

Semiconductor 802.11ah GS-AH-Rx00P Family

Brief Datasheet

Confidential Level	A	Semiconductor 802.11ah GS-AH-Rx00P Family Brief Datasheet	Document No.	
Date	2022-7-30		Version	V1.6.1

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1 General Description

As an optimized Wi-Fi solution for IOT devices, GS-AH-Rx00Pxx series module (Laterreferred to as GS-AH-Rx00P) designed , is an industry leading Wi-Fi module compliant with the IEEE 802.11ah standard.

GS-AH-Rx00P module integrates 802.11ah SOC GSW83xx, which can work in 730Mhz-950Mhz frequency range that gets better communication distance than 2.4G or 5G Wi-Fi devices under the same transmit power. GS-AH-Rx00P supports 1/2/4/8MHz channel bandwidth, and provides physical throughput ranging from 150Kbps to 32.5Mbps, supporting applications from low-rate sensors to multi-channel high-rate surveillance cameras.

GS-AH-Rx00P module uses channel collision assessment (CCA) and carrier sense multiple access/collision detection (CSMA_CD) mechanisms to avoid channel access. And it adopts automatic frequency selection, automatic power control and other means to optimize the network transmission performance.

GS-AH-Rx00P supports SDIO, USB, SPI, UART interfacing with application processor, which can be applied to wireless security, UAV image transmission, smart home and smart grid and other fields. In addition, GS-AH-Rx00p also provides RMII interface to realize the low-cost solution of single-module wireless network bridge.

For low power consumption, GS-AH-Rx00P supports low-power mode for STA that provides power consumption as low as 200uA to keep alive. The module also supports low power consumption of AP, AP's Current consumption in low-power mode is 10mA at most.

For networking, GS-AH-Rx00P supports relay mode that extends the coverage of wireless signal. It also supports roaming mode that allows STA roaming among APs, and supports the multicast mode and applies to the data multicast working scenario.

For antenna, the module supports single antenna and dual antennas. And the dual antennas means selecting one from two, and the antenna selection operates automatically according to the signal.

The structure of the GS-AH-Rx00P module is shown in fig 1-1.

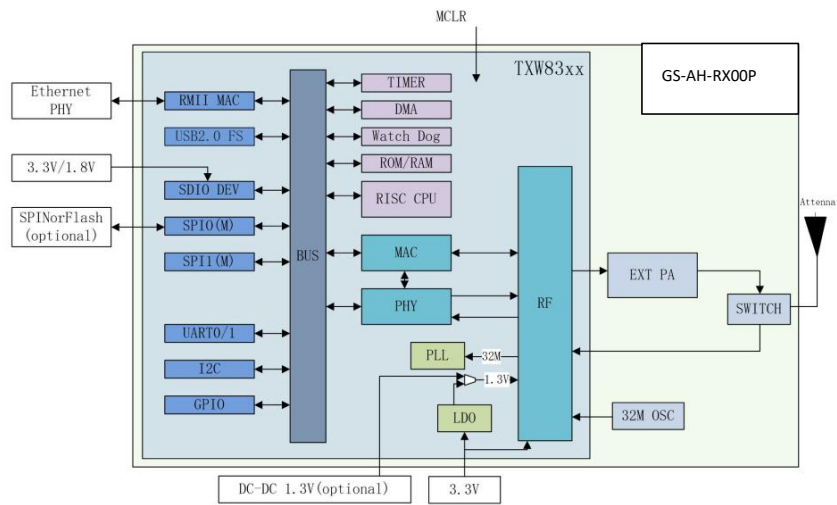


Fig 1-1. The structure of the GS-AH-Rx00P module

The front view of GS-AH-Rx00P is Fig 1-2.(Take GS-AH-R900PNR as an example)

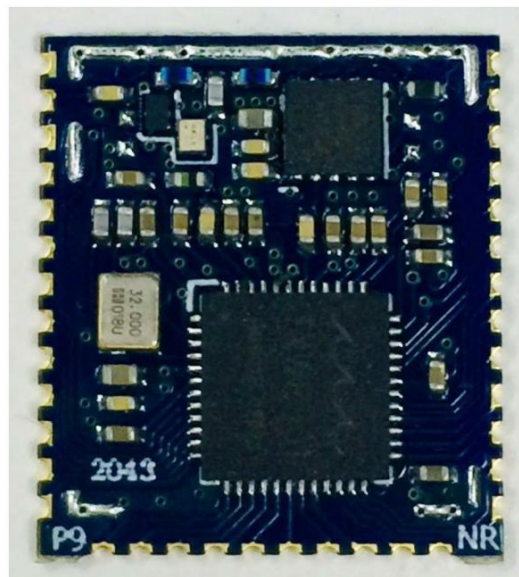
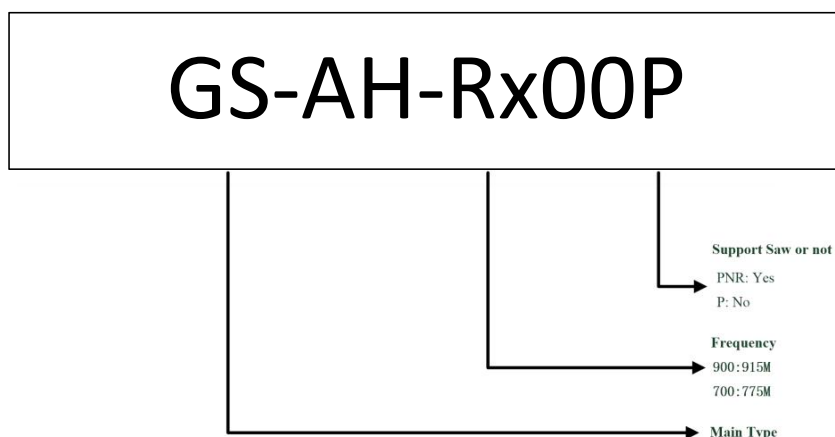


Fig 1-2. the front view of GS-AH-Rx00P(Take GS-AH-R900PNR as an example)

Table 1-Parameters of GS-AH-Rx00P

Category	Parameter	Note
wireless	Wi-Fi Protocol	802.11ah
	Frequency Range	Different sub-types use different frequencies, please look at Table 2-1.
Hardware	Interface	SDIO/USB/SPI/RMII/UART/I2C
	VCC Working Voltage	3.0 V ~ 3.4 V
	VCC Input current	$\geq 150\text{mA}$
	RF Working Voltage	3.0 V ~ 3.4V
	RF Input current	$\geq 450\text{mA}$
	Working temperature	-20 °C ~ 70 °C
	Storage temperature	-20 °C ~ 70 °C
software	Dimension	$(17.00 \pm 0.10)\text{mm} \times (15.00 \pm 0.10)\text{mm} \times (2.40 \pm 0.10)\text{mm}$
	Security mode	WPA2-PSK
	Encryption type	AES
	Firmware upgrade	Air Upgrade (OTA) / UART(Xmodem)
	HOST Wi-Fi driver	Wi-Fi driver for Linux/RTOS/Non-OS is available

2 Product sub-types comparison



GS-AH-Rx00P has sub-types listed in table 2-1, please make a reasonable choice according to the needs of the scheme.

Table 2-1. Sub-type of TX-AH-Rx00P

Sub-type	Top silkscreen	Status of certification	Note
GS-AH-R900P	Left bottom P9, Right bottom P9	Can pass FCC/CE certification	Support 860MHz ~ 928MHz
GS-AH-R900PNR	Left bottom P9, Right bottom : NR	Can pass FCC certification	Support 902MHz ~ 928MHz, apply 915M Saw to improve reception performance.
GS-AH-R900PNR-860M	Left bottom : 86, Right bottom : NR	Can pass CE certification	Support 859MHz ~ 894MHz, apply 875M Saw to improve reception performance.
GS-AH-R700P	Left bottom : P7, Right bottom :P7		Support 730MHz ~ 790MHz
GS-AH-R700PNR	Left bottom : P7, Right bottom : NR		Support 760MHz ~ 785MHz, apply 775M Saw to improve reception performance.

Note:

1. GS-AH-Rx00P modules are not equipped with shielding cover by default. If need shielding cover, please specify when placing an order.

3 Parameters

Note:

Test condition: 3.3V power input, 1.3V is provided by internal LDO, the temperature is 25℃.

3.1 Wi-Fi Parameters

Table 6-1. Wi-Fi parameters

Parameter	Typical Value	Unit
Working parameter		
Working Frequency	Reference list2-1	MHz
Channel BW	1, 2, 4, 8	MHz
Modulation	BPSK, QPSK, 16QAM, 64QAM	
MCS	0~7 (1/2/4/8M Mode), 10 (1M Mode)	
Physical Data rate		
1M MCS10	150	Kbps
8M MCS7	32.5	Mbps
The maximum data rate of Protocol layer ⁽¹⁾		
TCP	About 15	Mbps
UDP	About 16	Mbps
Transmission Distance (TX power +20dBm, 1 vs 1 TCP data rate) ⁽²⁾		
2MhzFrequencyBandwidth	1200Meters, >2Mbps	
4MhzFrequencyBandwidth	1200Meters, >3Mbps	
8MhzFrequencyBandwidth	1200Meters, >4Mbps	
TX Parameter		
TX Power	+20	
dBm		
EVM (MCS7)	< -27	dB
Rx Parameter		
Sensitivity (10%PER)		
1M PPDU MCS=10	-105	dBm
8M PPDU MCS=0	-95	dBm
8M PPDU MCS=7	-81	dBm
Adjacent channel suppression		
RX Adjacent Channel Rejection (MCS10)	28	dBc
RX Alternate Channel Rejection (MCS10)	35	dBc
Out-of-band interference tolerance	-20	dBm

Other		
Max Input	-10	dBm

Note:

- (1) The data limit was tested at 8Mhz bandwidth and 16 maximum aggregations;
- (2) The transmission distance was tested in open space, testing result may be different due to interfering factor from practical environment.

3.2 Power consumption

Table 6-2 power consumption

mode	Typical Value	Unit
Continuous transmitting (100% duty cycle) , Pout=+20dBm	300	mA
Continuous Receiving (1.3V powered by internal LDO)	100	mA
Continuous Receiving (1.3Vpowered by external DCDC)	55	mA
Deep-sleep	110 ^[1]	uA
DTIM10	195 ^[1]	uA
DTIM20	160 ^[1]	uA
DTIM30	145 ^[1]	uA
AP low power	10	mA

[1] The table above is for STA in low-power mode. 1.3V is provided by DCDC, the power supply on RF (VCC1/VCC2) is automatically controlled by Module.(If power of RF does not cut off during sleep, it will increase by 200uA leakage.)

4 Application Development and Testing

1. We provide prototype of network bridge (large white bridge) for the convenience of customers to evaluate the performance of AH, if a smaller size network bridge for integration is needed, we have 38mm*38mm small network bridge for sale, please contact our salesmen for more details.



Fig 4-1. AH network bridge demo

2. In order to speed up the application development of customer, we have AH development boards for sale. The board draws out SDIO/USB/SPI/UART and other interfaces, and reserved interfaces for testing the current when in low-power mode, for the convenience of application development and evaluation. For more details, please contact our salesmen.



Fig 4-2. AH development board

3. We provide AH test boxes for AH production testing. For more details, please contact our FAE.

