# 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 |

# Index

# 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**: 2.4~2.4835GHz
- ✓ **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 1.5dBi antenna)
- ✓ **Connector**: I-PEX connector. Provide Optional ANT pin out for SMT
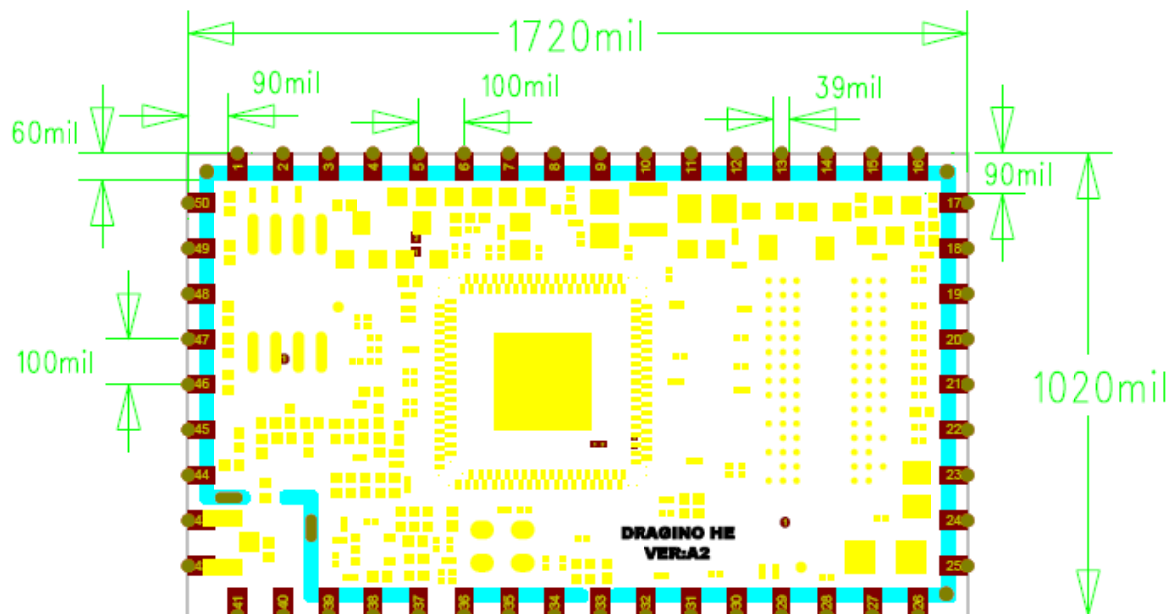
# 3. Applications

- Internet of Things

- Voice over IP

- Mesh WiFi

- Industrial Control
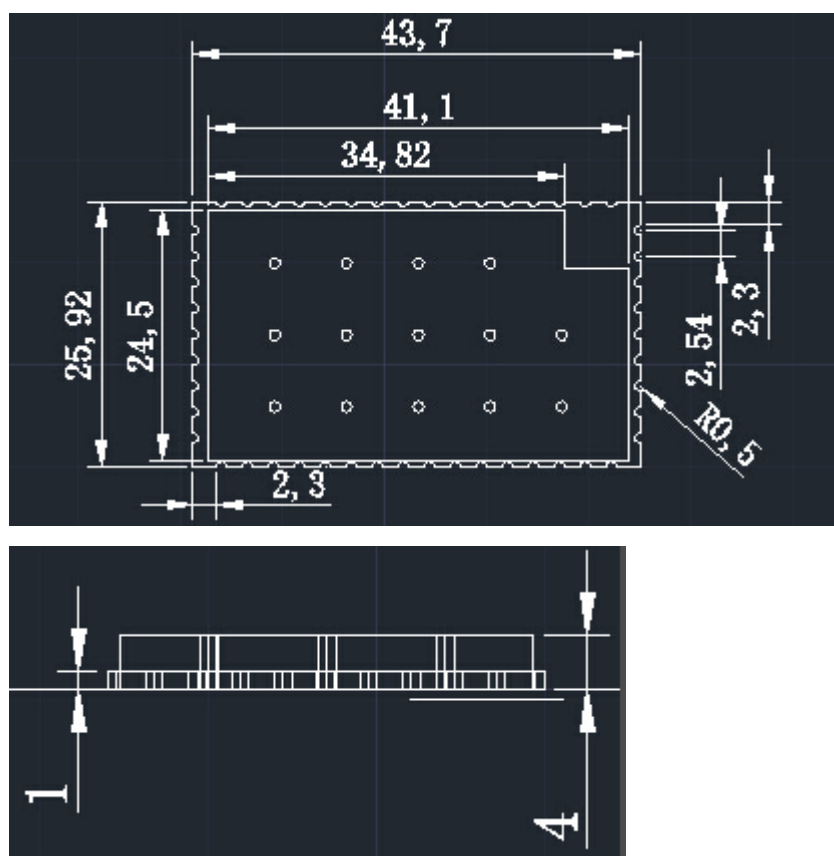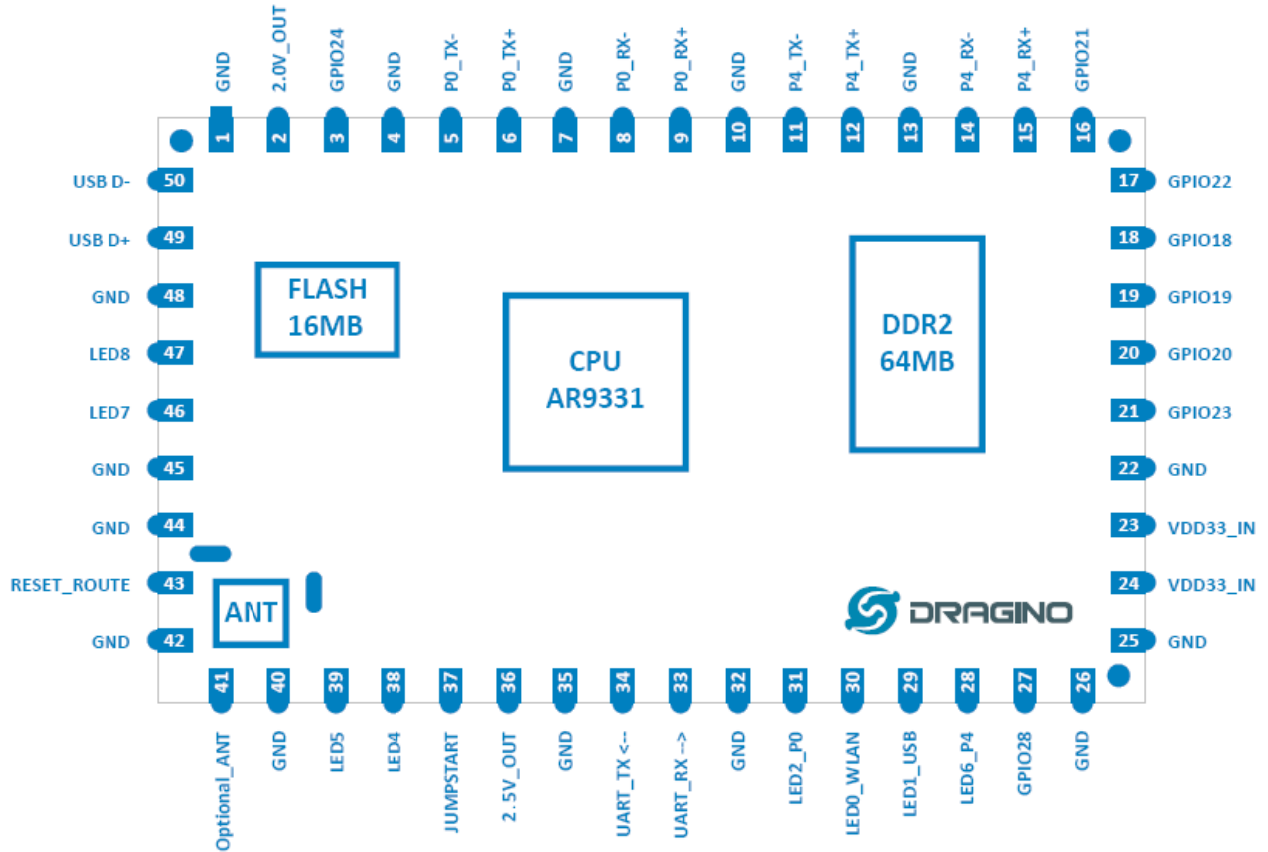
# 4. Dimensions and Mechanical

Unit: mm
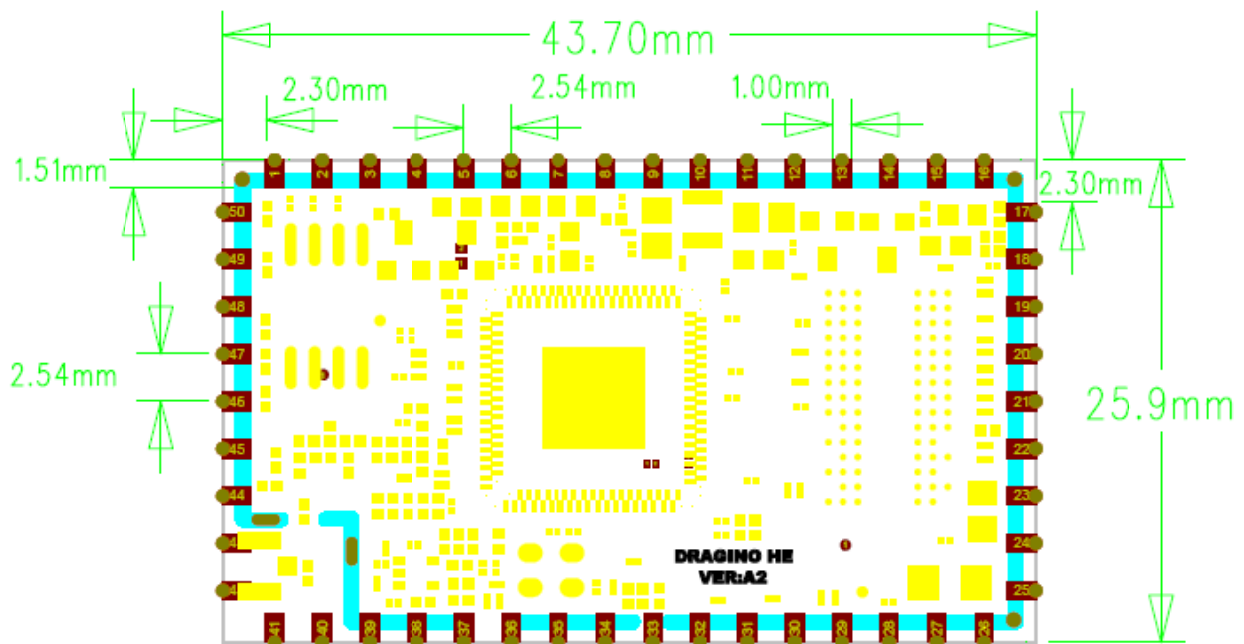


Unit: mil

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 | 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, 3G. 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.  Antenna information

Model: ATW-102-0009-010

Manufacturer: Ante intelligent Communications(shenzhen)CO.,Ltd

## 6.  Software Source

# 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. 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