

WiFi IoT Module Datasheet

Version: 1.2

PART No: HE-A4

Hardware Version: A4

Version	Description	Date
1.0	Initiate Release	2014-Jul-24
1.1	Add GPIO Characteristics	2014-Nov-17
1.2	Add production info	2015-Jul-31

Index

1. Description.....	3
2. Specification.....	3
3. Applications	3
4. Dimensions and Mechanical	4
5. Pin Definition	6
5.1 Pin Definition	6
5.2 GPIO Characteristics	7
5.3 Power Consumption:	7
6. Reference Design	9
6.1 Generic IoT Router	9
6.2 Arduino Yun Shield	12
7. Recommend Land Pattern	13
8. Recommend Soldering Parameters.....	13
9. Software Source	14

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.

HE means “core” in Chinese. Intend of HE 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

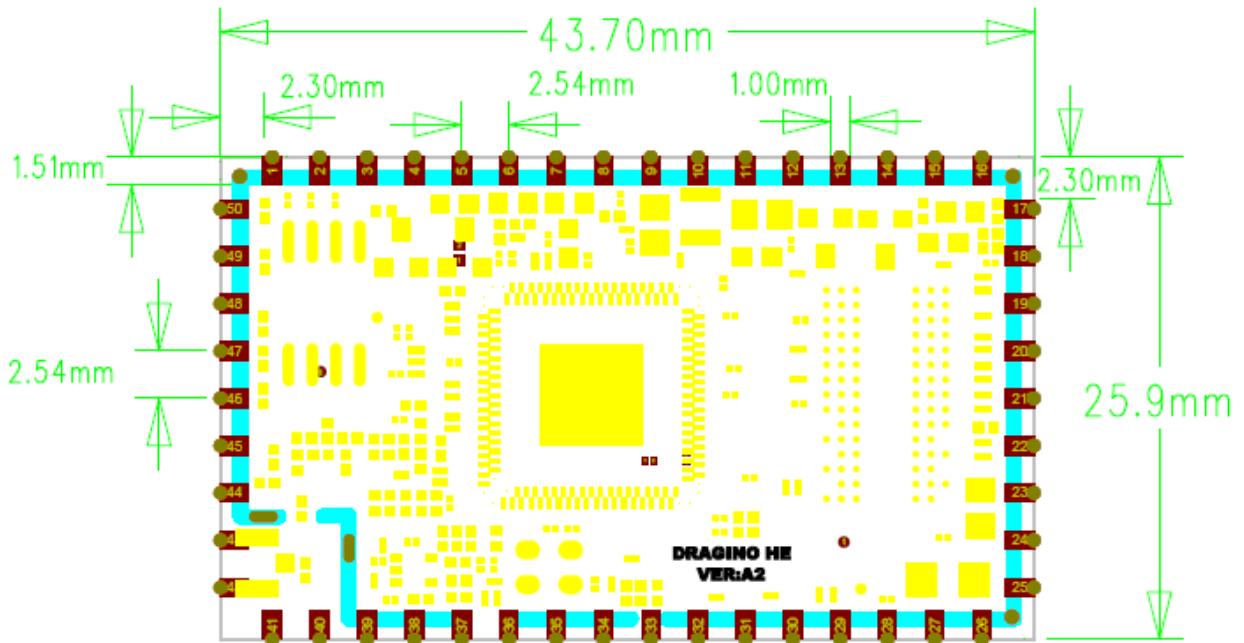
- ✓ **CPU:** ATHEROS AR9331 chipset, which integrates MIPS 24Kc processor, CPU 400MHz, Switch (MAC, PHY) and integrates with MAC, RF, PA and LNA for WiFi.
- ✓ **RAM :** 64MB;
- ✓ **Flash :** 16MB
- ✓ **Interfaces:** 2 x RJ45, 1 x USB Host, 1 x UART, 14 multiplex GPIOs
- ✓ **OS:** Open Source OpenWrt
- ✓ **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 2 dBi antenna)
- ✓ **RF Power:** 11n: 13dBm; 11g: 13-15dBm, 11b: 16-18dBm,
- ✓ **Connector:** I-PEX connector. Provide Optional ANT pin out for SMT

3. Applications

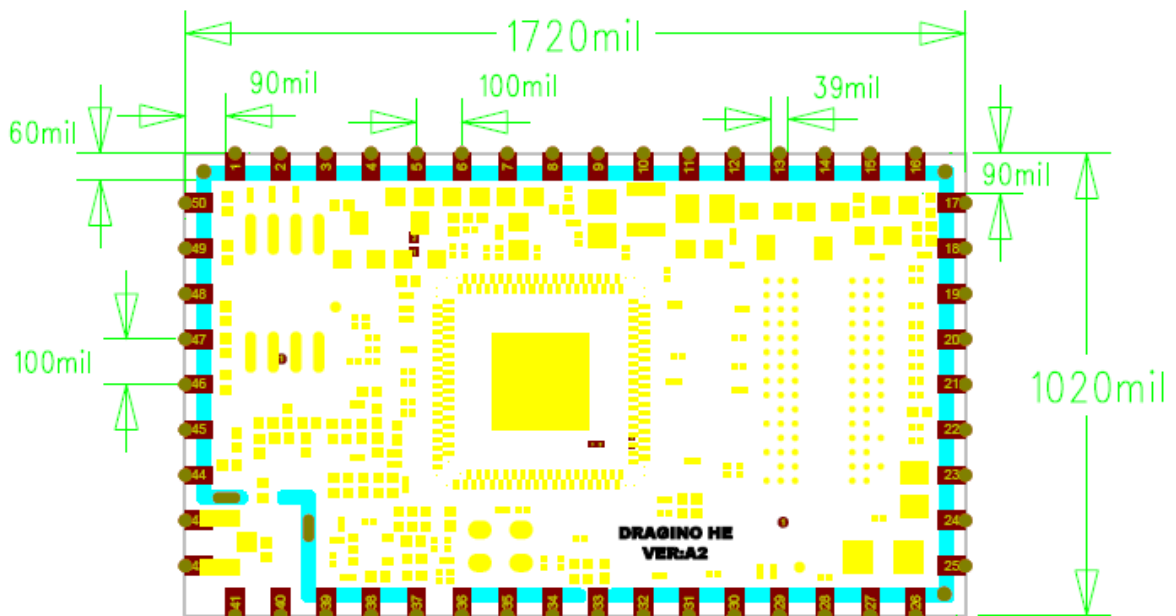
- Internet of Things
- Voice over IP
- Mesh WiFi
- 3G/4G router
- Industrial Control

4. Dimensions and Mechanical

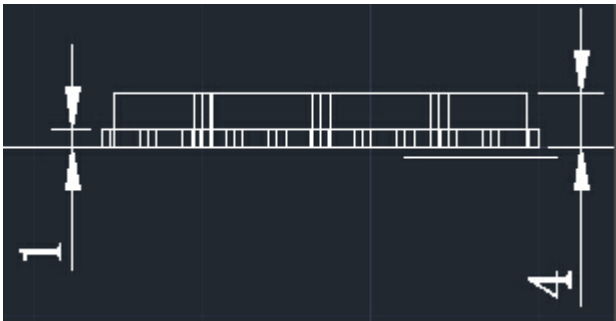
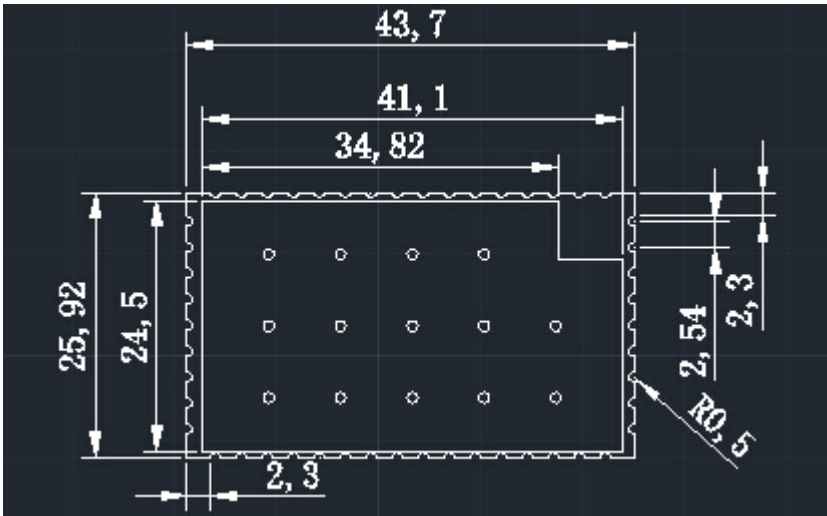
Unit: mm



Unit: mil

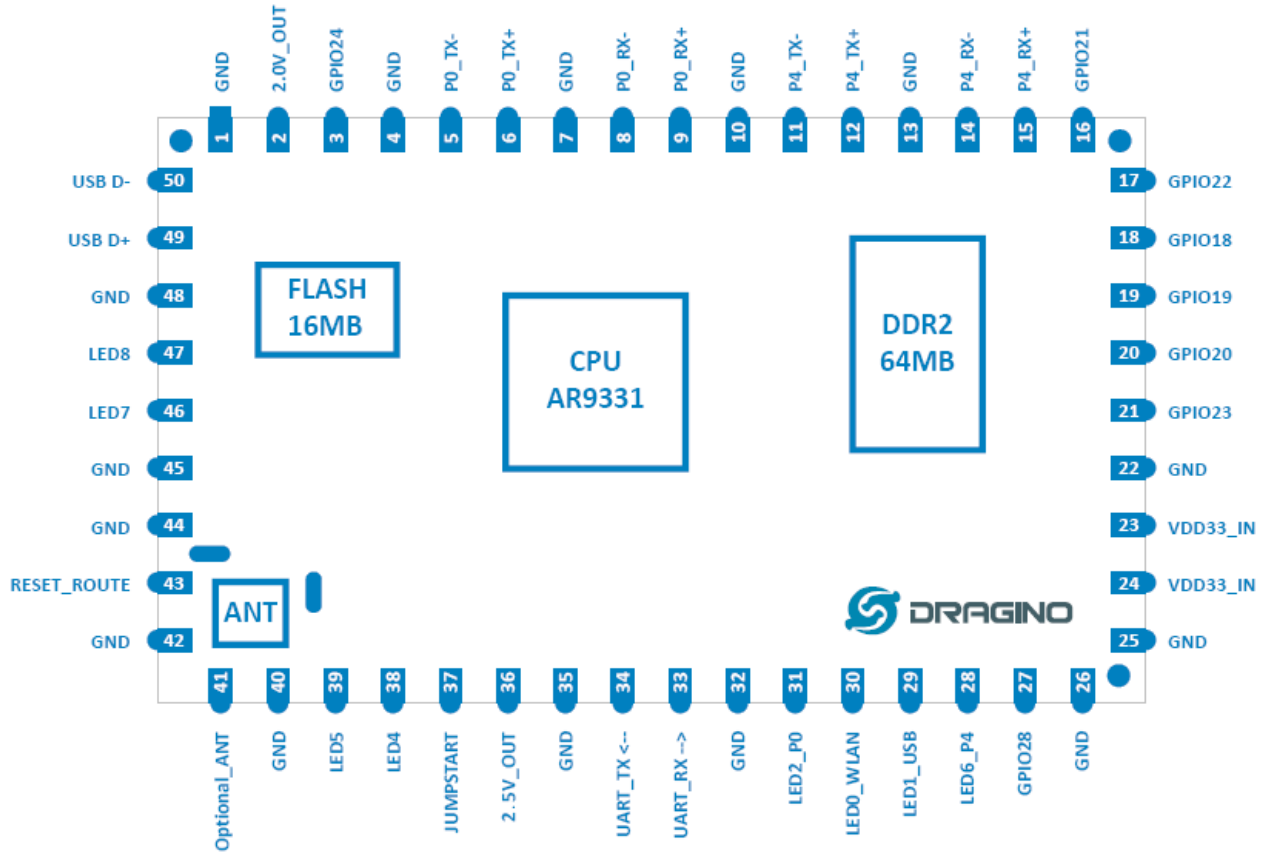


Unit:mm



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:

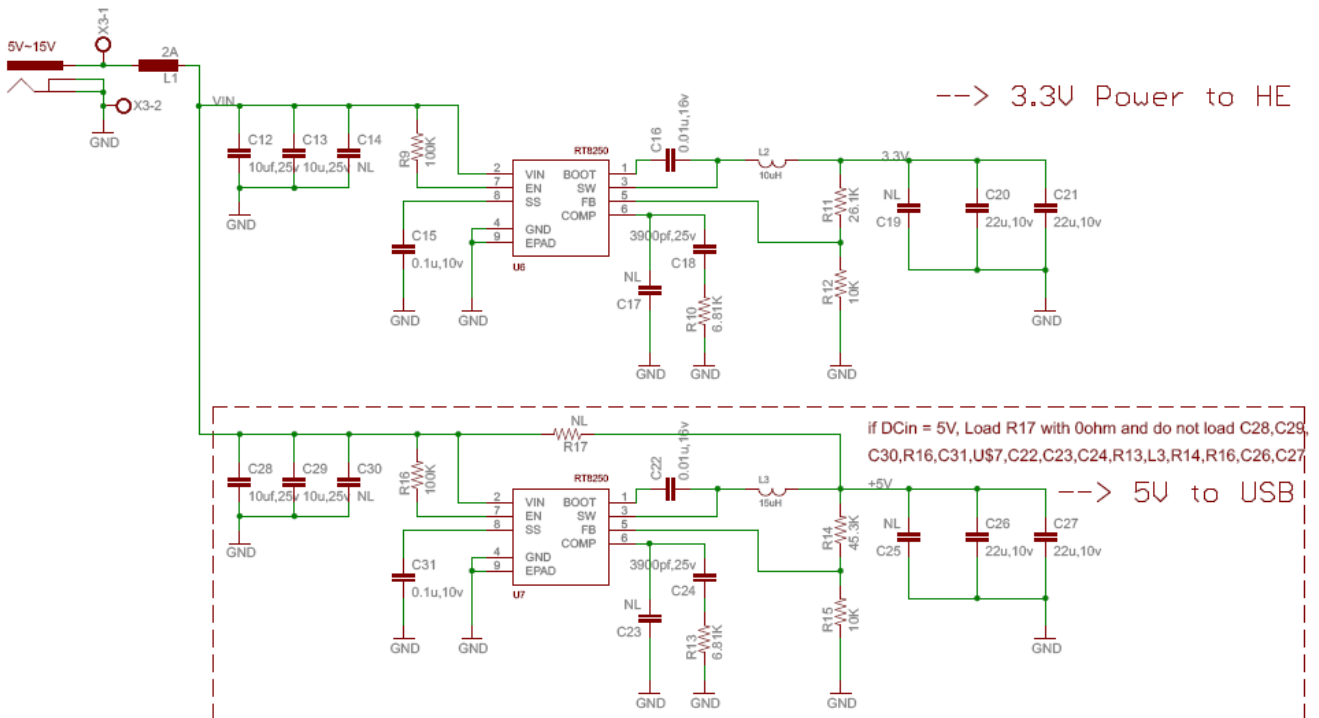
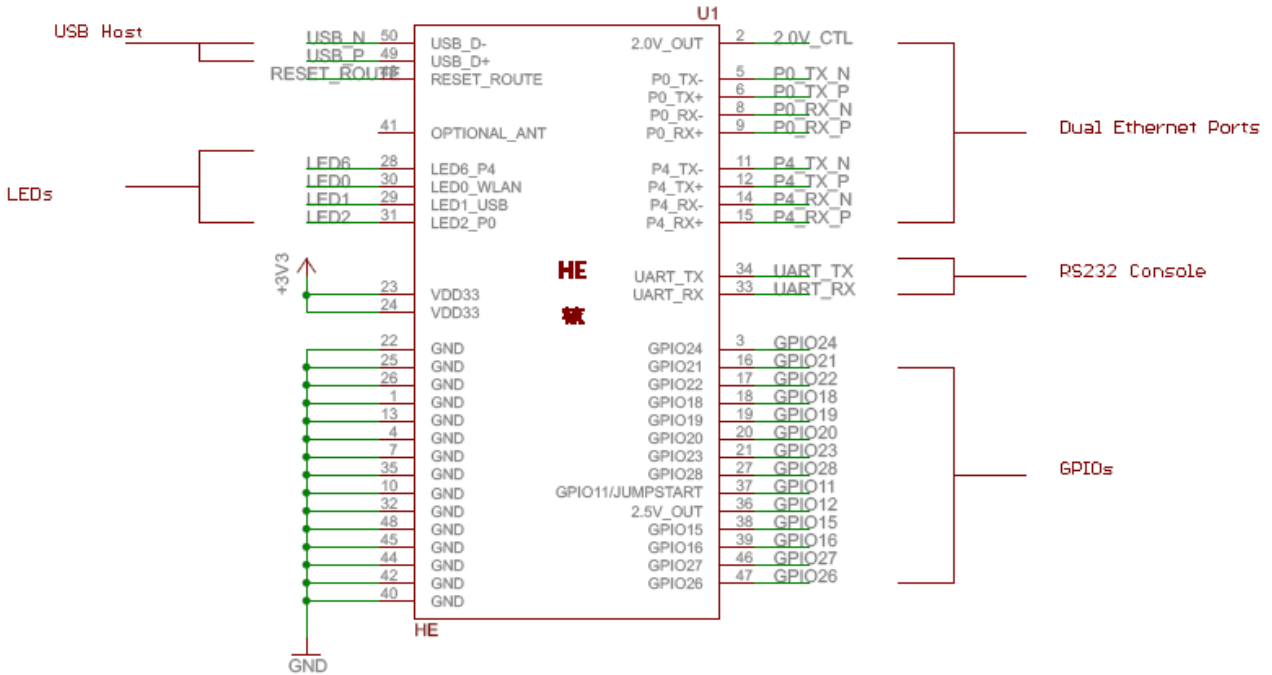
Periphery	IDLE		Bulk File Transfer in all ports	
	Current @3.3v	Power	Current @3.3v	Power
WiFi only	150ma	495mw	220ma	726mw
RJ45 only	160ma	528mw	205ma	676mw
WiFi + 1 RJ45	210ma	693mw	282ma	924mw
WiFi + 2 RJ45	270ma	891mw	343ma	1131mw
WiFi + 2 RJ45 + USB				

6. Reference Design

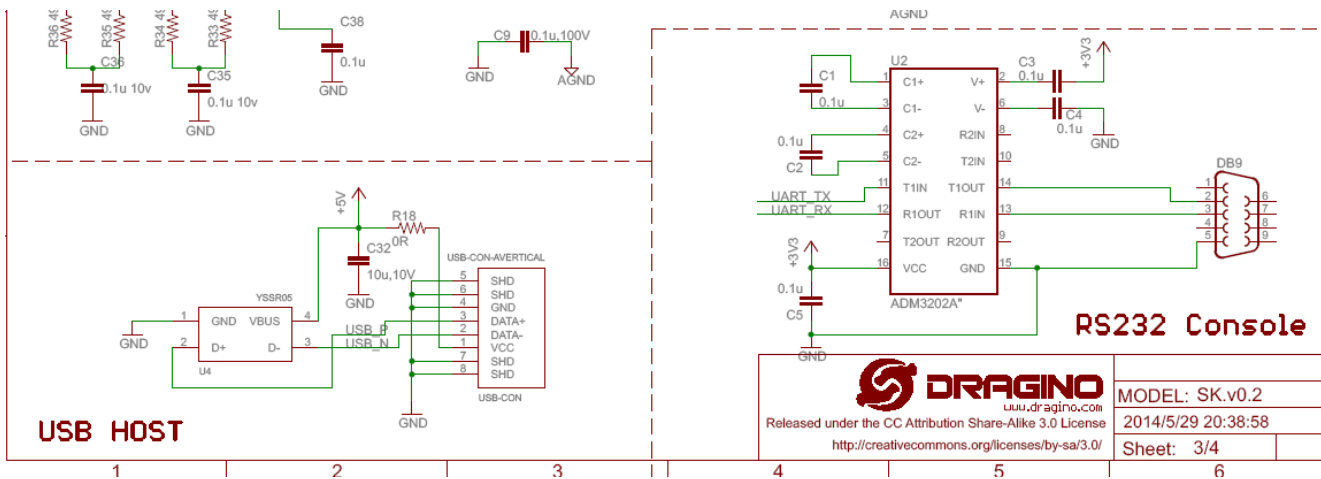
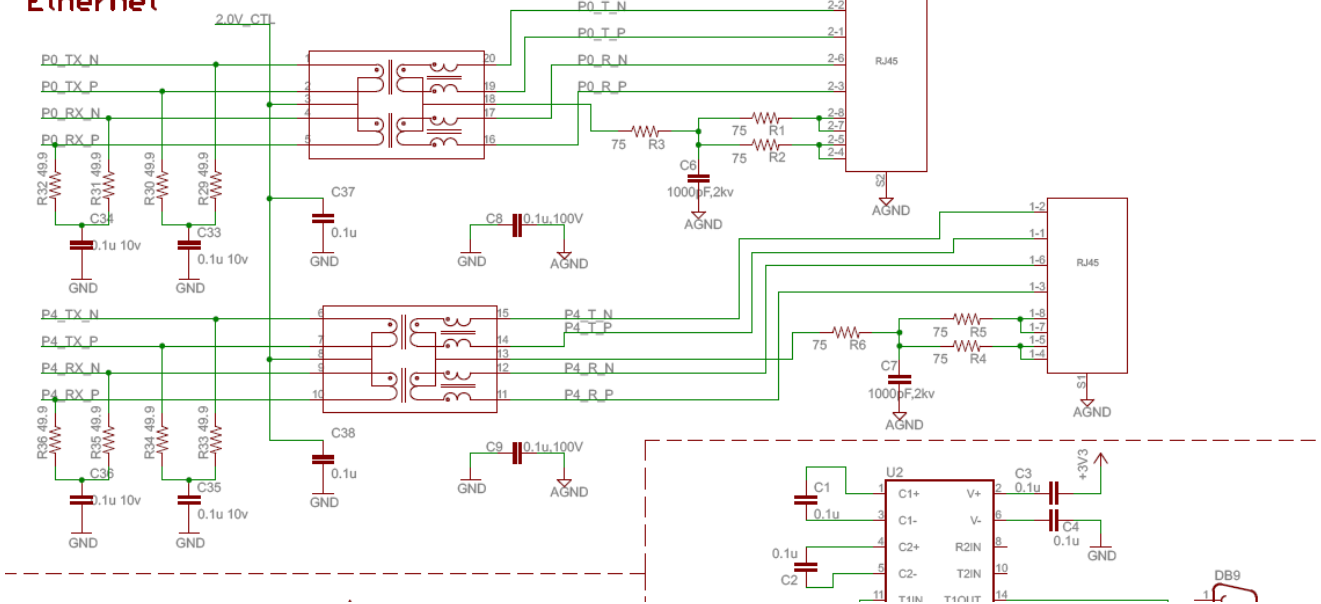
6.1 Generic IoT Router

This generic router design is a similar design as MS14 and the software and application can refer [MS14](#).

Eagle File source: https://github.com/dragino/modules/tree/master/hardware/HE_START_KIT



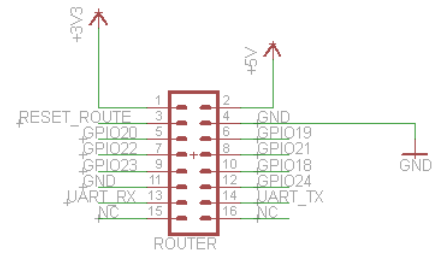
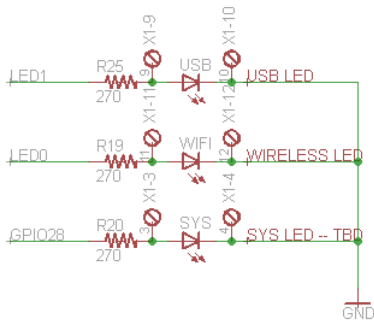
Ethernet



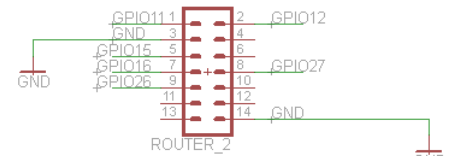
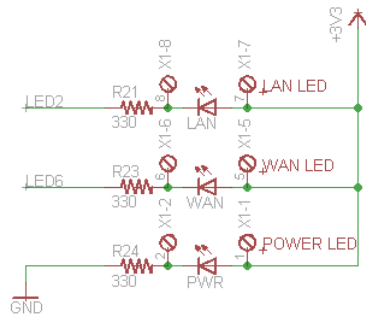
USB HOST

RS232 Console

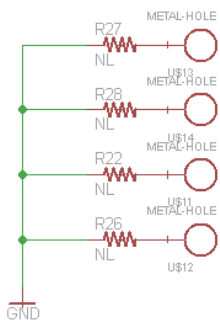
<p>www.dragino.com Released under the CC Attribution Share-Alike 3.0 License http://creativecommons.org/licenses/by-sa/3.0/</p>	MODEL: SK.v0.2
	2014/5/29 20:38:58
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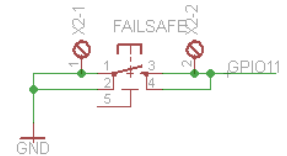
Router connector is compatible with ms14



Router_2 connector is different from ms14



JUMPSTART



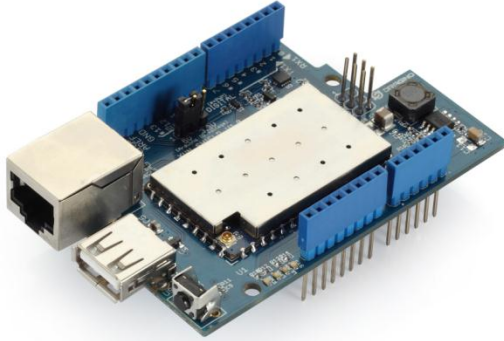
 www.dragino.com Released under the CC Attribution Share-Alike 3.0 License	MODEL: SK.v0.2
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6.2 Arduino Yun Shield

Arduino Yun Shield is a WiFi, Linux , Ethernet, and USB Shield for Arduino.

Product Link: <http://www.dragino.com/products/yunshield/item/86-yun-shield.html>

Product Photo:



Documents:

[Quick Start Guide](#)

[User Manual](#)

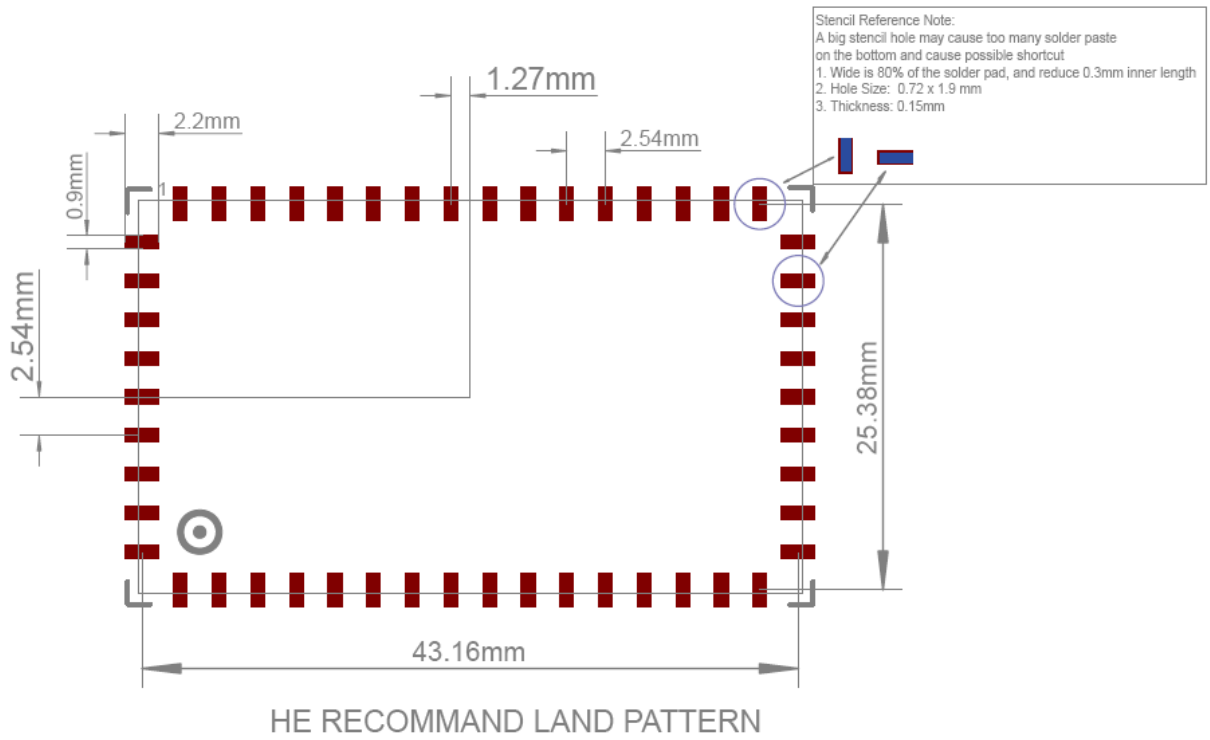
[Datasheet](#)

[Hardware Source](#)

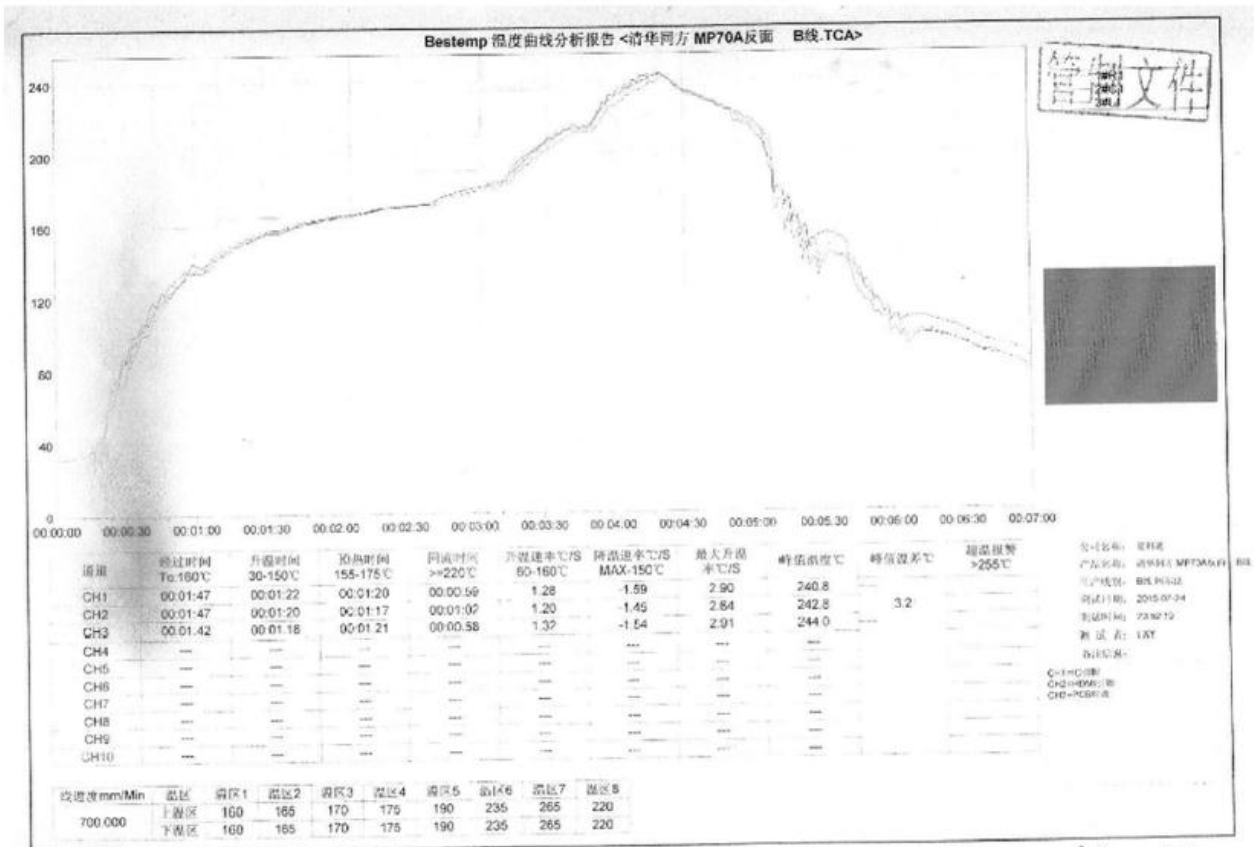
[Software Source](#)

[Firmware Download](#)

7. Recommend Land Pattern



8. Recommend Soldering Parameters



9. 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](#)