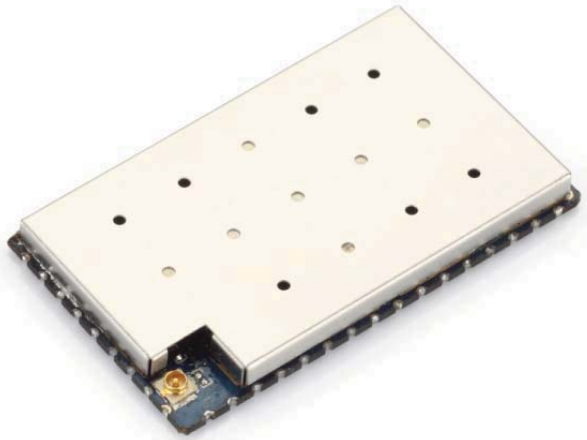
Dragino Technology Co., Limited
www.dragino.com sales@dragino.com
TEL:86610829 FAX: 86647123



Wireless IoT Module Manual

Version: 1.1

PART No: HE-A2

Hardware Version: A2

Version	Description	Date
1.0	Initiate Release	2014-Jul-24
1.1	Add GPIO Characteristics	2014-Nov-17

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1. Description

HE is a high performance, low cost 150M, 2.4G WiFi module. It is compatible with 802.11b/g/n. provide Ethernet, USB, UART and GPIOs interface. HE use small outline package, it is used widely in WiFi solutions.

HÉ means “core” in Chinese. Intend of HÉ module is to be used as the core of the IoT, WiFi solution.

HE is based on Open Source OpenWrt system. User is free to modify the software for their applications.

2. Specification

- ✓ **CPU**: ATHEROS AR9331 chipset, which integrates MIPS 24Kc processor, CPU 400MHz, Switch (MAC, PHY) and integrates with MAC, RF, PA and LNA for WiFi.
- ✓ **RAM** : 64MB;
- ✓ **Flash** : 16MB
- ✓ **Interfaces**: 2 x RJ45, 1 x USB Host, 1 x UART, 14 multiplex GPIOs
- ✓ **OS**: Open Source OpenWrt
- ✓ **Power**: 3.3v power input
- ✓ **WiFi**: Support 150M 2.4Ghz WiFi, 802.11 b/g/n
- ✓ **Frequency range**: 2412-2462MHz
- ✓ **Modulation**: BPSK, QPSK, CCK and OFDM (BPSK/QPSK/16-QAM/ 64-QAM)
- ✓ **Sensitivity** @PER : 135M : -65dBm@10%PER; 65M : -65dBm@10%PER; 54M : -68dBm@10%PER; 11M : -84dBm@8% PER; 6M : -88dBm@10% PER; 1M : -90dBm@8% PER
- ✓ **Typical Distance**: Indoor: 60m (max); Outdoor 150m (max) (with 2 dBi antenna)
- ✓ **Connector**: I-PEX connector. Provide Optional ANT pin out for SMT

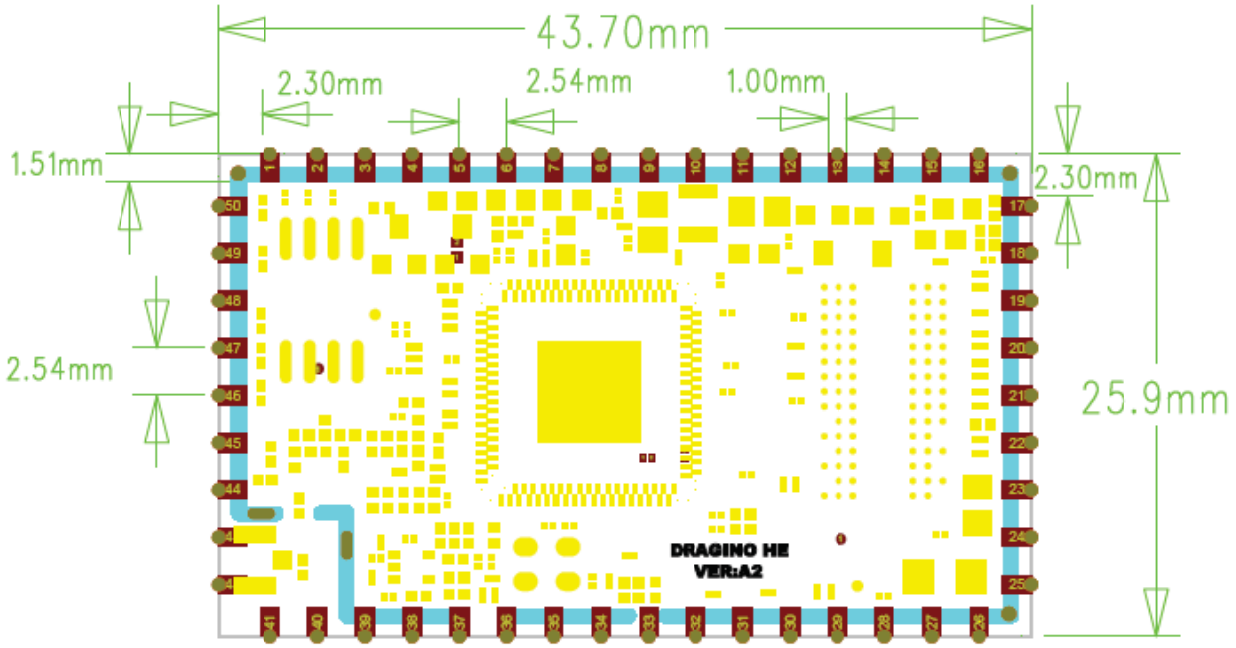
3. Applications

- Internet of Things
- Voice over IP
- Mesh WiFi
- Industrial Control

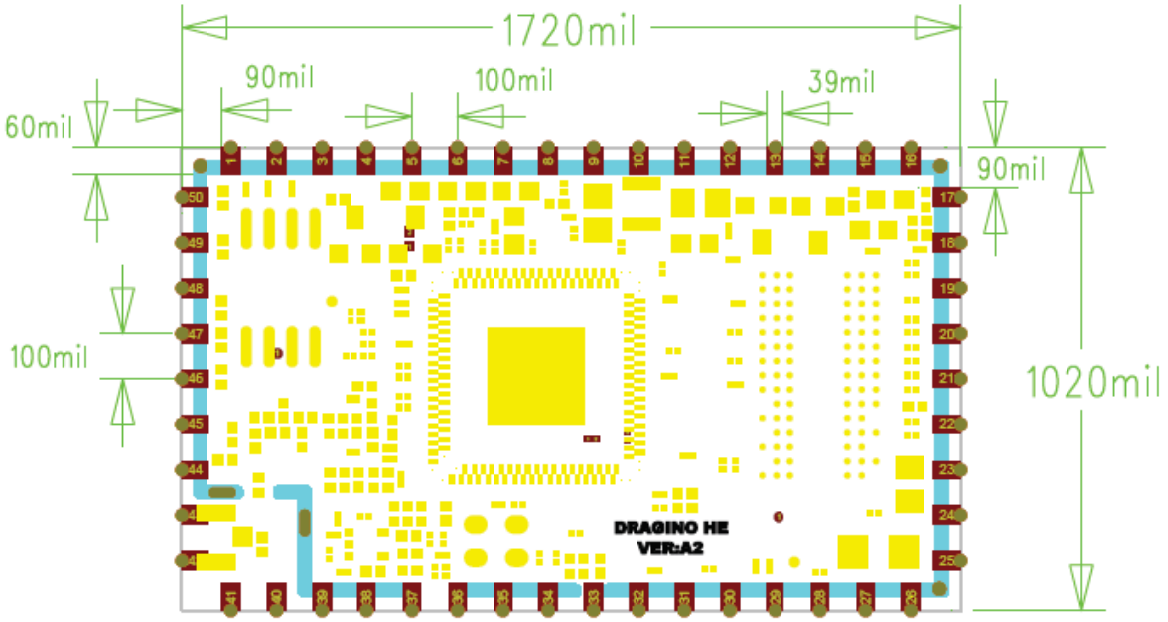
Antenna manufacture： Dragino Technology Co., LTD.
Model: PA02
Antenna gain： 2dBi

4. Dimensions and Mechanical

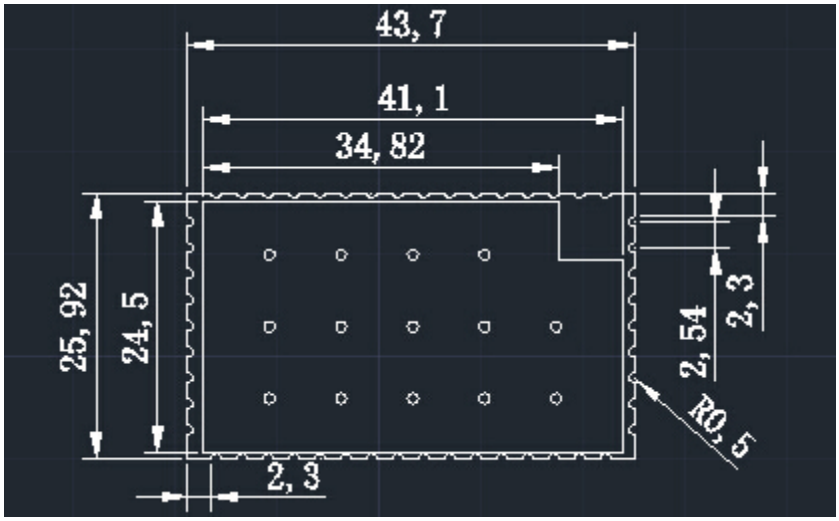
Unit: mm

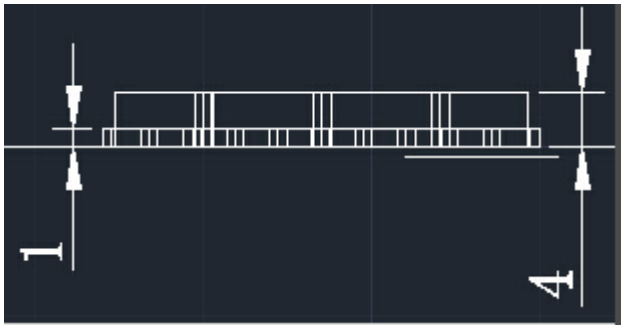


Unit: mil



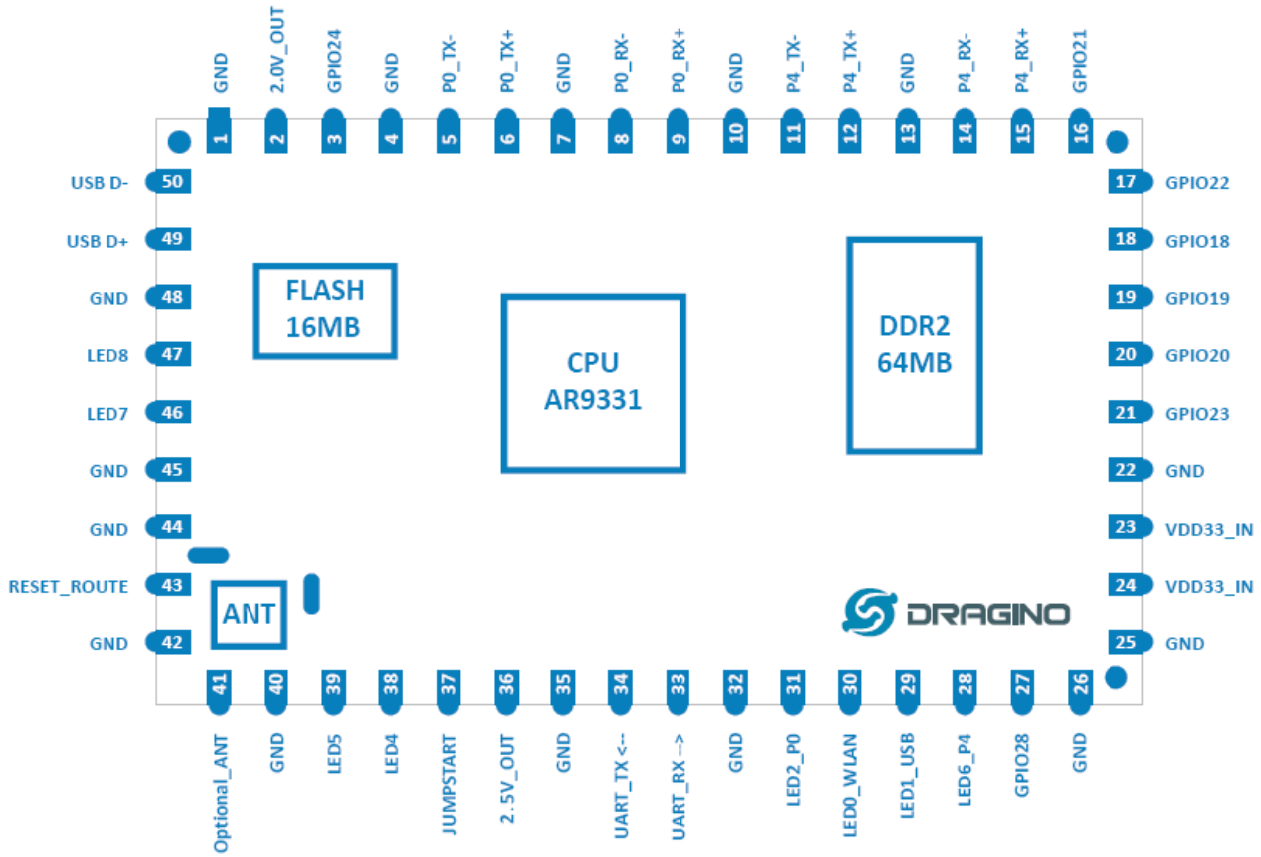
Unit:mm





5. Pin Definition

5.1 Pin Definition



Pin No.	Signal	Direction	Function	Remark
1	GND		Ground	
2	2.0V_Out	Output	2.0V output to Ethernet	
3	GPIO24	In/Out	General I/O	
4	GND		Ground	
5	P0_TX-	Out	Ethernet Port0 transmit pair	
6	P0_TX+	Output		
7	GND		Ground	
8	P0_RX-	Input	Ethernet Port0 receive pair	
9	P0_RX+	Input		
10	GND		Ground	
11	P4_TX-	Out	Ethernet Port4 transmit pair	
12	P4_TX+	Output		
13	GND		Ground	
14	P4_RX-	Input	Ethernet Port4 receive pair	
15	P4_RX+	Input		
16	GPIO21	In/Out	General I/O	
17	GPIO22	In/Out	General I/O	
18	GPIO18	In/Out	General I/O	
19	GPIO19	In/Out	General I/O	

20	GPIO20	In/Out	General I/O	
21	GPIO23	In/Out	General I/O	
22	GND		Ground	
23	VDD33_IN	Input	Power Supply, 3.3V	
24	VDD33_IN	Input	Power Supply, 3.3V	
25	GND		Ground	
26	GND		Ground	
27	GPIO28	In/Out	General I/O	
28	LED6_P4	Output	Status LED for Ethernet Port4	Should be source current only
29	LED1_USB	Output	Status LED for USB port	Should be source current only
30	LED0_WLAN	Output	Status LED for Wireless	Should be source current only
31	LED2_P0	Output	Status LED for Ethernet Port0	Should be source current only
32	GND		Ground	
33	UART_RX	Input	Serial data in	
34	UART_TX	Output	Serial data out	
35	GND		Ground	
36	2.5v_out	Output	Reference 2.5v output	
37	JumpStart	In/Out	Failsafe Control Signal, GPIO11	
38	GPIO15	In/Out	General I/O	Should be source current only
39	GPIO16	In/Out	General I/O	
40	GND		Ground	
41	Optional ANT	Output	Optional Antenna output	
42	GND		Ground	
43	RESET	Input	RESET input, active LOW	
44	GND		Ground	
45	GND		Ground	
46	GPIO27	In/Out	General I/O	
47	GPIO26	In/Out	General I/O	
48	GND		Ground	
49	USB D+		USB D+ Signal	
50	USB D-		USB D- Signal	

5.2 GPIO Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output High Voltage	—	2.44	—	—	V
V_{OL}	Output Low Voltage	—	—	—	0.1	V
V_{IH}	Input High Voltage	—	0.7	—	—	V
V_{IL}	Input Low Voltage	—	0.3	—	—	V

Signal Name	Type	Drive	PU/PD Resistance
GPIO_0 – GPIO_28	I/O	Up to 24 mA	200 KΩ

5.3 Power Consumption:

Periphery	IDLE		Bulk File Transfer in all ports	
	Current @3.3v	DC Power	Current @3.3v	DC Power
WiFi only	150ma	495mw	220ma	726mw
RJ45 only	160ma	528mw	205ma	676mw
WiFi + 1 RJ45	210ma	693mw	282ma	924mw
WiFi + 2 RJ45	270ma	891mw	343ma	1131mw
WiFi + 2 RJ45 + USB				

6. Software Source

Software of HE module base on OpenWrt Linux, OpenWrt trunk source code can be used for HE.

We also provide two of customized software as a quick start.

Mesh IoT Firmware:

This firmware has enhanced network support such as WiFi Mesh, . It also supports the basic Arduino Bridge features and remote upgrade. Link for this firmware:

Release Note

Source code and How to Compile

Arduino Yun Firmware:

This firmware is derived from the official Arduino Yun firmware with some bug fixed and support more avrs.

Release note

Source code

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

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: ZHZHE Or Contains FCC ID: ZHZHE ″

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product