USER'S MANUAL

802.11b/g/n 2T2R Wireless LAN USB Module

WN4646L

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PRODUCT FEATURES

- Operate at ISM frequency Band (2.4GHz)
- IEEE Standards Support, 802.11b, 802.11g and 802.11n
- CMOS MAC, Baseband PHY, and RF in a single chip for IEEE 802.11b/g/n compatible WLAN
- Complete 802.11n MIMO solution for 2.4GHz band
- Complies with USB Specification 2.0, support Full-speed(12Mbps) and High-Speed(480Mbps)
- Enterprise level security supporting: IEEE 802.11i (WPA, WPA2). Open shared key and pair-wise key authentication services
- Wi-Fi Direct supports wireless peer to peer applications
- Support 20MHz/40MHz bandwidth transmission
- Support 2 transmission and 2 receiving, transmission rate can up to 300Mbps (Physical Rate) in downstream and upstream
- Support Wake-On-WLAN via magic packet and wake-up frame
- RoHS compliance
- Low Halogen compliance

PRODUCT SPECIFICATIONS

MAIN CHIPSET

Realtek RTL8192FC

FUNCTIONAL SPECIFICATIONS

Wi-Fi Function	
Standard	IEEE802.11b; IEEE 802.11g; IEEE 802.11n
Bus Interface	USB 2.0

Data Rate	*802.11b:*
	    11, 5.5, 2, 1 Mbps
	802.11g:
	    54, 48, 36, 24, 18, 12, 9, 6 Mbps
	802.11n:
	    MCS 0 to 7 for HT20MHz
	    MCS 0 to 7 for HT40MHz

Media Access Control	CSMA/CA with ACK

Modulation Techniques	*802.11b*:
	    CCK, DQPSK, DBPSK
	802.11g:
	    64QAM, 16QAM, QPSK, BPSK
	802.11n:
	    64QAM, 16QAM, QPSK, BPSK

Network Architecture	Ad-hoc mode (Peer-to-Peer) Infrastructure mode

Operation Channel	*2.4GHz*
	    11: (Ch. 1-11) – United States
	    13: (Ch. 1-13) – Europe
	    14: (Ch. 1-14) – Japan

Frequency Range	*802.11bg* 2.400 ~ 2.4835 GHz

Transmit Output Power - single chain @ant;
Tolerance: ±1.5dBm@2.4GHz

2.4GHz

802.11b	*1Mbps*	*2Mbps*	*5.5Mbps*	*11Mbps*
Tgtpwr (dBm)	16	16	16	16

802.11g	*6~24Mbps*	*36Mbps*	*48Mbps*	*54Mbps*
Tgtpwr (dBm)	15	15	15	15

802.11n HT20	*MCS0*	*MCS1*	*MCS2*	*MCS3*	*MCS4*
Tgtpwr (dBm)	14	14	14	14	14
	MCS5	*MCS6*	*MCS7*		

	14	14	14		

802.11n HT40	MCS0	MCS1	MCS2	MCS3	MCS4
Tgtpwr (dBm)	14	14	14	14	14
	MCS5	MCS6	MCS7		
	14	14	14		

Receiver Sensitivity			
Frequency Band	Rate	Condition	1x1(1SS) (dBm)
2.4G	11b-1M	PER < 8%	-92
	11b-11M	PER < 8%	-85
	11g-6M	PER < 10%	-90
	11g-54M	PER < 10%	-71
	11n-HT20 MCS0	PER < 10%	-90
	11n-HT20 MCS7	PER < 10%	-70
	11n-HT40 MCS0	PER < 10%	-87
	11n-HT40 MCS7	PER < 10%	-67

Security	WEP 64&128 bit, WPA, WPA-PSK, WPA2, WPA2-PSK, WPS, IEEE 802.1X, IEEE 802.11i
Operating Voltage	5 V ±10% I/O supply voltage
OS Supported	Microsoft Windows; Linux based

Power Consumption Test Condition: - Operate at HT40 - File Transmission	Mode	Average 2.4GHz	Peak 2.4GHz
	TX	282mA	648mA
	RX	175mA	566mA
	Associated Idle	15mA	
	Standby	13mA	

Antenna Type	Dual Metal Antennas

RECOMMENDED OPERATION CONDITIONS

Symbol	Rating	Min	Typ	Max	Units
VCC	5V Supply Voltage	4.5	5	5.5	V
VDD33	3.3V I/O Supply Voltage	3.0	3.3	3.6	V
VDD10	1.05V Core Supply Voltage	0.95	1.05	1.15	V

DC CHARACTERISTICS

Symbol	Parameter	in	Typ	Max	Units
V_{IL}	Input Low Voltage	-	0	0.9	V
V_{IH}	Input High Voltage	2.0	3.3	3.6	V
V_{OL}	Output Low Voltage	0	-	0.33	
V_{OH}	Output High Voltage	2.97	-	3.3	V

RESET TIMING SPEC
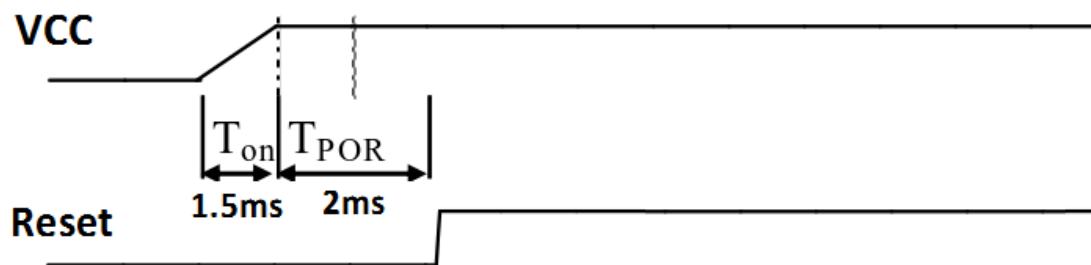
Symbol	Min	Typ	Max	Units
T_{on}	0.25	1.5	5	ms
T_{POR}	-	2	10	ms

PIN ASSIGNMENT

Pin.	Pin Define	Description	Status
1	+5VCC	5V source	YES
2	+5VCC	5V source	YES
3	USB_D-	USB Data-	YES
4	USB_D+	USB Data+	YES
5	GND	Ground	YES
6	RESET#	System reset RTL8192FC, low active	YES
7	WoWLAN#	Wake up system via wi-fi, low active	YES
8	GND	Ground	YES

EEPROM INFORMATION

Reg Domain	Worldwide Channels 1-13 with active scan
	0x20
Vendor ID	0x0BDA
Device ID	0xF192

ENVIRONMENTAL

OPERATING

Operating Temperature: 0 to 70 °C (32 to 158 °F)
Relative Humidity: 5-90% (non-condensing)

STORAGE

Temperature: -25 to 75 °C (-13 to 167 °F)
Relative Humidity: 5-95% (non-condensing)

WARNINGS

Federal Communication Commission Interference Statement

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.

FCC Caution:

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

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This module compy with the requirement of the following standards

47 CFR FCC Part 15.247

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated.

Frequency Band	Antenna Type	Model Number	Gain(dBi)
2400-2483.5MHz	PIFA	RFMTA200700NNLB002	2.48
2400-2483.5MHz	PIFA	RFMTA200700NNLB002	-0.29

This module has been approved under stand-alone configuration.

OEM integrator has be limited the operation channels in channel 1-11 for 2.4GHz band.

The separate approval is required for all other operating configurations, including portable

configurations with respect to Part 2.1093 and different antenna configurations
The information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, , versus with multiple, simultaneously transmitting modules or other transmitters in a host can be found at KDB Publication 996369 D04

Appropriate measurements (e.g. 15 B compliance) and if applicable additional equipment authorizations (e.g. SDoC) of the host product to be addressed by the integrator/manufacturer. This module is only FCC authorized for the specific rule parts 15.247 listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host product as being Part 15 Subpart B compliant.

The user manual of the end product should include
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons.

Label of the end product:
The host product must be labeled in a visible area with the following " Contains FCC ID: PPQ-WN4646L".
The end product shall bear the following 15.19 statement: 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.