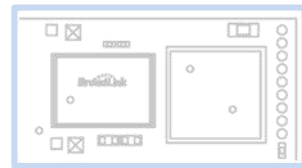




## BiTrend™ EssentialSeriesWi-Fi Module Datasheet



BL3329-P

## Hangzhou Gubei Electronics Technology Co., Ltd.

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### Version History

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# 1. Introduction

## 1.1 Overview

BiTrend™ Essential is the industrial leading 2.4GHz 802.11 b/g/n embedded Wi-Fi module which delivers unmatched performance and codeless development in a compact package, providing a quick, easy and cost effective way for developers and manufacturers to add Wi-Fi connectivity for home automation, lighting control, energy efficiency and other IOT applications.

BiTrend™ Essential family combines a 2.4GHz 802.11 b/g/n radio transceiver with a 32-bit microprocessor and embedded with MAC, baseband processing and optimized Wi-Fi network stack. It is an ideal solution for developers and manufacturers with limited RF and embedded programming expertise as it significantly reduces RF design time and removes the burden of testing and certification.

Benefitted from BroadLink's turn-key solution, BiTrend™ Essential is an ideal solution for developers with limited Wi-Fi or RF expertise or for those seeking faster time to market. It reduces RF design time and removes the burden of testing and certification. BiTrend™ Essential is fully compliant with IEEE 802.11 b/g/n standard and certified with CE, FCC and RoHS.

BiTrend™ Essential is a highly integrated Wi-Fi SoC(system on Chip) single chip, which supports IEEE802.11b/g/n single stream, providing GPIO for intelligent control, and UART interfaces for device communication.

BiTrend™ Essential has 8Mbits flash and integrates power amplifier, low noise amplifier, and RF switch to reduce the module size and RF design capability required. And also integrate power manage unit for single 3.3V power source for cost effective design.

BiTrend™ Essential embedded 32-bit RISC MCU for 802.11b/g/n drivers, supplicant, TCP/IP protocol stack, and networking applications, can be operated in station mode and softAP mode. The 3329-P is an ideal solution for embedded device to enable networking service with minimized design effort.

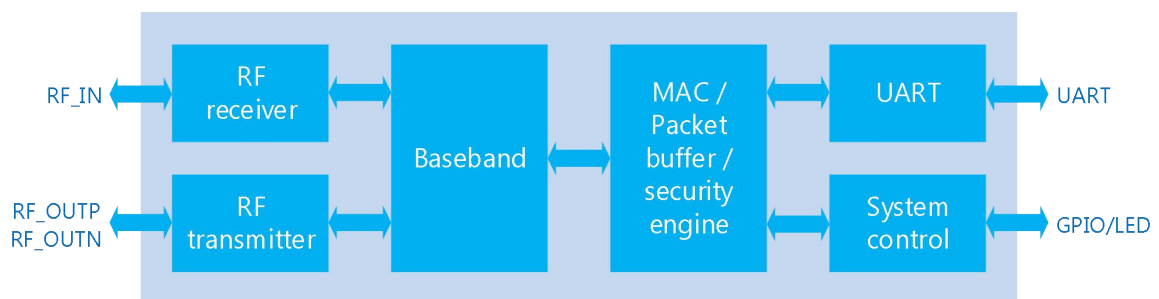


Figure 1. 3329-P block diagram

## 1.2 Applications

- Smart home appliances
- Remote Control
- Medical/Health Care
- Network consumer devices

## 1.3 Key Features

- a. Support IEEE802.11b/g/n

Frequency Range	2.412 GHz - 2.462 GHz
Wi-Fi Standard	IEEE 802.11 b/g/n
Transmitter Power	802.11b:17.5dBm 802.11g:14dBm 802.11n:14dBm
MIN Receiver Sensitivity	802.11b<-81dBm@11Mbps 802.11g<-69dBm@54Mbps 802.11n<-68dBm@MCS7
Data rate	11M@802.11b, 54M@802.11g, MCS7@802.11n
Security	Encryption Standard: WEP/WEPA/WPA2 EncryptionAlgorithm: WEP64/WEPA128/TKIP/AES
Wi-Fi Modes	STA/AP/STA+AP/WIFI Direct

- b. Support **UART\PWM\ADC\GPIO\I2C** port
- c. Support **STA\AP\AP+STA**
- d. Patent Smart Config™ technology
- e. Support **TLS\SSL\mDNS**
- f. PCB printed antenna

Antenna type	PCB printed ANT
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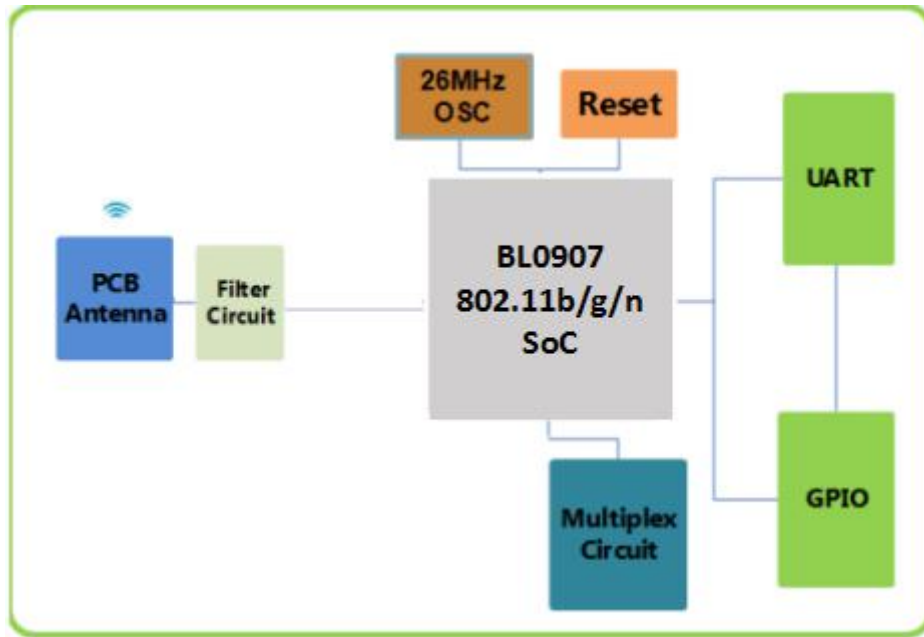
- g. Power source: 3.3V
- h. Dimension (L\*W\*H) : 25mm\*17.7mm\*3.7mm (Including shielding cover height)
- i. ESD: 2KV

## 2. Product Overview

### 2.1 Product Picture



## 2.2 Block Diagram



## 3. Electrical Characteristics

### 3.1 Absolute Maximum Ratings – Voltage & Current

Using products above the absolute maximum ratings may cause permanent damage to the device. These are maximum ratings only and functional operation of the device at these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect the reliability of the device.

Symbol	Description	Min.	Max.	Units
Ts	Storage temperature	-40	125	°C
TAMBIENT	Ambient Temperature	-10	80	°C
Vdd	Supply voltage	3.0	3.6	V
Vio	Voltage on IO pin	0	3.3	V
VESD	HBM(human body model)		2000	V

### 3.2 Current consumption

Symbol	Condition	Performance	
		TYP	Unit
$I_{RF\_Standby(SP\ mini)}$	IDLE mode	80	mA
$I_{RF\_b}$	pulse current @TX 11b @18dBm 11Mbps	272	mA
$I_{RF\_g}$	pulse current @TX 11g @16dBm 54Mbps	247	mA
$I_{RF\_n}$	pulse current @TX 11n @15dBm MCS7	240	mA

Note: All result is measured at the antenna port and VDD33 is 3.3V

### 3.3 Absolute maximum ratings – Temperature

Symbol	Rati	Max	Unit
$T_{STG}$	Storagetemperature	-40 to+125	°C
$T_A$	Workingtemperature	-10 to+80	°C
Humidity	Non condensing, relative humidity	90% (RH)	

### 3.4 Absolute maximum ratings – ESD

Symbol	Ratings	Conditions	Class	Max	Unit
$V_{ESD(HBM)}$	Electrostatic discharge voltage (human body model)	$T_A = +25\text{ °C}$ conforming to JESD22-A114	2	2000	V

## 4. RF Characteristics

### 4.1 Basic Characteristics

Item	Specification
OperatingFrequency	2.412 GHz - 2.462GHz
Wi-FiStandard	IEEE 802.11b/g/n



ModulationType	11b: DBPSK, DQPSK,CCK for DSSS 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: MCS0~7,OFDM
Data Rates	11b:1,2,5.5and 11Mbps 11g:6,9,12,18,24,36,48 and 54 Mbps 11n:MCS0~MCS7
Antennatype	PCB printed ANT

## 4.2 IEEE802.11b Mode

Item	Specification
ModulationType	DSSS/CCK
Frequencyrange	2412MHz~2462MHz
Channel	CH1 toCH11
Datarate	1,2,5.5,11Mbps

TX Characteristics	Min	Typical	Max.	Unit
Transmitter Output Power				
@11Mbps		18		dBm
Frequency Error	-10		+10	ppm
Constellation Error( peak EVM)@ target power				
@11Mbps			-30	
Transmit spectrum mask				
Pass				

RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
11Mbps (FER $\leq$ 8%)		-84	-83	dBm
Maximum Input Level (FER $\leq$ 8%)	-10			dBm

## 4.3 IEEE802.11g Mode

Item	Specification
ModulationType	OFDM

Frequencyrange	2412MHz~2462MHz
Channel	CH1 toCH11
Datarate	6,9,12,18,24,36,48,54Mbps

TX Characteristics	Min	Typical	Max.	Unit
<b>Transmitter Output Power</b>				
@54Mbps		14		dBm
Frequency Error	-10		+10	ppm
<b>Constellation Error( peak EVM)@ target power</b>				
@54Mbps			-30	dB
<b>Transmit spectrum mask</b>				
Pass				

RX Characteristics	Min	Typical	Max.	Unit
<b>Minimum Input Level Sensitivity</b>				
@54Mbps		-70		dBm
Maximum Input Level (FER ≤ 10%)	-20			dBm

## 4.4 IEEE802.11n 20Mhz Bandwidth Mode

Item	Specification
ModulationType	OFDM
Frequencyrange	2412MHz~2462MHz
Channel	CH1 toCH11
Datarate	MCS0/1/2/3/4/5/6/7

TX Characteristics	Min	Typical	Max.	Unit
<b>Transmitter Output Power</b>				
@HT20, MCS7		14		dBm
Frequency Error	-10		+10	ppm
<b>Constellation Error( peak EVM)@ target power</b>				
@HT20, MCS7			-30	dB
<b>Transmit spectrum mask</b>				
Pass				

RX Characteristics	Min	Typical	Max.	Unit
Minimum Input Level Sensitivity				
@HT20, MCS7		-70	-68	dBm
Maximum Input Level (FER $\leq$ 10%)	-20			dBm

## 5. Mechanical Characteristics

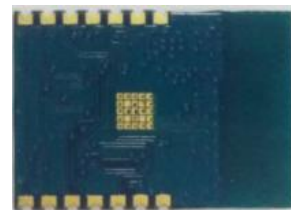


Figure2. 3329-P top view(Metricunits)

## 6. Module Interfaces

### 6.1 PIN Layout

3328-P has one group of pins2X7. The layout of PINs are shown in the figure below.

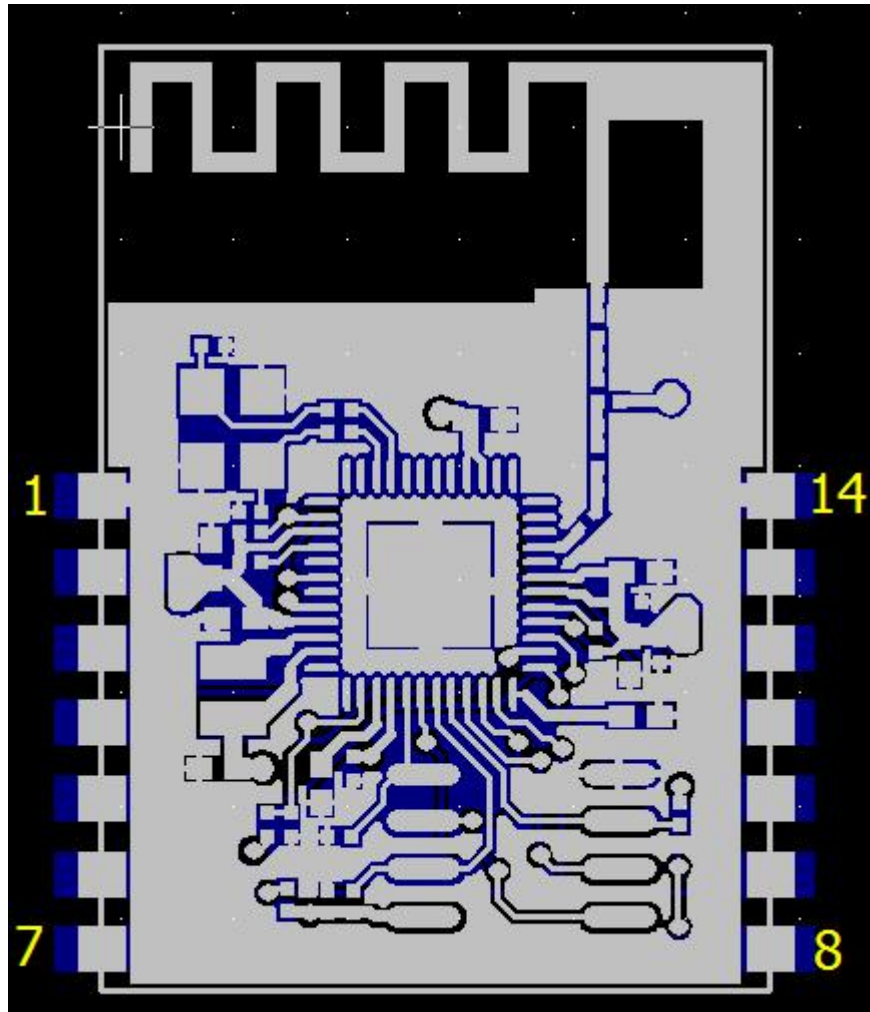


Figure6. 3329-P Layout

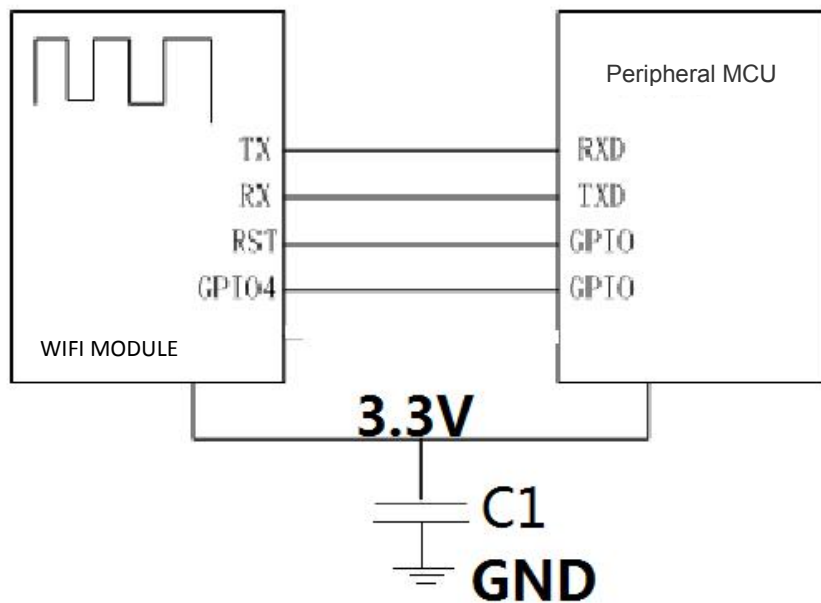
## 6.2 PIN Definitions

### PIN Assignment

PIN	PIN NAME	NOTE
Pin1	GND	
Pin2	VCC	3.3V
Pin3	RST_N	Module software reset, Available at low level
Pin4	UART_TX0	UART Only for Passthrough
	GPIO15	I/O
Pin5	UART_RX0	UART Only for Passthrough
	GPIO18	I/O

Pin6	TX1	UART Only for Passthrough
	GPIO1	I/O
Pin7	RX1	UART Only for Passthrough
	GPIO3	I/O
Pin8	RX1	UART Only for Passthrough
	GPIO3	
Pin9	TX1	I/O
	GPIO1	I2S Port
Pin10	GPIO25	I/O
Pin11	GPIO27	I/O
Pin12	GPIO21	I/O
Pin13	VCC	3.3V
Pin14	GND	

## 7. Reference Design



If the peripheral MCU uses power source of 5V, it needs to add a level switching circuit in the connection of the serial port and the related circuit.

The module needs a large current about 300mA when transmitting data, please ensure that the power source can provide sufficient current.

## 8. AntennaCharacteristics

### 8.1 Antenna Selection

The WT1SBSL supports on-board PCB printed antenna. When the Operating Frequency is between 2.4G~2.5GHz, S11 of antenna port is less than -10dB and peak gain is about 1.2dBi.

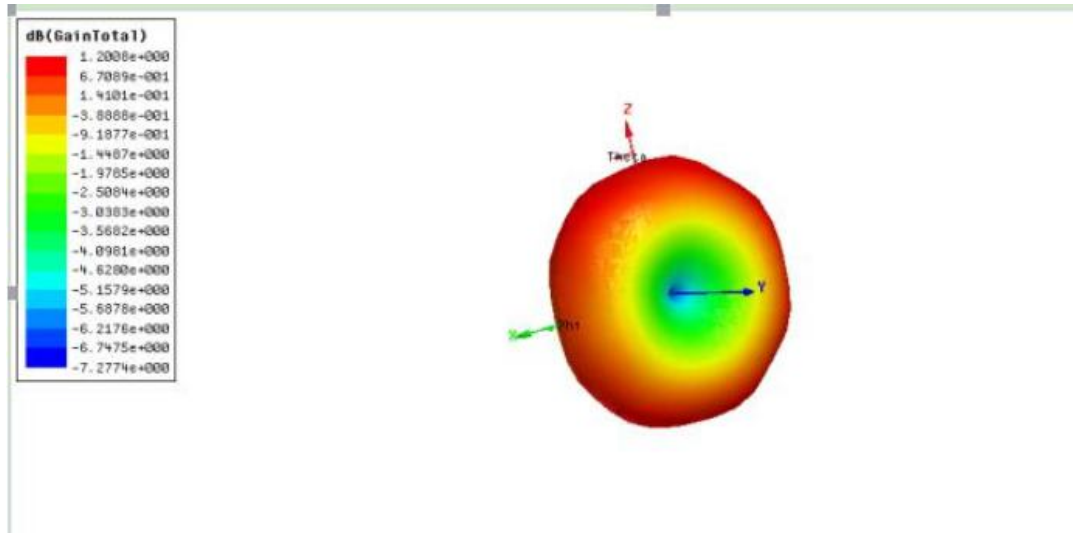


Figure 7. Antenna radiation pattern simulation

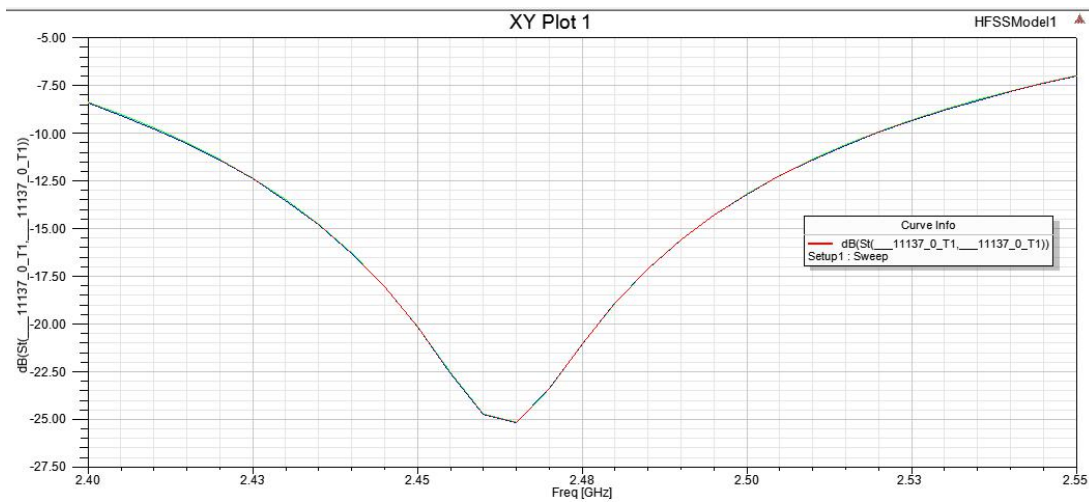


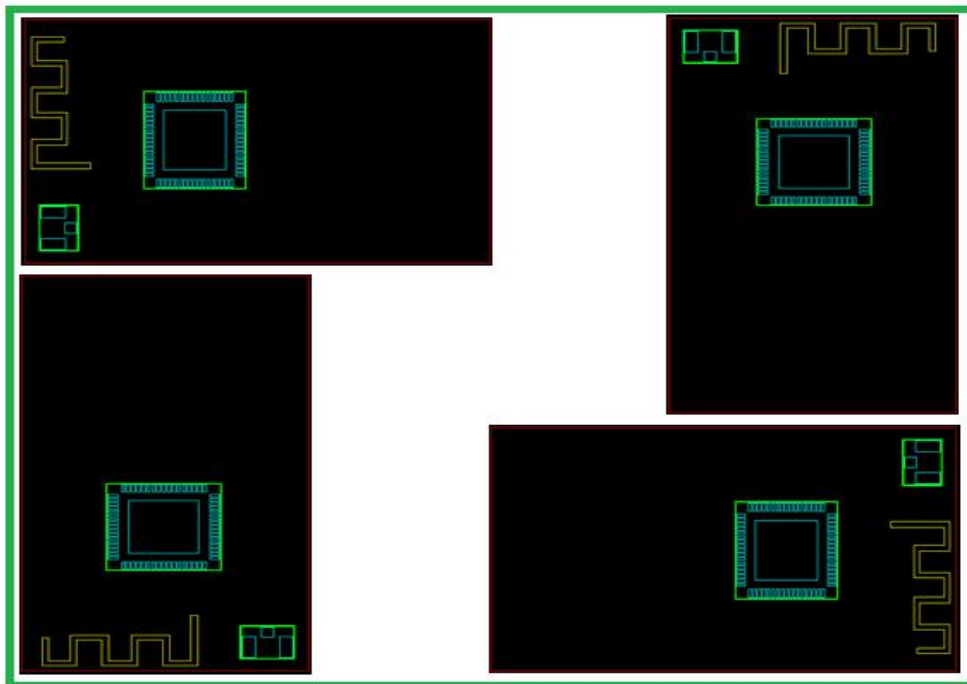
Figure 8. Antenna port S11simulation curve

In practical use, 3329-P is welded on user's board and value of S11 has some changes.

## 8.2 Minimizing Radio Interference

When integrating the Wi-Fi module with on board PCB printed antenna, make sure the three points below:

1. The area under the antenna end of the module should be keep clear of metallic components, connectors, vias, traces and other materials that can interfere with the radio signal.
2. The area around the antenna end the module protrudes at least 10mm from the mother board PCB and any metal enclosure.
3. When planning PCB layout, it is recommended that user places the antenna of Wi-Fi module as close as possible to the edge of boarder to ensure the good performance of antenna, which is shown in the picture below.



## 8.3 Specification of On-Board Antenna

OperatingFrequency	2.4G~2.5GHz
VSWR(max)	2
Peak Gain	1.2dBi
AntennaType	PIFA

## Appendix A Glossary (Quentin respible)

<b>ADC</b>	Analog-to -Digital Converter
<b>AES</b>	Advanced Encryption Standard
<b>ANT</b>	Antenna
<b>AP</b>	Wireless Access Point
<b>BPSK</b>	Binary Phase Shift Keying
<b>DBPSK</b>	Differential binary phase shift keying
<b>DC</b>	Direct Current
<b>CCK</b>	Complementary Code Keying
<b>CDM</b>	Charge Device Model
<b>DHCP</b>	Dynamic Host Configuration Protocol
<b>CMOS</b>	Complementary Metal Oxide Semiconductor
<b>DNS</b>	Determination of non-significance
<b>DQPSK</b>	Differential quadrature phase shift keying
<b>DSSS</b>	Demand assigned signaling and switching subsystem
<b>DTIM</b>	Digital Transmission Interface Module
<b>EMSP</b>	Enhanced Modular Signal Processor
<b>ESD</b>	Electrostatic Discharge
<b>EVM</b>	Error Vector Magnitude
<b>FCC</b>	Federal Communications Commission
<b>FER</b>	Floating Error
<b>GND</b>	Ground
<b>GPIO</b>	General Purpose Input/Output
<b>HBM</b>	Human body model
<b>IEEE</b>	Institute of Electrical and Electronics Engineers
<b>IO</b>	Input/Output
<b>IOT</b>	Individual operation test
<b>IPv4</b>	Internet Protocol version 4
<b>LED</b>	Light-emitting diode
<b>LVTTTL</b>	Low Voltage Transistor Transistor Logic
<b>MAC</b>	Medium Access Control layer
<b>MCS</b>	Modulation and coding scheme
<b>MCU</b>	Microcontroller Unit
<b>MIMO</b>	Multiple-Input Multiple-Output
<b>MSL</b>	Multilayer Switching Protocol
<b>NC</b>	Numerical Control
<b>NRST</b>	Negative Reset
<b>OFDM</b>	Orthogonal Frequency Division Multiplexing
<b>OSC</b>	Oscillator
<b>PCB</b>	Printed Circuit Board
<b>PIFA</b>	Planar inverted F antenna
<b>QPSK</b>	Quadrature Phase Shift Keyin



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<b>RC</b>	Resistance- capacitance
<b>RF</b>	Radio Frequency
<b>RISC</b>	Reduced Instruction Set Computer
<b>RoHS</b>	Restriction of Hazardous Substances
<b>RX</b>	Receiver
<b>SDIO</b>	Serial Digital Input/Output
<b>SoC</b>	System on Chip
<b>SPDT</b>	Single-Pole Double-Throw
<b>SPI</b>	Serial Peripheral Interface
<b>STA</b>	Spanning Tree Algorithm
<b>TCP</b>	Transfer Control Protocol
<b>TKIP</b>	Temporal Key Integrity Protocol
<b>TX</b>	Transmitter
<b>IP</b>	Internet Protocol
<b>UART</b>	Universal Asynchronous Receiver/Transmitter
<b>UDP</b>	User Datagram Protocol
<b>UFL</b>	a miniature coaxial RF connector for high-frequency signals manufactured by Hirose Electric Group
<b>VSWR</b>	Voltage Standing Wave Ratio
<b>WEP</b>	Wired Equivalent Privacy
<b>WEPA</b>	Welded Electronic Packaging Association
<b>WEP64</b>	64 bit Wired Equivalent Privacy
<b>WEP128</b>	128 bit Wired Equivalent Privacy
<b>WPA2</b>	Wi-Fi Protected Access 2
<b>XTAL</b>	External Crystal Oscillator
<b>QAM</b>	Quadrature Amplitude Modulation
<b>802.11 b/g/n</b>	The IEEE 802.11 b/g/n

## Appendix B Reference paper (Quentin respible)

[1] IEEE 802.11b/g/n- published IEEE 802.11-2007 wireless networking standard and published IEEE 802.11-2012 standard for Information technology - Clause 19 of the published IEEE 802.11-2007 standard, and Clause 19 of the published IEEE 802.11-2012 standard.

## Contact Us



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This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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.

#### MPE Requirements

To satisfy FCC / IC 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.

Les antennes installées doivent être situées de façon à ce que la population ne puisse y être exposée à une distance de moins de 20 cm. Installer les antennes de façon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l'antenne.

La FCC des états-unis stipule que cet appareil doit être en tout temps éloigné d' au moins 20 cm des personnes pendant son fonctionnement.

#### Region Selection

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

#### Information for the OEM Integrators

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

#### Label Information to the End User by the OEM or Integrators

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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: XXXXXXX and IC: XXXXXXX”