

Tyxin **AH-RF EMC** Certification Guide



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Confidentiality level	A	Tyxin AH-RF EMC Certification Guide	File No	
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Revision history

date	Version	describe	Revised by
2022-10-2	V1.9	Added description of superpower in Notes;	WE
2022-9-6	V1.8	Added explanation of the first point of attention;	WE
2022-4-12	V1.7	Added description of serial port alternatives; Added processing methods for hibernating devices; Add module model description;	WE
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1 Overview

1.1 Purpose of document

Introduces the test mode of AH-RF and the configuration methods for common EMC certification.

1.2 Module model description

Please select the module according to the certification area you want to pass:

- a) The modules that can pass FCC certification are: TX-AH-R900PNR / TX-AH-R900P; b) The modules that can pass CE certification are: TX-AH-R900PNR-860M / TX-AH-R900P.

1.3 Serial port settings

When testing, you need to use the test mode of AH. Use the AT+ command to enter the test mode and configure the frequency point.

bandwidth and other parameters.

AT+ commands are accessed through the serial port of AH. AT+ commands are not case-sensitive, but please be careful to use English characters.

Serial port configuration instructions:

端口(O):

COM7

▼

波特率(B):

115200

▼

数据位(D):

8

▼

奇偶校验(A):

None

▼

停止位(S):

1

▼

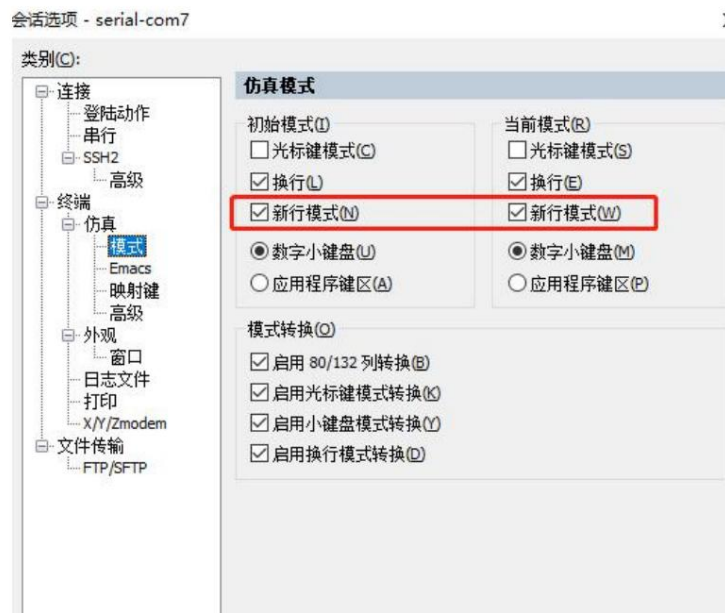
流控

☐ DTR/DSR

☐ RTS/CTS

☐ XON/XOFF

Pay attention to selecting the new line mode, taking SecureCRT as an example:



To test whether the serial port is normal, enter AT+ and the following will be printed:

```
valid cmds:
0. AT+REG_RD
1. AT+REG_WT
2. AT+TEST_START
3. AT+TX_FC
4. AT+TX_FLAGS
5. AT+TX_DST_ADDR
6. AT+TX_LEN
7. AT+TX_TYPE
8. AT+TX_PHA_AMP
9. AT+TX_STEP
10. AT+TX_CONT
11. AT+TX_START
12. AT+TX_TRIG
13. AT+TX_MCS
14. AT+TX_MCS_MAX
15. AT+TX_BW
16. AT+TX_PWR_AUTO
```

If there is no such print, it means the input is incorrect and you need to contact our FAE.

1.4AT command description

1. At+test_start=1 //Enter test mode; 2. At+lo_freq=866000 //

Configure the center frequency, here is 866M as an example; 3. At+bss_bw=4 //Configure

the working BSS bandwidth, here is bss_bw 4M Take for example; 4. At+tx_cont=1 //If you want to send signals continuously, set tx_cont=1 and send as normal packets

tx_cont=0; The default is 0; //

At+tx_start=1 6. Enable tx; 5.

At+Tx_type=S //If you want to send a non-modulated signal, that is, single tone, then Tx_type=S, S means Single tone, if a modulated signal is sent, Tx_type=N, indicating normal, the default is N.

7. At+Tx_mcs=255 //If you want to modulate the transmitted MCS, set Tx_mcs=0~7, 10 (mcs10 is added under 1M), 255 (default value) means automatic adjustment;

8. At+Txpower=20 //If you want to modify the transmit power, set Txpower, the maximum is 20 (default value),

It can be adjusted smaller, but it is not recommended to be less than 14, otherwise Tx performance

at+delay=100 will become worse; //Set the delay between two tx packets to 100ms 9.

1.5 Description of serial port alternatives

Since the serial port of the AH module is sometimes difficult to access, the AH module can be controlled through other interfaces for testing.

1.5.1 Network port

The bridge solution can use the netat/netlog gadget to control the AH device. Please consult FAE for details.

1.5.2 Main control serial port

In solutions with a Linux master control, the AH module can usually be accessed through the serial port of the master control. Visitor

The

method is: 1. iwpriv hg0 set dbginfo=1 //Redirect the printing of the AH module to the printing of the main control 2. iwpriv hg0 set

atcmd=xxx //xxx is the at+ command you want to enter, refer to Section 1.3

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For the time being, master controllers of other operating systems cannot access the AH module through the serial port of the master controller. They can only lead out

the serial port of the AH module.

1.6 How to deal with hibernating devices

For devices that can sleep, you need to configure the AH module to ps_mode=0 during testing, that is, do not sleep, and

And ensure that the main control will not configure the AH module into sleep mode

again. If it is configured directly through the serial port of the module, the

command is as follows: at+ps_mode=0 (early version is at+psmode=0) If

it is controlled through Linux, it is recommended to contact the driver person in charge to change the above when designing the non-sleep mode.

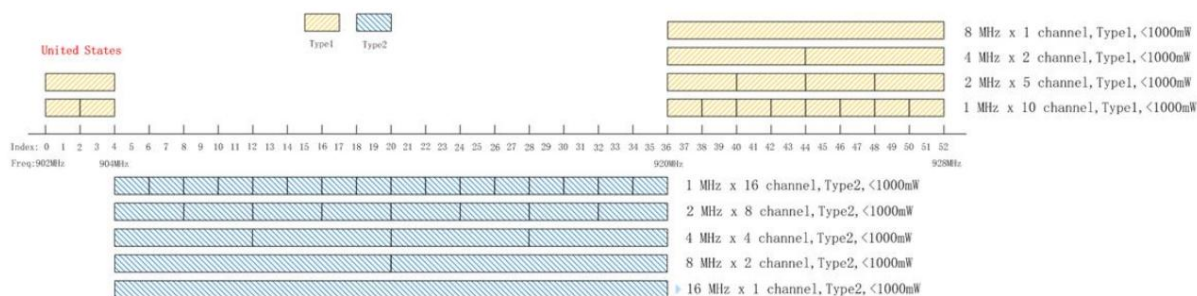
The command is sent to the module through the interface. The command is as follows:

iwpriv hg0 set ps_mode=0

1.7 EMC standard configuration instructions

1.7.1 FCC

Taking the United States as an example, the EMC standards of AH are:



FCC certification Txpower can be set to 20.

a) BSS_BW=8M, a total of 3 channels, the center frequency is 908M/916M/924M;

Command sequence:

At+test_start=1 //Enter test mode

At+lo_freq=908000 //908M as an example

At+bss_bw=8 // //Set bss_bw to 8M

At+tx_start=1 //Enable tx

At+tx_cont=1 you want to send signals continuously, set tx_cont=1

b) BSS_BW=4M, a total of 6 channels, the center frequency is 906M/910M/914M/918M/922M/926M;

Command sequence:

At+test_start=1 //Enter test mode

At+lo_freq=906000 //906M as an example

At+bss_bw=4 // //Set bss_bw to 4M

At+tx_start=1 Enable tx

c) BSS_BW=2M, a total of 11 channels, the center frequencies are:

905M/907M/909M/911M/913M/915M/917M/919M/921M/923M/925M

Command sequence:

At+test_start=1 //Enter test mode

At+lo_freq=905000 //905M as an example

At+bss_bw=2 // //Set bss_bw to 2M

At+tx_start=1 Enable tx

that because AH does not leave enough guard intervals on frequency boundaries, 903M/927M may not be able to pass

Testing standards suggest discarding these two channels.

d) In the case of 1M, there are 24 channels, and the center frequency is 903.5/904.5~926.5M (one every 1M);

Command

sequence: At+test_start=1 //Enter test mode

At+lo_freq=903500 //903.5M as an example //Set bss_bw

At+tx_start=1 Note to 1M At+bss_bw=1 //Enable tx

interval left on the that since AH is in The guard

frequency boundary is not enough, so 902.5M/927.5M may not pass

According to the test standards, it is recommended to discard these two channels.

1.7.2 EC

AH's EMC standards in the EU refer to the following standards: ETSI EN

300 220-2 V3.2.1 (2018-06) Annex B

K	863 MHz to 865 MHz	25 mW e.r.p.	$\leq 0.1\%$ duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz		46a
L	865 MHz to 868 MHz	25 mW e.r.p.	$\leq 1\%$ duty cycle or polite spectrum access	The whole band		47

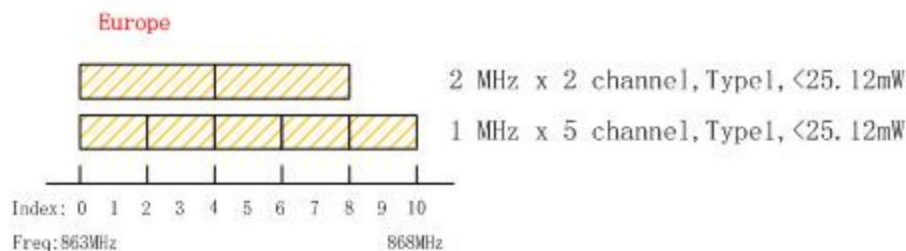
K segment, for audio and video applications, the bandwidth is limited to 300KHz. For other applications, it only needs to meet $\leq 0.1\%$ duty cycle or polite spectrum access. Therefore, AH cannot be used for audio and video, and can only be used for other applications.

L segment, as long as the entire frequency band meets $\leq 0.1\%$ duty cycle or courtesy spectrum access, AH can be used for audio and video, and can also be used for other applications. For audio and video applications, the duty cycle is often higher than 0.1%, and it needs to pass the certification test of courtesy spectrum access.

For an explanation of polite spectrum access, please refer

to: Section 5.21 of ETSI EN 300 220-1 V3.1.1 (2017-02).

The specific frequency bands for CE certification are as follows:



a) BSS_BW=2M, a total of 2 channels, the center frequencies are: 864M/866M (note that for audio and video applications, only 866M can be used as a channel);

Command sequence:

At+test_start=1 //Enter test mode

At+lo_freq=866000 //866M as an example//Set bss_bw

At+bss_bw=2 //Enable to 2M

At+tx_start=1 //If you tx

At+tx_cont=1 want to send signals continuously, set tx_cont=1

b) In the case of 1M, there are 5 channels, and the center frequency is 863.5/864.5/865.5/866.5/867.5M (one every 1M); Command sequence:

```
At+test_start=1 //Enter

test mode At+lo_freq=863500 //863.5M as an example//Set bss_bw
to 1M At+bss_bw=1 //Enable tx At+tx_start=1 c) CCA test

Enter test mode//Set          command sequence: At+test_start=1 //
At+lo_freq=866000 //bss_bw to 2M At+bss_bw=2

Here is 866M as an
example

at+delay=100 //Set the minimum sending interval to 100mS //

          Enable tx At+tx_start=1
```

Note that the EU's allowable power is relatively low. Before testing, please confirm that the transmit power of the solution does not exceed the requirements of the EMC standard.

1.8 FCC ID Reference

Currently, Tyxin AH's FCC certification has been completed. Customers can consider quoting our company's FCC ID to speed up and simplify the certification process.

Please consult the certification agency for specific methods.

1.9 Precautions

1. The power condition of EMC certification is closely related to the antenna, and the radiation efficiency of the antenna is related to the design of the antenna itself, so it may be necessary to adjust the transmit power to make the power radiated by the antenna end close to the upper limit of the test standard. Please note that the set transmit power has an impact on the coverage range that the solution can achieve. The effect of the solution should be evaluated based on the actual transmit power that can pass EMC.

2. The EMC certification of the module uses fixed-frequency testing, which requires the use of test mode; and usually the whole machine test may need to be tested during normal operation, not necessarily in the test mode. In normal mode, superpower is turned on by default, and the average power can be as high as 25dbm (when sending MCS0/1/2), while in test mode, superpower is turned off by default, and the average power is 20dbm. However, the peak power with superpower turned on is not much different from that without superpower, only 1-2db difference. In addition, if superpower is turned on, Txpower adjustment of maximum power will be disabled. The command to switch superpower is: at+tx_pwr_super=1/0.

3. Please note that the EU region needs to distinguish between audio and video applications and IOT applications (application scenarios with a small duty cycle). a) For audio and video applications, the EU frequency band can use BSS_BW=2M and BSS_BW=1M a) BSS_BW=2M,

then there is only one channel:

CHAN_LIST=[8660], that is, the center frequency is 866M;

b) BSS_BW=1M, then there are 3 channels:

CHAN_LIST=[8655,8665,8675], that is, the center frequencies are 865.5M/866.5M/867.5M respectively;

b) For IOT applications, the EU frequency band can use BSS_BW=2M and

BSS_BW=1M a) BSS_BW=2M, then there are 2

channels: CHAN_LIST=[8640, 8660], that is, the center frequencies are

864M and 866M; b) BSS_BW =1M, then there are

5 channels: CHAN_LIST=[8635,8645,8655,8665,8675], that is, the center

frequencies are 863.5M/864.5M/865.5M/866.5M/867.5M;

Since 863-865M only allows the use of narrowband no more than 300kHz for audio and video applications, AH transmission cannot be used.

2 Appendix

Taixin **AH** module **FCC** certification

<https://fccid.io/2AXPI>

FCC ID applications by 2AXPI (Zhuhai Huge-ic Co., Ltd.)	
FCC ID Application Date	Product Purpose Application Type
2AXPI-R900 2021-02-26	802.11ah WIFI module Original Equipment
2AXPI-TX-AH-R900ATR 2020-10-19	802.11ah WIFI module Original Equipment

Taixin **AH** module **CE** certification

[Taixin AH module CE certification statement](#)