AR9331 Core Module

Oolite V2.0_Module _SPEC_EN

Specification Version V2.0.2

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Rev.	Date	Contents of Revision Change	Remark
1.0.1	2018-07-14	Initial release	Kary
2.0.2	2019-11-26	Update Pin Description	Len

General Description

Oolite-9331(5FE) is a highly integrated wireless routing module. It is not only a wireless module, it is a complete route, only energized, it can work in a wireless AP module, if co upled with a network transformer and RJ45 network port, she is a wireless router.

Oolite-9331(5FE) power is very low, working alone, only 0.36W, very suitable for battery products, it has a 150M wireless transmission rate, up to 22 GPIOs, and 5 Ethernet port c an be defined as input and output.

It's design for WiFi hard disk, WiFi router, remote monitoring, remote video, Industrial cont rol DIY and so on.

The module based on the single chip AR9331 which integrates an 802.11n 1x1 MAC/BB/rad io with internal PA and LNA. It supports 802.11n operations up to 72 Mbps for 20 MHz a nd 150 Mbps for 40 MHz channel respectively, and IEEE 802.11b/g data rates.

Characteristics:

CPU: AR9331 400MHZ MIPS core

RAM: 64MByte DDR2 RAM

Flash: 16MByte SPI NOR Flash memory(4/8MByte option)

Wireless speed: 150Mbps

General GPIO: 22 (not including TX, RX)

High-speed UART for console support

USB: Usb 2.0 master interface, support USB hub extension

Power supply voltage: 3.3V.

Port: 5×100Mbps network interface

Antenna: the built-in IPX external antenna.

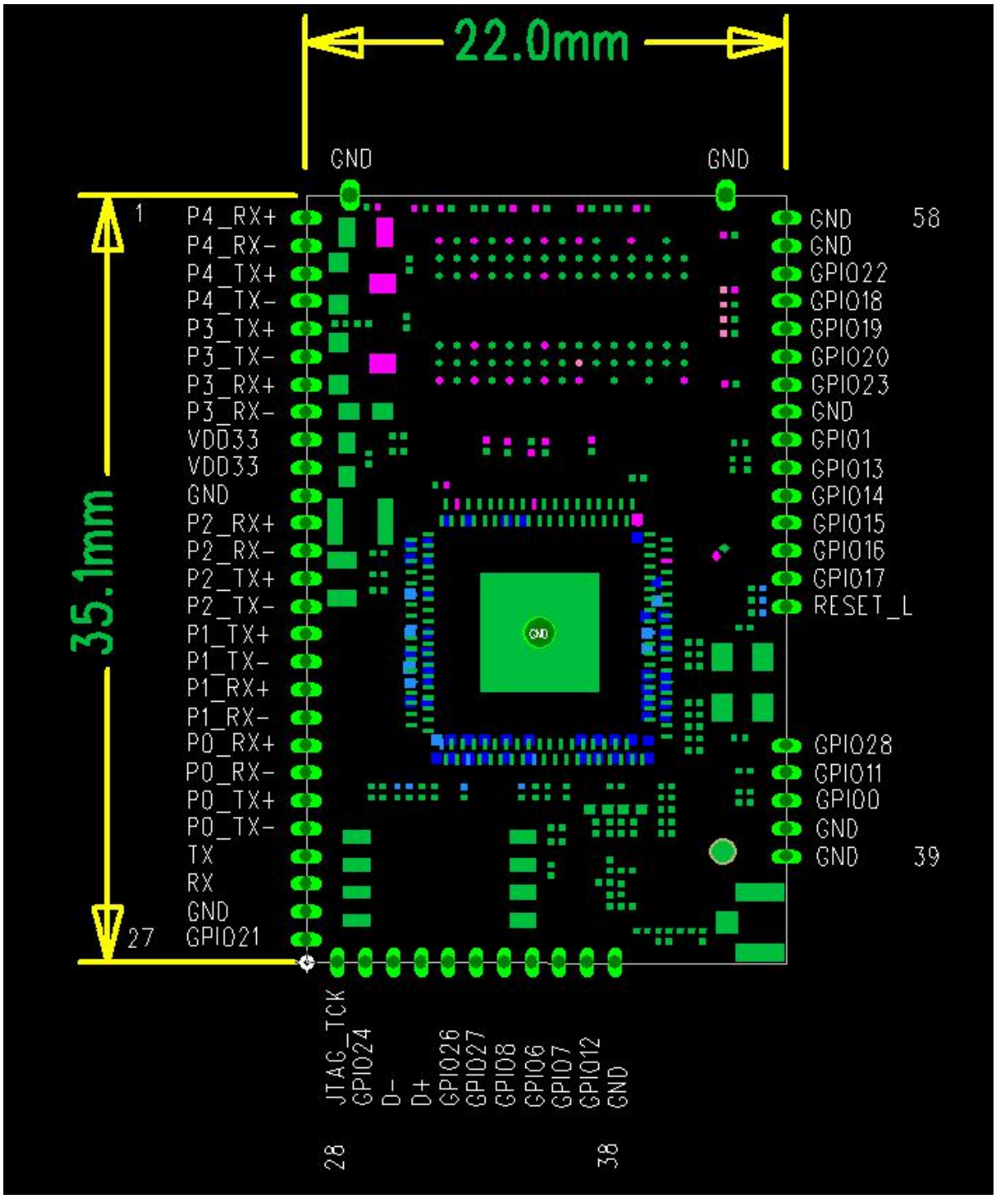
Debug: serial debugging interface has been out.

Board Power: 0.36W

Product size: 22.0* 35.1MM

SPI interface pin out.

Pictures:


22.0mm
35.1mm
GND
GND
1
P4_RX+
P4_RX-
P4_TX+
P4_TX-
P3_TX+
P3_TX-
P3_RX+
P3_RX-
VDD33
VDD33
GND
P2_RX+
P2_RX-
P2_TX+
P2_TX-
P1_TX+
P1_TX-
P1_RX+
P1_RX-
P0_RX+
P0_RX-
P0_TX+
P0_TX-
TX
RX
GND
27
GPIO21
58
GND
GND
GPIO22
GPIO18
GPIO19
GPIO20
GPIO23
GND
GPIO1
GPIO13
GPIO14
GPIO15
GPIO16
GPIO17
RESET_L
GPIO28
GPIO11
GPIO0
GND
GND
39
28
JTAG_TCK
GPIO24
D-
D+
GPIO26
GPIO27
GPIO8
GPIO6
GPIO7
GPIO12
GND
38

Pins Description :

Pin No.	Name	spec
1	P4_RX+	P4 Network Port
2	P4_RX-	
3	P4_TX+	
4	P4_TX-	
5	P3_TX+	P3 Network Port
6	P3_TX-	
7	P3_RX+	
8	P3_RX-	
9	VCC3V3	3.3V
10	VCC3V3	3.3V
11	GND	GROUND
12	P2_RX+	P2 Network Port
13	P2_RX-	
14	P2_TX+	
15	P2_TX-	
16	P1_TX+	P1 Network Port
17	P1_TX-	
18	P1_RX+	
19	P1_RX-	
20	P0_RX+	P0 Network Port
21	P0_RX-	
22	P0_TX+	
23	P0_TX-	
24	Uart TX	TX
25	Uart RX	RX

26	GND	GROUND
27	GPIO21	I/O
28	JTAG_TCK	JTAG
29	GPIO24	I/O
30	USB-	USB Master USB-
31	USB+	USB Master USB+
32	GPIO26	I/O
33	GPIO27	I/O
34	GPIO8	I/O
35	GPIO6	I/O
36	GPIO7	I/O
37	GPIO12	I/O
38	GND	GROUND
39	GND	I/O
40	GND	I/O
41	GPIO0	I/O
42	GPIO11	I/O
43	GPIO28	I/O
44	RESET_L	RESET
45	GPIO17	I/O
46	GPIO16	I/O
47	GPIO15	I/O
48	GPIO14	I/O
49	GPIO13	I/O
50	GPIO1	I/O
51	GND	GROUND
52	GPIO23	I/O

53	GPIO20	I/O
54	GPIO19	I/O
55	GPIO18	I/O
56	GPIO22	I/O
57	GND	GROUND
58	GND	GROUND

NOTE：

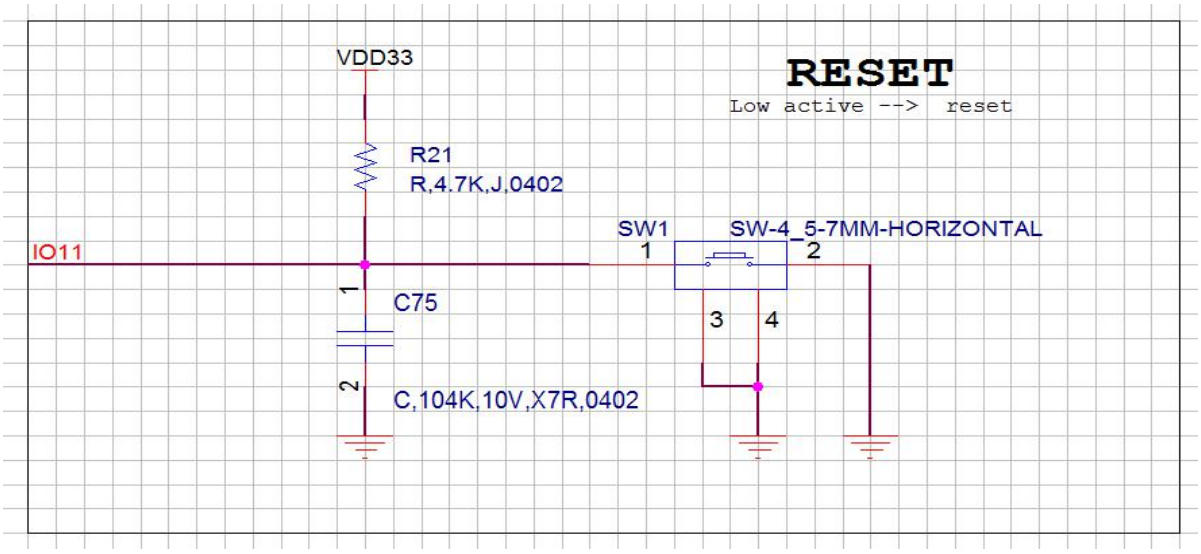
1. All power supply pins (VCC3V3) are power input pin, in theory, the input 3.3V voltage in a pin on it, No.9 and No.10 pins together for power supply. recommended

2. Unused GPIO can empty, no need pull-up or pull-down.

3. The power supply voltage of GPIO is 2.62V, when the GPIO outputs high, the voltage is 2.62V, the low voltage is 0V.

Now,GPIO11 set to be RESET pins, If the control circuit of GPIO11 access to 3.3V, recommended circuit

Input mode：



4. NET_POW, Network transformer bias power output. The output of 2.0V, to offset the use of wired network transformer

5. network port(default)： P0、P1、P2、P3、P4Lan/Wan can be programmer

Pins Size：1.27mm PINs

Radio Receiver Characteristics for 2.4 GHz Operation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F_{rx}	Receiver input frequency range	5 MHz center frequency	2.412	—	2.472	GHz
NF	Receive chain noise figure (max gain)				—	dB
		LNA1 (Tx/Rx shared)	—	5.0	—	
S_{rf}	Sensitivity[1]					
	CCK, 1 Mbps	See Note[2]	-80	-93	—	dBm
	CCK 11 Mbps		-76	-87	—	
	OFDM, 6 Mbps		-82	-88	—	
	OFDM, 54 Mbps		-65	-74	—	
	HT20, MCS0, 1 stream, 1 Tx, 1 Rx	See Note[2]	-82	-88	—	dBm
	HT20, MCS7, 1 stream, 1 Tx, 1 Rx		-64	-71	—	
	HT40, MCS0, 1 stream 1 Tx, 1 Rx	See Note[2]	-79	-85	—	dBm
	HT40, MCS7, 1 stream 1 Tx, 1 Rx		-61	-69	—	
IP1dB	Input 1 dB compression (min. gain)	—	—	-4	—	dBm
IIP3	Input third intercept point (min. gain)	—	—	5.5	—	dBm
Z_{RFin_input}	Recommended LNA differential drive impedance	LNA2	—	27-j5	—	Ω
ER_{phase}	I, Q phase error	—	—	0.15	—	°
ER_{amp}	I, Q amplitude error	—	—	1.0	—	dB
R_{adj}	Adjacent channel rejection					
	OFDM, 6 Mbps	10 to 20 MHz[3]	16	34	—	dB
	OFDM, 54 Mbps		-1	19	—	
	HT20, MCS0		16	34	—	dB
	HT20, MCS7		-2	18	—	
TR_{powup}	Time for power up (from synthesizer)	—	—	1.5	—	µs

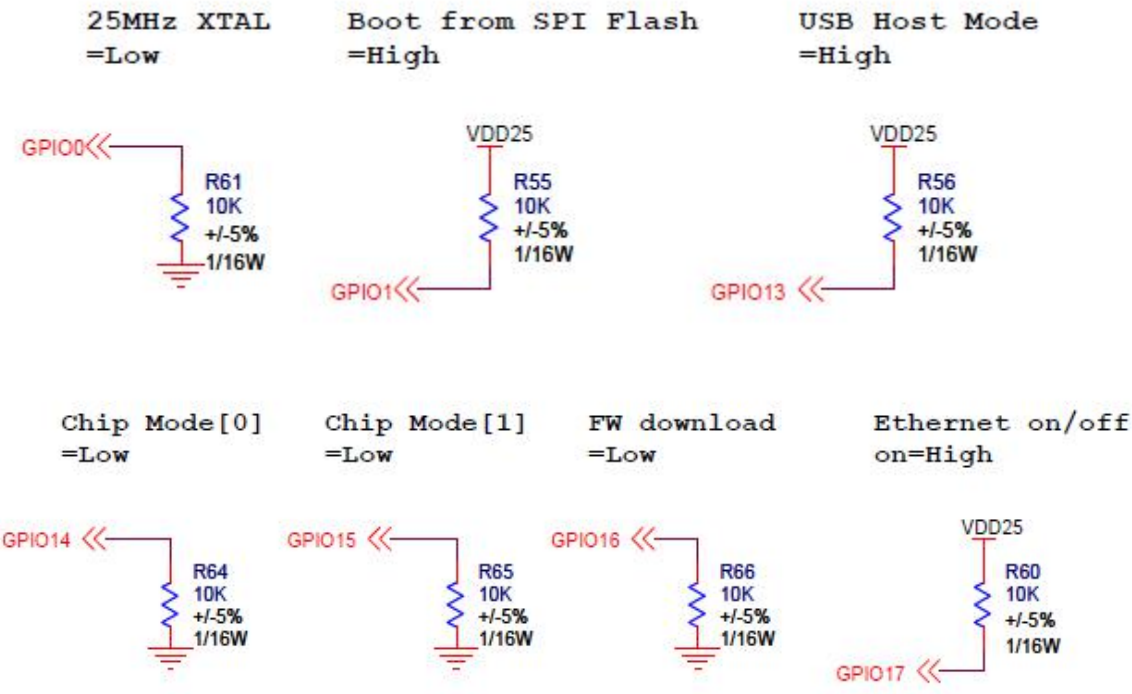
[1]Sensitivity for LNA2 (Rx only chain). Sensitivity for LNA1 (Rx/Tx shared chain) is 3dB worse than LNA2.
[2]Sensitivity performance based on Atheros reference design, which includes Tx/Rx antenna switch. Minimum values based on IEEE 802.11 specifications.
[3]Typical values measured with reference design. Minimum values based on IEEE 802.11 specifications.

Radio Transmitter Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F_{tx}	Transmit output frequency range	5 MHz center frequency	2.412	—	2.472	GHz
P_{out}	Mask Compliant CCK output power	See Note[1]	—	19.5	—	dBm
	Mask Compliant OFDM output power					
	802.11g BPSK 6 Mbps	See Note[2]	—	20	—	dBm
	HT20, MCS0		—	19	—	
	HT40, MCS0		—	16	—	
	EVM Compliant OFDM output power					
	802.11g 64 QAM 54 Mbps	See Note[1]	—	19	—	
	HT20, MCS7		—	17	—	dBm
	HT40, MCS7		—	16	—	
SP_{gain}	PA gain step	See Note[2]	—	0.5	—	dB
A_{pl}	Accuracy of power leveling loop	See Notes[3][4]	—	±0.5	—	dB
Z_{RFout_load}	Recommend differential PA load impedance	See Note[5]	—	12+j13	—	Ω
OP1dB	Output P1dB (max. gain)	2.442 GHz	—	21	—	dBm
OIP3	Output third order intercept point (max. gain)	2.442 GHz	—	31	—	dBm
SS	Sideband suppression	—	—	–37	—	dBc
RS	Synthesizer reference spur	—	—	–62	—	dBc
TT_{powup}	Time for power up (from synthesizer on)	—	—	1.5	—	µs

[1]Measured using the balun recommended by Atheros under Tx power control.
[2]Guaranteed by design.
[3]Manufacturing calibration required.

Bootstrap:



Module operating environment

Working temperature: 0 to 60 ;

Storage temperature: -40 to 85 ;

Humidity: 10% to 90%RH no condensation;

Storage humidity: 5% to 90%RH no condensatio