HL-R8192EU5

IEEE 802.11b/g/n 2T2R USB WiFi Module

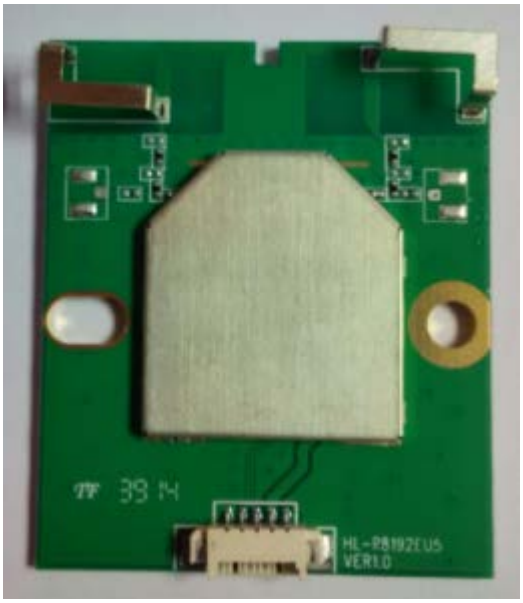
Features：

- **Reserving System**

  IEEE Std. 802.11b
  IEEE Std. 802.11g
  IEEE Std. 802.11n

- Size

  46.45mm x 40mm x 6.5mm



Module	Installation	standard	Frequency	Antenna	Remark
HL-R8192EU5	Screw	IEEE 802.11b/g/n	2.412-2.462G	Integral	5V

Software Requirements

The driver supports the following operating systems: Linux, Microsoft Windows 2000, XP, Vista andWin7.

1. Introduction

HL-8192EU5 is based on Realtek RTL8192EU complied with IEEE 802.11b/g/nstandard from 2.4-2.5GHz.This documentation describes the engineering requirements specification.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure 1. This WLAN Module design is based on Realtek RTL8192EU. It is a highly integrated single-chip MIMO(Multiple In Multiple Out) Wireless LAN (WLAN) USB2.0 network interface controllercomplying with the 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 highthroughput performance wireless client.

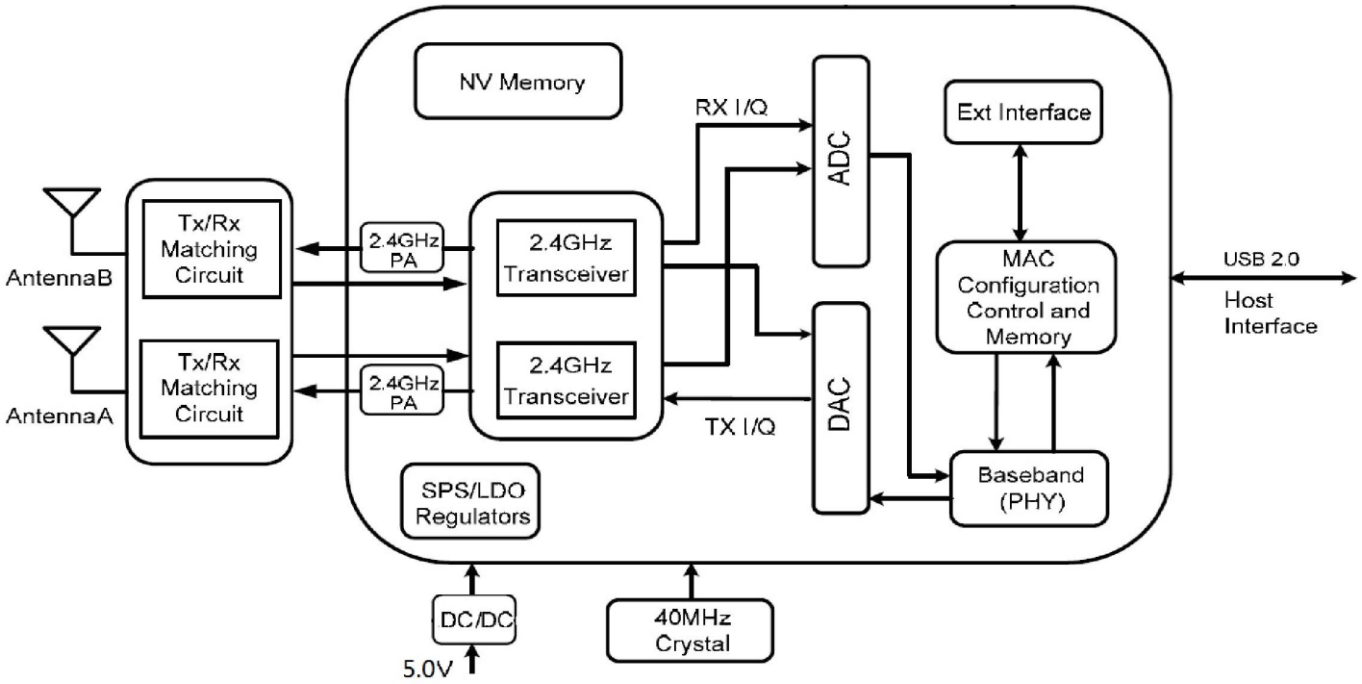


Figure 1 HL-8192EU5 Block Diagram

1.2 Specification reference

This specification is based on additional references listed below.
_ IEEE Std. 802.11b
_ IEEE Std. 802.11g
_ IEEE Std. 802.11n

1.3 System Functions

Table1: General Specification as below:

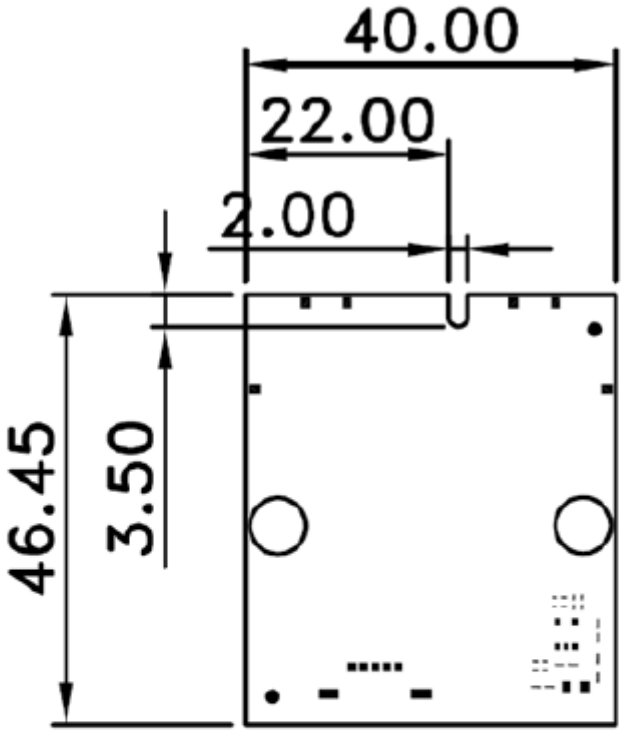
Main Chipset	Realtek RTL8192EU
Operating Frequency	2.412~2.472GHz
WiFi Standard	802.11b/g/n(2x2)
Modulation	11b: DBPSK, DQPSK and CCK and DSSS 11g: BPSK, QPSK, 16QAM, 64QAM and OFDM 11n: MCS0~15 OFDM
Data rates	11b:1, 2, 5.5 and 11Mbps 11g:6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~15, up to 300Mbps
Form factor	5pin side entry type WTB CONN, 1.25mm pitch,
Host Interface	USB 2.0
PCB Stack	4-layers design
Dimension	Typical, 46mm(W)*52.54mm(L)*13.2mm(T)
Antenna	Two Metal PiFA Antennas on-Board design
Operation Temperatur	0℃ to +60℃
Storage Temperature	-40℃ to +85℃
Operation Voltage	5V +/-10%

2. Mechanical Specification

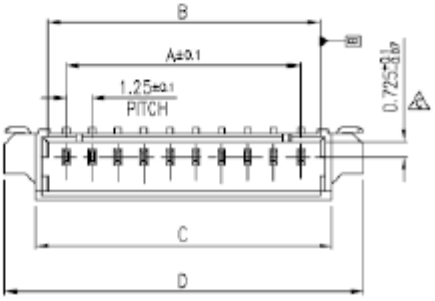
2.1 Mechanical Outline Drawing

Typical Dimension (W x L): 46.45mmx 40.mm x 6.5mm

Mechanical



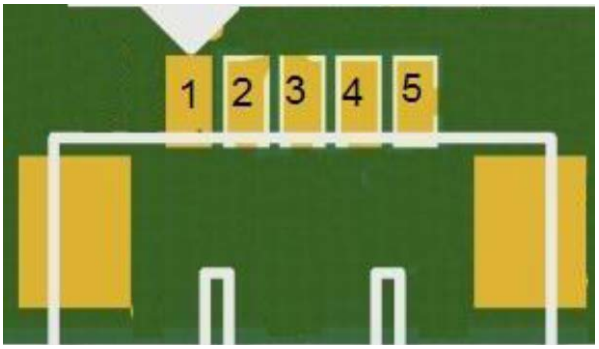
Connector SPEC (CONNECTOR 1.25mm 1*5P 50271-0060N-001 SMD(宏致))



CKT	Dim A	Dim B	Dim C	Dim D	Dim E
2	1.25	3.05	4.25	7.25	7.15
3	2.50	4.30	5.50	8.50	8.40
4	3.75	5.55	6.75	9.75	9.65
5	5.00	6.80	8.00	11.00	10.90
6	6.25	8.05	9.25	12.25	12.15

2.2 WTB CONNECTOR Pin definition

5Pin, 1.25mm pitch, SMD, side entry type



Pin #	Name	Description
1	GND	GND
2	D+	USB Data DP
3	D-	USB Data DN
4	VCC	+5V DC Power supply input
5	CTR	Reserve Default (no use)

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature (0℃,+25℃,+60℃) and overall voltage (4.5V,5V,5,5V)..

3.1 802.11b Mode

Items	Contents				
Specification	IEEE802.11b				
Mode	DSSS / CCK				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
1.DC current (Average) @5V input					
1) TX only @17dBm (continue Tx SISO)	-	200	250	mA	
2) TX throughput mode	-	150	220	mA	
3) RX throughput mode	-	100	200	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels(Calibrated)					
1) 17dBm Target (For Each antenna port)	15	17	19	dBm	
3. Spectrum Mask @ target power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
4. Frequency Error	-25	-5	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER ≦8%)	-	-94	-83	dBm	
2) 2Mbps (FER ≦8%)	-	-93	-80	dBm	
3) 5.5Mbps (FER ≦8%)	-	-91	-79	dBm	
4) 11Mbps (FER ≦8%)	-	-89	-76	dBm	
6 Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

3.2 802.11g Mode

Items	Contents				
Specification	IEEE802.11g				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
1. DC current (Average) @5V input					
1) TX only @15dBm (continue Tx SISO)	-	190	250	mA	
2) TX throughput mode	-	80	200	mA	
3) RX throughput mode	-	80	200	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels					
1) 15dBm Target (For Each antenna port)	13	15	17	dBm	
3. Spectrum Mask @ target power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
4 Constellation Error(EVM)@ target power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-30	-25	dB	
5 Frequency Error	-25	-5	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6 Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≤10%)	-	-88	-85	dBm	
2) 9Mbps (PER ≤10%)	-	-87	-84	dBm	
3) 12Mbps (PER ≤10%)	-	-86	-82	dBm	
4) 18Mbps (PER ≤10%)	-	-85	-80	dBm	
5) 24Mbps (PER ≤10%)	-	-82	-77	dBm	
6) 36Mbps (PER ≤10%)	-	-79	-73	dBm	
7) 48Mbps (PER ≤10%)	-	-75	-69	dBm	
8) 54Mbps (PER ≤10%)	-	-74	-68	dBm	
7 Maximum Input Level (PER ≤10%)	-20	-	-	dBm	

3.3 802.11n HT20 Mode

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4GHz				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
1¦ DC current (Average) @5V input					
1) TX only @ 14dBm Target(each port), (continue Tx MIMO MCS15)	-	290	350	mA	
2) TX throughput mode	-	108	260	mA	
3) RX throughput mode	-	75	201	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels					
1) 14dBm Target (For Each antenna port)	12	14	16	dBm	
2) 14dBm Target (Combined two antenna port)	15	17	19	dBm	
3. Spectrum Mask @14.5dBm					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
4. Constellation Error(EVM)@ target power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-31	-28	dB	
5. Frequency Error	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-82	-	dBm	
2) MCS1 (PER ≦10%)	-	-79	-	dBm	
3) MCS2 (PER ≦10%)	-	-77	-	dBm	
4) MCS3 (PER ≦10%)	-	-74	-	dBm	
5) MCS4 (PER ≦10%)	-	-70	-	dBm	
6) MCS5 (PER ≦10%)	-	-66	-	dBm	
7) MCS6 (PER ≦10%)	-	-65	-	dBm	
8) MCS7 (PER ≦10%)	-	-64	-	dBm	
7. Maximum Input Level (PER ≦10%)	-20	-	-	dBm	

3.4 802.11n HT40 Mode

Items	Contents				
Specification	IEEE802.11n HT40 @ 2.4GHz				
Mode	OFDM				
Channel	CH3 to CH11				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
1. DC current (Average) @5V input					
1) TX only @ 14dBm Target(each port), (continue Tx MIMO MCS15)	-	290	350	mA	
2) TX throughput mode	-	100	282	mA	
3) RX throughput mode	-	78	205	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels (Calibrated)					
1) 14dBm Target (For Each antenna port)	12	14	16	dBm	
2) 14dBm Target (Combined two antenna port)	15	17	19	dBm	
3. Spectrum Mask @13dBm					
1) at fc +/-22MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-45	dBr	
4. Constellation Error(EVM)@target power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-31	-28	dB	
5. Frequency Error	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)		-79	-	dBm	
2) MCS1 (PER ≦10%)		-76	-	dBm	
3) MCS2 (PER ≦10%)		-74	-	dBm	
4) MCS3 (PER ≦10%)		-71	-	dBm	
5) MCS4 (PER ≦10%)		-67	-	dBm	
6) MCS5 (PER ≦10%)		-63	-	dBm	
7) MCS6 (PER ≦10%)		-62	-	dBm	
8) MCS7 (PER ≦10%)	-	-61	-	dBm	
7. Maximum Input Level(PER ≦10%)	-20	-	-	dBm	

3.5 On-board Antenna Specification

Operating Frequency	2.412~2.472GHz
VSWR	≤2:1
Antenna Type	Metal PiFA

The WIFI Modular has 2T2R transmitter, have two antennas, The two antennas are the same, for the Integral Antenna, max Gain is 1 dBi.

FCC ID: 2ADK2R8192EU5

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.

FCC Caution: Any 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.

For product available in the UAS market, ony channel 1-11 can be operated, selection of other channels is not possible.

IMPORTANT NOTE:
Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:
In the event that these conditions can not 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 can not 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: 2ADK2R8192EU5” .If the size of the end product is smaller than 8x10cm, 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.