



# Full Mode SDR Transceiver

QR20



# User Manual



## About Radioddity

**“You, our friend and customer, are at the forefront of what we do.”**

Thank you for purchasing Radioddity products. On behalf of our caring and responsive Customer Support team, we strive to fulfill that promise and better meet your needs every day.

In order to protect your rights and interests, please read the terms of Warranty Policy.

## Warning

1. Please read this manual fully before operation so as to get a good understanding of the QR20's capabilities and functions.
2. When using an external power supply, carefully check the polarity of the power cord and do not reverse the polarity.
3. The limited warranty of this radio does not include damage caused by an external power connection error or damage caused by improper power supply voltage.
4. Qualified technicians shall service this equipment only.
5. Do not tamper the transceiver for any reason.
6. Do not use any transceivers with a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.
7. Turn off your transceiver prior when entering any area with explosive and flammable materials.
8. Do not charge your transceiver in the area with explosive and flammable materials.
9. To avoid electromagnetic interference and/or compatibility conflicts, please turn off your transceiver in any area where posted notices instruct you to do so.
10. Turn off your transceiver before boarding an aircraft; any use of a radio must be in accordance with airline regulations or crew instructions.
11. Turn off your transceiver before entering a blasting area.
12. Do not place a transceiver over an airbag area or in the airbag deployment area for vehicles with an airbag.
13. Do not expose the transceiver under direct sunlight over a long time, nor place it close to a heating source.
14. When transmitting with a transceiver, hold it with the microphone 3 to 4 centimeters away from your lips; also make sure the antenna stays at least 2.5 centimeters away from your body when transmitting.

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## Summary

The Radioddity QR20 is an ultra-portable full-frequency full-mode SDR radio with a reception from 100kHz to 2GHz and transmit from 160m to 70cm. The operation modes include SSB, CW, AM, FM, RTTY and digital modes. It includes multiple advanced functions and features as an SDR radio station. The QR20 is designed with both USB and DC interface power supply modes.

The display adopts high-brightness and high-resolution liquid crystal display with adjusted backlight brightness, which can be clearly displayed outdoors. The panel is designed with full keyboard, which is convenient for various operations. The keyboard is with backlight to help operate this radio in a dark environment. The QR20 has a built-in Bluetooth module, a USB cable integrated sound card and a serial port. You can easily control the radio with a single USB cable.

The QR20 has a lot of advanced features that are only available in large base stations. This gear has dual VFO mode, different frequency operation function, intermediate frequency offset adjustment, receiving frequency fine-tuning, intermediate frequency noise suppression, AGC speed selection, RF gain adjustment, squelch control, front attenuator, AM aviation communication reception, AM/FM Broadcast reception, built-in telegraph automatic key, automatic key-point ratio adjustment, built-in CTCSS analog tone, automatic shutdown function (APO), transmission timeout function (TOT); connection with computer and computer-aided control function, copy function, etc.

In addition, the QR20 has several modules to customize more functions.

### Features:

1. Real-time spectrum
2. Waterfall chart
3. Supports FT8 mode
4. Using software-defined radio technology (SDR), with multi-band and multi-mode (SSB, CW, RTTY, AM, FM, and optional DMR) support
5. Double conversion circuit structure
6. IF width and IF shift hardware and software can be modified to provide powerful IF interference suppression
7. DSP digital noise reduction
8. Built-in 160-6 meters high-speed automatic antenna tuner
9. Built-in electronic key controller, all parameters can be set flexibly
10. Built-in sound card with IQ and audio output
11. USB TYPEC3.1 interface for power supply and computer connection
12. High precision TXCO  $\pm 0.5\text{ppm}$  (-10-60  $^{\circ}\text{C}$ )
13. Ultra-wide working voltage range: 5-32VDC
14. Power supply reverse polarity protection
15. GPS / BeiDou, GSM, electronic compass (acceleration, angle sensor) (optional)
16. GPS time service (requires optional GPS module)
17. Built-in UTC clock
18. Voltage display
19. VOX
20. Support RTTY, DTU, CW via keyboard
21. Ultra-light weight:  $\leq 4.4\text{lb}$  (2kg)
22. IF IQ signal output available (which enables DRM decoding via PC)



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## Accessories and options

Built-in Module	Optional Module
WFM	GPS + GSM
Bluetooth module	Electronic compass (Altitude meter)
Cable Hand Mic	DMR
Built-in sound card	External VFO Knob
Automatic antenna tuner	

## Specifications

Transmitter Parameters	
Transmitter Architecture	SDR
Transmission Mode	DMR (optional), SSB, CW, RTTY, AM, FM
Frequency Resolution	1Hz
Transmit Frequency Range*1	1.800—2.000, 3.500—3.900, 5.351.5—5.366.5, 7.000— 7.200, 10.100—10.150, 14.000—14.350, 18.068— 18.168, 21—21.450, 24.890—24.990, 28—29.7, 50—54, 134— 170, 400—450MHZ
Output Power	HF + 6m: SSB: (1-20W) CW: (0.1-20W) FM: (0.1-20W) AM: (1-5W) VHF: SSB / CW / FM (0.5-10W) UHF: SSB / CW / FM (0.5-5W)
Power Current	TX: 13.8V-6A (20W) RX: 13.8V-0.25A typical value, 0.5A (highest brightness, audio peak)
Carrier Suppression	<50db
Spurious Suppression	1.8-54MHZ: ≥50db 144-146MHZ: ≥60db 430-440MHZ: ≥60db
Channels	99 channels
Receiver Parameters	
Receiver Architecture	SDR
Reception Mode	DMR (optional), SSB,CW, RTTY, AM, FM
Reception Frequency Range	100kHz—2GHz * 2
IF Bandwidth	20kHz
Sensitivity *3	SSB / CW: (BW: 2.4kHz @ 10dB S / N) 0.18uV (1.8-54MHZ)



Sensitivity *3	0.25uV (144-146MHZ) 0.25uV (430-440MHZ) AM: (BW: 6kHz @ 10dB S / N) 15uV (0.3-1.8MHZ) 2uV (1.8-54MHZ) 2uV (144-146MHZ) 2uV (430-440MHZ) FM: (BW: 15kHz @ 12dB S / N) 0.5uV (28.0-29.7MHZ) 0.25uV (50-54MHZ) 0.3uV (144-500MHZ) 0.5uV (430-440MHZ)
Intermediate Frequency Suppression	≥70db
Image Suppression	≥80db
Audio Output Power	2W (10% distortion rate, 4Ω Load, 3KHZ)
<b>Antenna Tuner Parameters</b>	
Tuning frequency Range	1.8—54MHz
Tuning Impedance Range	16.7Ω–150Ω Unbalanced (standing wave ratio is better than 1: 3)
Tuning Accuracy	VSWR: 1: 1.5 or less
Tuning Time	2-5S (whole section 10 seconds)
Tuning Mode	Automatic
<b>Spectral Parameters</b>	
Spectral Bandwidth	48K radio frequency spectrum FFT
<b>Conventional Parameters</b>	
Size	170X120X45mm (excluding projections)
Weight	<2KG
Voltage Range	RX:5-32V TX: 5- 12V transmit power limit 12-18V full power output 18-32V transmit power limit
Antenna Interface	M

**Note \*1:** Frequency range can vary according to different countries or regions, the actual frequency by local legal provisions.

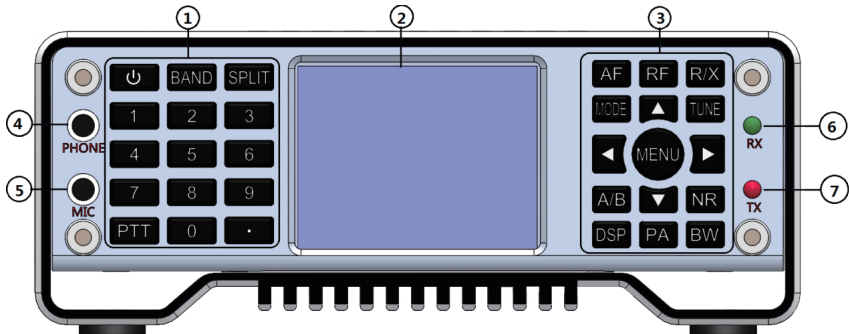
**Note \*2:** Data retention.

**Note \*3:** To be calibrated. The final interpretation reserved to manufacturers.



## Panel control and operation

### Front panel



- ① Numeric keyboard
- ② LCD Monitor
- ③ Function keyboard
- ④ Headphone interface
- ⑤ Wired hand microphone interface
- ⑥ Receiving indicator
- ⑦ Transmitting indicator

### Key function

Key	Short Key Function	Long Key Function
Power	Switch the standing wave table (VSWR), ALC, MIC audio indication	Power on, power off
BAND	Frequency band selection	CW setting
SPLIT	Different frequency on, different frequency off	Tone setting
AF	Volume, MIC gain, MIC audio compression, ground bass, treble	Channel/VFO mode selection
RF	Radio frequency gain, Intermediate frequency gain, AGC、SQL、ATT	USB data output format selection
R/X	RIT receiving frequency offset, IT transmitting frequency offset	Transceiver frequency offset switch
MODE	Mode setting	USB/LSB, NFM/WFM/CWR switching
TUNE	Antenna tuner on and off	Tuning start/stop
A/B	A/B Band	A=B Band
NR	NB or NR options	Spectrum only, waterfall only, display both spectrum and waterfall



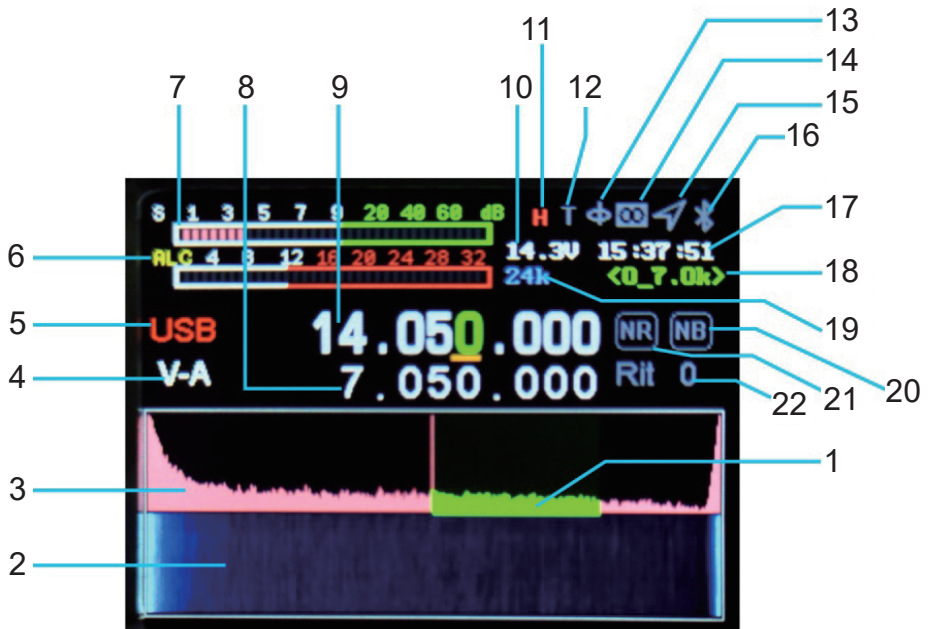
Key	Short Key Function	Long Key Function
DSP	NR, NB, PEAK threshold setting	Turn off NR or NB
PA	Transmitting power setting	High-low power switching
BW	Digital filter selection	Spectrum bandwidth setting, spectrum reference level setting, spectrum refresh rate setting
Direction Key Left	Left selection or decrement operation	*
Direction Key Right	Right selection or increment value	*
Direction Key Up	Up operation	Fast frequency adding
Direction Key Down	Down operation	Fast frequency reduction
MENU	Confirm	Application interface; Back

## Indicator light

Status	Red	Green
On	Transmitting	
Off		Receiving
Flashing		Error



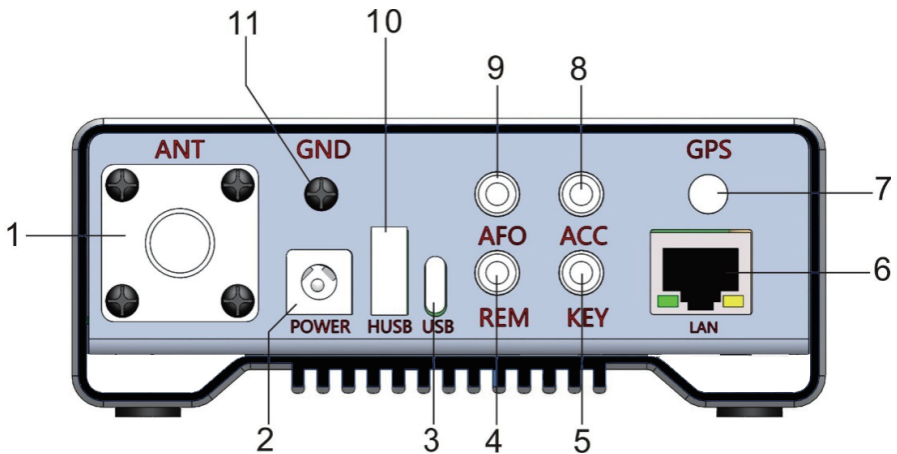
## Main interface



- |   |                              |
|---|------------------------------|
| 1. Digital filter                                       | 11. Tune enable display      |
| 2. Waterfall illustration                               | 12. Power display            |
| 3. Spectrum   | 13. Digital compass          |
| 4. Band A/B instructions                                | 14. LoRa display             |
| 5. Mode display   | 15. GPS display              |
| 6. SWR, AUD, ALC meter                                  | 16. Bluetooth display        |
| 7. S-meter (transmitting power meter when transmitting) | 17. Time display             |
| 8. Transmitting frequency                               | 18. Digital filter bandwidth |
| 9. Receiving frequency                                  | 19. Spectrum bandwidth       |
| 10. Voltage display                                     | 20/21. NR/NB display         |
|   | 22. RIT/XIT frequency offset |



## Rear Panel Interface



### 1. Antenna interface

HF/50MHz/144MHz/430MHz antenna port (M type), the output impedance is 50Ω.

### 2. DC power interface.

The specification of power interface is 5.5\*2.5. Use the standard DC power cord to connect to a regulated power supply or battery. The power supply must be able to provide a current of 6A@(13.8~16.8)V to ensure the full power output of the radio. Need 15V-16.8V if using higher power in HF band (note it generates more heat), under 15V for UV band.

If the power supply less than 12V or more than 18V, the radio will be with limit power output.

### 3. SELEVE USB interface

It is used to connect the USB cable to the computer and can output audio, digital and IQ signals.

### 4. RS232 serial interface

### 5. Electric key interface

This interface is a 3.5mm three-core interface, used to connect electronic automatic key control or ordinary hand keys.

### 6. Network interface

Used for remote control and remote firmware update.

### 7. GPS antenna port

Connected to an active GPS antenna.

### 8. PTT control output.

Used to control the amplifier's PTT.

### 9. Audio output.

Demodulated audio output

It is used for connecting peripheral smart devices, such as external wave wheels.

### 10. HOST USB interface

The function of this interface is temporarily reserved. Please be careful if used for charging external devices.

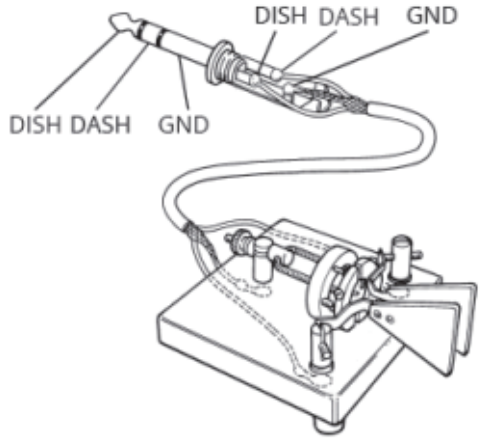
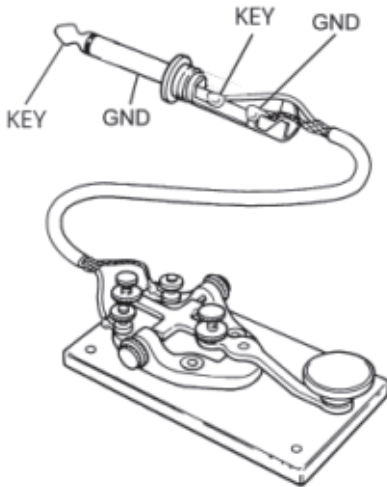
### 11. Grounding post

To achieve the best performance and ensure safety, you can use a short and thick copper stranded wire to connect this ground terminal to the ground well.

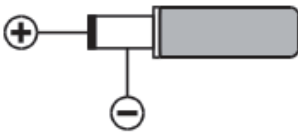


## Interface Definition

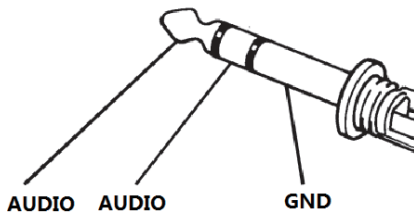
### Key



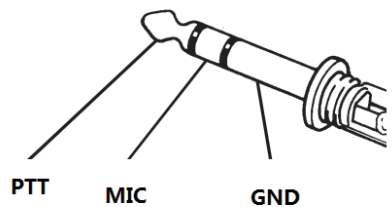
### Power



### Audio output/headphone interface



### Hand microphone









## Radio Setting and Operation

Please follow this guide to learn how to quickly set up and use your new equipment QR20.

To activate transmitting: Long press [MENU] - select [SET] - select [TX-EN] – select [ON] – long press [MENU] again to exit.

### Turn on/off QR20

1. To turn on the radio, simply long press the power button  for one second.
2. To turn off the radio, simply long press the power button  for one second.

**Note:** QR20 is with power-off data saving function. For example, when powered-off on 7.050Mhz LSB, it will directly restore the data status (7.050Mhz LSB) before. This function is great for remote operation.



### Frequency band selection

1. The frequency range of QR20 is very wide. Short press [BAND] to pop up the frequency band menu.
2. Short press the direction keys to select, short press [MENU] to confirm the frequency band.



### Frequency selection

1. Short press the left and right direction keys to select the cursor position in image, short press the up-direction key to adjust the frequency, long press the up and down direction keys to quickly select the required frequency.
2. Input the required frequency by direct numeric keyboard.

**For example:** if you want to enter 14.270MHz, press the numeric keyboard: 014270000 or 14.270000, and then press the key [MENU] to confirm.





## Mode selection

The QR20 all bands support LSB、USB、CW、FM. Short press [MODE] button to select them. Note that switch between LSB/USB, CW/CWR, and WFM/NFM need to long press [MODE] button.

## Transmit power selection

1. Short press [PA] to enter the transmit power adjustment, use the up and down direction keys to adjust the value.
2. Long press [PA] to quickly select the 5W/20W power, each selection can be fine-tuned by the up and down direction keys.

## Receive volume, MIC gain

1. Short press the [AF] button to enter the AF interface, use the left and right direction keys to select the setting section, use the up and down keys to set the value.

SVOL: Volume

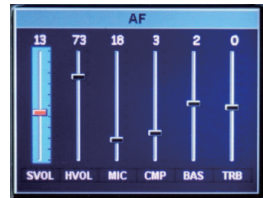
HVOL: Front-panel headphone volume

MIC: MIC gain

CMP: MIC compression ratio

BAS: Bass

TRB: Treble



## Hand microphone selection

1. QR20 comes with a wired speaker, plug directly into the MIC port on the front panel.
2. When the wired speaker is connected to the radio, the MIC gain cannot be adjusted too much. In SSB, if the wired speaker PTT is pushed and there is no speech and environmental noise but the radio power meter has an output, then the hand microphone gain is too large and needs to be reduced. It is so small that there is no power output when the hand microphone is quiet. Usually, LSB mode is used below 7Mh, USB mode is used above 14MHz, and FM mode is used above 28MHz. Please check your radio license before transmitting and abide by local laws and regulations.

## Channel saving

1. Long press [AF] to the channel mode
2. Long press the left and right direction keys to turn the numbers beside CH to red, short press [MENU] to turn to green. When in green, use up and down direction keys to operate the channel mode.



3. In channel mode. When in a non-stored channel (or want to replace an existed one), there is a RENAME icon. Long press the right direction key to turn the RENAME to red, short press [MENU] to pop up the input box.
  - 3-1. Input method: currently only supports the input of letters and numbers.
  - 3-2. Long press the number 1 key to switch the input of uppercase letters, lowercase letters, numbers and punctuations, and short press the [MODE] button to delete.
  - 3-3. When in punctuation, short press the [.] in left keypad to switch the selection among [ , . ? ! : ; ' " ( ) < > [ ] { } \$ % @ \* + - = ~ ]. Short press the [MODE] button to delete.
  - 3-4. When in letter, short press the number keys to select letters. Short press [2] to select A, twice for B and triple for C.  
2=ABC 3=DEF 4=GHI 5=JKL 6=MNO 7=PQRS 8=TUV 9=WXYZ
  - 3-5. When in number, press [MENU] to confirm you input. Then adjust the frequency, mode, and other corresponding parameters on the interface, and it will be automatically stored when the radio is turned off.
4. Enter the next channel and repeat the above operation.

## Band selection operation

Short press the [BAND] button to pop up the frequency band selection interface, press the direction key to select the frequency band, and press the MENU key to confirm.



## Different frequency operation

Short press [SPLI] to display the different frequency, press again to turn off the different frequency, press the left and right direction keys to select the frequency, press the up and down direction keys to increase or decrease the frequency. The upper row of frequencies is the receiving frequency and the lower row is the transmitting frequency. Press [A/B] to switch.





## AF audio setting

Short press the [AF] button to enter the AF interface, use the left and right direction keys to select the setting item, and use the up and down buttons to set the value.

SVOL: Volume

HVOL: Panel headphone

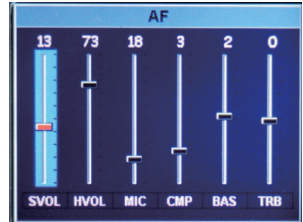
volume

MIC: MIC gain

CMP: MIC compression ratio

BAS: Bass

TRB: Treble



## RF setting

Short press [RF] to enter the RF parameter setting interface, use left and right direction keys to select the setting item, and use the up and down keys to set the value.

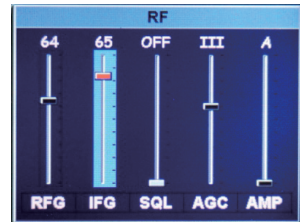
RFG: RF gain

IFG: IF gain

AGC: Automatic gain adjustment speed

SQL: Squelch level (FM)

AMP: Pre-amplification



## USB sound card data output format setting

Long press the [RF] key to enter the USB sound card data output format selection interface, press the up and down keys to select the output mode. Press and hold again to exit.



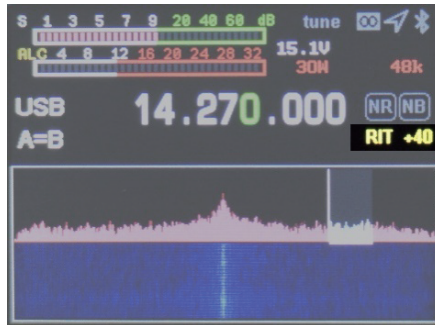
**USB:** Select USB when using digital modes like FT8/HRD/N1MM/LOG32/RTTY

**SDR:** Select SDR when using software like SDR#/HSDR



## Transceiver frequency offset setting

Long press [R/X] to open the interface for sending and receiving frequency offset setting, long press again to exit. Short press to select the receiving frequency offset RIT, short press again to set the transmitting frequency offset XIT. Use the left and right direction keys to set the frequency deviation frequency. **Frequency offset frequency = key display value \* 20Hz.**



## Transceiver mode setting

Short press [MODE] button to select the mode.

In FM mode: long press to select NFM/WFM

In SSB mode: Long press to select USB/LSB

In CW mode: Long press to select CWL/CWR

Followed by recycling AM, FM, USB (LSB), CW



## Tune operation

1. Short press [Power] key to switch to SWR standing wave meter.
2. Long press the [TUNE] key to enter the automatic tuning mode. The machine will make a short sound of click. The T on screen will turn green. Long press [TUNE] to exit if want to stop during tuning. T turns green when succeed, turn gray when fail. Short press [TUNE] to turn off the tuner when T is in green status.
3. Long press [.] , QR20 will automatically enter 5W CW mode long tone transmission status. With the standing wave, you can directly observe the SWR value of the antenna standing wave and adjust your antenna feed system. Short press [.] again to exit.



## A/B frequency operation

Short press [A/B] button to switch A/B frequency, long press A frequency=B frequency.



## NR/NB noise suppression setting

Short press [NR] to turn on NR/NB, short press again to switch NR/NB (normally select NR).

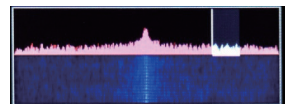
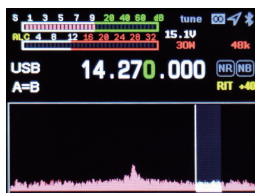
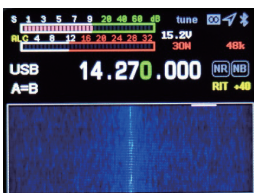
Short press [BW] to turn on the digital filter (green display in image), short press the left and right direction keys to decrease the bandwidth to 4.8K.

When the NR is working, long press [DSP] to turn off NR/NB.



## Spectrum and waterfall display setting

Long press the [NR] key to select and switch the display way amount Waterfall Only – Spectrum Only – Both Waterfall and Spectrum.

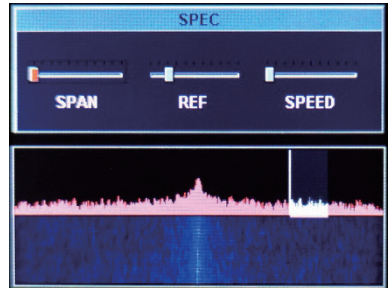




## Spectrum parameter display setting

Long press [BW] button to set spectrum bandwidth, reference level, refresh rate, up and down direction buttons to select setting items, left and right direction keys to set value.

- SPAN: spectrum bandwidth
- REF: spectrum reference level
- SPEED: Spectrum refresh rate



## Digital filter operation

Short press [BW] key to select digital filter (green display in image), left or right direction key to select filter bandwidth, short press [BW] key to ensure filter bandwidth (green will turn to white).



## Application Menu Operation

Long press the [MENU] key to enter the menu interface, long press the [MENU] key to exit the menu interface. Left and right, up and down keys to select the application, and short press the [MENU] key to select the application.







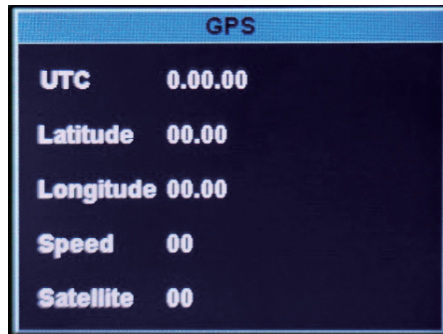
### 1. Radio operation

Use the left and right buttons to search for the channel, up and down buttons to increase or decrease the volume. Long press to exit the radio function.



### 2. GPS operation (\*DIR) – optional module

Directly display the UTC time, latitude and longitude, speed, direction, altitude, etc. received by the GPS module.



### 3. Digital compass operation (\*MESSAG) – optional module

### 4. Bluetooth operation (\*BT) – not available now

### 5. Music player (\*MUSIC) – under developing

### 6. VSWR standing wave scanning

- Long press Menu button to exit
- Use the left and right keys to select BAND, Maker and START
- Select BAND to select different bands
- Select Maker then use the left and right keys to learn the band frequency's standing wave value
- Select START to scan the antenna standing wave value







#### 7. APRS

#### 8. Setting (\*SET)

- KEY-LED: Key buttons backlight on/off
- OUT-BAND-EN OFF: Lock BAND key band pool data
- TX-EN: Transmitting switch (need to turn on when the gear is activated)
- KEY-VOLUME: Key buttons volume
- BACKLIGHT: Screen brightness
- HOUR: Time setting of hour
- MINUTE: Time setting of minute
- SECOND: Time setting of second
- FAN-EN-TEMP: Fan temperature control
- VSWR-THRESHOLD: Standing wave protection threshold (OFF means no threshold)
- VSWR-TUNER: Antenna tuner threshold (stop tuning if lower than the setting)
- TOT-TIMER: Transmitting time limit
- TX-DISABLE-10M: 10M band transmitting switch
- FW-VERSION: Version number

## CAT Control

Radioddity QR20 comes with a CAT system. You can use a personal computer to control the radio with a mouse and simple clicks. It also supports the control of third-party software (such as radio log software for competitions), so no additional operator is needed. The CAT protocol is compatible with FT-817, just choose the FT-817 radio model during CAT control.

For CAT control, a TYPE-C USB cable connected to a PC would be enough. Note the serial port driver is only suitable for WINDOWS 10 system. The USB cable also integrates the sound card function. One USB cable realizes CAT control and data transmission. Due to the wide variety of computers, operating systems, and various application software, Radioddity does not develop system control software, but QR20 widely supports various third-party control software.

## Receiving Operation

The QR20 will be in reception status when power on.

1. Select a frequency and mode. For example: 14.270MHz\USB.
2. Short press the [AF] button to pop up volume control interface, press the up and down direction keys to adjust the volume, short press the [AF] button again to save and exit.
3. Short press the [RF] button to pop up the radio frequency setting interface. Use the left and right direction keys to select, press the up and down keys to set the value, then short press the [RF] key again to save and exit.



3-1. RFG: Radio frequency gain.

3-2. IFG: Intermediate frequency gain.

Through the combination of RFG and IFG, the receiver will achieve the highest sensitivity and the lowest noise level. Usually, you need to increase these two parameters if you want to hear a very weak signals, but the noise will also increase. You need to carefully adjust to achieve a balanced state. Usually, the intermediate frequency gain can be opened higher than the radio frequency gain.

3-3. AMP pre-amplifier. It includes A and B.

3-4. MIC gain. If the gain is turned on too high, it will cause the sensitivity of pickup to increase greatly, causing MIC overload. The result is that there will be transmitting power and noise even you don't speak when the PTT is pushed. The balance would be, no power in SSB mode when the speaker mic is pushed.

4. Long press the [BW] button to set the spectrum bandwidth, reference level, refresh rate. Use up and down keys to select, left and right buttons to set the value, and long press the [BW] button again to exit. You can see other signals within the bandwidth through the spectrum display.

4-1. SPAN: spectrum bandwidth, 1.5K, 3K, 6K, 12K, 24K, 48K available

4-2. REF: Spectrum reference level.

4-3. SPEED: Spectrum refresh rate.

5. Frequency spectrum and waterfall display settings

Long press the [NR] key to select the waterfall display, long press again to switch to spectrum, long press again to show them simultaneously.

6. Digital filter operation. QR20 is with a powerful digital filter.

Short press the [BW] button to select the digital filter. When turned on, the original white horizontal line on the spectrogram will be displayed in green. Use left and right keys select the filter bandwidth, short press the [BW] button again to confirm the filter bandwidth and exit.

Different band widths can effectively avoid interference signals, achieving excellent listening effects.

7. NR/NB noise suppression settings. Normally this option must be combined with a digital filter to achieve best results.

7-1. Short press [NR] key to turn on and gain to switch NR/NB. Long press [DSP] key to turn off NR/NB. Short press [DSP] to set NR/NB/PEAK threshold, use up and down keys to select NR/NB/PEAK, left and right keys to set the value, short press [DSP] again to exit.

7-2. Find the signal you need, turn on NR, usually the NR is more obvious, and adjust the digital filter to the maximum bandwidth, and then reduce the bandwidth of the digital filter little by little. When it is 4.8K, the noise will be greatly suppressed. At this time, you can also adjust the combination of the previous RFG and IFG to achieve the best reception effect.

Through the above settings, you have mastered the advanced reception settings of QR20, congratulations!



## Transmitting operation (locked by default)

### SSB communication

1. Press the [MODE] key to select one of the SSB (LSB or USB) modes. If you are operating at 7MHz or below, please select LSB mode. If you are operating at 14MHz or above, please select USB mode.
2. Short press [Power] key, the screen switches between ALC, SWR, AUD meter display.
3. Push the PTT button on the speaker and talk in normal voice, observing the ALC meter display. When the microphone enters the actual voice level, there will be a corresponding amplitude display on the AUD meter. Release the PPT button to return to the receive mode.
4. If the ALC meter shows too high or too low, you can reset the microphone gain value as follows: Long press the [AF] key for one second to enter the selection mode, use left and right keys to select MIC, use the up-direction key to set value, long press [AF] key again to exit. Speak into the microphone until AUD appears at the peak of your voice

### CW communication

When using hand keys, automatic keys, semi-automatic keys, an external electronic key control or a computer-generated keyboard device, please follow the steps below:

1. Insert your 3.5mm (three-phase or two-phase) plug into the KEY jack on the rear panel.
2. Short press [MODE] to select a CW mode (CW or CWR), "CW" mode uses the carrier input on the USB side, and CWR (reverse) mode uses the input on the LSB side.
3. Long press [BAND] key to enter CW setting. Up and down arrow keys on keyboard  
Select an option and use the left and right arrow keys to adjust the settings within the option.
  - 3-1. KEY MODE left and right direction key selection content: manual electric key | automatic electric key
  - 3-2. KEY SPEED automatic key code rate, the greater is the value, the faster is the speed.
  - 3-3. TX-RX CW transmission and reception switching time, the greater is the value, the greater is the delay.
  - 3-4. STF CW side tone audio
  - 3-5. STG CW side tone volume
  - 3-6. TRAINING training mode, no transmission



### FM communication

The QR20 supports full-band FM mode transmission and reception. It is usually used for FM communication above 28MHz in short-wave communication. 29.6MHz is called the magic band by the HAM community. It will be opened in a short time in the summer of the year, which is very challenging.

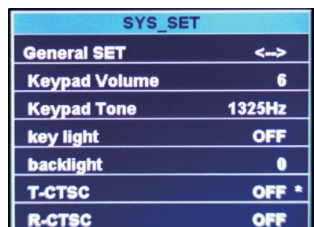
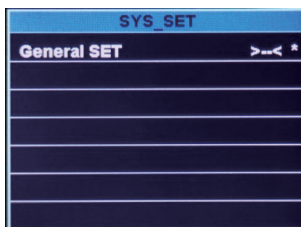
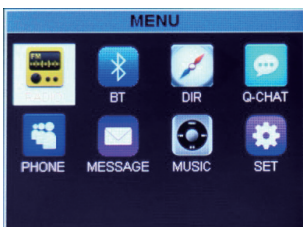


1. Short press [MODE] key to switch to FM mode, long press [MODE] key to switch between WFM mode and NFM mode.
2. QR20 includes UV band FM, you can communicate with handheld walkie-talkies, or you can connect it to a local repeater.
3. Short press [RF] key, use left and right direction keys are to select SQL, squelch option, use up and down direction keys to set squelch level.

## Repeater operation

1. Set the required frequency, for example, repeater parameters (receiving 145.670MHz, transmitting 144.130MHz, CTCSS 88.5) are set as follows:
  - 1-1. Press SPLI to display the different frequency, press again to turn off the different frequency. The upper row of frequencies is the receiving frequency, press the left and right direction keys to select the frequency, press the up and down direction keys to increase or decrease the frequency, or directly enter the numeric keyboard: 14567000. The lower row of frequencies is displayed as the transmission frequency, directly enter 14413000 on the keyboard. Press the A/B key to switch between the upper/lower row.
  - 1-2. Tone setting. Long press the [MENU] key, use direction keys to select the [SET] to enter the SYS\_SET interface, press the right direction key to expand the menu, then use the up and down keys to select T-CTSC and R-CTSC tone, use the left and right direction keys select the value 88.5.

Long press [MENU] to exit to the application menu interface, and then long press [MENU] to exit to the radio interface.





## AM communication

1. Press the [MODE] key to select the AM mode and set the required frequency
2. In AM mode, the input RF power is 5W

## Data communication RTTY

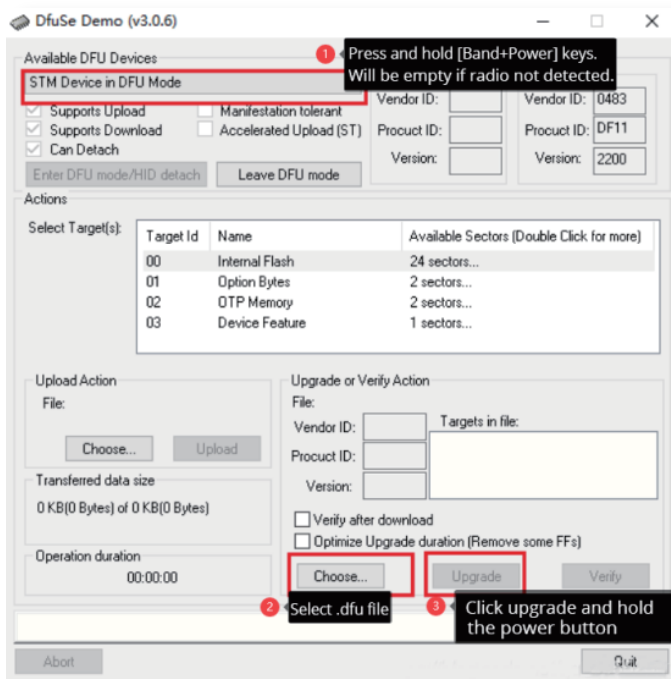
QR20's "RTTY" mode is based on the long-term use of amateur radio, based on the LSB carrier. If you want to use the USB carrier for "RTTY" operation, you need to set up as the following introduction.

1. Connect your computer and QR20 via s USB cable.
2. Long press the RF key to enter the USB sound card data output format selection interface, use the up and down keys to select the output mode. Press and hold again to exit. Select [USB] digital mode.
3. At this time, you can search on the frequency. If there is RTTY signal, the relevant computer software can decode.



## QR20 Firmware Upgrade

1. Open the Dfuse Demo software.
2. Plug the QR20 power supply and connect it to USB.
3. Hold down the [BAND] key and then hold down the [POWER] key. At this time, if the computer is connected to the QR20 correctly, ① will display (STM Device in DFU Mode). Otherwise, please check whether the computer is properly connected to the QR20.
4. Select the firmware file \*.dfu ②
5. Hold down the [BAND] and power keys, click Upgrade button. ③  
At this point, the upgrade begins, wait for the progress bar to finish, release the button, and restart the computer.
6. If you let go of the button or power off halfway, you only need to restart the operation.



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