KZL科中龙

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

WIFI Module

WM415 Product Specification

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

1. Product Introduction

The Realtek RTL8192EU is a highly integrated single-chip MIMO (Multiple In, Multiple Out) Wireless LAN (WLAN) solution for the wireless high throughput 802.11n specification. It combines a MAC, a 2T2R capable baseband, and RF in a single chip. The RTL8192EU provides a complete solution for a high throughput performance wireless Lan controller.

The RTL8192EU baseband implements Multiple Input, Multiple Output (MIMO) Orthogonal Frequency Division Multiplexing (OFDM) with 2 transmit and 2 receive paths (2T2R) and is compatible with the 802.11n specification. Features include two spatial streams transmission, short Guard Interval (GI) of 400ns, spatial spreading, and transmission over 20MHz and 40MHz bandwidth. The RTL8192EU provides a spatial stream Space-Time Block Code (STBC), Transmit Beamforming (TxBF) and Low Density Parity Check (LDPC) encoding and decoding to extend the range of transmission. At the receiver, extended range and good minimum sensitivity is achieved by having receiver diversity up to two antennas. As the recipient, the RTL8192EU also supports explicit sounding packet feedback that helps senders with beamforming capability. With two independent RF blocks, the RTL8192EU can perform fast roaming without link interruption.

For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK) and OFDM baseband processing are included to support all 802.11b and 802.11g data rates. Differential phase shift keying modulation schemes, DBPSK and DQPSK with data scrambling capability, are available along with complementary code keying to provide data rates of 1, 2, 5.5 and 11Mbps with long or short preamble. The high-speed FFT/IFFT paths, combined with BPSK, QPSK, 16QAM, and 64QAM modulation of the individual subcarriers and rate compatible punctured convolutional coding with coding rate of 1/2, 2/3, 3/4, and 5/6, provides the maximum data rate of 54Mbps and 300Mbps for 802.11g and 802.11n MIMO OFDM respectively.

The RTL8192EU builds in an enhanced signal detector, an adaptive frequency domain equalizer, and a soft-decision Viterbi decoder to alleviate severe multi-path effects and mutual interference in the reception of multiple streams. For better detection quality, receive diversity with maximal-ratio-combine (MRC) applying up to 2 receive paths are implemented. Robust interference detection and suppression are provided to protect against Bluetooth, cordless phone, and microwave oven interference. Receive vector diversity for multi-stream application is implemented for efficient utilization of MIMO channels. Efficient IQ-imbalance, DC offset, phase noise, frequency offset, and timing offset compensations are provided for radio frequency front-end impairments. Selectable digital transmit and receive FIR filters are provided to meet transmit spectrum mask requirements and to reject adjacent channel interference, respectively.

The RTL8192EU supports fast receiver Automatic Gain Control (AGC) with synchronous and asynchronous control loops among antennas, antenna diversity functions, and adaptive transmit power control functions to obtain the better performance in the analog portions of the transceiver.

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

2. Features

2.1 General

> 56-pin QFN

> CMOS MAC, Baseband MIMO PHY, and RF in a single chip for 802.11b/g/n compatible WLAN

> Complete 802.11n MIMO solution for 2.4GHz band

> 2x2 MIMO technology for extended reception robustness and exceptional throughput

> Maximum PHY data rate up to 144.4Mbps using 20MHz bandwidth, 300Mbps using 40MHz bandwidth

> Compatible with 802.11n specification

> Backward compatible with 802.11b/g devices while operating at 802.11n data rates

2.2 MAC Features

> Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)

> Low latency immediate High-Throughput Block Acknowledgement (HT-BA)

> Long NAV for media reservation with CF-End for NAV release

> PHY-level spoofing to enhance legacy compatibility

  MIMO power saving mechanism

> Channel management and co-existence

> Multiple BSSID feature allows the RTL8192EU to assume multiple MAC identities when used as a wireless bridge

> Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth

2.3 PHY Features

> 802.11n   MIMO OFDM

> Two Transmit and Two Receive path (2T2R)

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

> 20MHz and 40MHz bandwidth transmission

> Short Guard Interval (400ns)

> Sounding packet

> Low Density Parity Check (LDPC) to enhance link robustness over range

> Transmit Beamforming

> DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble

> OFDM with BPSK, QPSK, 16QAM, and 64QAM modulation.   Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6

> Maximum data rate 54Mbps in 802.11g and 300Mbps in 802.11n

> OFDM receive diversity with MRC using up to 2 receive paths. Switch diversity used for DSSS/CCK.

> Selectable digital transmit and receive FIR filters

> Programmable scaling in transmitter and receiver to trade quantization noise against increased probability of clipping

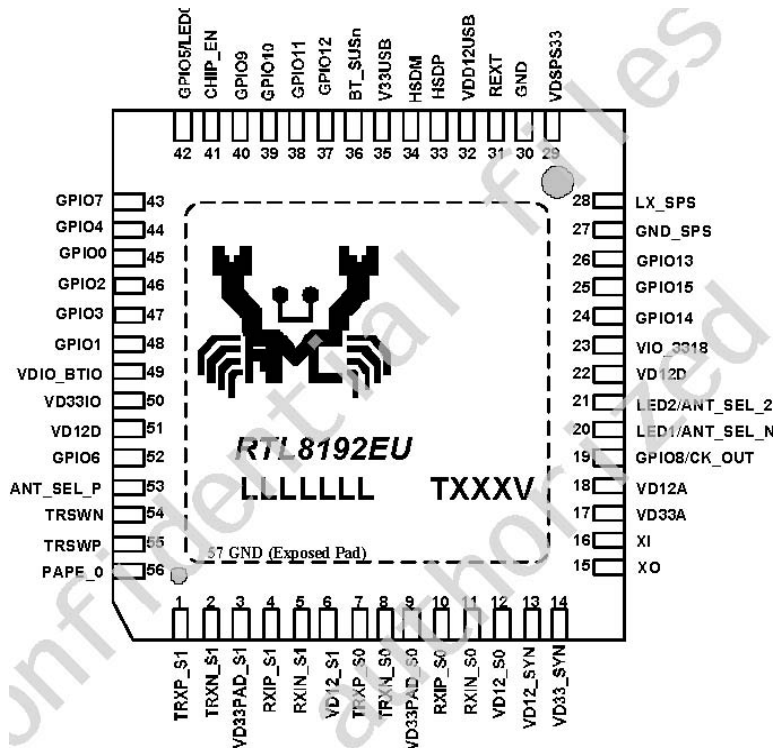>Fast receiver Automatic Gain Control (AGC)

> On-chip ADC and DAC

3. Application Diagram

3.1. Single-Band 11n 2x2 WLAN Application

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.
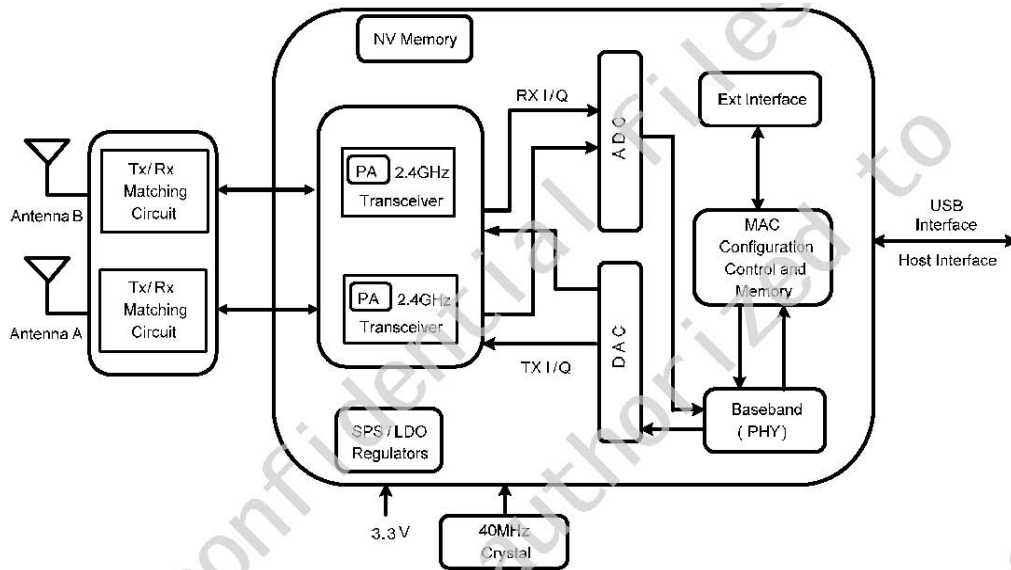
4. Pin Assignments

5. Electrical and Thermal Characteristics

5.1 Temperature Limit Ratings

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-55	+125	°C
Ambient Operating Temperature	0	70	°C
Junction Temperature	0	125	°C

5.2 DC Characteristics

5.2.1 Power Supply Characteristics

DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VD33A, VD33PAD_S0, VD33PAD_S0, VD33_SYN, VDSPS33, V33USB, VDIO_BTIO, VD33IO	3.3V Supply Voltage	3.0	3.3	3.6	V
VD12A, VD12D, VD12_S0, VD12_S1, VDD12USB	1.2V Core Supply Voltage	1.10	1.2	1.32	V
IDD33	3.3V Rating Current	-	-	600	mA

5.2.2 Digital IO Pin DC Characteristics

3.3V GPIO DC Characteristics

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

Symbol	Parameter	Minimum	Normal	Maximum	Units
VIH	Input high voltage	2.0	3.3	3.6	V
VIL	Input low voltage	--	0	0.9	V
VOH	Output high voltage	2.97	--	3.3	V
VOL	Output low voltage	0	--	0.33	V

1.8V GPIO DC Characteristics

Symbol	Parameter	Minimum	Normal	Maximum	Units
VIH	Input high voltage	1.7	1.8	2.0	V
VIL	Input low voltage	--	0	0.8	V
VOH	Output high voltage	1.62	--	1.8	V
VOL	Output low voltage	0	--	0.18	V

6. Specification

Chipset	RTL8192EU
Interface type	USB1.1/ USB 2.0
Antenna Type	PIFA Antenna * 2
Product size	47.0mm(length)x 26.0mm (width) x 12.0mm（height）
Standard	IEEE 802.11b, IEEE 802.11g, IEEE 802.n
Frequency Range	2.400~2.4835GHz
Channel	1~11(USA, or Canada）,1~13(China,Europe),1~14(Japan)
Modulation Mode	802.11b：DSSS (CCK, DQPSK, DBPSK) 802.11g/n：OFDM (BPSK, QPSK, 16QAM, 64QAM)
Wireless Transmission speed	802.11b 11, 5.5, 2, 1Mbps 802.11g 54, 48, 36, 24, 18, 12, 9, 6Mbps 802.11n 150Mbps（max）
Transmitted Power	802.11b 11Mbps：17±1dBm 802.11g 54Mbps：15±1dBm 802.11n HT20: 14±1dBm HT40: 14±1dBm
Operating mode	Ad-Hoc & Infrastructure
Working Voltage	DC 5V ±0.2V
Wireless Security	64/128-bit WEP, WPA/WPA2, WPA-PSK/WPA2-PSK (TKIP/AES)

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

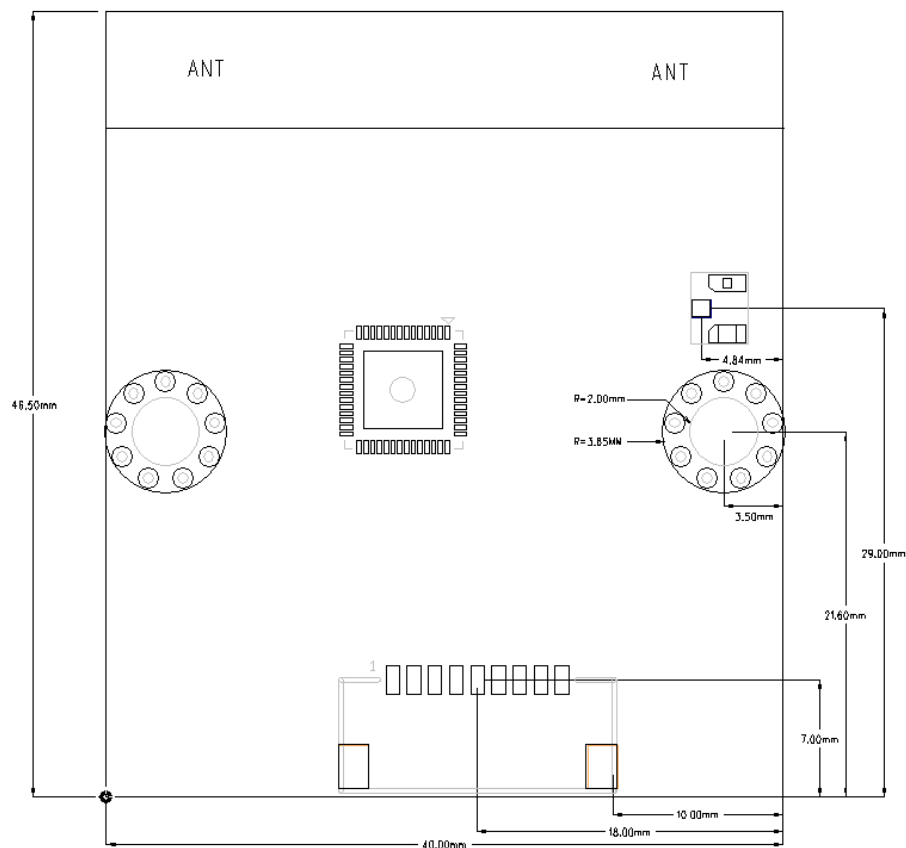| Transmission distance	farthest to 100m (indoor) / farthest to 300m (outdoor)
System support	WINXP/VISTA/LINUX/WINCE/WIN7

7. Product design

7.1 Pin design

天线 → (ANT1)

天线 → (ANT2)

1. WIFI-DEV-Wake
2. DISABL E-ML
3. 3D-SYNC
4. GND
5. D+
6. D-
7. VCC 5V
8. Blank
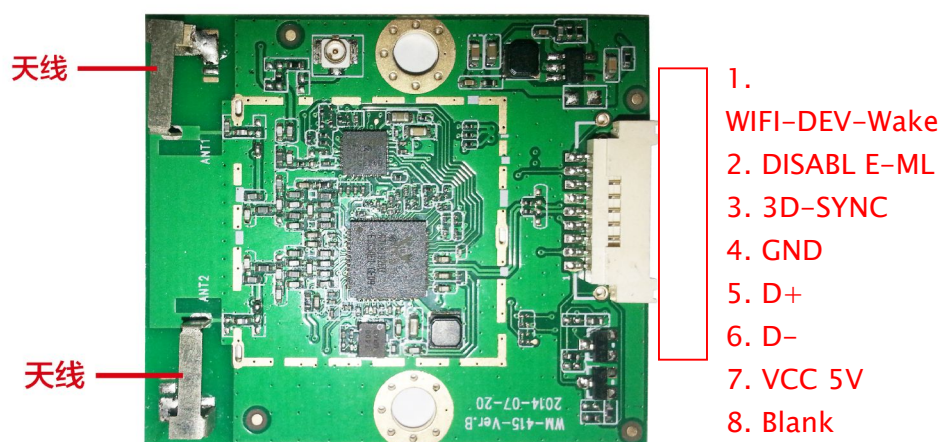
Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

7.2 Institution organization（unit：mm）

7.3. PCB LAYOUT

                TOP   **BOTTOM**

![KZL 科中龙 logo]
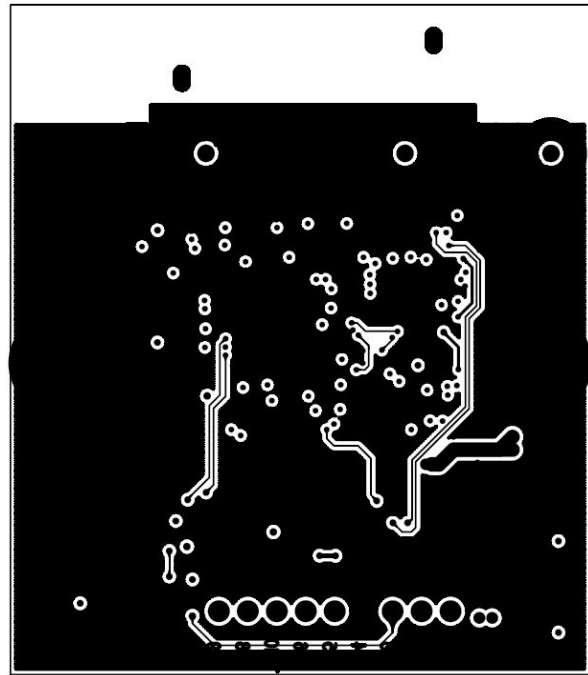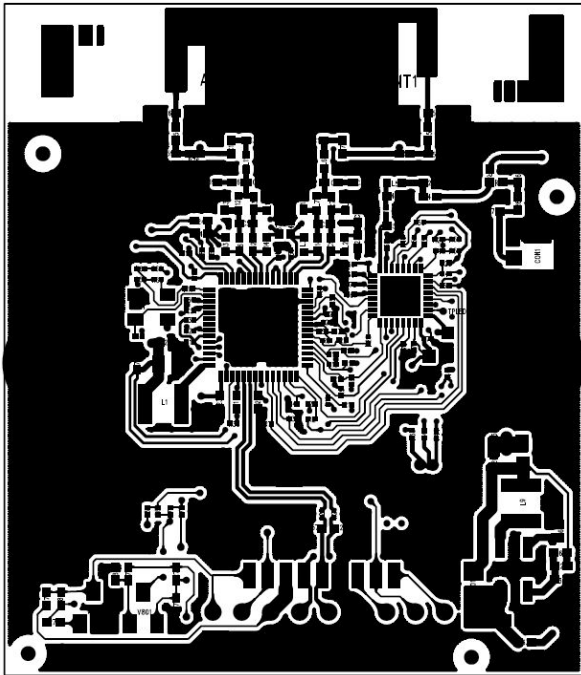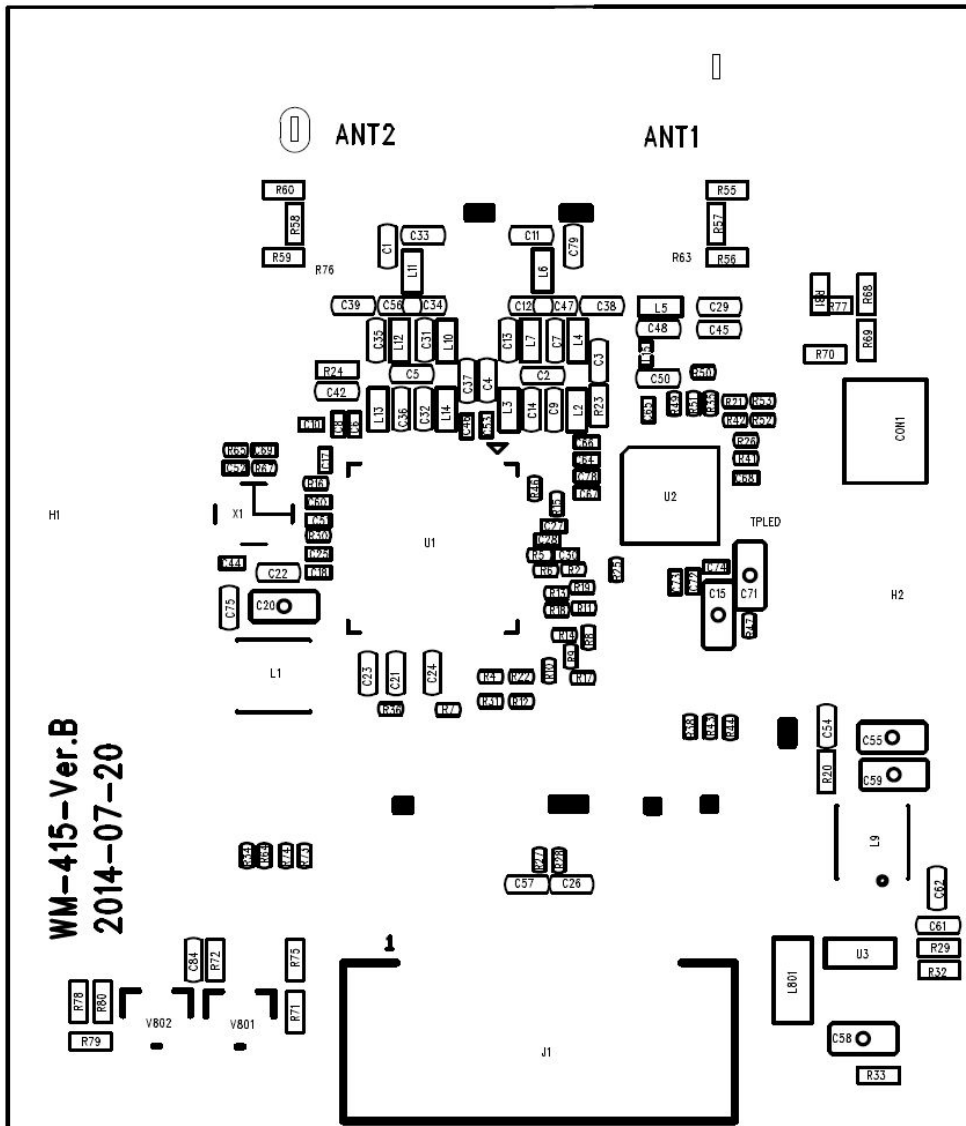
Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

7.4　Placement of Part List

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

8．FCC 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.
Warning: 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.

9．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.

Shenzhen KeZhongLong Optoelectronic Technology Co., Ltd.

FCC INFORMATION (additional)

OEM INTEGRATION INSTRUCTIONS:
This device is intended only for OEM integrators under the following conditions: The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. 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.).

Validity of using the module certification:
In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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.

End product labeling:
This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AF2K-WM415".

Information that must be placed in the end user manual:
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

This device must be kept away from all persons by 20cm or more and installations using less distance, or installations using antennas with gain greater than that with which this was Certified will require additional approvals.

Antenna Specification:
Type: Integrated
Model: WM415
Gain: -1.78dBi