# RF4200 用户手册
RF4200 USERS MANUAL

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment. Notes: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna.

--Increase the separation between the equipment and receiver.

--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

--Consult the dealer or an experienced radio/TV technician for help.

Note: If shielded cables or special accessories are required for compliance, a statement
must be included which instructs the user to employ them, for example, Shielded
cables must be used with this unit to ensure compliance with the Class B FCC limits.

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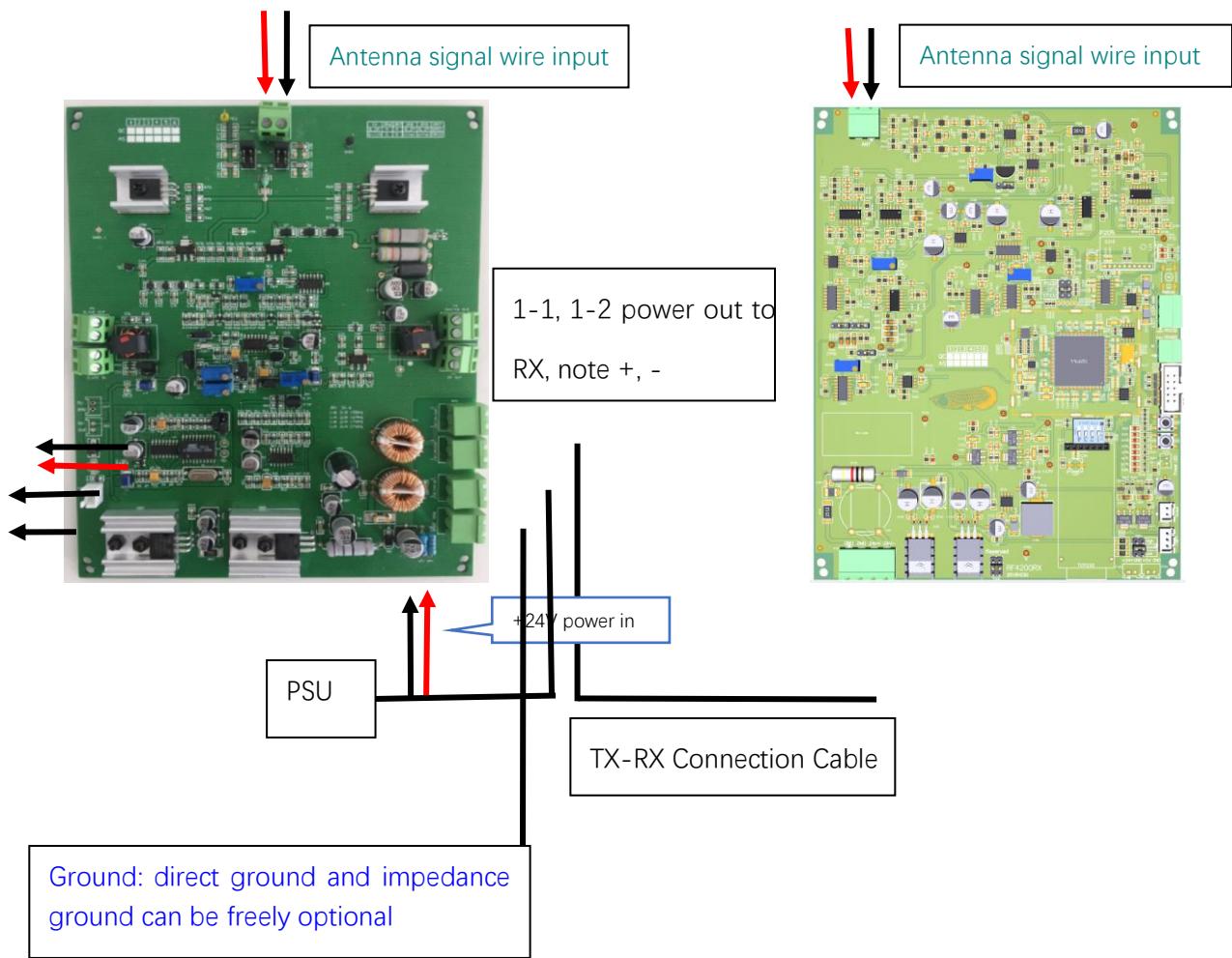
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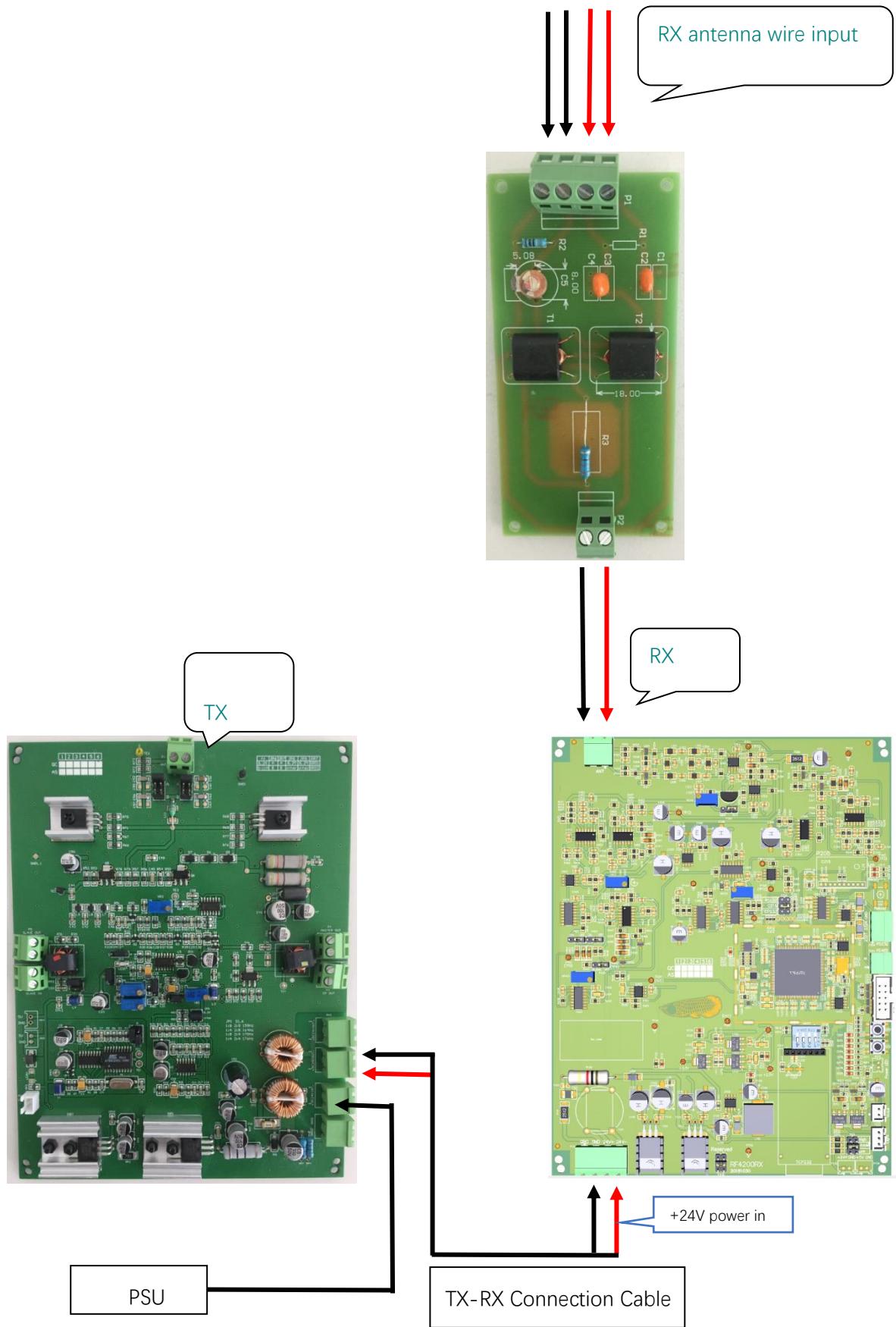
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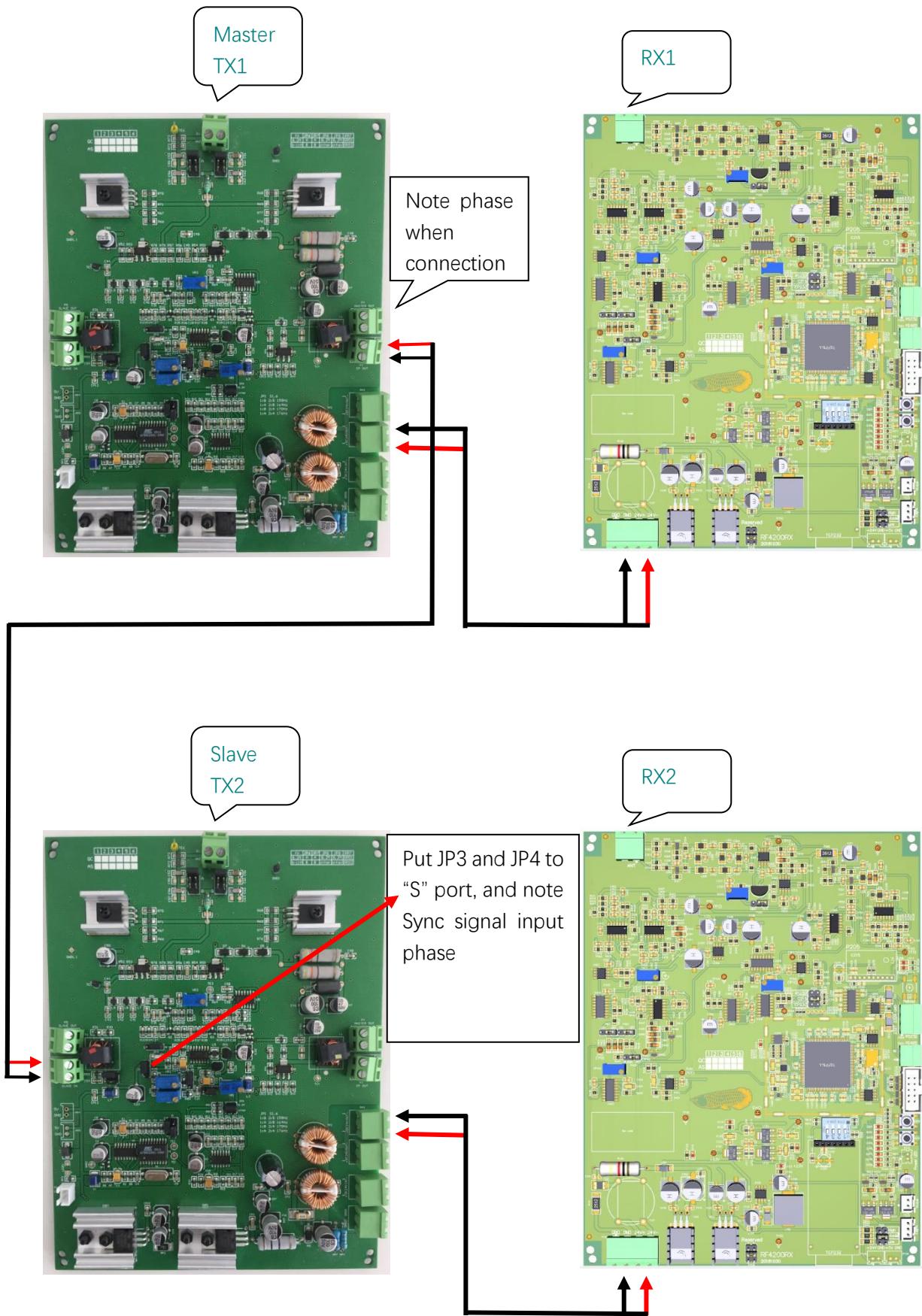
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2.1.1 Cable Connection Method

使用 RS232 串口线连接计算机与 RF4200 主板，安装 RS232 串口驱动程序，并在计算机上打开 CardMonitor.exe 软件，点击 ⟳ (Refresh)按钮，选择正确的 COM 号，点击 ▶ (Open)按钮打开串口，软件会自动识别主板类型，主板参数配置如图 1-1 所示。如果有的参数没有显示，可以点击 ℞ (Read)按钮。

One way is the usual on site tuning. Use RS232 cable to connect PC to RF4200 board, install RS232 driver, open the software CardMonitor.exe, click Refresh button ⟳, select the correct Port COM, click Open button ▶, then the software will automatically recognize the model number of the board, and shows the factory's setting parameters as bellow (Figure 1-1). If some parameters are not showed, click Read button ℞, then all parameters will be showed.
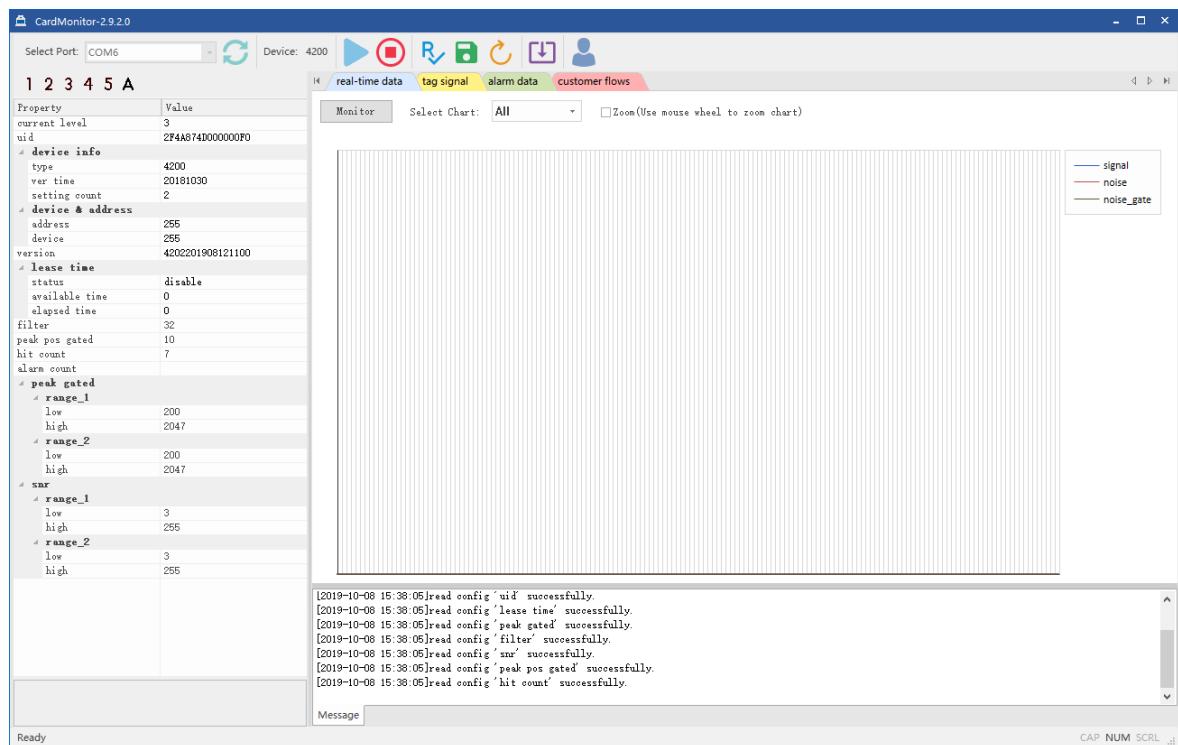

Figure 1-1

2.2 测试系统工作情况
2.2 Working Conditions Testing

发射天线与接收天线相距 1.5 米，系统上电后，可以正常检测标签并报警，报警时蜂鸣器发出嘀嘀声音，报警指示灯闪烁，说明系统工作正常。报警声音大小由 P201 控制，有低中高 3 个等级，默认是中等。测试距离，4*4 软标：收发相距 1.5 米；5*5 软标：收发相距 1.6 米；黑色小方：收发相距 1.8 米。

Put the TX antenna 150cm far from RX antenna, power on, use soft label or hard tag to test until the RF4200 system alarms, the buzzer sounds "di…di…di….."and also the leds on rx board flashing, then it means the system is working normally. The alarm sound volume is controlled by P201 on the RX board. The volume has low, medium and high optional. Factory setting is medium.　Testing the 4*4 soft label, the detection is 150cm, and 5*5 soft label, the detection is 160cm, and mini hard tag, the detection is 180cm.

2.3 读取和设置参数
2.3 Parameters Reading & Setting
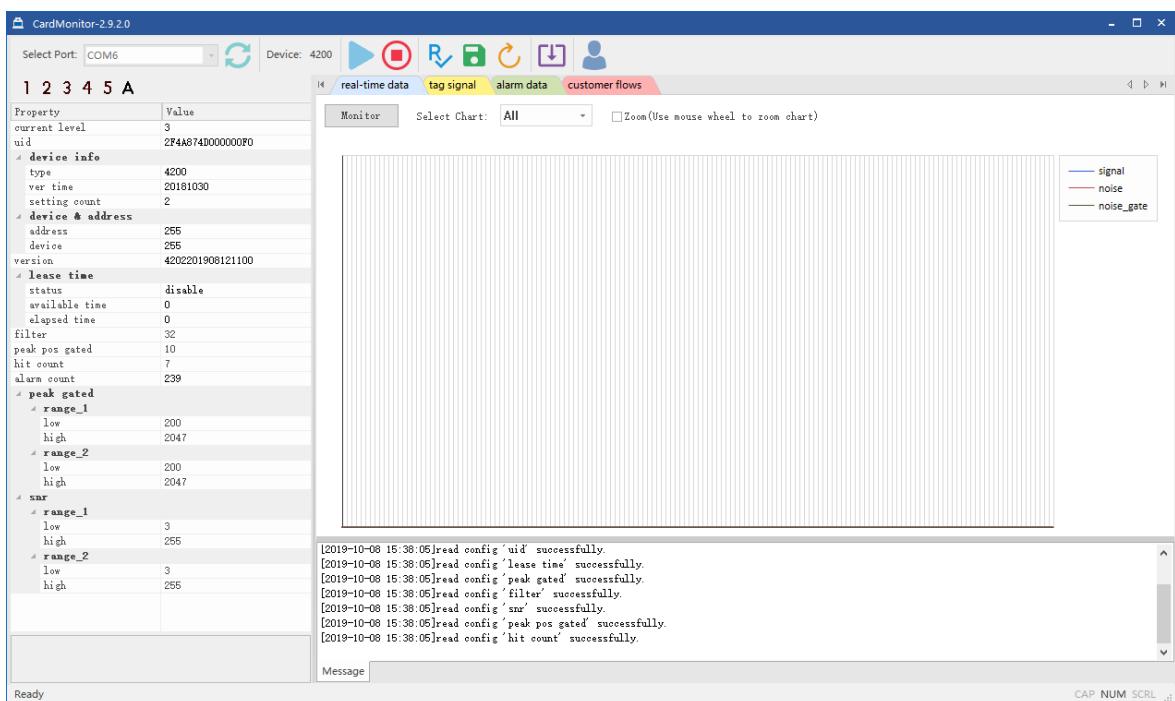
Figure 3-1

点击 ⬚ (Read)按钮，即可读取当前电脑所连接主板的全部参数（如图 3-1 所示）。参数显示后，可在左边显示栏，对任意参数进行修改，并点击 ⬚ (Save)按钮进行保存。在不小心调乱参数的情况下，可点击 ⬚ (Reset)进行恢复出厂设置。

Click Read button ![Read icon], the software will get all parameters from the RF4200 board that connects to the PC. On the left side of the software, each parameter data could be changed. After changed, click Save button ![Save icon] to save the new data. If the data are not well changed, then click Reset button ![Reset icon] to resume factory setting.
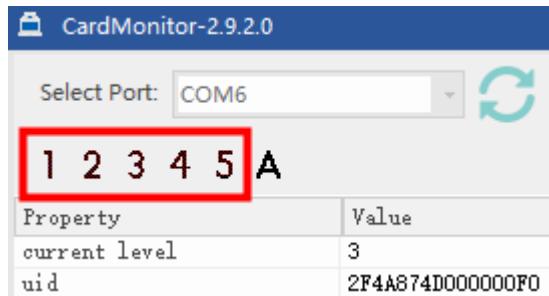
Figure 3-2

五个档位分别代表主板从低到高的五个灵敏度档次（如图 3-2 所示）。选择对应档位，然后点击 ![Save icon] (Save)按钮进行保存，可对主板的灵敏度进行快速设置。灵敏度参数设置越高，主板检测距离越远，同时抗干扰性能越差。

The above 1 2 3 4 5 five buttons are the sensitivity levels of the board. Select and click Save button ![Save icon] to set the board quickly and simply. The higher the number selected, the wider the detection will be, but the lower the anti-interference capability will be.

2.4 参数说明
2.4 Parameters Descriptions
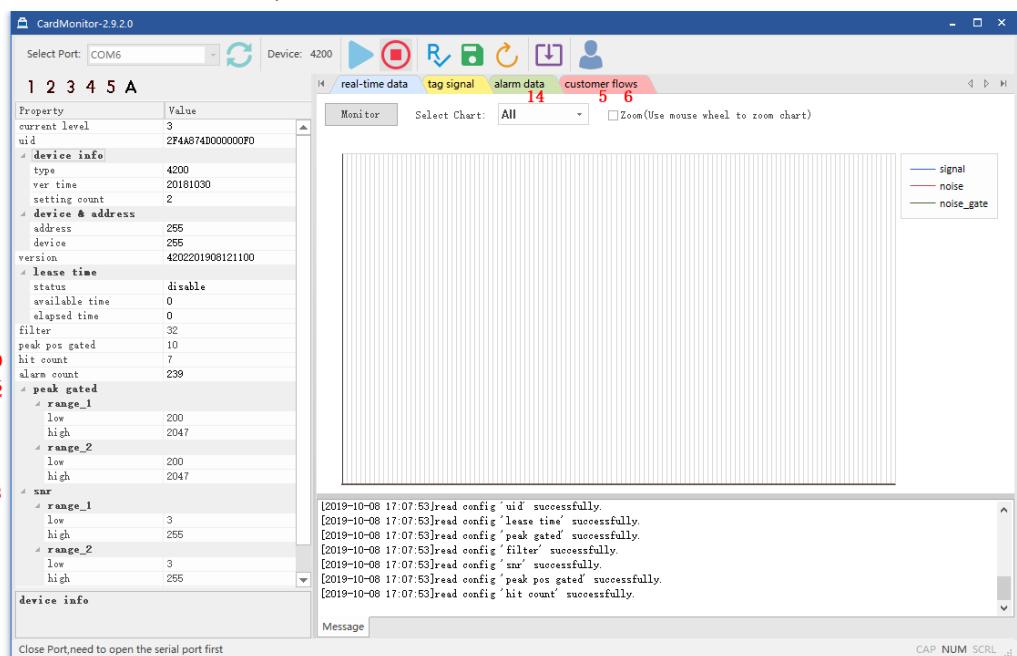
Figure 4-1

1、灵敏度一键设置，默认参数是 3。这个参数代表主板灵敏度常规水平，1 表示灵敏度很低，识别标签距离较近，但是误报几率较小；5 表示灵敏度很高，识别标签距离较远，但是误报几率相对较大。从 1 到 5 共有 5 个等级，表示灵敏度逐步变强。

1. Sensitivity one-button setting: 3 is the factory setting, it means the normal sensitivity using in normal environment. 1 means the sensitivity is very low, the detection is very narrow, but the false alarms will not come easily; 5 means the sensitivity is very high, the detection is very wide, but the false alarms will come easily.

2、uid，是主板的唯一标识，每个主板都有唯一的 uid，主板之间的 UID 不会重复。

2. The uid is the Unique ID number of the board. Each board has only one uid. All boards have different uid number. The number will not repeat.

3、设备和地址（device&address），是对于一个串口线接多套系统的时候用的。暂时未使用该参数。

3. The device&address is not used yet. It is spare for the situation that one serial cable is to connect multiple systems.

4、版本（version），这个参数表示程序的版本号，4200 表示主板类型，201807111600 表示程序生成的日期。

4. The version is the firmware version number, 4200 is the model number of the board, 201807111600 is the release date of the firmware.

5、顾客流量（进）（customer flows（in）），这个参数记录自系统工作时候起，穿过天线（进入超市）的顾客数量，只支持带有红外计数功能的系统。

5. The customer flows (in) is the record number that customers have passed through the system to come into the shop from the date when the system starts working. This function is only used for the system with IR counting sensor.

6、顾客流量（出）（customer flows（out）），这个参数记录自系统工作时候起，穿过天线（走出超市）的顾客数量，只支持带有红外计数功能的系统。

6. The customer flows (out) is the record number that customers have passed through the system to go out of the shop from the date when the system starts working. This function is only used for the system with IR counting sensor.

7、租赁时间（lease time），默认是不启用租赁时间（disable）。status 可以显示租赁时间是否启用，enable 是启用租赁时间，disable 是不启用租赁时间。available time 是设定的有效租赁时间，elapsed time 是自设定时起到当前已经用掉的时间。如果需要重新设定租赁时间，只需在 available time 处写入有效租赁时间

（非 0）后，保存即可，租赁时间以 1 刻钟为单位，如果设置为 4，表示 4 刻钟（1小时），设置范围是 1-30000。如果需要禁止，可以在 Enable 处点击并选择 Disable后，保存即可。

7. The lease time is used to limit the effective working time for the system. The factory setting is to disable this function, means the system can work for unlimited time. The status can show whether the lease time function is enabled: enable is to limit the working time, while disable is not to limit the working time. The available time is the effective working time that was set for the system, and the elapsed time is the time that has been used since the setting. If you need to reset the effective working time for the system, just put a valid number (not 0) at the available time, and click the Save button to save it. The lease time is based on 1 quarter of the clock, if it is set to 4, it means 4 quarters (1 hour)). The setting range is 1-30000. If you need to disable it, you can click Enable button, and select Disable, then click save button to save it.

8、滤波因数（filter），默认值是 32，设置范围是 0-1023，一般不作修改。

8. The filter is set at 32 by factory, the setting range is 0-1023. Usually it is not necessary to modify.

9、峰值位置差门限（peak pos gated），默认值是 10，设置范围是 0-255，一般不作修。该数值越小，报警的条件越严格，报警约准确。假如存在误报，可以将该数值调小，反之，如果检测距离不理想，可以尝试将该数值调大。

9. The peak pos gated is set at 10 by factory. The setting range is 0-255, Normally it is not necessary to modify. When this value is smaller, the alarm possibility is very low, and the alarm accuracy is very high. If there are false alarms, change to a smaller value. If the detection is not good, change to a bigger value.

10、命中次数（hit count），默认值是 8，设置范围是 1-8。如果在一个处理周期内连续 8 次出现疑似标签信号，则主板将信号判定为真正的标签信号，并发出声光报警。命中次数与天线识别标签的距离有关系，命中次数越小，报警的概率越高，反之报警的概率越低。在不误报的情况下，可以通过减小命中次数来提高天线识别标签的距离。

10. The hit count is set at 8 by factory. The setting range is 1-8. In one processing cycle, if a suspected tag signal appears 8 times, the system will determine this signal is a true tag, then decide to alarm. The hit count is related to the detection distance. When the hit count is smaller, the alarm possibility is higher, means the sensitivity is higher. And vice verse. If there is no false alarm, the hit count can be changed to smaller to make the detection distance wider.

11、报警次数（alarm count），该参数表示从主板上电起至当前的总计报警次数，断电后清零。

11. The alarm count is total alarms quantity that counted from the system power on of the last time. When the power off, the number is resume to 0.

12、峰值门限（peak gated），低位（low）默认值是 150，高位（high）默认是 2047。 设置范围是 0-2047。峰值门限参数的数值范围是区间表达，有 2 个有效区间（range_1 和 range_2）。系统采集到的信号特征（峰值）数值，只要在其中任一区间范围内，则被认为是标签信号。峰值低位（low）是报警最重要的参数之一，参数越小，报警的概率越高，反之报警的概率越低。在不误报的情况下，可以通过减小该参数来提高天线识别标签的距离。

12．The peak gated low value is set at 150 and high value is set at 2047 by factory. The setting range is 0-2047. The range of peak gated is 2 effective intervals (range_1 and range_2). The characteristic (peak) value of the signal collected by the system is regarded as the label signal as long as it is in any range. The low peak is one of the most important parameters of alarm. The smaller the parameters, the higher the probability of alarm, otherwise the lower the probability of alarm. If there is no false alarm, the detection distance can be wider by reducing this parameter.

13、信噪比门限（snr gated），低位（low）默认值是 3，设置范围是 0-255，高位（high）默认是 255。信噪比门限参数的数值范围是区间表达，有 2 个有效区间（range_1 和 range_2）。系统采集到的信号特征（信噪比门限）数值，只要在其中任一区间范围内，则被认为是标签信号。信噪比低位（low）是报警最重要的参数之一，参数越小，报警的概率越高，反之报警的概率越低。在不误报的情况下，可以通过减小该参数来提高天线识别标签的距离。

13. The signal to noise ratio (snr gated), the low bit (low) default value is 3, the setting range is 0-255, and the high (high) default is 255. The numerical range of snr is expressed by interval. The parameters are 2 effective intervals (range_1 and range_2). The signal characteristics (signal-to-noise ratio threshold) values collected by the system are considered as label signals as long as they are in any range. Low signal-to-noise ratio (low) is one of the most important alarm parameters. The smaller the parameters, the higher the alarm probability, otherwise the lower the alarm probability. The smaller the parameters, the higher the alarm probability, otherwise the lower the alarm probability. If there is no false alarm, reduce this parameter, the detection distance will be wider.

14、报警数据（alarm data），选择报警数据（alarm data）图框，点击 Monitor 按钮可以显示 1 组最新的报警数据日志，报警数据中包括出现报警时的报警次数序

号、峰值、噪声值、最小峰值、最大峰值（如图 4-2 所示）。

14. The alarm data is the alarm daily records. Select alarm data, click button to display the new alarm records. The records include alarm id, peak, snr, peak pos min, and peak pos max.
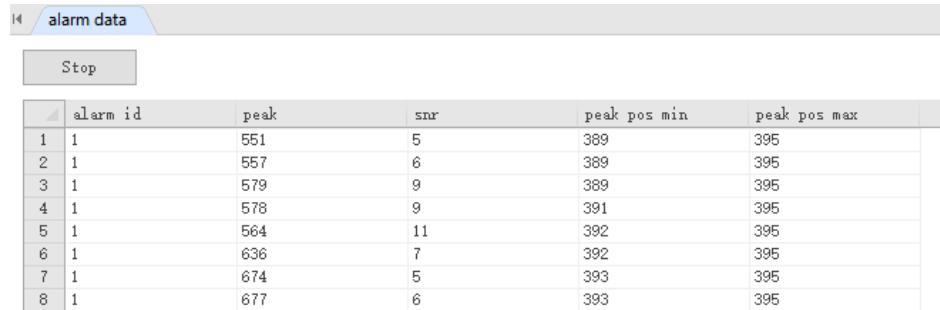
	alarm id	peak	snr	peak pos min	peak pos max
1	1	551	5	389	395
2	1	557	6	389	395
3	1	579	9	389	395
4	1	578	9	391	395
5	1	564	11	392	395
6	1	636	7	392	395
7	1	674	5	393	395
8	1	677	6	393	395

Figure 4-2

2.5 误报处理
2.5 False Alarm Processing Methods

1）、上电后，假如存在误报，首先确认周围是否存在标签干扰，如果有的话，请让其远离天线 2 米以外，避免系统受其干扰。如果没有标签，首先保证命中次数为 8，峰值位置差为 10，其次可依据软件中的报警数据确定各个参数。

1). After power on, if there is false alarms. Firstly, you check whether there is a tag around. If yes,　please put it away from the antenna 2 meters away to avoid the system from interference. If no, firstly check if the hit count is 8 and the difference of peak pos max - peak pos min　is 10, and then according to the data in the software to determine every parameters.

2）、假如没有误报，且标签的检测效果不好。首先保证使用的是默认参数，然后提升检测效果的步骤有一下几种，尽量一次修改一个参数，且数值变化范围不要变化太大。

2). If there is no false alarm, and the detection is not good. First of all, resume to factory setting parameters. Then improve the detection step by step. It is better to try the parameters one by one, the the modification range is not too much. Modify and test, little by little, to improve the detection.

A. 降低峰值门限（如图 5-1 所示）
reduce the peak gated low
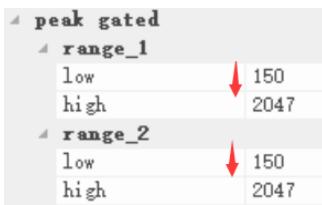
Figure 5-1

B. 降低信噪比 （如图 5-2 所示）

reduce the snr low
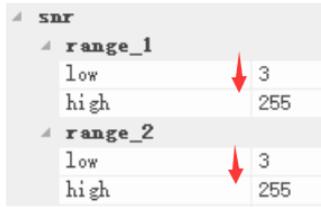
Figure 5-2

C. 降低命中次数（如图 5-3 所示）

reduce the hit count

Figure 5-3

D. 降低峰值位置差（如图 5-4 所示）

reduce the peak pos gated

Figure 5-4

主要修改的是峰值门限以及信噪比。A and B are the mainly ones to be modify.

上述过程中，如果出现误报，请参照上述关于误报处理过程修改参数.

During the above processing, if there false alarm, please refer to the False Alarm Processing.

备注：

信噪比 (snr)、峰值 (peak)、峰值位置差 (peak pos) 和命中次数 (hit count) 是识别标签的 4 个重要参数，合理的参数设置可以达到更好的效果。修改后必须保存才有效。

Remarks:

Signal to noise ratio (snr), peak value (peak), peak pos gated (peak pos) and hit count (hit count) are 4 important parameters of identification tags. Reasonable parameter settings can achieve better results. The new modification must be saved,

then it will be valid.

2.6 特殊误报屏蔽
2.6 Special False Alarms Shielding Methods

在现场，很多时候系统偶尔的误报并非是受到了覆盖标签频率的全范围干扰，而是某个频段的干扰。在这个时候，我们就可以通过观察报警数据日志，找出特殊误报的范围，设置参数规避掉一部分的特殊误报。

In the working site, the occasional false alarm of the system is not caused by the full range interference of the label frequency, but by the interference of a certain frequency band. In this case, we can observe the alarm data log, find out the scope of special false alarms, set parameters to avoid this special false alarms.
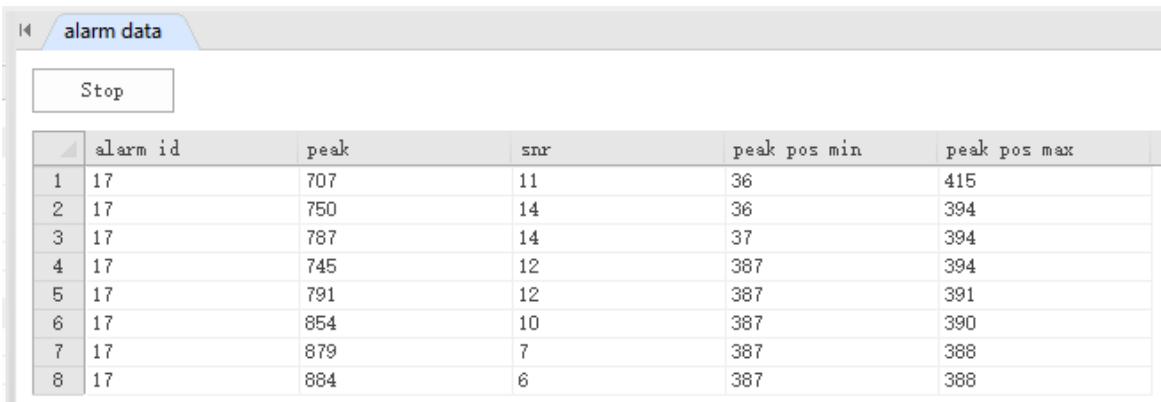
	alarm id	peak	snr	peak pos min	peak pos max
1	17	707	11	36	415
2	17	750	14	36	394
3	17	787	14	37	394
4	17	745	12	387	394
5	17	791	12	387	391
6	17	854	10	387	390
7	17	879	7	387	388
8	17	884	6	387	388

Figure 6-1
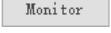
点击 Monitor 按钮，即可进行报警数据日志实时读取。假设当前无标签进入，则我们看到的报警数据应均为误报报警数据（如图 6-1 所示）。

由报警数据日志可以看出，误报的 peak 范围基本上集中在 750-900 之间。则，我们可以设置 peak gated 数据为（如图 6-2 所示）：

Click the button Monitor to make the alarm data log read in real time. Assuming that there is no tag enter, the alarm data are false alarm data(Figure6-1).

From the alarm data, we can see that the peak range of false alarms is basically concentrated between 750-900. Then, we can set peak gated data to(Figure6-2):
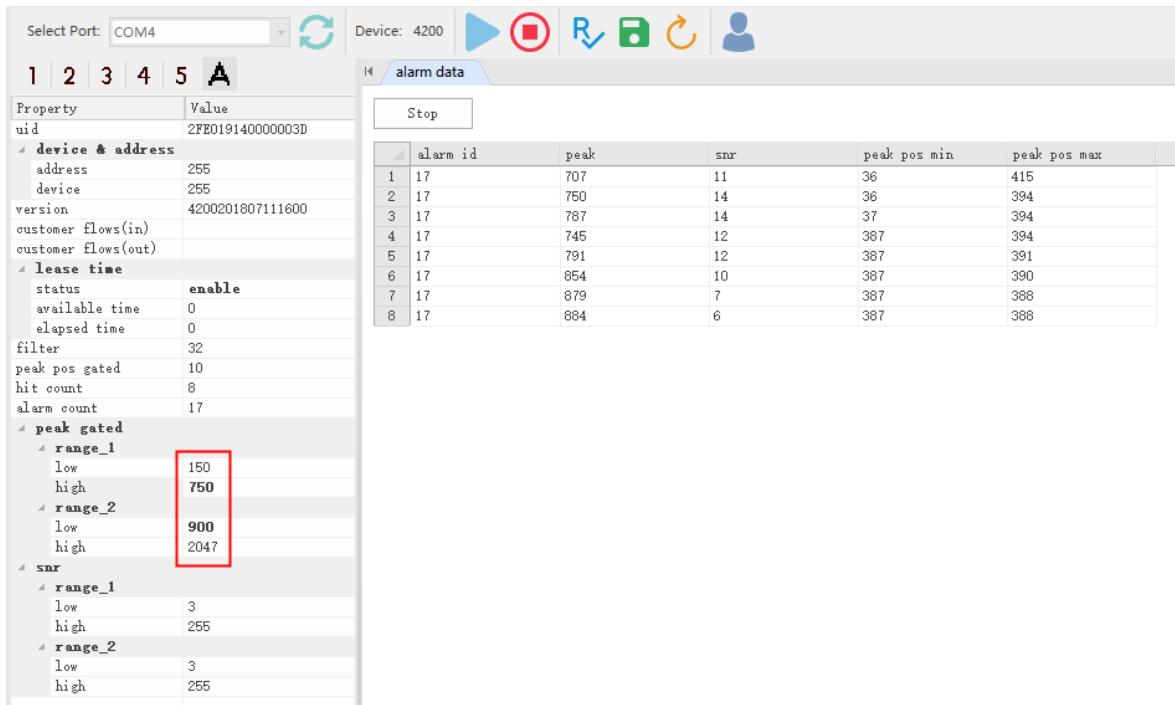
Figure 6-2

则我们就可以规避掉报警记录中，第 3 到第 8 条情况下的误报。

Then the false alarm of alarm data No. 1 to 8 will stop.

主板会随时采集检测范围内的无线信号，并对当前采集到的信号的特性进行分析，符合标签特征的信号则进行报警。报警数据日志，就是主板每次识别出标签（报警）的特性的综合数据记录。信号必须最终同时符合三个特性（peak、snr，peak pos max-peak pos min）的判断条件，才会被认为是标签信号。以下是三个特性的判断条件：

The main board will collect the RF signal in the range of detection at any time, and analyze the characteristics of the signal collected at present, and give the alarm to the signal that conforms to the feature of the tag. The alarm data log is the comprehensive data record that the main board recognizes the characteristics of the label (alarm) every time. In order to be considered as a tag signal, the signal must ultimately meet the criteria of three characteristics (peak, snr, peak pos max - peak pos min). The following are the criteria for judging the three characteristics:

Peak：

Figure 6-3

信号的 peak 数值（如图 6-3 所示），必须在 range_1 或者 range_2 范围内。

1

The peak (Figure6-3) value must be inside range_1 or range 2

Snr：

Figure 6-4

信号的 snr 数值（如图 6-4 所示），必须在 range_1 或者 range_2 范围内。

The snr value (Figure6-4) must be inside range_1 or range_2.

Peak pos max - Peak pos min：

Figure 6-5

信号的 peak pos max 和 peak pos min 的差值，必须小于 peak pos gated 参数设定的值（如图 6-5 所示）。在上面一组报警数据日志中，只有前 3 条记录的 Peak pos max - Peak pos min 差值有效，其余可忽略，不作为误报判断依据。

The difference between the peak pos. max and the peak pos. min of the signal must be less than the value set at the peak pos gated(Figure6-5). In the above group of alarm data log, only the first 3 records of the peak pos max - peak pos min difference is effective, so the rest can be ignored, not as the judge of false alarm.

上面，我们介绍了通过观察报警日志中的 peak 数值来设置参数，从而屏蔽误报的方法。但因为信号必须同时符合三个特性才被确认为标签信号，所以如果信号的 peak 数值比较分散、范围较大,无法通过设置参数来屏蔽,那么我们也可以观察 snr、Peak pos max - Peak pos min 的数值，看是否在某一个小范围内，则也同样可以通过设置对应参数来规避误报。如果三个信号特征的数值都比较分散和平均，甚至覆盖了标签的全范围，则可认为当前的干扰信号就完全、无限近似于一个标签，无法屏蔽该干扰信号，消除误报。

Above, we introduce the method of setting up parameters by observing the peak value in the alarm data log, thus shielding false false alarms. But because the signal must be conformed to three characteristics at the same time, then it would be finally identified as a true tag signal. So if the peak value of the signal is more scattered, larger,

and can not shield false alarms by setting parameters, then we can also observe the values of snr, peak pos max - peak pos min, whether or not in a small range, it is also possible to set corresponding parameters to avoid false alarms. If the values of the three signal features are scattered and average, and even cover the entire range of the tag, the current interference signal is considered to be completely and infinitely similar to a tag, in this case, it is not possible to shield the interference signal to eliminate the false alarm.