RAK47X WiFi Power Consumption/Connecting Time Test Report

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Test module software version	RAK475：1.0.0.2_2.6.2
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CONTENTS

1 Main Test Items

1.1 The power consumption under STA mode

Table 1-1 The power consumption under STA mode

Power consumption mode	Test item instruction
Power consumption mode 0	Keep Wifi connected without sending data
	Keep Wifi connected with sending data of 100B/100ms
	Keep Wifi connected with receiving data of 100B/100ms
	Keep Wifi connected with receiving and sending data of 100B/100ms by duplex signaling mode
	Peak power consumption on the Wifi module power-on
Power consumption mode 1(DTIM=100ms)	Keep Wifi connected without sending data
	Keep Wifi connected with sending data of 100B/100ms
	Keep Wifi connected with receiving data of 100B/100ms
	Keep Wifi connected with receiving and sending data of 100B/100ms by duplex signaling mode
	Peak power consumption on the Wifi module power-on

1.2 The power consumption under AP mode

Table 1-2 The power consumption under AP mode

Power consumption mode	Test item description
Power consumption mode 0	No equipment connected and no data sent
	Equipment connected but no data sent
	Equipment connected with sending data of 100B/100ms
	Equipment connected with receiving data of 100B/100ms

	Equipment connected with receiving and sending data of 100B/100ms by duplex signaling mode

Caution: The power consumption mode 1 is the same as the power consumption mode 0 under AP mode; namely, there is only one kind of power consumption mode under AP mode.

2 Test environment

2.1 Test hardware

- WiFi module: RAK475
- Oscilloscope: DSO-X 3014A
- Multimeter: FLUKE
- USB cable
- Serial port line

2.2 Test software

- Serial port debugging assisant
- TCP/UDP test tool

2.3 Test method

The oscilloscope probe is connected to the ends of the power consumption test used resistance R of RAK475EVB, and the resistance is 1 Ω (the actual measurement is 1.5 Ω , and the power consumption in the report is calculated by 1.5 Ω). I=U/R, i.e., the voltage (U) detected through the oscilloscope divided by the resistance (R) is equal to the current (I) flowing through the WIFI module. Details are shown below：

Figure 2.1 Actual test

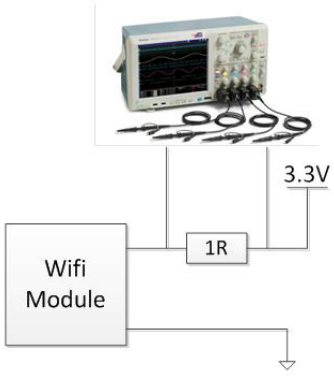

Figure 2.2 Test sketch

3 Test conclusion

3.1 The power consumption under STA mode

Values of the module's power consumption to keep connection, receive and send data, mutually send data and power on under the STA mode. (100B/100ms, unit: mA)

Table 3-1 The power consumption under STA mode

The power consumption mode	Mode 0	Mode 1
Average power consumption when keeping connected	47.79	21.82
Peak power consumption when keeping connected	102.67	94.67
Average power consumption when receiving	60.15	58.67
Peak power consumption when receiving data	231.33	212.67
Average power consumption when sending data	62.19	59.67
Peak power consumption when sending data	236.67	212.67
Average power consumption when mutually sending data	68.23	55.98
Peak power consumption when mutually sending data	236.67	220
Peak power-on power consumption	225.33	220.33

3.2 The power consumption under AP mode

The values of the module's power consumption to keep connected, receive and send data, and mutually send data without equipment connected under the AP mode. (100B/100ms, unit: mA)

Table 3-2 The power consumption under AP mode

Power consumption mode	Mode 0	Mode 1
Average power consumption without equipment connected	48.61	Caution: The power consumption mode 1 is the same as the power consumption mode 0 under AP mode;
Peak power consumption without equipment connected	225.33	
Average power consumption when keeping connected	48.95	
Peak power consumption when keeping connected	234	
Average power consumption when receiving data	49.63	
Peak power consumption when receiving data	234	

Average power consumption when sending data	51.3	namely, there is only one kind of power consumption mode under AP mode.
Peak power consumption when sending data	234	
Average power consumption when mutually sending data	53.31	
Peak power consumption when mutually sending data	234	

4 Detailed test data

4.1 Oscilloscope calibration

Note: The initial value of the oscilloscope is not zero; when the positive and negative probe of the oscilloscope is short-circuited, the maximum level is -8mV, and the average level is -15.63mV; therefore, the initial value of the oscilloscope is needed to be considered when calculating the tested real power consumption.

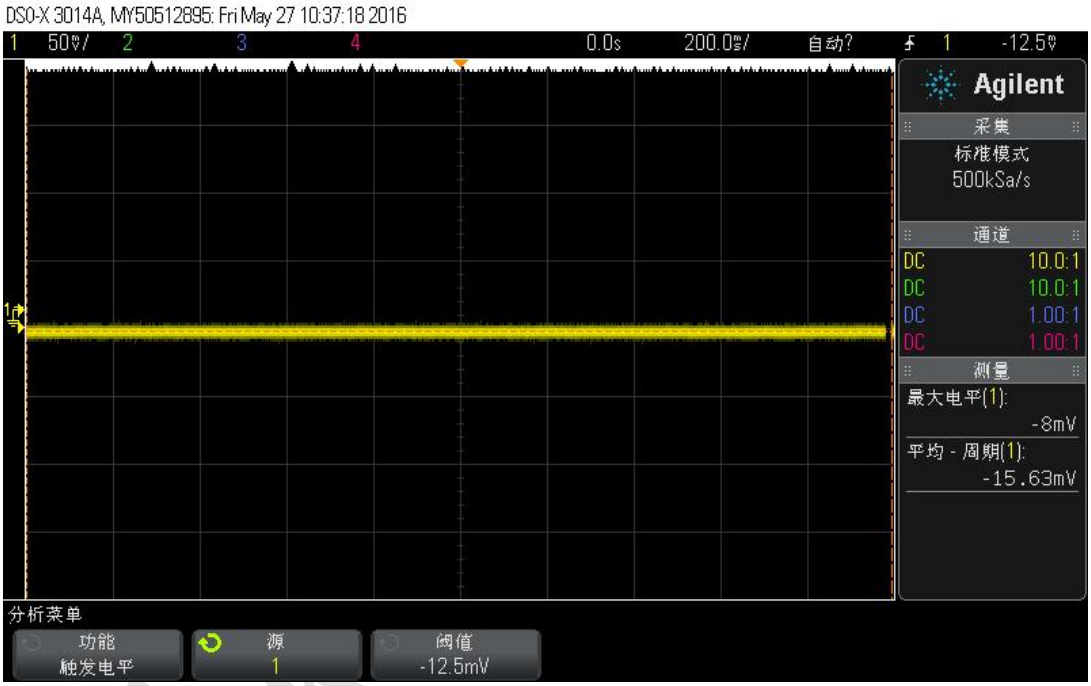

Figure 4.1 Initial value of the oscilloscope

(In the picture, the Chinese meaning: 自动 Automatic, 采集 Collect, 标准模式 Standard mode, 通道 Channel, 测量 Measure, 最大电平 Maximum level, 平均-周期 Average-period, 分析菜单 Analytical menu, 功能 Function, 触发电平 Trigger level, 源 Source, 阈值：Threshold value.)

4.2 The power consumption under STA mode

4.2.1 The power consumption mode 0

4.2.1.1 The power consumption when keeping connected

Configure WIFI module as: STA - the power consumption mode 0; test the power consumption of the module when keeping connected as shown below:

Maximum current: (146mV+8mV)/1.5 Ω = 102.67mA
Average current: (56.06mV+15.63mV)/1.5 Ω = 47.79mA

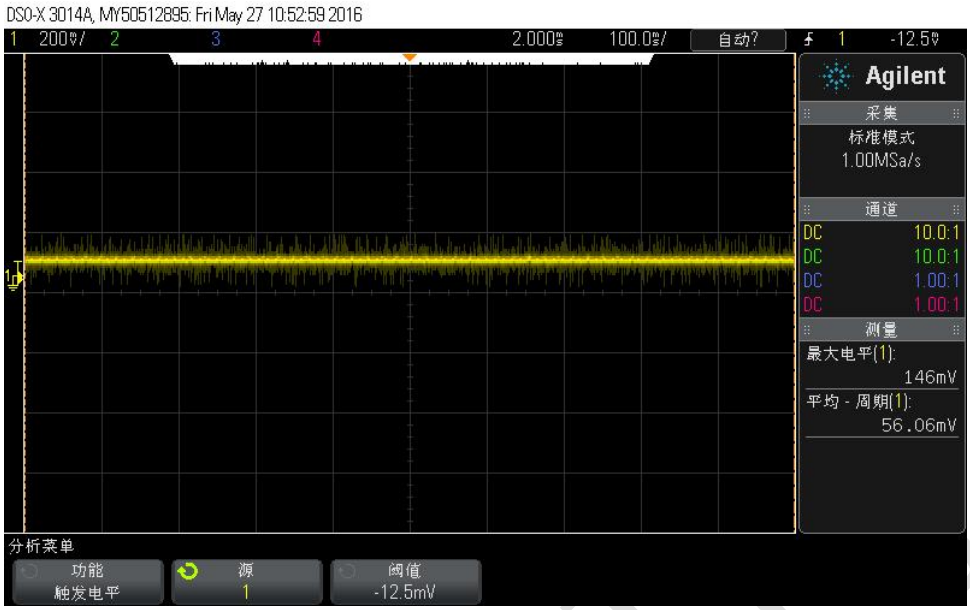

Figure 4.2.1.1 STA_ power consumption mode 0_keep connected

4.2.1.2 The power consumption when receiving data

Configure WIFI module as: STA - the power consumption mode 0; test the power consumption of the module when receiving data (100B/100ms) as shown below:

Maximum current: (339mV+8mV)/1.5 Ω = 231.33mA
Average current: (74.6mV+15.63mV)/1.5 Ω = 60.15mA

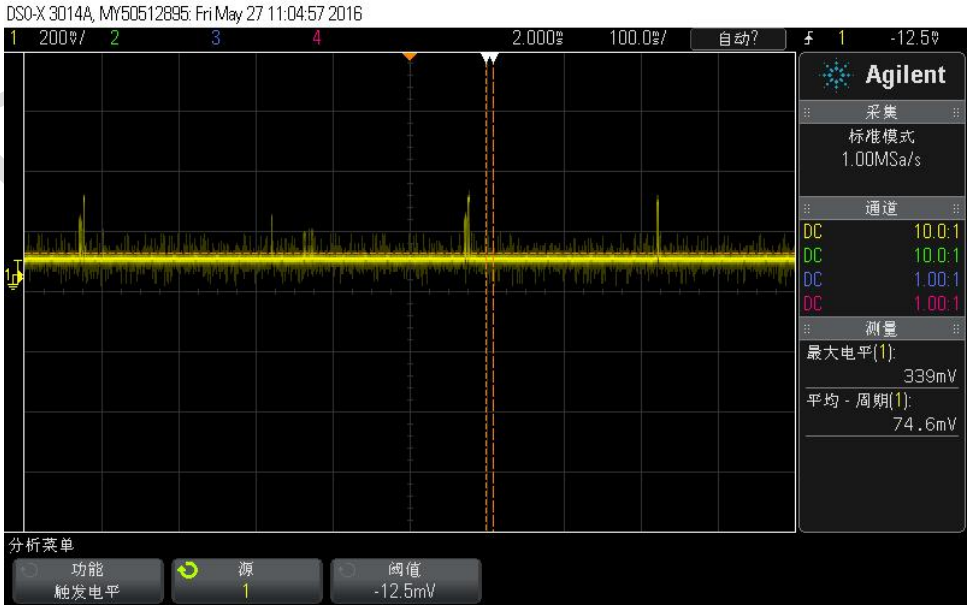

Figure 4.2.1.2 STA_ power consumption 0_ receiving data

4.2.1.3 The power consumption when sending data

Configure WIFI module as: STA - the power consumption mode 0; test the power consumption of the module when sending data (100B/100ms) as shown below:

Maximum current: (347mV+8mV)/1.5 Ω = 236.67mA
Average current: (77.66mV+15.63mV)/1.5 Ω = 62.19mA

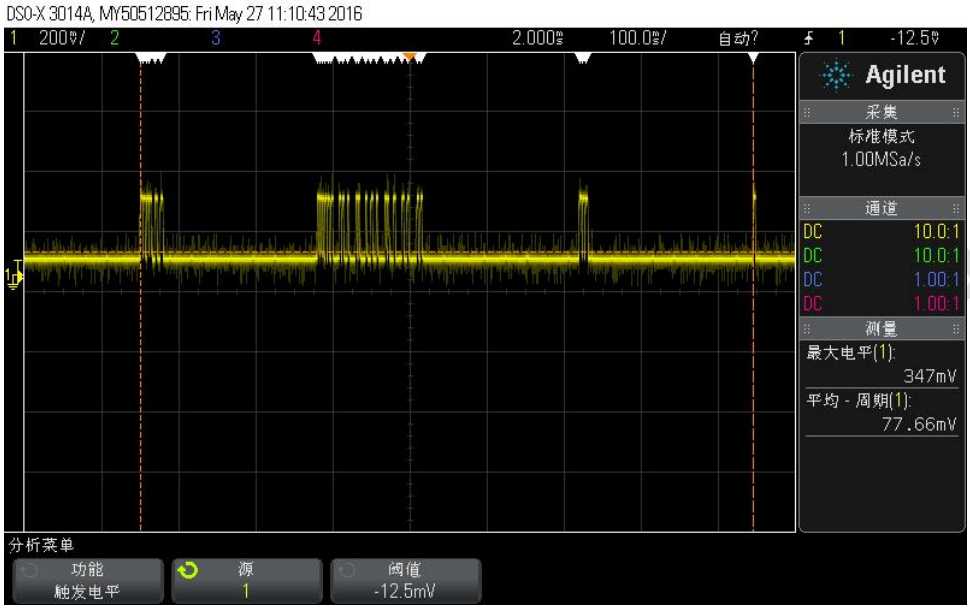

Figure 4.2.1.3 STA_ power consumption 0_ sending data

4.2.1.4 The power consumption when mutually sending data

Configure WIFI module as: STA - the power consumption mode 0; test the power consumption of the module when mutually sending data (100B/100ms) as shown below:

Maximum current: (347mV+8mV) /1.5 Ω = 236.67mA
Average current: (86.71mV+15.63mV)/1.5 Ω = 68.23mA

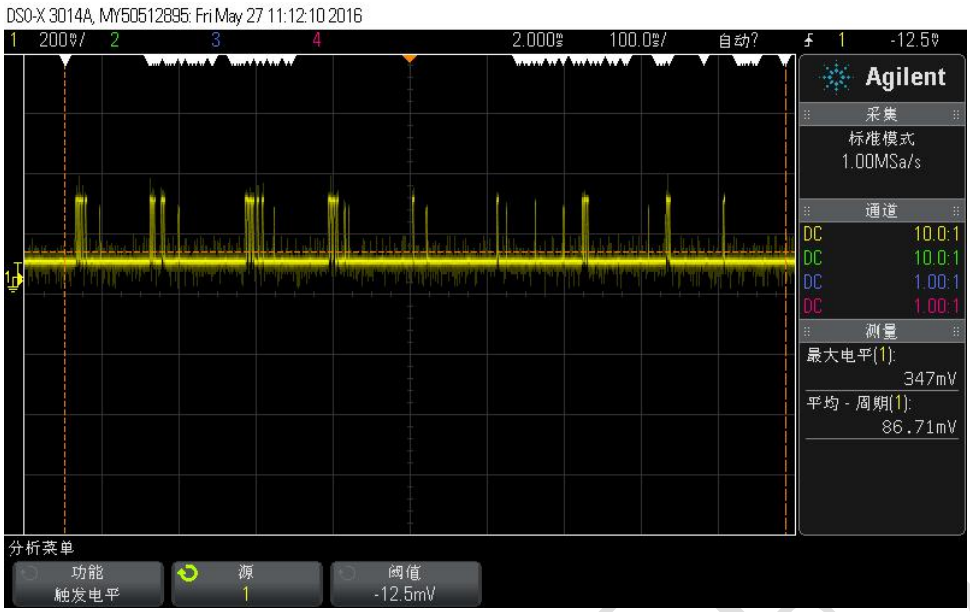

Figure 4.2.1.4 STA_ power consumption 0_ mutually sending data

4.2.1.5 The peak power-on power consumption

Configure WIFI module as: STA - the power consumption mode 0, and WIFI module is established with UDPserver, and the computer and the module establish the UDP connection and send data of 10B/10ms; test the power consumption and time for the WIFI module from powering on to receiving data as shown below:

Maximum current: (330mV+8mV)/1.5 Ω=225.33mA

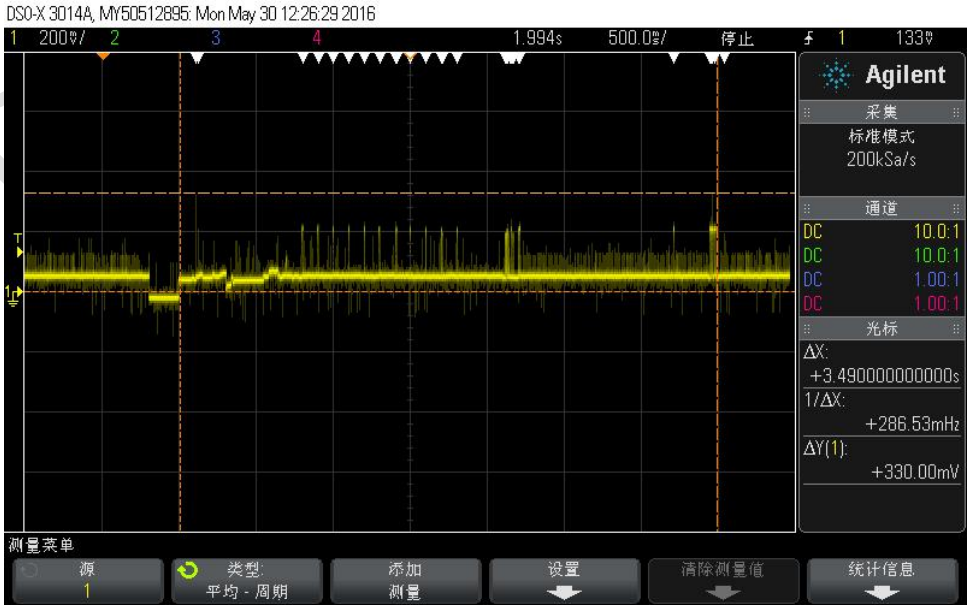

Figure 4.2.1.5 STA_ power consumption 0_ from powering on to receiving data

4.2.2 The power consumption mode 1

4.2.2.1 The power consumption when keeping connected

Configure WIFI module as: STA - the power consumption mode 1; test the power consumption of the module when keeping connected as shown below:

Maximum current: (134mV+8mV)/1.5Ω = 94.67mA
Average current: (17.10mV+15.63mV)/1.5Ω = 21.82mA

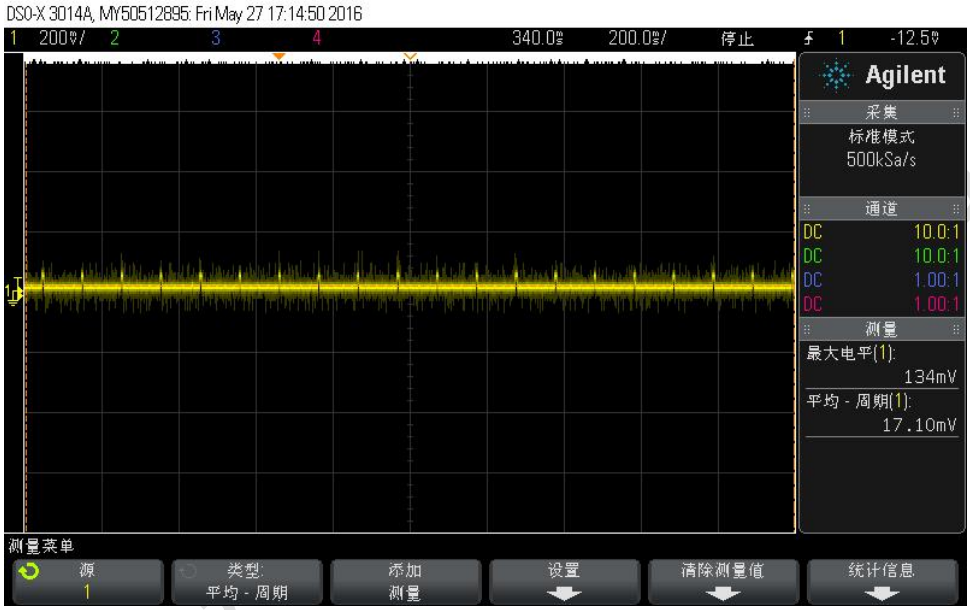

Figure 4.2.1 STA_ power consumption 1-keep connected

4.2.2.2 The power consumption when receiving data

Configure WIFI module as: STA - the power consumption mode 1; test the power consumption of the module when receiving data (100B/100ms) as shown below:

Maximum current: (311mV+8mV) /1.5Ω =212.67mA
Average current: (72.37mV+15.63mV)/1.5Ω =58.67mA

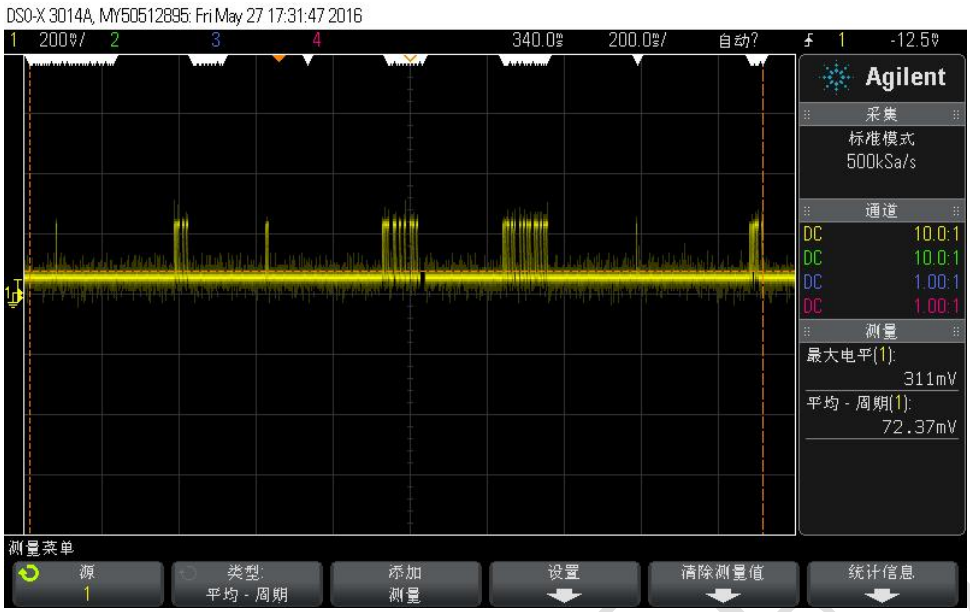

Figure 4.2.2.2 STA_ power consumption 1_ receiving data

4.2.2.3 The power consumption when sending data

Configure WIFI module as: STA - the power consumption mode 1; test the power consumption of the module when sending data (100B/100ms) as shown below:

Maximum current: (311mV+8mV) /1.5 Ω = 212.67mA
Average current: (73.88mV+15.63mV)/1.5 Ω = 59.67mA

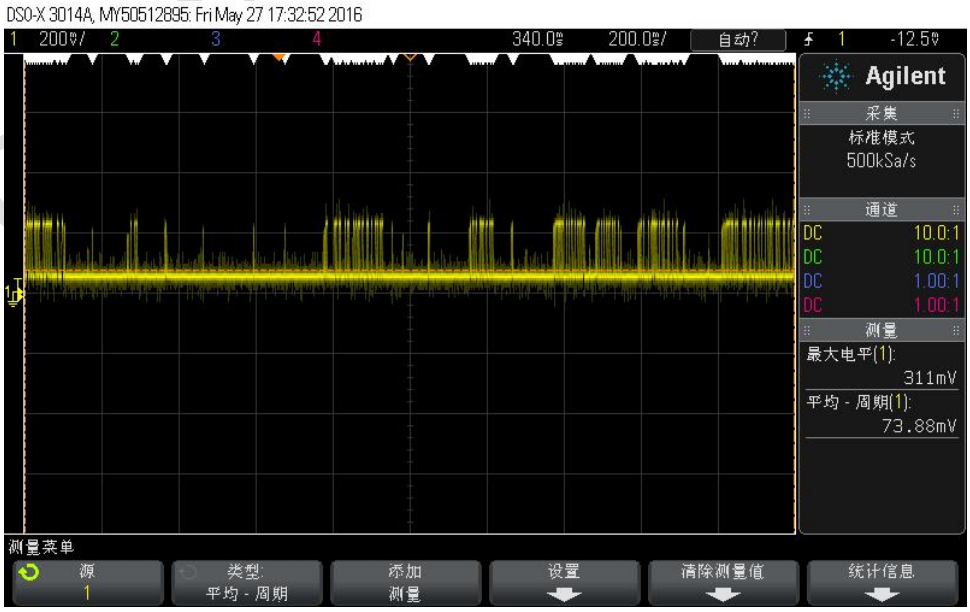

Figure 4.2.2.3 STA_ power consumption 1_ sending data

4.2.2.4 The power consumption when mutual sending data

Configure WIFI module as: STA - the power consumption mode 1; test the power consumption of the module when mutually sending data (100B/100ms) as shown below:

Maximum current: (322mV+8mV)/1.5 Ω = 220mA
Average current: (68.34mV+15.63mV) /1.5 Ω = 55.98mA

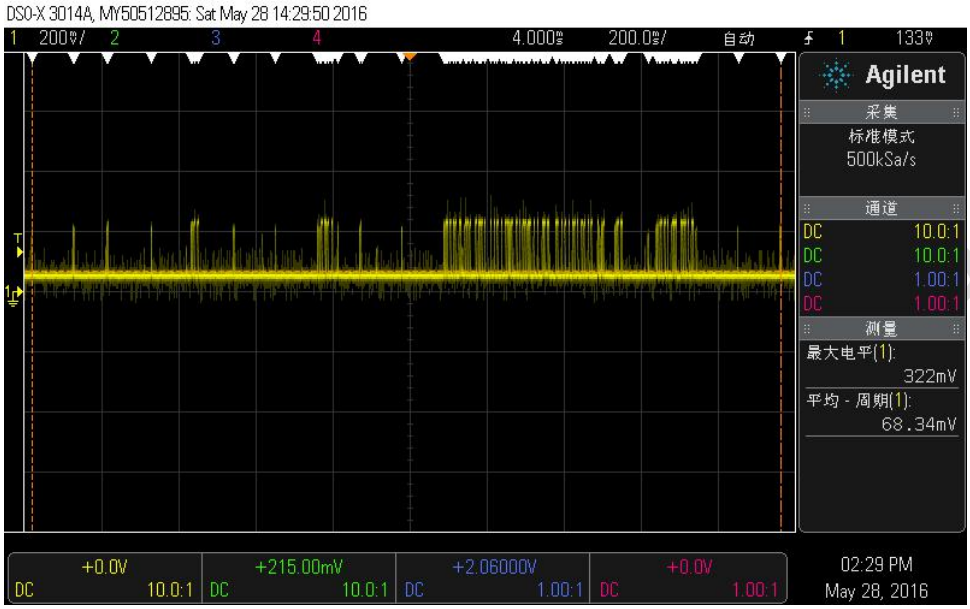

Figure 4.2.2.4 STA_ power consumption 1_ mutually sending data

4.2.2.5 The peak power-on power consumption

Configure WIFI module as: STA - the power consumption mode 1, and the WIFI module is established with UDPserver, and the computer and the module establish UDP connection and send data of 10B/10ms; test the power consumption and time for the WIFI module from powering-on to receiving data as shown below:

Maximum current: (322.5mV+8mV)/1.5 Ω =220.33mA

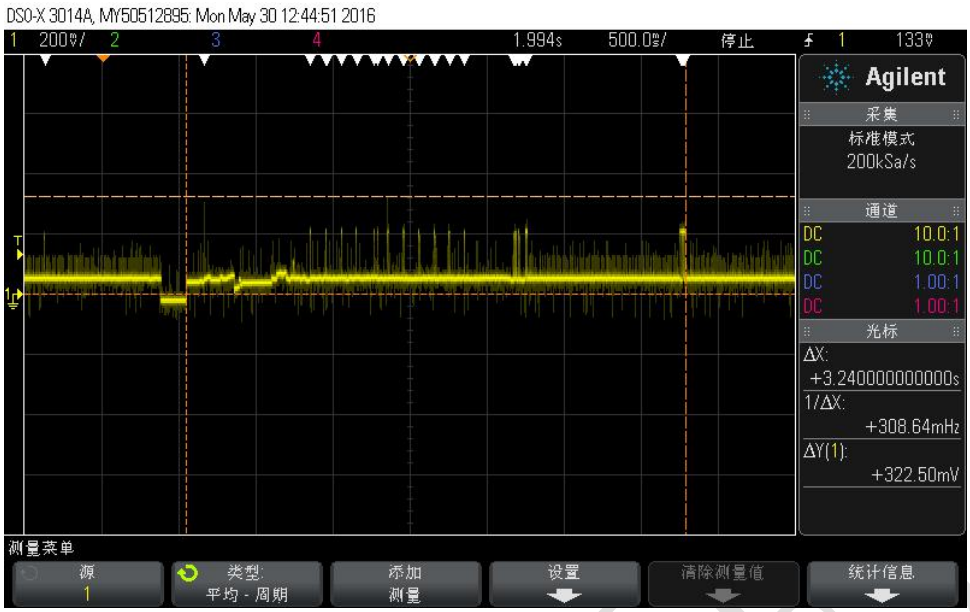

Figure 4.2.2.5 STA_ power consumption 1_ peak power-on

4.3 The power consumption under AP mode

4.3.1 The power consumption mode 0

4.3.1.1 The power consumption without equipment connected

Configure WIFI module as: AP - the power consumption mode 0-without equipment connected to AP; test the power consumption of the module as shown below:

Maximum current: (330mV+8mV) /1.5 Ω = 225.33 mA
Average current: (57.29mV+15.63mV) /1.5 Ω = 48.61mA

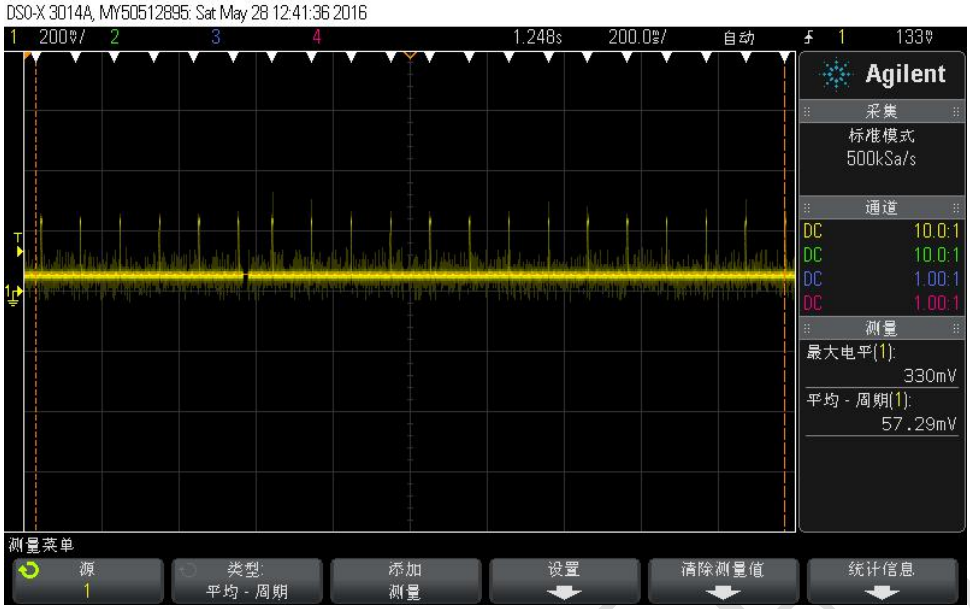

Figure 4.3.1.1 AP_ the power consumption mode 0-without equipment connected to AP

4.3.1.2 The power consumption when keeping connected

Configure WIFI module as: AP - the power consumption mode 0; test the power consumption of the module when keeping connected as shown below:

Maximum current: (343mV+8mV) /1.5 Ω = 234mA
Average current: (57.80mV+15.63mV) /1.5 Ω = 48.95mA

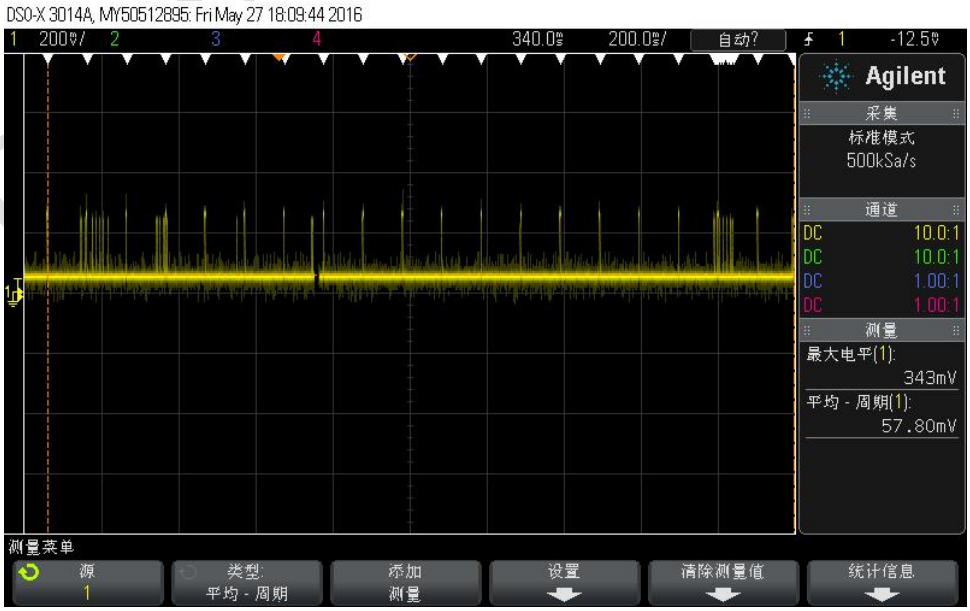

Figure 4.3.1.2 AP_ power consumption 0_ keep connected

4.3.1.3 The power consumption when receiving data

Configure WIFI module as: AP - the power consumption mode 0; test the power consumption of the module when receiving data (100B/100ms) as shown below:

Maximum current: (343mV+8mV) /1.5 Ω = 234mA
Average current: (58.81mV+15.63mV) /1.5 Ω = 49.63mA

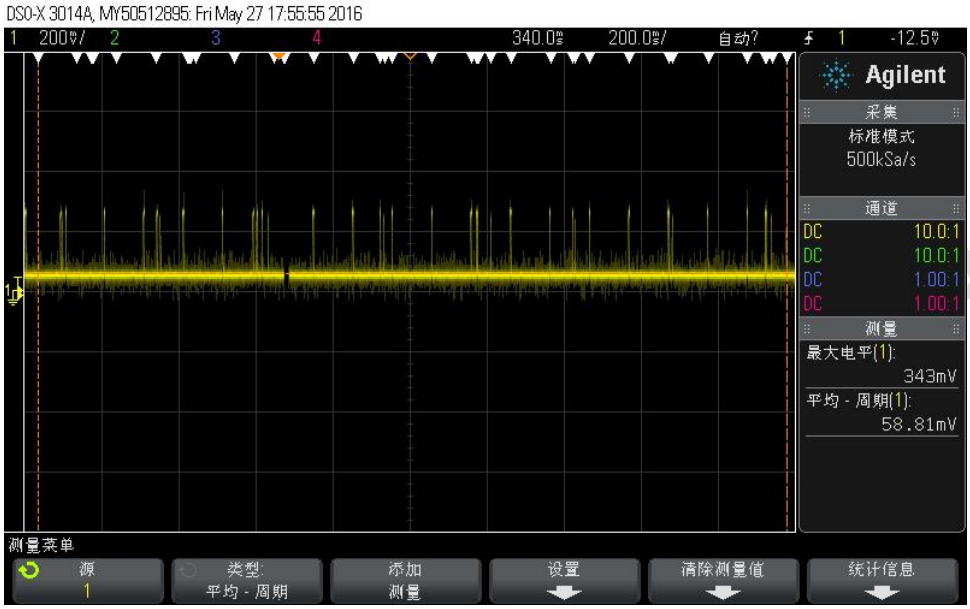

Figure 4.3.1.3 AP_ power consumption 0_ receiving data

4.3.1.4 The power consumption when sending data

Configure WIFI module as: AP - the power consumption mode 0; test the power consumption of the module when sending data (100B/100ms) as shown below:

Maximum current: (343mV+8mV) /1.5 Ω = 234mA
Average current: (61.32mV+15.63mV) /1.5 Ω =51.3mA

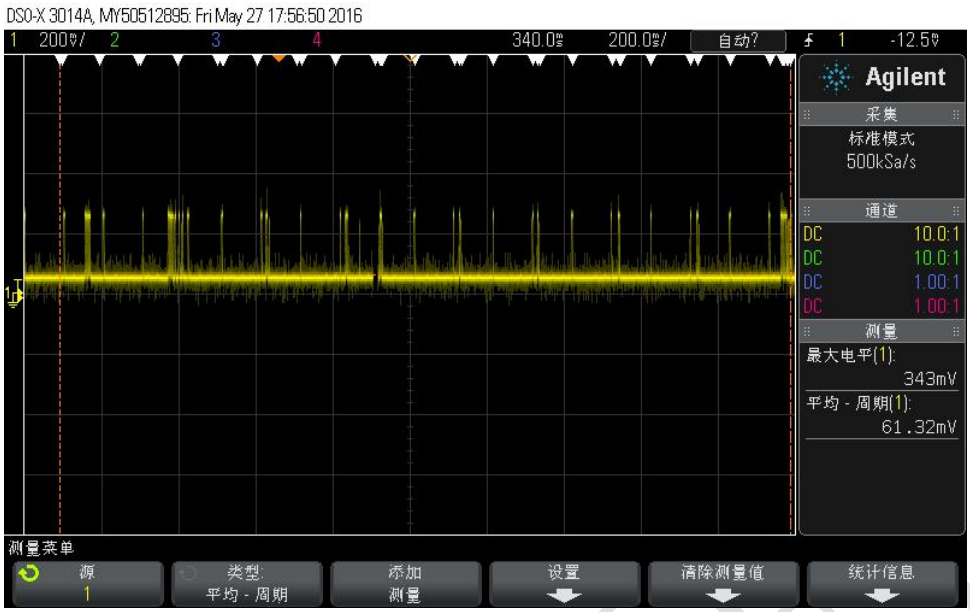

Figure 4.3.1.4 AP_ power consumption 0_ sending data

4.3.1.5 The power consumption when mutual sending data

Configure WIFI module as: AP - the power consumption mode 0; test the power consumption of the module when mutually sending data (100B/100ms) as shown below

Maximum current: (343mV+8mV) /1.5Ω=234mA
Average current: (64.33mV+15.63mV) /1.5Ω= 53.31mA

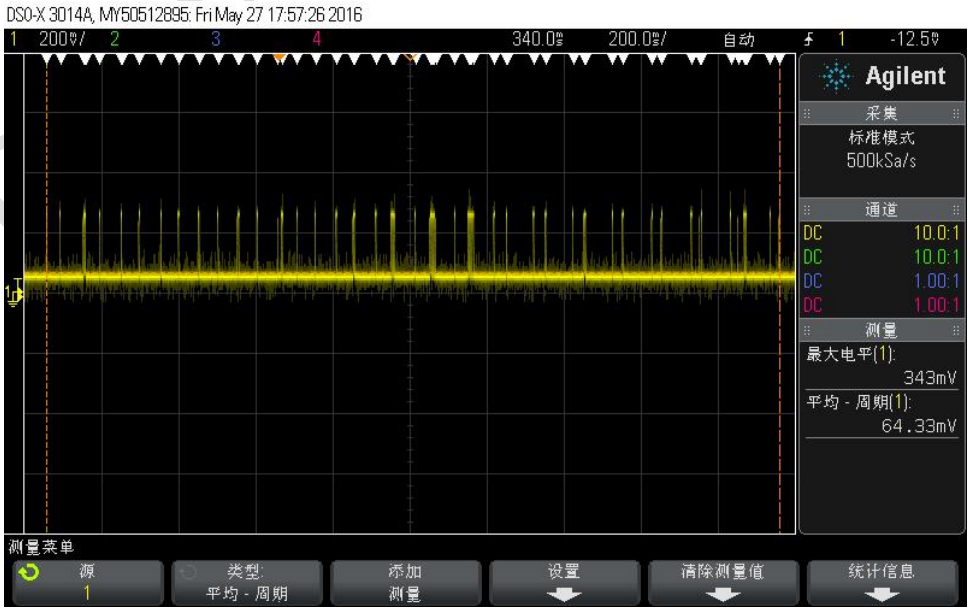

Figure 4.3.1.5 AP_ power consumption 0_ mutual sending data

4.3.2 The power consumption mode 1

When WIFI module under AP mode, the power consumption is the same under power consumption mode 0 and power consumption 1, so separate tests will not be needed here.

Version

Version	Author	Date	Content modification
V1.0	Lianbo Wang	2016/02/02	Create a document
V1.1	Xiaocheng Cao	2016/10/13	Modify some of the details