WF-R710-RTG1

IEEE 802.11b/g/n 1T1R UART SoC Module

Features：

> ### Reserving System
> IEEE Std. 802.11b/g/n Wi-Fi
> 1T1R System-on-Chip UART module

> ### Chip Solution
> RTL8710B

> ### I/O Interface & Size
> Standard two UART/GPIO I/O Interface
> Support RF Testing and OTP/Flash Programming
> 17.7mm x30.0mm x2.9mm

Model Overview：

Model	Interface	RF Standard	Data rate	Freqency	I/O	Voltage Input
WF-R710-RTG1	UART	IEEE 802.11b/g/n	150 Mbps	2.4G	GPIO	3.3V

. Introduction

WF-R710-RTG1 SoC module designed base on RTL8710BN chip solution, The SOC module is a highly intelligent platform for the Internet of Everything that contains a low-power Wi-Fi connectivity solution on one package. It includes a number of TCP/IP based connectivity protocols along with SSL, enabling a low-cost, low-complexity system to obtain full-featured internet connectivity and reliable information exchange.

Realtek RTL8710BN is a highly integrated single-chip low power 802.11n Wireless LAN (WLAN) network controller. It combines an ARM-CM4F MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals fordifferent applications and control usage.

RTL8710BN integrates internal memories for complete WIFI protocol functions. The embedded memory configuration also provides simple application developments.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure-1, The WF-R710-RTG1 module is a aloned chipset solution, system-on-chip-module, 1x1 802.11 b/g/n device optimized for low-power embedded applications with single-stream capability for both transmit and receive. It has an integrated network processor with a large set of TCP/IP with IPv4/IPv6 based services.
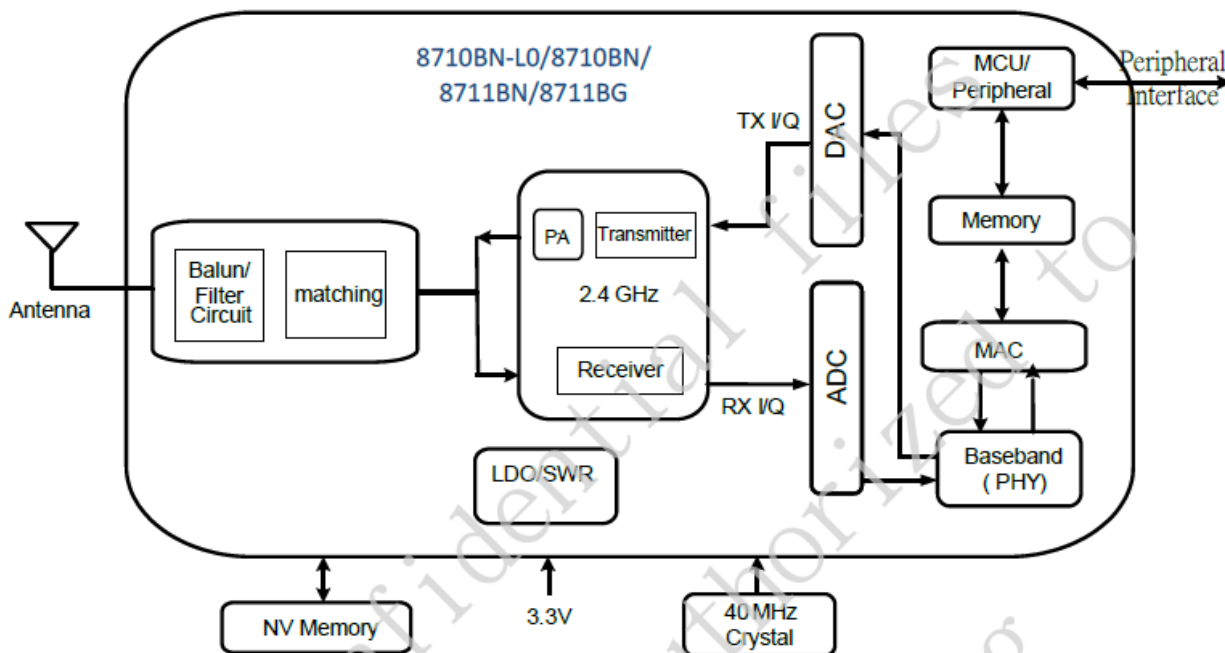

Figure 1 WF-R710-RTG1 Block Diagram

1.2. RF Specification Reference

SoC RF specification refer to below list.

Main Chipset	RTL8710BN-A0
SoC RF standard	IEEE 802.11 b/g/n
Operating Frequency	2.412~2.462 GHz
UART Interface	For testing and OTP programming (Calibration data)
Antenna Design Options	PCB printed
RF Modulation	WIFI: 11b: DBPSK, DQPSK and CCK and DSSS 　　　11a/g: BPSK, QPSK, 16QAM, 64QAM and OFDM 　　　11n: BPSK, QPSK, 16QAM, 64QAM and OFDM
Data rates	11b: 1, 2, 5.5 and 11Mbps 11a/g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65，up to 150 Mbps
Operation Voltage	3.3V +/-10% input

1.3. System Functions

SoC S/W & system general specification refer to below list:

Main Chipset	RTL8710BN
WLAN PHY Features	1T1R
Connective	WIFI Direct support
Package	QFN32 (5x5mm)
Bandwidth	20MHz and 40MHz bandwidth transmission
HW acceleration	WPA,WPA2, WPS2.0
Form factor	Maximum 9 GPIO pins
PCB Stack	2-layers design (1+/-0.15mm)
Module Dimension	Typical，17.7mm x30.0mm x2.9mm
Operation Temperature	-20℃ to +85℃
Storage Temperature	-40℃ to +125℃

2. Mechanical Specification

2.1 PCBA Mechanical Outline Drawing

Typical Dimension (W x L x T): 17.7mm x30.0mm x2.9mm   (+/-0.2 mm)

PCB Thickness: 1mm (+/-0.2mm)
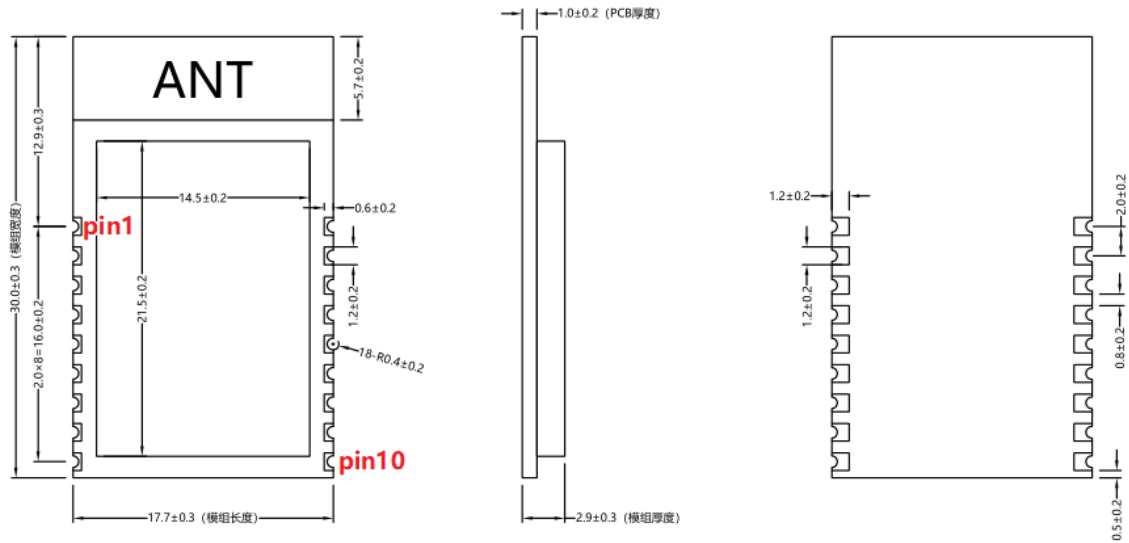
2.2 Pin Distribution Definition

Pins sequence and distribution list as follows

Pin	Define
1	SWD_CLK
2	SWD_DATA
3	GND
4	3.3V
5	IO0
6	TXD
7	RXD
8	IO12
9	IO5
10	TX
11	RX
12	I2C_SDA
13	I2C_SCL
14	NC
15	3.3V
16	GND
17	NC
18	NC

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature +25℃ and overall voltage 3.3V.

3. 1　IEEE 802.11b Section:

Items	Contents				
Specification	IEEE802.11b				
Mode	DBPSK, DQPSK and CCK and DSSS				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) 17dBm Target (For Each antenna port)	-	17	19	dBm	
2. Spectrum Mask @ Target Power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 1Mbps	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-	-10	dB	
4. Frequency Error	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER ≦8%)	-	-	-88	dBm	
2) 2Mbps (FER ≦8%)	-	-	-86	dBm	
3) 5.5Mbps (FER ≦8%)	-	-	-83	dBm	
4) 11Mbps (FER ≦8%)	-	-	-79	dBm	
6. Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

3.2　IEEE 802.11g Section:

Items	Contents				
Specification	IEEE802.11g				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 11g				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 15dBm Target (For Each antenna port) @ 11g	-	15	17	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 6Mbps	-	-	-10	dB	
2) 9Mbps	-	-	-11	dB	
3) 12Mbps	-	-	-12	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4. Frequency Error					
1) IEEE802.11g	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≦10%)	-	-	-82	dBm	
2) 9Mbps (PER ≦10%)	-	-	-81	dBm	
3) 12Mbps (PER ≦10%)	-	-	-79	dBm	
4) 18Mbps (PER ≦10%)	-	-	-77	dBm	
5) 24Mbps (PER ≦10%)	-	-	-74	dBm	
6) 36Mbps (PER ≦10%)	-	-	-70	dBm	
7) 48Mbps (PER ≦10%)	-	-	-66	dBm	
8) 54Mbps (PER ≦10%)	-	-	-65	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11g	-20	-	-	dBm	

3.3   IEEE 802.11n HT20 Section:

Items	Contents				
Specification	IEEE802.11n HT20				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 2.4G	-	13	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	
5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

3.3 IEEE 802.11n HT40 Section:

Items	Contents				
Specification	IEEE802.11n HT40				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 2.4G	-	13	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT40 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-79	dBm	
2) MCS1 (PER ≦10%)	-	-	-76	dBm	
3) MCS2 (PER ≦10%)	-	-	-74	dBm	
4) MCS3 (PER ≦10%)	-	-	-71	dBm	
5) MCS4 (PER ≦10%)	-	-	-67	dBm	
6) MCS5 (PER ≦10%)	-	-	-63	dBm	
7) MCS6 (PER ≦10%)	-	-	-62	dBm	
8) MCS7 (PER ≦10%)	-	-	-61	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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.

To satisfy RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

Limited by local law regulations, version for North America does not have region selection option.

This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be label with

 "Contains FCC ID: 2AOKI-WFR710RTG1".