

# Oolite-V1 wireless routing module Spec

## General Description

Oolite-v1 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 coupled with a network transformer and RJ45 network port, he is one of 3 wireless routing.

Oolite-v1 power is very low, working alone, only 0.36W, very suitable for battery products, it has a 150M wireless transmission rate, up to 20 GPIOs, can be defined as input and output.

it's design for wifi hard disk, WiFi router, remote monitoring, remote video, Industrial control DIY and so on.

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

### Characteristics:

CPU: AR9331 400Mhz MIPS core

RAM: 64M DDR2 RAM

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

Wireless speed: up to 150Mbps

General GPIO: 20 (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: 2×100Mbps network interface

Antenna: the built-in PCB /IPX external antenna.

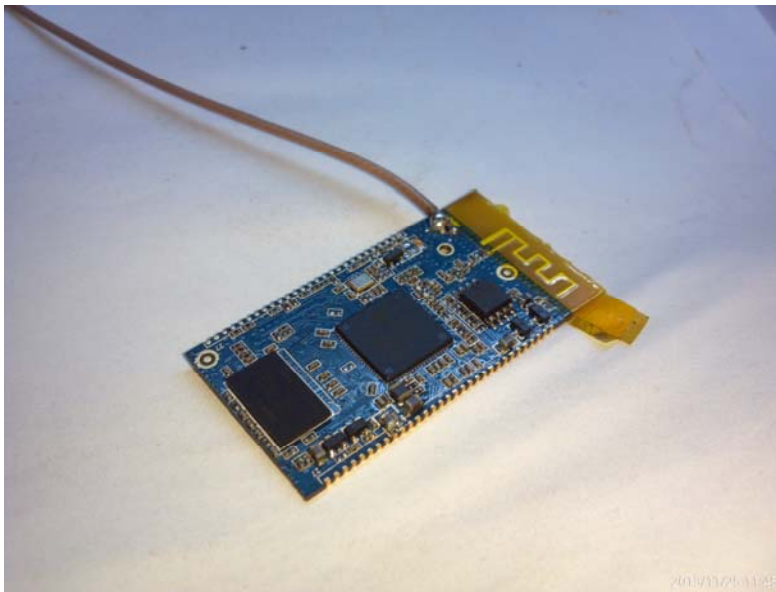
Debug: serial debugging interface has been out.

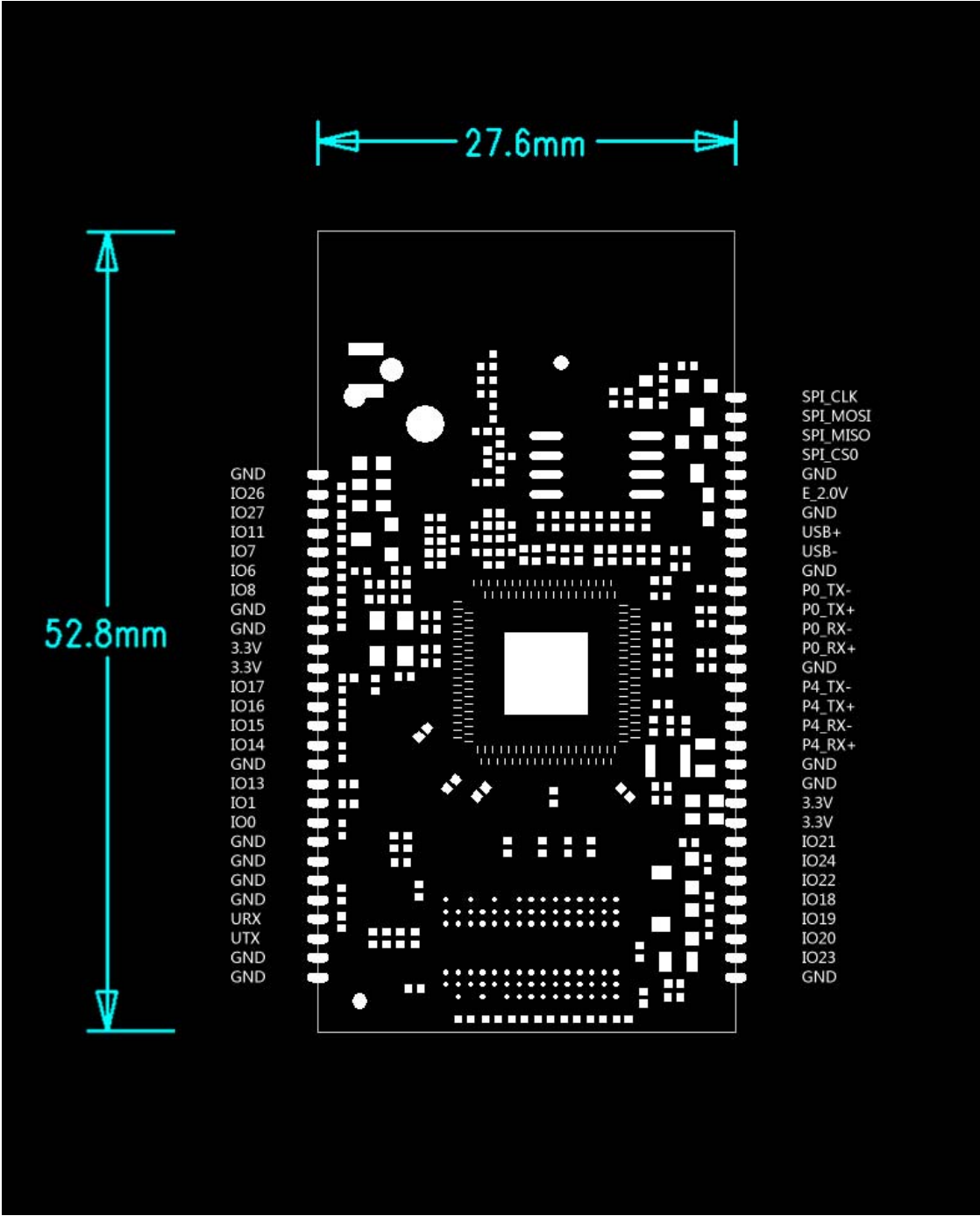
Board Power: 0.36W

**Product size: 27.6 \* 52.8MM**

SPI interface pin out.

Pictures:





**Pins Description :**

Pin No.	Name	GPIO state(default)	spec
1	GND		GROUND
2	GPIO26	output	I/O
3	GPIO27/SYS_LED	output	I/O
4	GPIO11	input	I/O Reset button

5	GPIO7	output	I/O
6	GPIO6	output	I/O
7	GPIO8	output	I/O
8	GND		
9	GND		
10	VCC3V3		
11	VCC3V3		
12	GPIO17	output	I/O
13	GPIO16	output	I/O
14	GPIO15	output	I/O
15	GPIO14	output	I/O
16	GND		
17	GPIO13	output	I/O
18	GPIO1	output	I/O
19	GPIO0	output	I/O
20	GND		
21	GND		
22	GND		
23	GND		
24	Uart RX		RX
25	Uart TX		TX
26	GND		GROUND
27	GND		
P28	GND		
P29	GPIO23	output	I/O
P30	GPIO20	output	I/O
P31	GPIO19	output	I/O
P32	GPIO18	output	I/O
P33	GPIO22	output	I/O
34	GPIO24	output	I/O
35	GPIO21	output	I/O
36	VCC3V3		

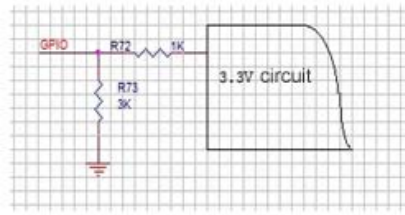
37	VCC3V3		
38	GND		
39	GND		
40	P4_RX+		P4 Network Port
41	P4_RX-		
42	P4_TX+		
43	P4_TX-		
44	GND		
45	P0_RX+		P0 Network Port
46	P0_RX-		
47	P0_TX+		
48	P0_TX-		
49	GND		
50	USB-		USB Master USB+
51	USB+		USB Master USB-
52	GND		GROUND
53	E_2.0V		Bias power output
54	GND		GROUND
55	SPI_CS0	IO2	
56	SPI_MISO		
57	SPI_MOSI		
58	SPI_CLK		

**NOTE:**

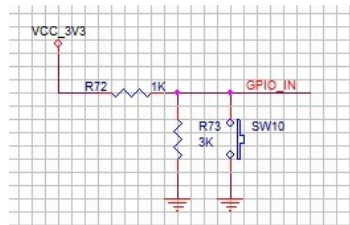
1. All power supply pins (VCC3V3) are power input pin, in theory, the input 3.3V voltage in a pin on it, No.36 and No.37 pins together for power supply. recommended
2. Unused GPIO can empty, no need pull-up or pull-down.
3. The power supply voltage of GPIO is 2.62V, when the GPIO outputs high, the voltage is 2.62V, the low voltage is 0V.

If the control circuit of GPIO access to 3.3V, recommended circuit:

Input mode:



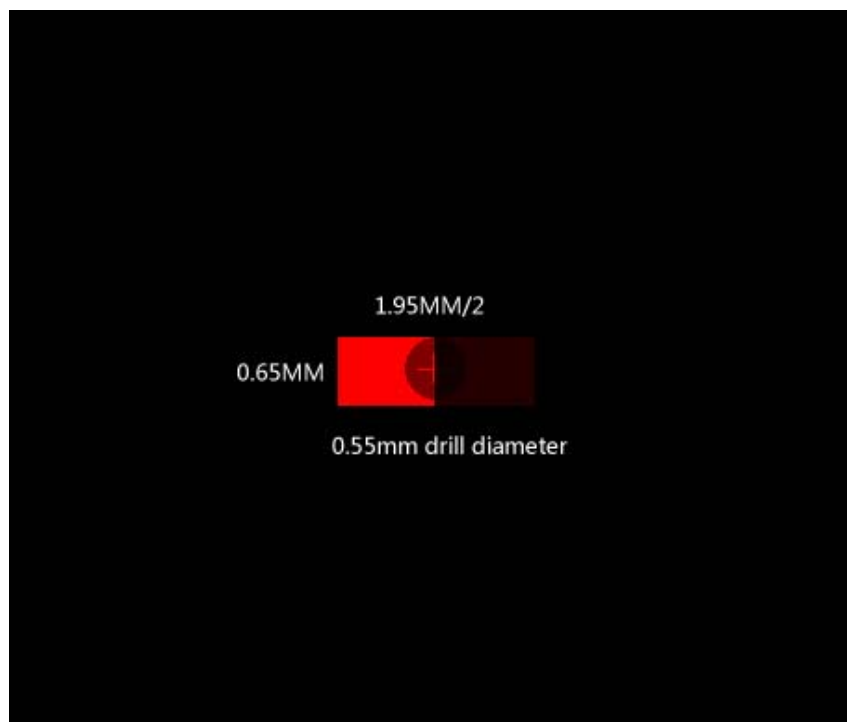
(A)



(B)

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 Lan/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 <sub>rx</sub>	Receiver input frequency range	5 MHz center frequency	2.412	—	2.462	GHz
NF	Receive chain noise figure (max gain)				—	dB
		LNA1 (Tx/Rx shared)	—	5.0	—	
S <sub>rf</sub>	Sensitivity <sup>[1]</sup>					
	CCK, 1 Mbps	See Note <sup>[2]</sup>	-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 <sup>[2]</sup>	-82	-88	—	dBm
	HT20, MCS7, 1 stream, 1 Tx, 1 Rx		-64	-71	—	
	HT40, MCS0, 1 stream 1 Tx, 1 Rx	See Note <sup>[2]</sup>	-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 <sub>RFin_input</sub>	Recommended LNA differential drive impedance	LNA2	—	27-j5	—	Ω
ER <sub>phase</sub>	I, Q phase error	—	—	0.15	—	°
ER <sub>amp</sub>	I, Q amplitude error	—	—	1.0	—	dB
R <sub>adj</sub>	Adjacent channel rejection					
	OFDM, 6 Mbps	10 to 20 MHz <sup>[3]</sup>	16	34	—	dB
	OFDM, 54 Mbps		-1	19	—	
	HT20, MCS0		16	34	—	dB
	HT20, MCS7		-2	18	—	
TR <sub>powup</sub>	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 <sub>tx</sub>	Transmit output frequency range	5 MHz center frequency	2.412	—	2.462	GHz
P <sub>out</sub>	Mask Compliant CCK output power	See Note <sup>[1]</sup>	—	19.5	—	dBm
	Mask Compliant OFDM output power					
	802.11g BPSK 6 Mbps	See Note <sup>[2]</sup>	—	20	—	dBm
	HT20, MCS0		—	19	—	
	HT40, MCS0		—	16	—	
	EVM Compliant OFDM output power					
	802.11g 64 QAM 54 Mbps	See Note <sup>[1]</sup>	—	19	—	dBm
	HT20, MCS7		—	17	—	
	HT40, MCS7		—	16	—	
SP <sub>gain</sub>	PA gain step	See Note <sup>[2]</sup>	—	0.5	—	dB
A <sub>pl</sub>	Accuracy of power leveling loop	See Notes <sup>[3][4]</sup>	—	±0.5	—	dB
Z <sub>RFout_load</sub>	Recommend differential PA load impedance	See Note <sup>[5]</sup>	—	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 <sub>powup</sub>	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.

## Module operating environment

Working temperature: 0 °C to 40 °C;

Storage temperature: -40 °C to 70 °C;

Humidity: 10% to 90%RH no condensation;

Storage humidity: 5% to 90%RH no condensation.

## FCC statement

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



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

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.

The minimum separation generally be used is at least 20cm, even if the calculation indicate that the MPE distance would be lesser.

**IMPORTANT NOTE:**

This device is intended only for OEM integrators under the following conditions:

- (1) According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding. However, due to there is no shielding for this WiFi Module, this module is granted as a Limited Modular Approval.
- (2) This device has been designed to operate with a PCB antenna built-in the base board having a maximum gain of 0dBi. Only this type of antenna may be used.
- (3) Integration is typically strictly restricted to Grantee himself or dedicated OEM integrators under control of the Grantee.

As long as 3 conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

**IMPORTANT NOTE:**

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**IMPORTANT NOTE:**

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

**LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following “Contains TX FCC ID: 2AB5EGS-OOLITE”. If the size of the end product is smaller than 8\*10 cm, then additional FCC part 15.19 statement is required to be available in the 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.