

# **EWM-W157H01E**

# **Datasheet**

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**Revision History**

Rev.	Date	History
1.0	2015/03/10	1. 1 <sup>st</sup> release
1.1	2015/04/28	1. Modify typo of antenna support description

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## 1. Overview

Advantech Co., Ltd. introduces the pioneer of the IEEE 802.11 a/b/g/n/ac WIFI with Bluetooth 4.0 and BT3.0+HS class I combo half mini card module --- EWM-W157H01E. The EWM-W157H01E IEEE 802.11 a/b/g/n/ac PCIE WIFI with Bluetooth 4.0 + BT3.0 HS class I combo module is a highly integrated wireless local area network (WLAN) solution to let users enjoy the digital content through the latest wireless technology without using the extra cables and cords. It combines with Bluetooth 4.0 and 3.0 + HS class I and provides a complete 2.4GHz Bluetooth system which is fully compliant to Bluetooth 4.0 and 3.0 + HS and v2.1 that supports EDR of 2Mbps and 3Mbps for data and audio communications. It enables a high performance, cost effective, low power, compact solution that easily fits onto the PCI Express and USB Combo half mini Card.

Compliant with the IEEE 802.11a/b/g/n/ac standard, EWM-W157H01E uses Direct Sequence Spread Spectrum (DSSS), Orthogonal Frequency Division Multiplexing (OFDM), BPSK, QPSK, CCK and QAM baseband modulation technologies.

Compare to 802.11n technology, 802.11ac standard makes big improvement on speed and range. EWM-W157H01E module adopts REALTEK solution. The module design is based on the RTL8821AE single solution.

## 2. Features

- High speed wireless connection up to 433.3Mbps transmit/receive PHY rate using 80MHz bandwidth
- 2 antennas to support 1(Transmit) x 1(Receive) diversity technology and Bluetooth
- WCS (Wireless Coexistence System)
- Low power consumption and high performance
- Enhanced wireless security
- Fully qualified Bluetooth BT4.0 and BT3.0 + High speed system
- Enhanced Data Rate(EDR) compliant for both 2Mbps and 3Mbps supported
- Fully speed operation with Piconet and Scatternet support
- Electrical compliant to USB1.1 & 2.0

### 3. Specification

<b>Standard</b>	
IEEE 802.11 a/b/g/n/ac Wi-Fi with Bluetooth 4.0 + 3.0 HS class I Combo half mini card Module	
<b>Chipset</b>	
REALTEK RTL8821AE	
<b>Host Interface</b>	
WiFi: PCI-E , BT: USB	
<b>Radio</b>	
Antenna	Standard U.FL Connector 1: Ant1 (Main): Wi-Fi Tx/Rx + BT 2: Ant2 (Aux): Wi-Fi Tx/Rx + BT
Operating Frequency	Wi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada BT: 2402MHz~2483MHz
Modulation	Wi-Fi: 802.11a/g/n/ac: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps) BT: Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSK
Output Power	Wi-Fi: 802.11a: 13.5 dBm +/-2dBm (54Mbps) 802.11b: 16 dBm +/-2dBm (11Mbps) 802.11g: 14 dBm +/-2dBm (54Mbps) 802.11n @2.4GHz: 13 dBm +/-2dBm (HT20 MCS7) 802.11n @2.4GHz: 13 dBm +/-2dBm (HT40 MCS7) 802.11n @5GHz: 12 dBm +/-2dBm (HT20 MCS7) 802.11n @5GHz: 12 dBm +/-2dBm (HT40 MCS7) 802.11ac @5GHz: 10 dBm +/-2dBm (HT80 MCS9)  BT: 0 ≤ Output Power ≤ +8 dBm (Conductive)
Receive Sensitivity	Wi-Fi: 802.11a: less than -65 dBm (54M) 802.11b: less than -76 dBm (11M) 802.11g: less than -65 dBm (54M) 802.11n@2.4GHz: less than -64 dBm (HT20 MCS7) 802.11n @2.4GHz: less than -61 dBm (HT40 MCS7) 802.11n@5GHz: less than -64 dBm (HT20 MCS7) 802.11n @5GHz: less than -61 dBm (HT40 MCS7) 802.11ac @5GHz: less than -51 dBm (VHT80 MCS9)  BT: BER < 0.1% (Anritsu 8852B Tx -70 dBm)
Operating Range	Wi-Fi: Open Space: ~300M / Indoor:~100M (The transmission speed may vary according to the environment)  BT: 10m~20m (depending on environment and NB model)

Specifications subject to change without notice, contact your sales representatives for the most update information.

<b>Operating Voltage</b>	DC 3.3V ± 9%
<b>Environmental</b>	
Operating Temperature	0 ~ 70°C
Storage Temperature	-40 ~ 85°C
<b>Physical Specification</b>	
Dimensions	29.85mm x 26.65mm x 1.5mm (Tolerance remarked in mechanical drawing)
Weight	3.28 g

### 3.1 Absolute Maximum Ratings

Symbol	Parameter	Max. Rating	Unit
Vdd33	Maximum I/O supply voltage	+3.6V	V

### 3.2 Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
Vdd33	I/O voltage	3~3.6	V

### 3.3 Power Consumption

#### WLAN

<b>Test Bed</b>	<b>DELL Vostro 3450</b>					
<b>Test OS</b>	<b>Windows 8.1 Professional x64</b>					
<b>Test AP</b>	<b>NETGEAR R6300</b>					
<b>Driver Version</b>	<b>AZ_RTL8723AE_8723BE_8821AE_Win7_Win8.X_2012.16.0523.2014</b>					
<b>Test Voltage</b>	<b>3.3V</b>					
Item		2.4 GHz		5 GHz		Note
		Disable ASPM	L1 mode	Disable ASPM	L1 mode	
<b>No connect AP</b>	<b>AVG</b>	37.9 mA	27.9 mA	38.4 mA	28.1 mA	
	<b>MAX</b>	187.8 mA	186.3 mA	186.7 mA	188.0 mA	
	<b>MIN</b>	28.3 mA	16.4 mA	28.3 mA	16.4 mA	
<b>Connect AP</b>	<b>AVG</b>	116.1 mA	107.1 mA	116.3 mA	113.6 mA	
	<b>MAX</b>	285.9 mA	284.5 mA	198.1 mA	198.2 mA	
	<b>MIN</b>	84.4 mA	76.5 mA	85.7 mA	78.0 mA	
<b>WLAN RF OFF</b>		24.0 mA	23.9 mA	24.0 mA	24.1 mA	
<b>Transmit by HT40/VHT80</b>		257.8 mA	265.8 mA	359.5 mA	356.2 mA	
<b>Receiver by HT40/VHT80</b>		183.8 mA	183.9 mA	225.7 mA	223.2 mA	

Note:

1. The power consumption data were measured when NB operated in DC (battery) mode.
2. Bluetooth function is disabled.

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**BT**

<b>Test Bed</b>		<b>DELL 3450</b>	
<b>Test OS</b>		<b>Windows 8.1 Professional x64</b>	
<b>Driver Version</b>		<b>RTBlueR_810.810.812.0402.2014</b>	
<b>Test Voltage</b>		<b>3.3V</b>	
<b>Item</b>		<b>Current value</b>	<b>Note</b>
<b>No connect BT device</b>	<b>AVG</b>	24.0 mA	
	<b>MAX</b>	35.8 mA	
	<b>MIN</b>	22.5 mA	
<b>connect BT device</b>	<b>AVG</b>	29.7 mA	
	<b>MAX</b>	41.1 mA	
	<b>MIN</b>	28.3 mA	
<b>BT RF OFF</b>		16.0 mA	
<b>Transmit by BER 2.1</b>		54.9 mA	
<b>Receiver by BER 2.1</b>		44.7 mA	

Note:

1. The power consumption data were measured when NB operated in DC (battery) mode.
2. WiFi function is disabled.

**4. Connector Pin-out Definitions**

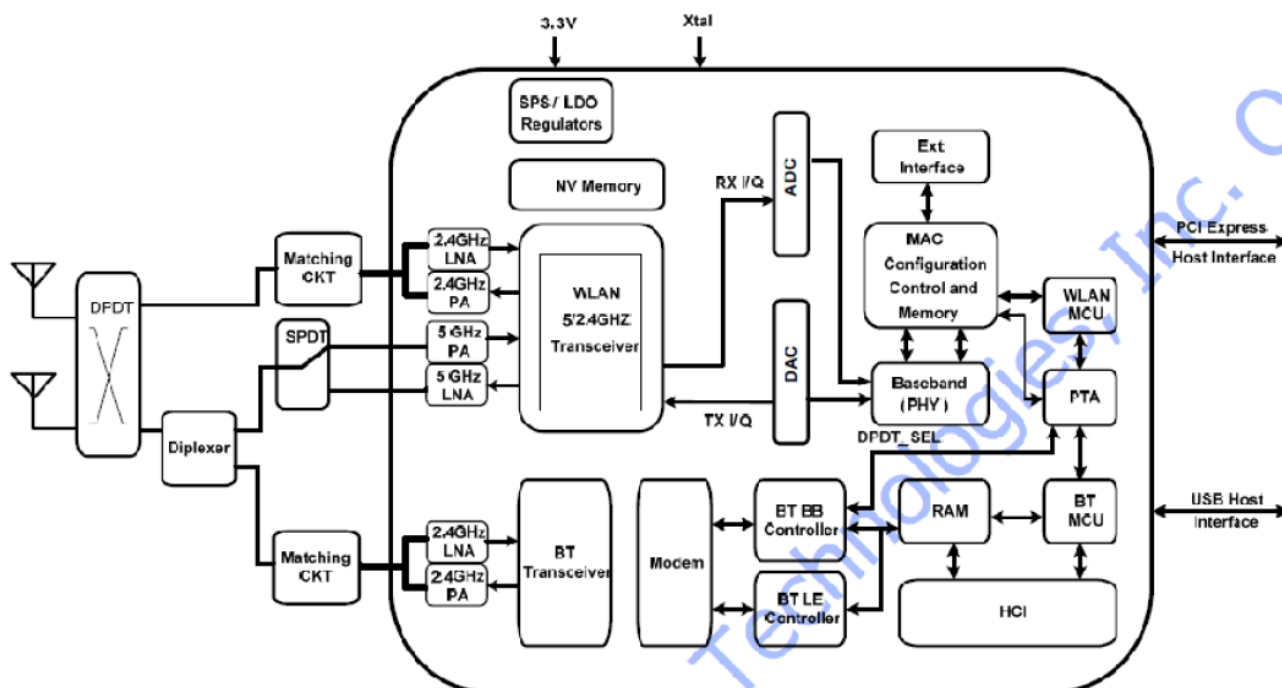
<b>Pin No.</b>	<b>Definition</b>	<b>Basic Description</b>	<b>Type</b>
1	WAKE#	Open Drain active Low signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event.	Output Open-Drain
2	NC	Floating Pin, No connect to anything.	Floating
3	NC	Floating Pin, No connect to anything.	Floating
4	GND	Ground	GND
5	NC	Floating Pin, No connect to anything.	Floating
6	NC	Floating Pin, No connect to anything.	Floating
7	CLKREQn	Reference clock request	Output
8	NC	Floating Pin, No connect to anything.	Floating
9	GND	Ground	GND
10	NC	Floating Pin, No connect to anything.	Floating
11	REFCLKN	Differential reference clock	Input
12	NC	Floating Pin, No connect to anything.	Floating
13	REFCLKP	Differential reference clock	Input
14	NC	Floating Pin, No connect to anything.	Floating



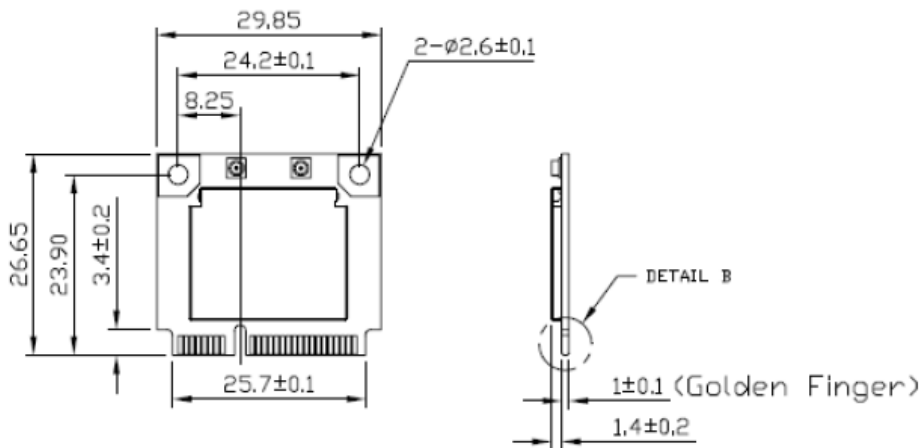
15	GND	Ground	GND
16	NC	Floating Pin, No connect to anything.	Floating
17	NC	Floating Pin, No connect to anything.	Floating
18	GND	Ground	GND
19	NC	Floating Pin, No connect to anything.	Floating
20	W_DISABLE#	WLAN disable control.	Input
21	GND	Ground	GND
22	PERSTn	PCI express fundamental reset	Input
23	PERn0	Differential transmit	Output
24	NC	Floating Pin, No connect to anything.	Floating
25	PERp0	Differential transmit	Output
26	GND	Ground	GND
27	GND	Ground	GND
28	NC	Floating Pin, No connect to anything.	Floating
29	GND	Ground	GND
30	NC	Floating Pin, No connect to anything.	Floating
31	PETn0	Differential receive	Input
32	NC	Floating Pin, No connect to anything.	Floating
33	PETp0	Differential receive	Input
34	GND	Ground	GND
35	GND	Ground	GND
36	USB_D-	USB Differential signal	Output/Input
37	GND	Ground	GND
38	USB_D+	USB Differential signal	Output/Input
39	NC	Floating Pin, No connect to anything.	Floating
40	NC	Floating Pin, No connect to anything.	Floating
41	NC	Floating Pin, No connect to anything.	Floating
42	NC	Floating Pin, No connect to anything.	Floating
43	GND	Ground	GND
44	LED_WLAN#	Active low signal. The signal is used to provide status indicators via LED.	Output
45	NC	Floating Pin, No connect to anything.	Floating
46	LED_BT#	Active low signal. The signal is used to provide status indicators via LED.	Output
47	NC	Floating Pin, No connect to anything.	Floating
48	NC	Floating Pin, No connect to anything.	Floating
49	NC	Floating Pin, No connect to anything.	Floating
50	GND	Ground	GND
51	BT_DISABLE_L	This pin can externally shut down the RTL8821AE BT function when BT_DISABLE# is pulled Low. When this pin is pulled low, USB interface will be also disabled. This pin can be also defined as the BT Radio-off function with host interface remaining connected.	Input
52	+3.3Vaux	3.3V/3.3AUX power supply (Use 3.3AUX for WOWL supporting)	VCC

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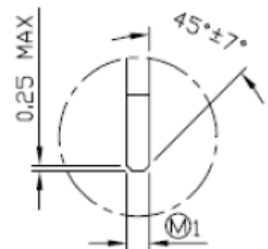
**5. Block Diagram**



**6. Mechanical Dimensions**



Tolerances unless otherwise specified : ±0.15mm



DETAIL B  
SCALE 3.000

**Appendix: Part Number Table**

Product	Advantech PN
802.11 a/b/g/n/ac, Realtek RTL8821AE, with BT4.0, 2-Antenna	EWM-W157H01E