency are 863MHz.
5	Tx power	Display the currently set transmit power. As shown in the figure above, it indicates that the current set transmit power is +20dBm.
6	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Tx）, CMT2390F64 / CMT2391F128 enters into carrier transmit mode； • Short press S3（⮐）, and return to the upper menu（that is，the main menu）.

Based on the operation shown in the above figure, short press S2 to enter into Carrier Tx mode, and the display is updated as shown in Figure 3-4 below.

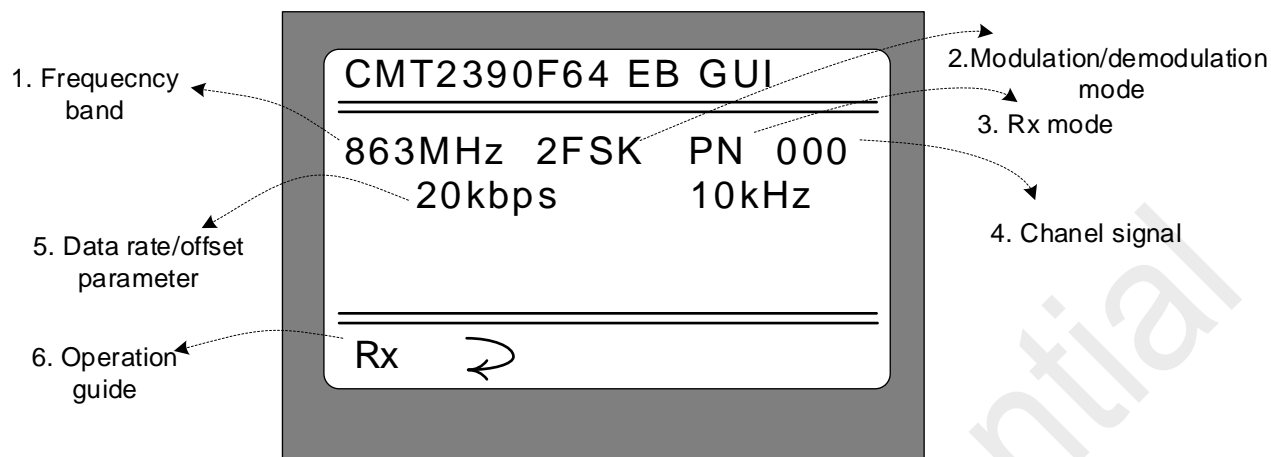**Figure 3-4. CW Tx mode interface（Carrier Wave is in Tx）**

Note：

1.   Under this interface, short press S2 again to stop the current carrier transmission mode and return to the upper menu (as shown in Figure 3-3). That is, the carrier transmission can be alternately enabled and stopped by short pressing S2.

2.   Under this interface, short press S3 to exit CW Tx working mode and returns to the main menu.

3.   The already set data rate/frequency offset combination parameter is not related to carrier wave transmission mode.

3.3 Direct Rx Mode

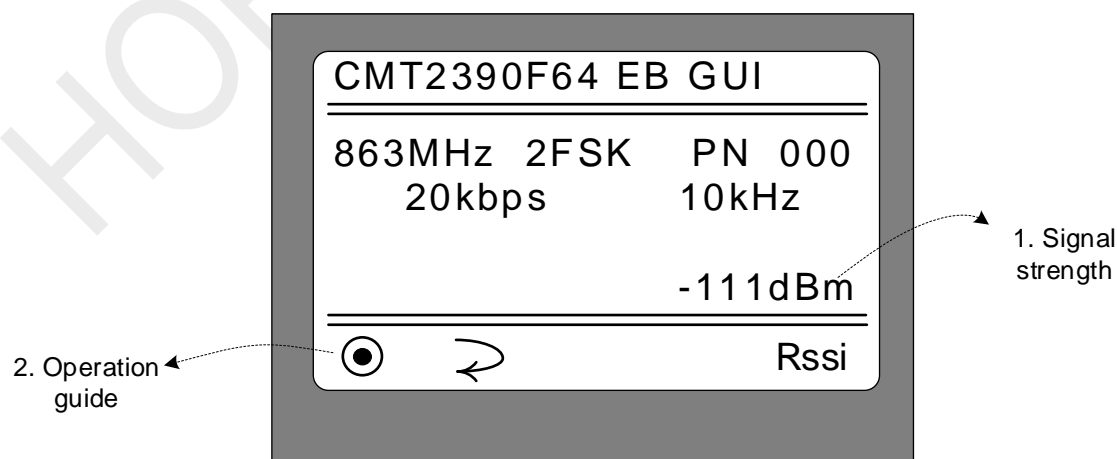After selecting " Direct Rx " mode, press S2 "○" in the main interface to enter the Direct Rx working mode,

as shown in Figure 3-5 below.

Figure 3-5. Direct Rx Working Mode

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Rx mode	Display the current receiving mode. PN indicates the Direct Rx mode (can be used as sensitivity test for PN9 series)
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. That is, the operating frequency and starting frequency are 863MHz
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that current setting rate is 10kbps and the frequency offset is +/-10khz.
6	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Rx）, CMT2390F64 / CMT2391F128 enters into direct receiving mode； • Short press S3（⤸）, return to the upper menu（that is, the main menu）

Based on the operation shown in the above figure, short press S2 and CMT2390F64 / CMT2391F128 enters into Direct Rx mode, the interface is updated as shown in Figure 3-6 below.
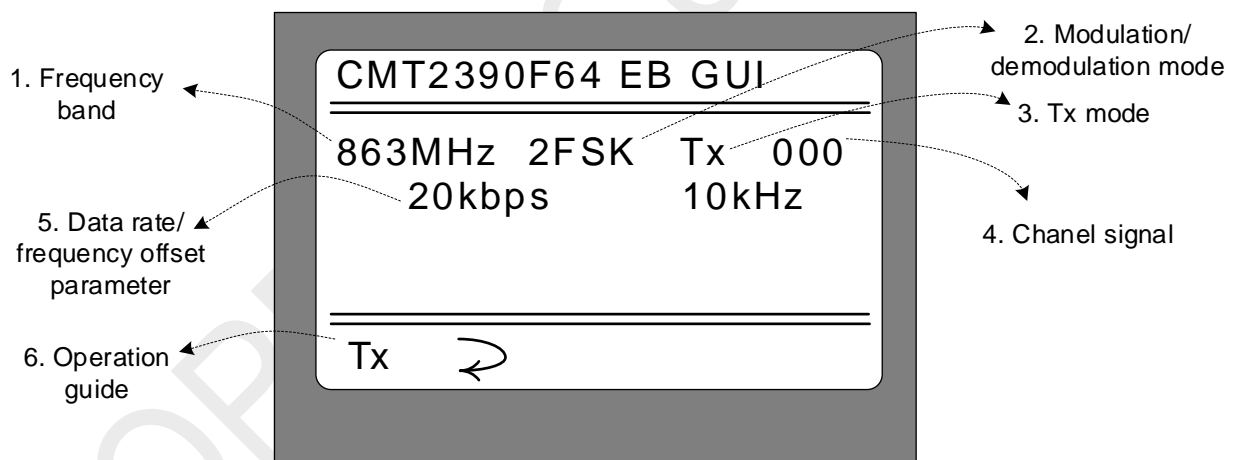
Figure 3-6. Direct Rx mode（In Receiving Mode）

No.	Function	Description
1	Signal strength	Displays the real-time signal strength in the current receiving state, in dBm
2	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Rx / ◉）, CMT2390F64 / CMT2391F128 enters into or / suspend Direct Rx mode； • Short press S3（⇄）, and return to the upper menu（that is, the main menu）

Note:

In this receiving mode, it can be used to dock the signal generator and evaluate the bit error rate (BER) of CMT2390F64 / CMT2391F128 by the PN9 sequence, which is used to evaluate the sensitivity of CMT2390F64 / CMT2391F128. The sensitivity test is related to the rate/frequency offset parameter, so it needs to be set according to the rate and frequency offset required by the target. GPIO1 is used as the output demodulation data stream and GPIO0 is used as the synchronous clock signal of the demodulation data stream.
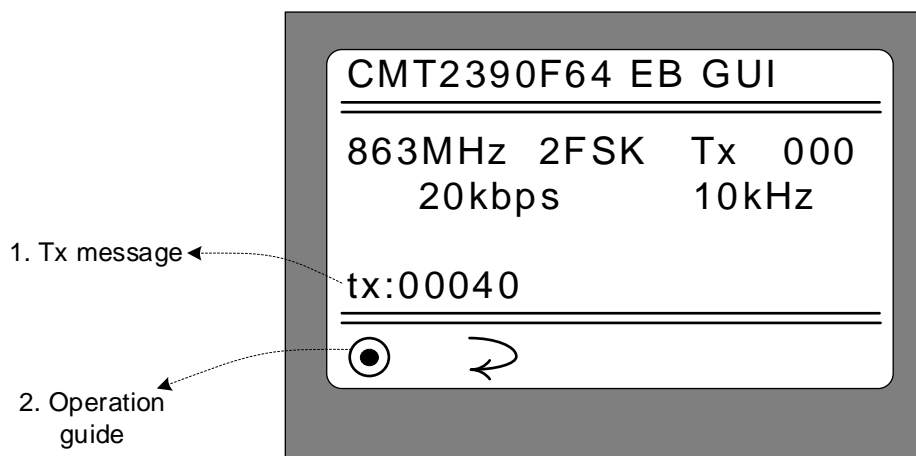
3.4 Only Tx Mode

After selecting the "Only Tx Mode", short press S2 "○" in the main menu to enter the only Tx Mode, as shown in Figure 3-7 below.

1. Frequency band
2. Modulation/demodulation mode
3. Tx mode
4. Chanel signal
5. Data rate/frequency offset parameter
6. Operation guide

CMT2390F64 EB GUI

863MHz 2FSK Tx 000
20kbps 10kHz

Tx ⇄

Figure 3-7. Only Tx Working Mode

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Tx mode	Display the current transmit mode, Tx indicates the only Tx mode.
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. Therefore, the operating frequency and starting frequency are 863 MHz.

No.	Function	Description
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that the current setting rate is 20kbps and the frequency offset is +/ -10khz.
6	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Rx），CMT2390F64 / CMT2391F128 enters into only Tx mode • Short press S3（⇌），return to the upper menu（that is, the main menu）

Based on the operation shown in the above figure, short press S2 and CMT2390F64 / CMT2391F128 will enter into only Tx mode, the interface is updated as shown in Figure 3-8 below.
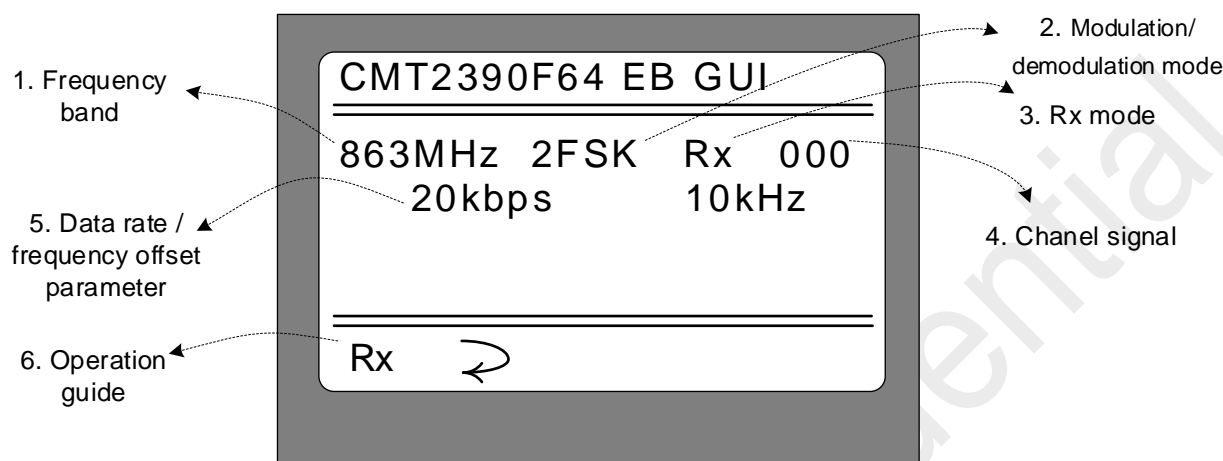

Figure 3-8. Only Tx Mode Working Mode（In transmitting mode）

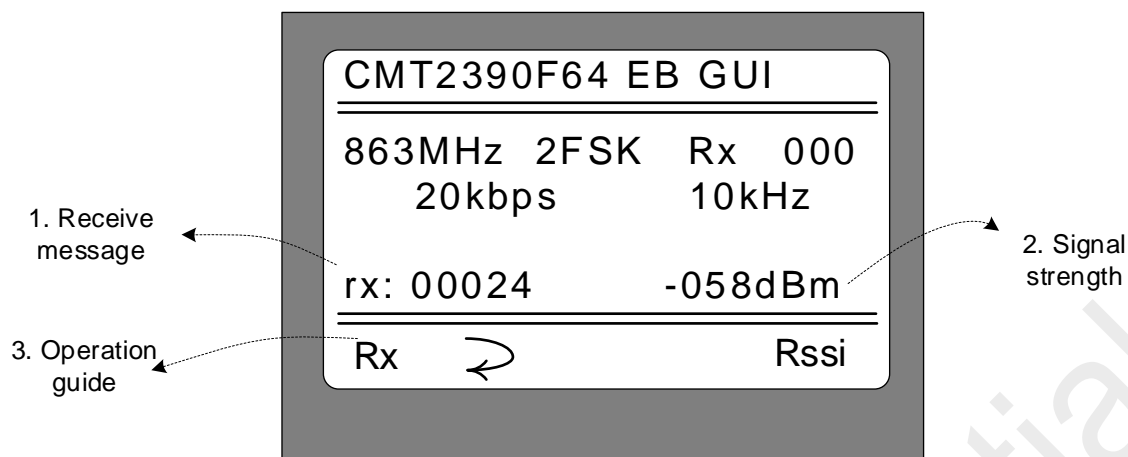| No.	Function	Description
1	Tx Packet information	Display the current packets numbers. For each packet sent, the number is increased by 1. The test stops automatically after it ends in sending the packet. The maximum packet number is 1000.
2	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Tx / ◉），enter into / suspend the packet sending process. Suspending will not reset the Tx packet counter； • Short press S3（⇌），and return to the upper menu, reset the packet counter（that is, clearing）

3.5 Only Rx Mode

After selecting the "Only Rx Mode", press S2 "○" in the main menu to enter the only Rx Mode, as shown in Figure 3-9 below.

Figure 3-9. Only Rx Mode Interface

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Rx mode	Display the current receiving mode. Rx indicates the only receiving mode.
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. Therefore, both the operating frequency and starting frequency are 863MHz.
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that the currently setting rate is 20kbps and the frequency offset is +/ -10khz.
6	Operation guide	The corrresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Rx），CMT2390F64 / CMT2391F128 enter into only Rx mode； • Short press S3（⇌），and return to the upper menu（that is, the main menu）

Based on the interface in the figure above, short press S2 and CMT2390F64 / CMT2391F128 enters into only Rx mode, the display is updated as shown in Figure 3-10 below

```
CMT2390F64 EB GUI

863MHz  2FSK   Rx   000
     20kbps        10kHz

rx: 00024        -058dBm

Rx      ⤸            Rssi
```

1. Receive message ←

2. Signal strength →

3. Operation guide ←

Figure 3-10. Only Rx Mode（In reveiving）

No.	Function	Description
1	Receive message	Display the current receiving packet numbers. For each packet received, the count is increased by 1.
2	Signal strength	Display the signal strength value of the current received packet, in dBm.
3	Operation guide	The corresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Rx / ◉）, enter into / suspend the packet Rx process. Suspending will not reset the Rx packet counter； • Short press S3（⤸）, and return to the upper menu, reset the packet counter（that is, clearing）.

Note：

1.   In the case of entering the receive mode while no packets received, the receive counter will not update or display, nor will the signal strength. The information is updated and displayed only when a packet is received.

2.   As it is in the Only Rx Mode, the sending content is not known in advance (the Tx mode content is randomly with different content each packet according to the Only Tx mode of the Demo). Therefore, the receiving counter will be increased by 1 and the display will be updated only when the CRC is correct.

3.6 Tx and Rx Mode

The "Only Tx Mode" and "Only Rx Mode" mentioned in the previous two sections are for the evaluation of unidirectional communication links. In the evaluation of two targets of bidirectional links (or upstream and downstream links), the two tested points need to perform the evaluation in ping-pong Mode. In this case, select the "Tx and Rx Mode", and short press S2 "○" in the main menu to enter the Tx and Rx mode, as shown in Figure 3-11 below.
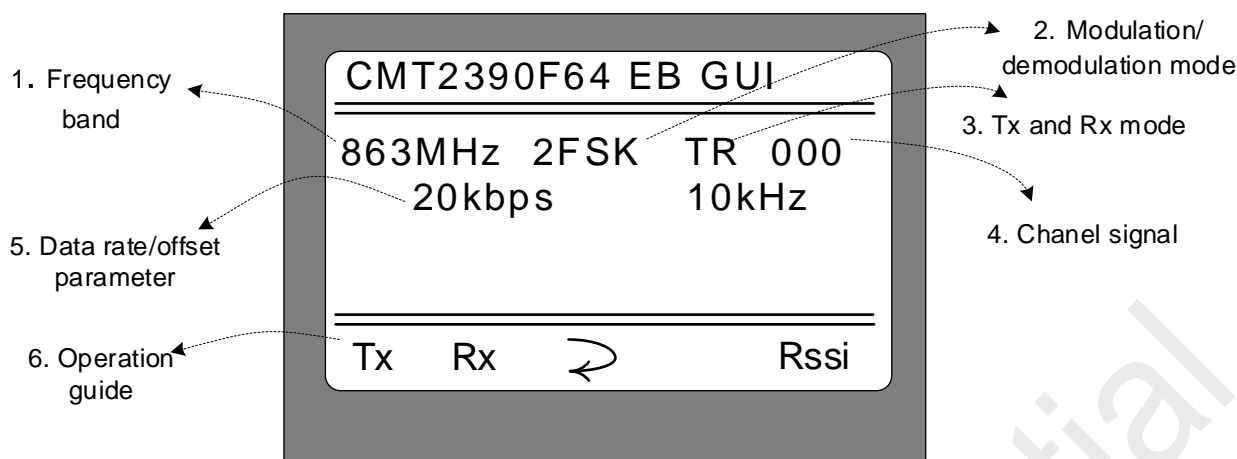
Figure 3-11. Tx and Rx Mode Interface

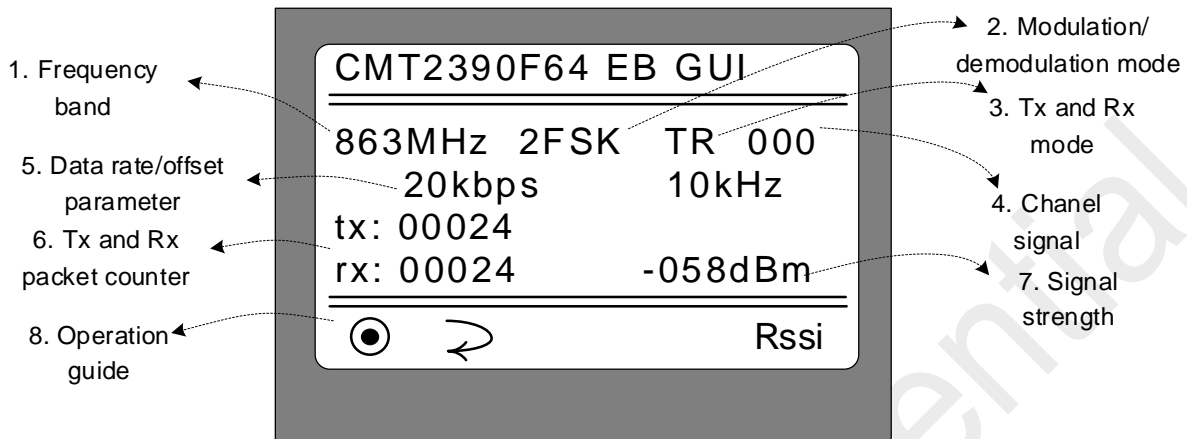| No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Tx and Rx mode	Display the current Rx and Tx mode, TR indicates alternative transmitting and receiving mode.
4	Chanel signal	Display the channel signal (value of Frequency Channel) as shown in the figure above, the channel signal is 0. Therefore, both of the operating frequency and starting frequency are 863MHz.
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that the current setting rate is 20kbps and the frequency offset is +/-10khz.
6	Frequency band	The corrresponding S1~S4 operation guide is shown in the figure above： • Short press S2（Tx）， enters into active Tx mode； • Short press S3（Rx）， enters into passive Rx mode； • Short press S4（⤸）， returns to the upper menu（that is, the main menu）

There are two sub-working modes in the alternative Rx and Tx mode: active Tx mode and passive Rx mode:

1. Active Tx mode: send out a message first with transmitting counter increased by 1, update the display and then automatically switch to Rx mode to receive the returned message as the preset receiving window. After receiving the returned message, compare it to the previous content. If the content is consistent, it is successful. The receiving counter is increased by 1 and the display is updated. If no return mode is received (or the receiving is incorrect, for example, the content is error, or the packet itself does not pass the CRC), the receiving counter remains the same.

2. Passive Rx mode: always in receiving mode. When receiving a correct packet (which is subject to CRC), the receiving counter will be increased by 1 as display updated and received packet content unchanged.

Therefore, two evaluation kits are needed for the Rx and Tx mode, one set to the active Tx mode and the other set to the passive Rx mode. After the two sets are started, a bidirectional ping-pong interaction communication mode can be formed between the two points, so as to evaluate the bidirectional link communication quality.

Based on the interface shown in Figure 3-11, short press S2 (Tx) and CMT2390F64 / CMT2391F128 will enter into active transmission mode, and the display is updated as shown in Figure 3-12 below.

Figure 3-12. Active Tx and Rx Mode Interface

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Tx and Rx mode	Display the current Rx and Tx mode, TR indicates alternative transmitting and receiving mode.
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. Therefore, the operating frequency and starting frequency are 863MHz.
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that the current setting rate is 20kbps and the frequency offset is +/-10khz.
6	Tx and Rx packet counter	"tx : xxxx" dislay the active Tx packet numbers (the maximum packet number is 1000); "rx : xxxx" display the returned packet numbers (the returned packet has to be consistent with the Tx packet);
7	Signal strength	Display the returned signal strength in dBm.
8	Operation guide	The corrresponding S1~S4 operation guide is shown in the figure above： • Short press S2（◉）, enters into/ suspend active Tx mode； • Short press S3（⇌）, returns to the upper menu

Based on the interface shown in Figure 3-11, short press S3 (Rx) and CMT2390F64 / CMT2391F128 enters into passive transmission mode, and the display is updated as shown in Figure 3-13 below.
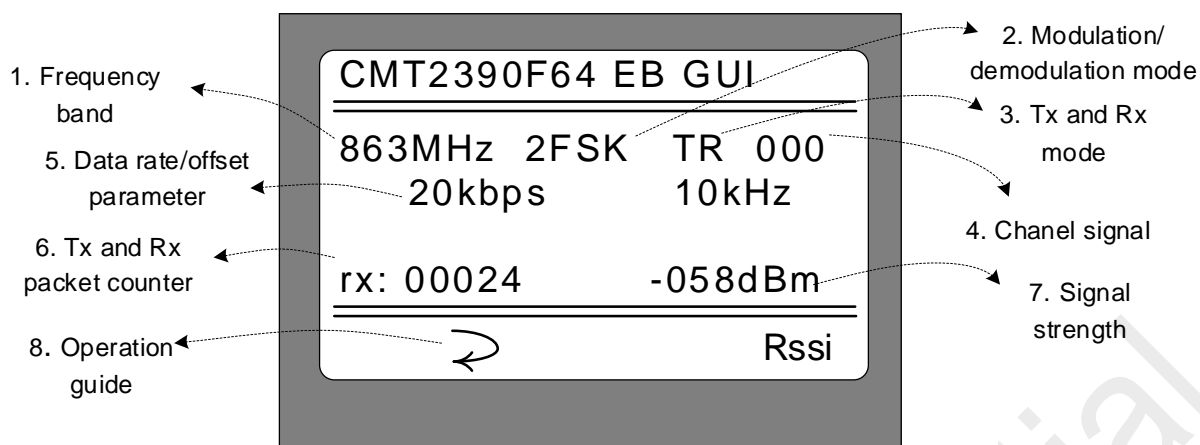
Figure 3-13. Passive Rx Mode Interface

No.	Function	Description
1	Frequency band	Display the selected frequency band as shown in the figure above. It indicates that the start frequency of the selected frequency band is 863000kHz.
2	Modulation/ demodulation mode	Display the selected modulation/demodulation mode, as shown in the figure above, indicating that the current modulation and demodulation mode is set to 2FSK.
3	Tx and Rx mode	Display the current Rx and Tx mode, TR indicates alternative transmitting and receiving mode.
4	Chanel signal	Display the channel signal (value of Frequencry Channel) as shown in the figure above, the channel signal is 0. Therefore, the operating frequency and starting frequency are 865MHz.
5	Data rate/offset parameter	Display the currently set data rate/frequency offset parameters. As shown in the figure above, it indicates that the current setting rate is 20kbps and the frequency offset is +/-10khz.
6	Tx and Rx packet counter	"rx : xxxxx" indicates the receive packet numbers（passed by CRC）;
7	Signal strength	Display the returned signal strength in dBm.
8	Operation guide	The corrresponding S1~S4 operation guide is shown in the figure above： • Short press S3（ ⮌ ）， returns to the upper menu.

Note：

1.   In passive receiving mode, packets are not compared and must be sent back if it passes CRC. That is, the receiving counter equals to the sending counter and only the receiving counter will be displayed.

2.   Combined with active transmitting mode, there will be three count value after completing two different tests, which are respectively the active transmitting count, passive receiving count and the returned packet count (that is, the returned count which is derived from the active transmitting terminal). These three values can be used to analyze whether the bidirectional communication is in balance. In the symmetric case, the packet loss probability is similar regardless of upstream or downstream. In the case of asymmetry (for example, if there is interference at one end of the attachment), a high probability of one side packet loss will occur.

4 Supplymentary

4.1 Firmware Update Burning Operation

CMT2390F64-EB/CMT2391F128-EB can be updated via J-Flash. The following will describe how to upgrade the firmware：

1.   Start the J-flash software. Take J-Flash V6.30d as an example, as shown in Figure 4-1. Click on "File" in the main menu bar and select "New Project".
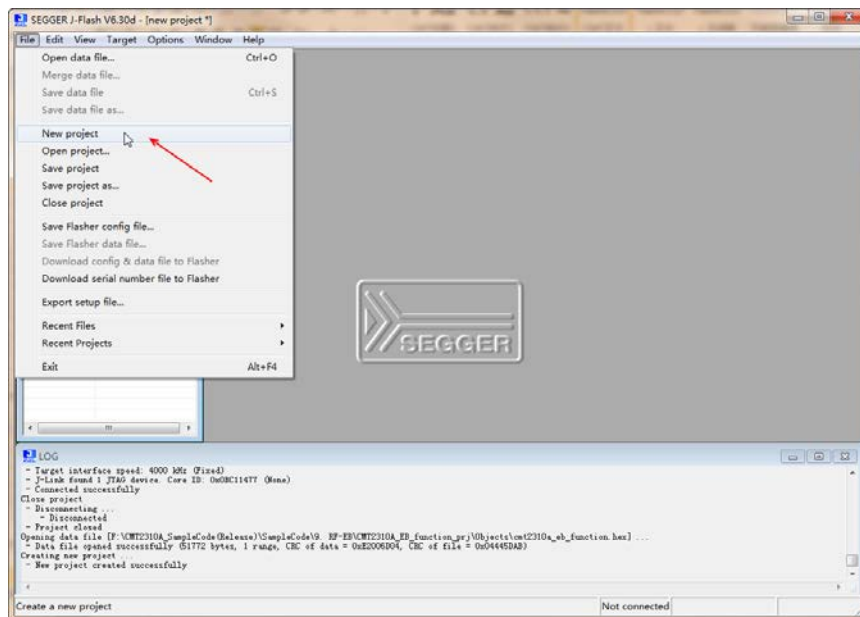

Figure 4-1. J-Flash Software Interface

2.   The new project window popped up, as shown in Figure 4-2. Click "... " in this window, the Target Device selection list window is displayed as shown in Figure 4-3. Select N32G031C8 in the Select Device window and then click "OK".
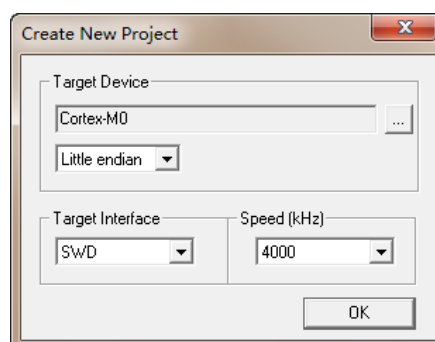
Figure 4-2. Create New Project Window
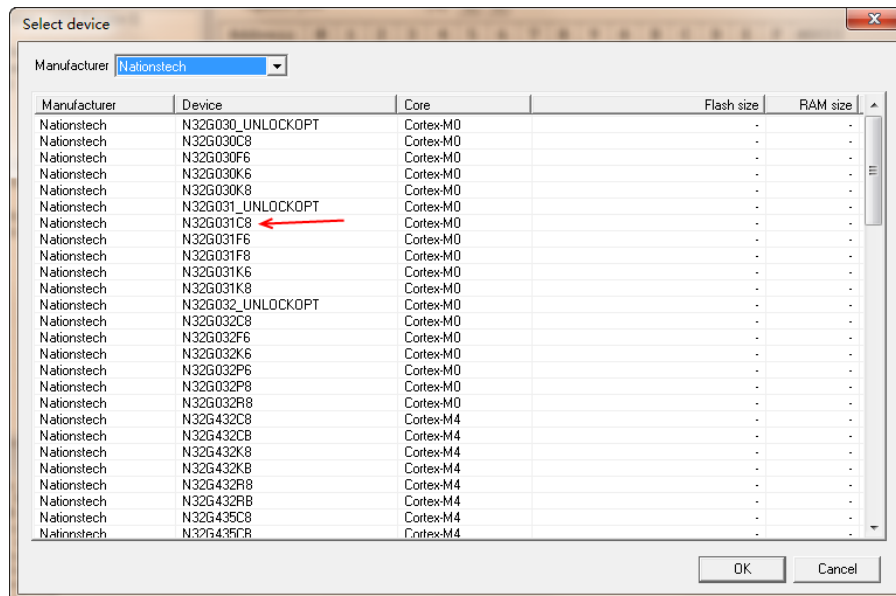
Figure 4-3. Select Device Window

3.　Return to the J-Flash window, click "Target" in the main menu bar, select "Connect" and connect the target board CMT2390F64-EB/CMT2391F128-EB) through the J-link debugger. Before this, ensure that the J-link debugger is properly connected from the computer and the CMT2390F64-EB/CMT2391F128-EB.
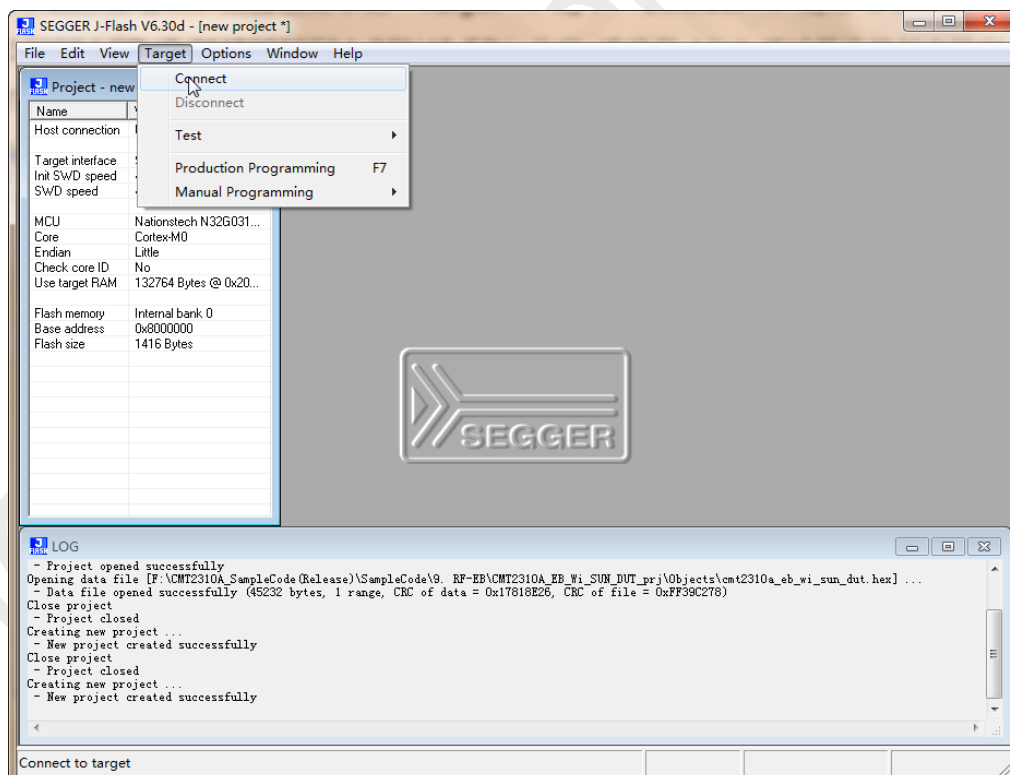
Figure 4-4. J-link Connecting Board

4.　Click "File" on the main menu bar and select "Open Data File..." to load the burning target file, namely CMT2390F64-EB/CMT2391F128-EB.
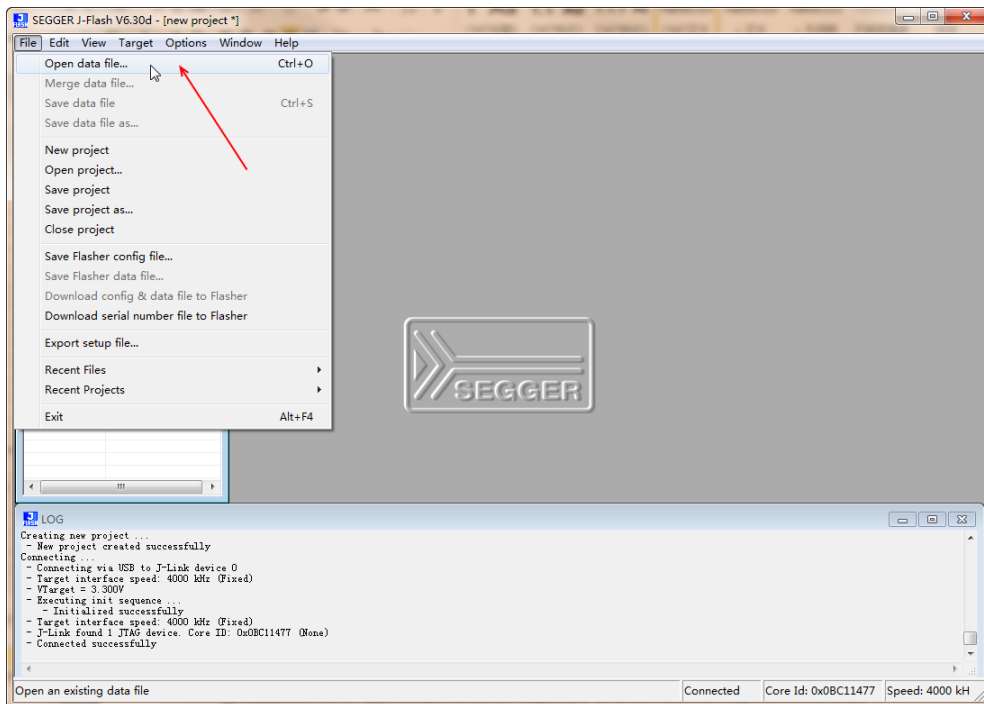
Figure 4-5. Upload the Target Burning File
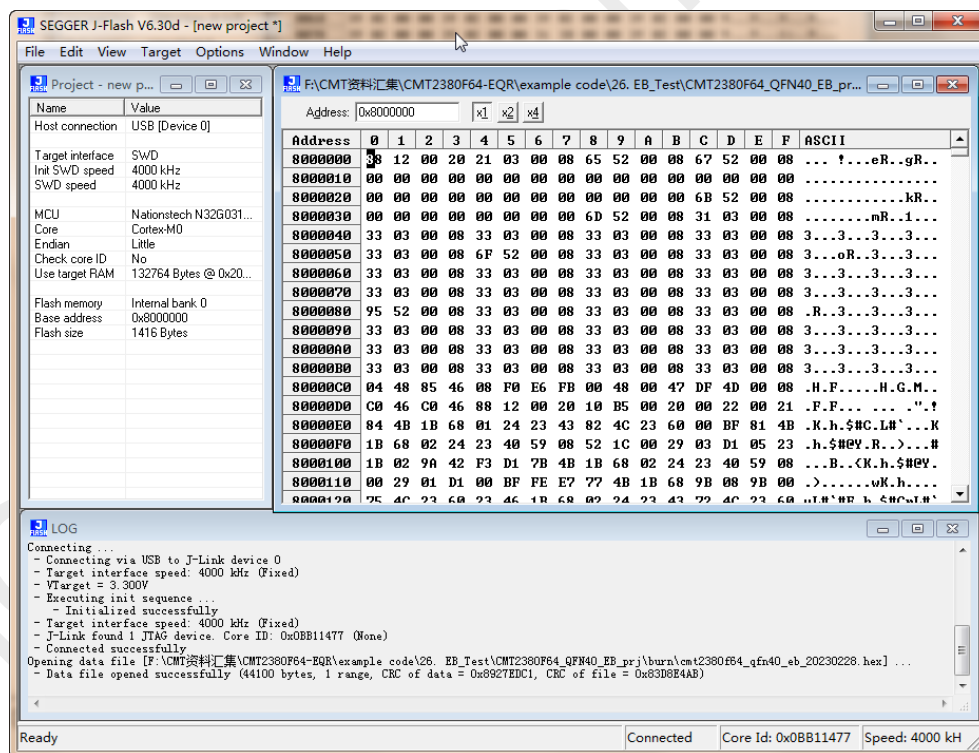
Figure 4-6. Open the Target Burning File

5. Click "Target" on the main menu bar, select "Manual Programming", and then select "Program", and then the J-Flash will burn the target file for CMT2390F64-EB/CMT2391F128-EB.
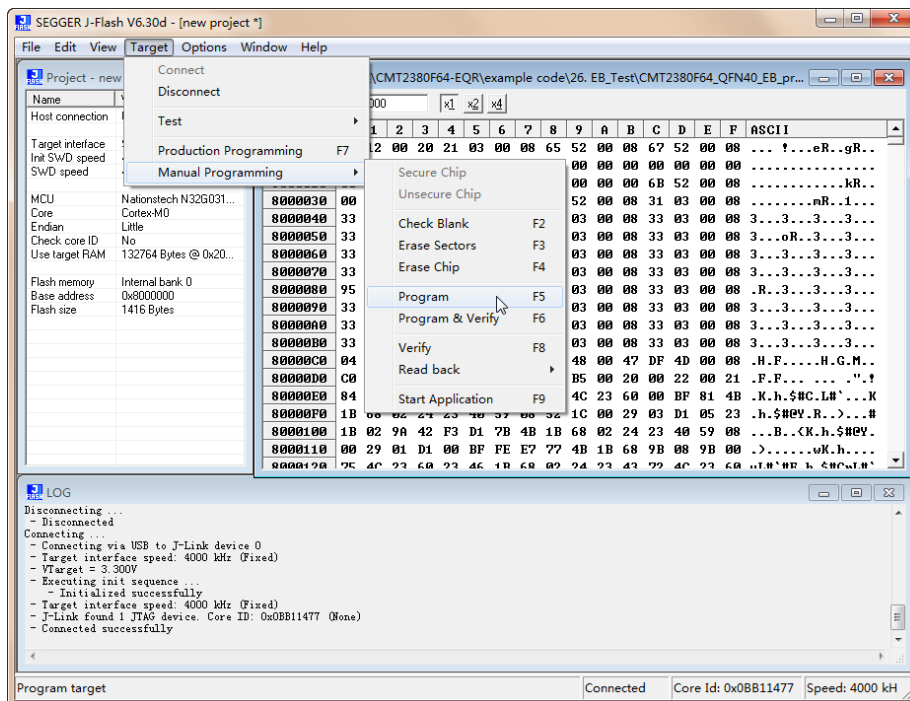
Figure 4-7. Manually Burning Operation
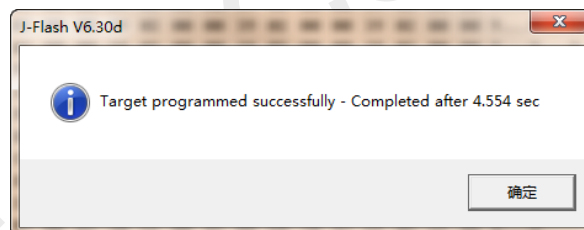
Figure 4-8. Successful Burning Prompt

6. Click CMT2390F64-EB/CMT2391F128-EB reset button to reset the main controller, then complete the firmware burning update.

4.2 Corresponding Mode for Each Function/Indicator

● Spectrum analysis test

The target frequency and target power can be tested for index of the spectrum when enter into CW Tx mode.

● Sensitivity test

The PN9 sequence error number rate can be tested by parameters of the target requency, target rate/frequency offset when enter into Direct Rx mode. RF GPIO3 can be used as demodulation output data stream and returns data to the signal source instrument. RF GPIO2 is output as synchronous data clock signal.

● Unidirectional distance test

Two sets, one is set for "Only Tx Mode", the other is set for "Only Rx Mode", when other parameters/configuration are consistent, one-way communication distance evaluation can be performed.

● Bidirectional distance test

Both sets are set to "Tx and Rx Mode". One sets the active Tx Mode and the other sets the passive Rx Mode. When other parameters/configurations are consistent, the bidirectional communication distance can be evaluated

● Reasonable RSSI evaluation

In the received state, the RSSI display is extracted. For example, in Direct Rx mode, the RSSI is monitored in real time and the display is updated, which can be used as an environmental noise assessment in the current test situation (based on conditions of the evaluation kit). Therefore, the communication link margin can be obtained by the comparision of the packet RSSI and environmental noise when the RSSI of the received packet is displayed no matter in unidirectional or bidirectional distant test.

5 Revise History

Table 5-1. Revise Record

Version	Chapter	Revise content	Date
0.1	All	Initial	2023-04-25
0.2	2	1. Updated the function menu sequence； 2. Added CRC Seed Value submenu 3. Added CRC Result Inv submenu 4. Added Dout Disable submenu 5. Added Interval Select submenu 6. Added DC DC Freq submenu 7. Added DC DC Voltage submenu 8. Delete the data rate combination of 1Mbps 250kHz under 4FSK.	2023-10-16
0.3	1	1. Added part number of CMT2391F128-EB	2023-10-27

6 Contacts

Shenzhen Hope Microelectronics Co., Ltd.

Address: 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China

Tel:	+86-755-82973805 / 4001-189-180
Post Code:	518052
Sales:	sales@hoperf.com
Website:	www.hoperf.com