HF-Z100 ZigBee Module User Manual

V 1.2

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HISTORY

Ed.V1.0	04-10-2014	First Version.
Ed.V1.1	05-18-2014	Update Antenna Option and add EVK information.

1. PRODUCT OVERVIEW

1.1. General Description

The HF-Z100 is a fully self-contained, small form-factor, IEEE802.15.4 Zigbee modulewith low complexity, self-organizing, lowpower, low cost feature.It is based on IEEE802.15.4 standard, can be coordinated toachieve communication between the thousands of tiny sensors that require very littleenergy to relay the data through radio waves from one sensor to another sensor, thus withhigh communication efficiency.

The HF-Z100 employs the world's lowest power consumption embedded architecture. It has been optimized for all kinds of Zigbee applications in the home automation, smart grid, smart lighting, handheld device, personal medical application and industrial control that have lower data rates, and transmit or receive data on an infrequent basis.

The HF-Z100 integrates all IEEE802.15.4 Zigbee functionality into a low-profile,15.6x12.2x2.0mmSMT module package that can be easily mounted on main PCB with application specific circuits. Also, module provides built-in antenna, external antenna option.

1.2. Device Features

- Size: 15.6x12.2x2.0mm Smallest size module;
- High RX sensitivity: ≤-101dBm;
- Excellent link budget: > 110dB;
- Max output power: 9dBM +/- 1.5dBm;
- Extend OperationTemprture: -40℃- 110℃ for smart lighting application;
- Low power consumption:
  - Operating Current: < 150mA
  - Deep Sleep Current: <10uA
- 512KB Internal Flash, 160KB SRAM resource for customized application;
- Full Zigbee ZHA/ZLL profile supported;
- Various peripherals interface:
  - 15 x GPIO ports
  - 3 x 16-bit ADC input channel
  - 2 x UART with hardware flow control
  - 1 x SPI interface
  - 1 x I2C interface
  - SWD debug interface
- Power Supply Range from 2V to 3.6V, support battery supply application;
- High performance on-board antenna and PAD/HOLE for external antenna option;
- CE/FCC/RoHS certification;

1.3. Device Paremeters

Table 1. HF-Z100 Module Technical Specifications

Class	Item	Parameters
Wireless Parameters	Certification	FCC/CE
	Wireless Standard	802.15.4
	Radio Data Rate	250Kbps@2.4GHz
	Frequency Range	2.4~2.4835GHz
	Transmit Power	9 +/-1.5dBm
	ReceiverSensitivity	≤-101dBm
	Antenna Option	External: PAD or Through Hole for external ANT
		Internal:On-board Chip ANT
Hardware Parameters	Data Interface	UART,ADC,DAC
		SPI,I2C,GPIO
	Operating Voltage	2.0~3.6V
	Operating Current	＜80mA
	Deep Sleep Current	＜10uA
	Communication Distance	Indoor 30m,Outdoor 100m
	Operating Temp.	-40℃- 110℃
	StorageTemp.	-45℃- 125℃
	Dimensions and Size	15.6x12.2x2.0mm

1.4. Key Application

- Illumination control
- HVAC monitoring and control
- Building automation
- Access Control
- Security system
- Industrial automation
- Automated metering
- Smart energy

2. HARDWARE INTRODUCTION

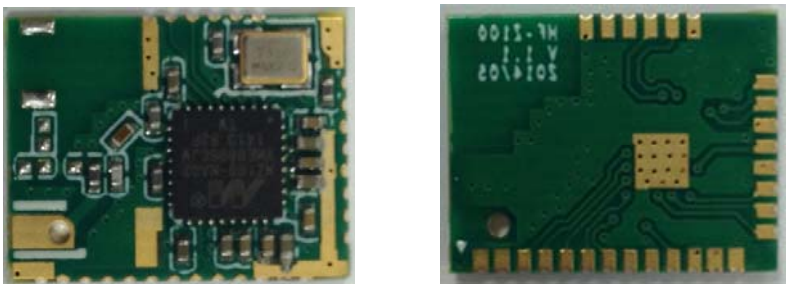


Figure 1. HF-Z100 Overview

2.1. Pins Definition

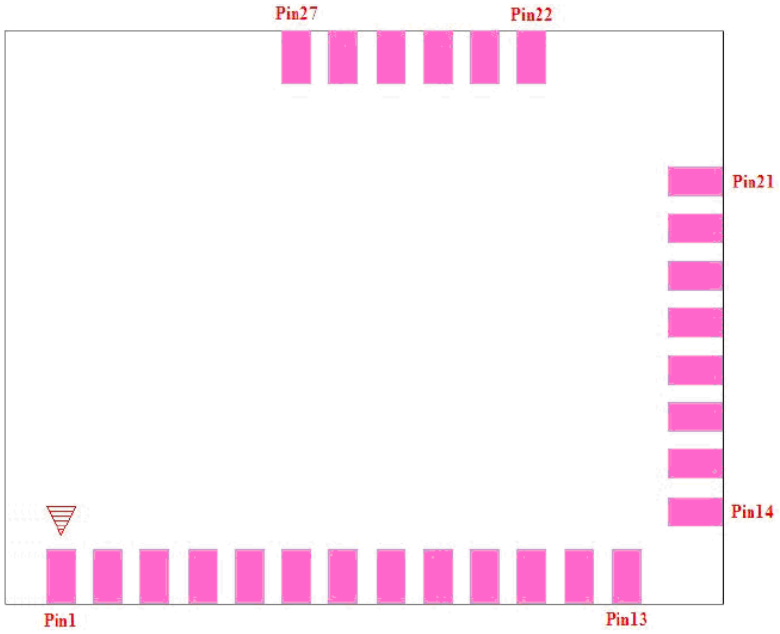


Figure 2. HF-Z100 Pins Map

Table 2. HF-Z100 Pins Definition

Pin	Net Name	Describtion
1~2	GND	Ground
3	GPIO12	PWM output-1 (Timerl)
4	GPIO13	PWM output-2 (Timerl)
5	GPIO14	SWD Clock
6	GPIO15	SWD Data
7	GPIO16	IIC SDA
8	VIO	IO Power (2.0~3.6V)

Pin	Net Name	Describtion
9	GPIO17	IIC CLK
10	GPIO18	PWM output-3 (Timerl)
11~13	GND	Ground
14	GPIO21	UART2_TXD
15	GPIO22	UART2_RXD
16	GPIO23	PWM output-4 (Timerl)
17	GND	Ground
18	VBAT	**Main Power (2.0~3.6V)**
19	GND	Ground
20	GPIO29	Reserve
21	GPIO28	Enable
22	GND	Ground
23	RESET_N	The reset signal
24	GPIO4	ADCx3 or ADCx1 And Wakeup INTx2
25	GPIO5	
26	GPIO6	
27	GND	Ground

2.2. Electrical Characteristics

Table 3. Operation Parameters

Parameter	Condition	Min.	Typ.	Max.	Unit
Operating Supply voltage		2.0	3.3	3.6	V
RX Current	Active CPU 32MHz		21		mA
TX Current	Active CPU 32MHz, +9dBm		34		mA
Deep Sleep Current			10		uA

Table 4. RF Parameters

Parameter	Ratings	Unit
Operating Frequency	2.4~2.4835	GHz
IF Frequency	4	MHz
Quantity of Channel	16	
Number of Channeels	11~26	
Max TX Power	9	dBm
RX Seneitivity	~104	dBM
Data Rate	250	KBS

2.3. Mechanical Size

HF-Z100 modules detailed mechanical data is referred to as following Figure(Unit is Mil).

The pad size:25mil X 45mil, pin pitch is 40mil.

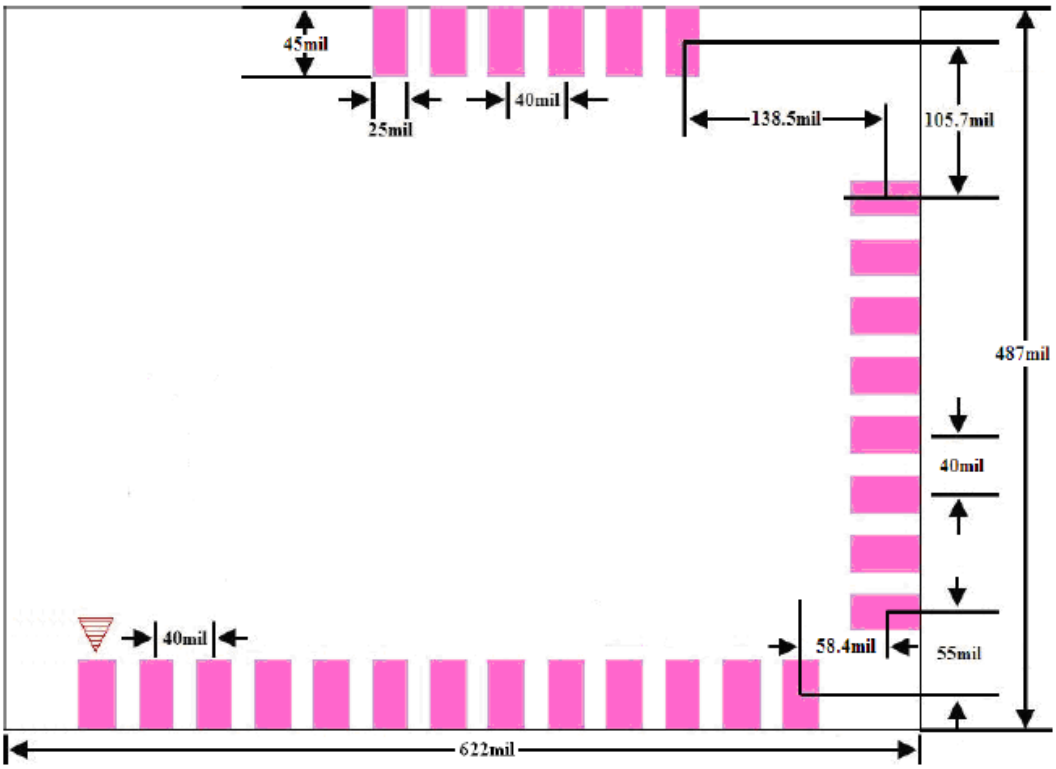


Figure 3. HF-Z100 Mechanical Dimension

2.4. Antenna

HF-Z100 module support internal on-board chip antenna and external wire antenna option.Wire antenna is flexible to avoid the metal affect or the other on RF performance in LED lighting because it isnot fixed on board like chip antenna and can be go out externally.

The position for the assembly of wireantenna on board referto Figure 4, user can select horizontal direction through the SMT PAD or vertical direction through the Through Hole PAD based on dedicated application.

When customer select internal antenna, you shall comply with following antenna design rules and module location suggestions:

- For user PCB, RED color region (6x5mm) can't put componet or paste GND net;
- Antenna must away from metal or high components at least 10mm;
- Antenna can't be shieldedby any meal enclosure. All cover, include plastic, shall away from antenna at least 10mm;

High-Flying suggest HF-Z100 module better locate in following region at customer board as Figure 5, which to reduce the effect to antenna and wireless signal, and better consult High-Flying technical people when you structure your module placement and PCB layout.

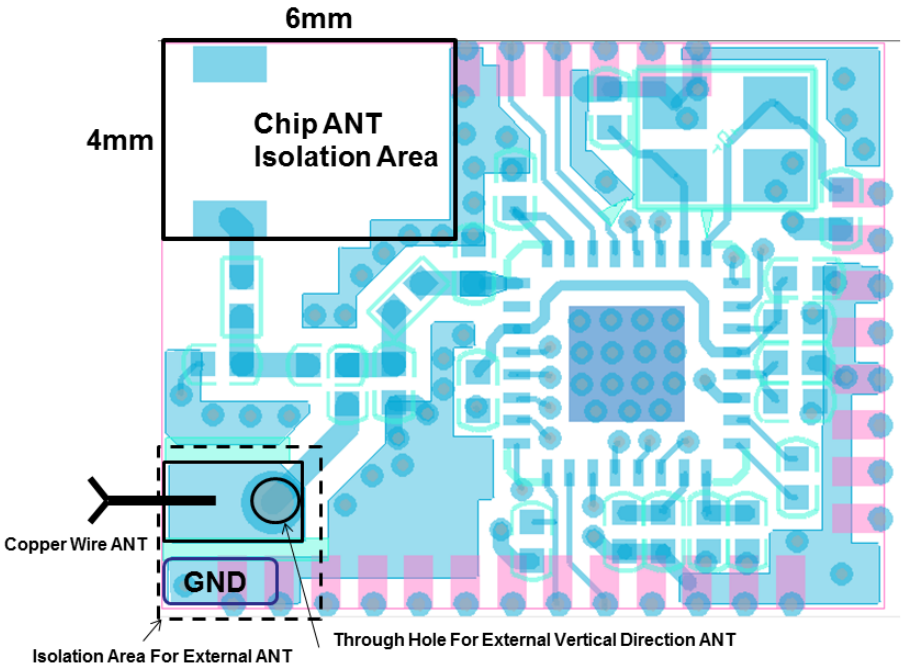


Figure 4. HF-Z100 Suggested Wire Antenna Position

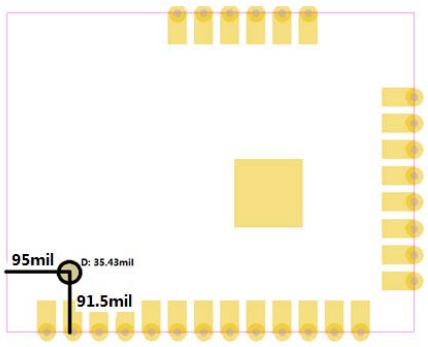


Figure 5. HF-Z100 through hole PAD Position

The through hole PAD Position:

X: 95mil; Y: 91.5mil; Dia.: 35.43mil

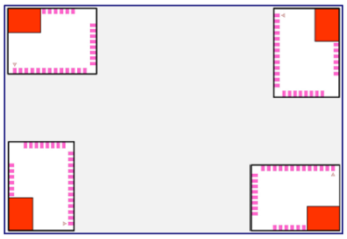


Figure 6. HF-Z100 with Chip Antenna Suggested Placement

2.5. Evaluation Kit

High-Flying provides the evaluation kit to promote user to familiar the product and develop the detailed application. The evaluation kit shown as below, user can connect to HF-Z100 module with the UART (USB), or SWD Debugger port to configure the parameters, manage the module or do the some functional tests.

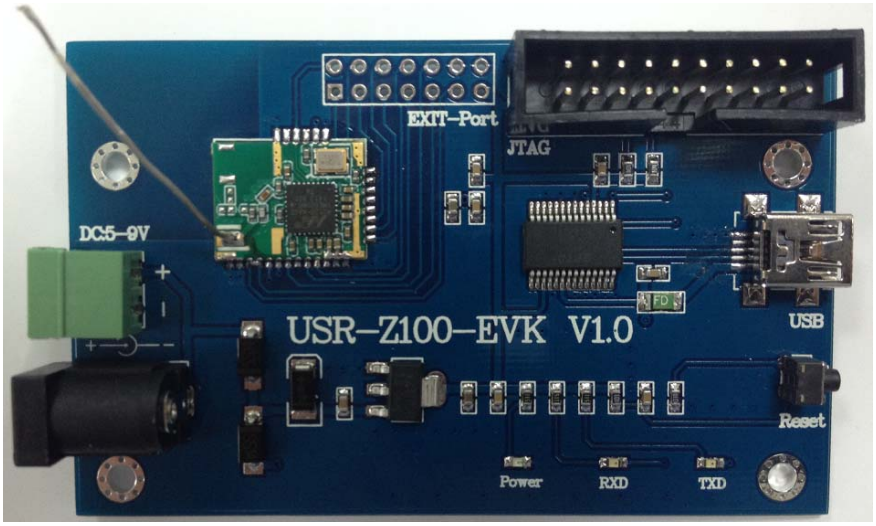


Figure 7. HF-Z100 Evaluation Kit

Notes: User need consult high-flying for software SDK support or more detailed debug support. The external interface description for evaluation kit as follows:

Table 5 HF-Z100 Evaluation Kit Interface Description

Function	Name	Description
External Interface	JTAG	JTAG data debug interface (Not for user use)
	USB	UART to USB debug interface. (For PC without RS232, need load driver). Can be Power input.
	DC Jack	DC jack for power in, 5~9V input.
	DC5-9V	DC jack for power in, 5~9V input.
	BAT	2 Li-Battery Power Supply.
	EXT PORT	HF-Z100 GPIO function extend interface connector
LED	Power	3.3V Power Indicator
	TXD	UART TXD Indicator
	RXD	UART TXD Indicator
Button	nReset	Used to reset the module.

2.6. Order Information

Base on customer detailed requirement, HF-Z100 series modules provide different variants and physical type for detailed application.

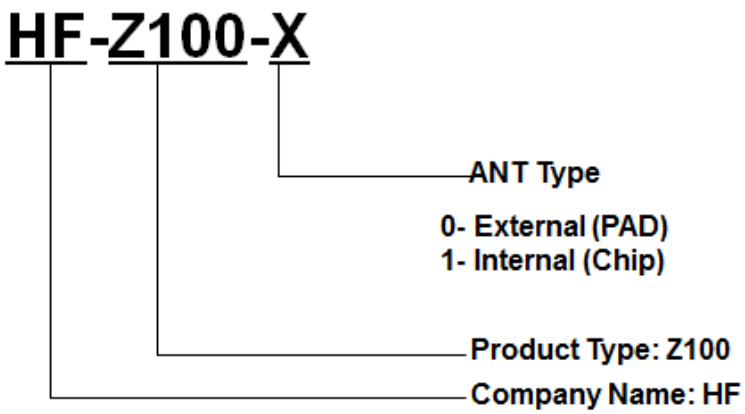


Figure 8. HF-Z100 Order Information

2.7. Typical Application

The module basic reference schematic is referred to following,

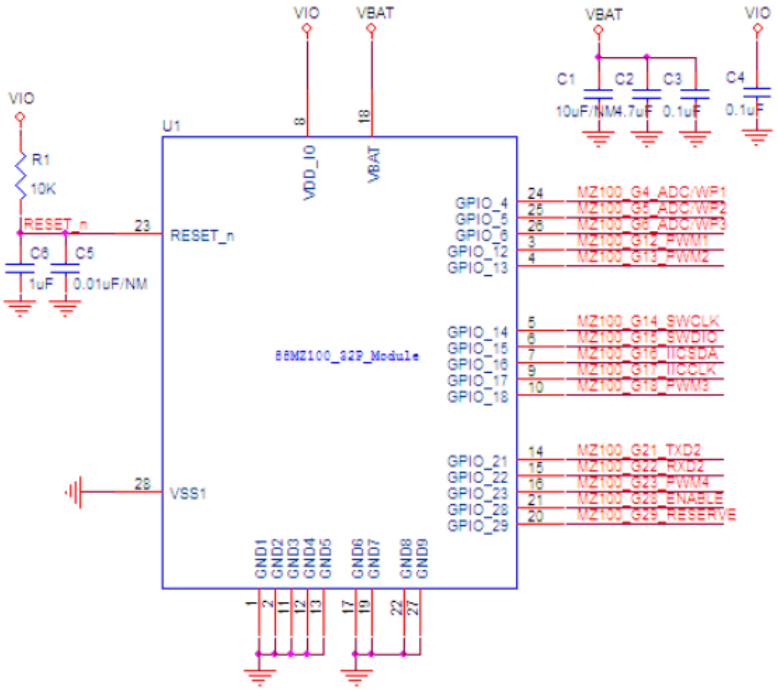


Figure 9. HF-Z100 Hardware Typical Application

Notes: If HF-Z100 GPIO6 (RXD) and GPIO4 (TXD) are not used for ADC and Wakeup function, suggestusing them as the default UART download port.

3. PACKAGE INFORMATION

3.1. Recommended Reflow Profile

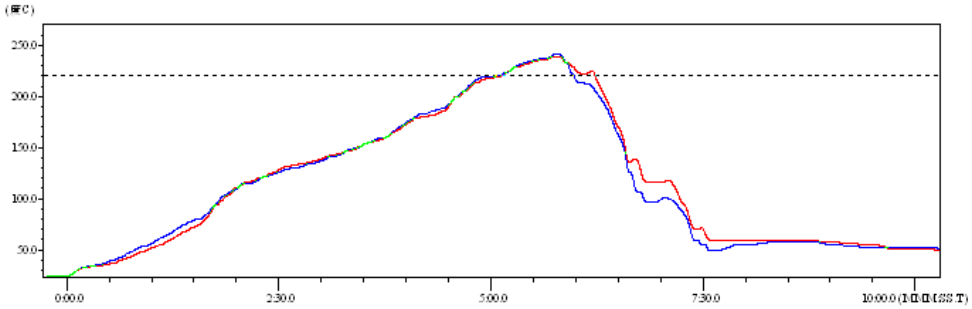


Figure 10. Reflow Soldering Profile

Table 6. Reflow Soldering Parameter

NO.	Item	Temperature (Degree)	Time(Sec)
1	Reflow Time	Time of above 220	35~55 sec
2	Peak-Temp	260 max	

Note: 1. Recommend to supply N2 for reflow oven.
2. N2 atmosphere during reflow (O2<300ppm)

3.2. Device Handling Instruction (Module IC SMT Preparation)

1. Shelf life in sealed bag: 12 months, at <30℃ and <60% relative humidity (RH)
2. After bag is opened, devices that will be re-baked required after last baked with window time 168 hours.
3. Recommend to oven bake with N2 supplied
4. Recommend end to reflow oven with N2 supplied
5. Baked required with 24 hours at 125+-5℃ before rework process for two modules, one is new module and two is board with module
6. Recommend to store at ≦10% RH with vacuum packing
7. If SMT process needs twice reflow:
   (1) Top side SMT and reflow . (2) Bottom side SMT and reflow
   Case 1: Wifi module mounted on top side. Need to bake when bottom side process over 168 hours window time, no need to bake within 168 hours
   Case 2: Wifi module mounted on bottom side, follow normal bake rule before process

Note: Window time means from last bake end to next reflow start that has 168 hours space.

3.3. Shipping Information

TAPE

Size: 340*340*70 mm

BOX

Size: 340*340*350 mm (inside)

Figure 11. Shipping Information

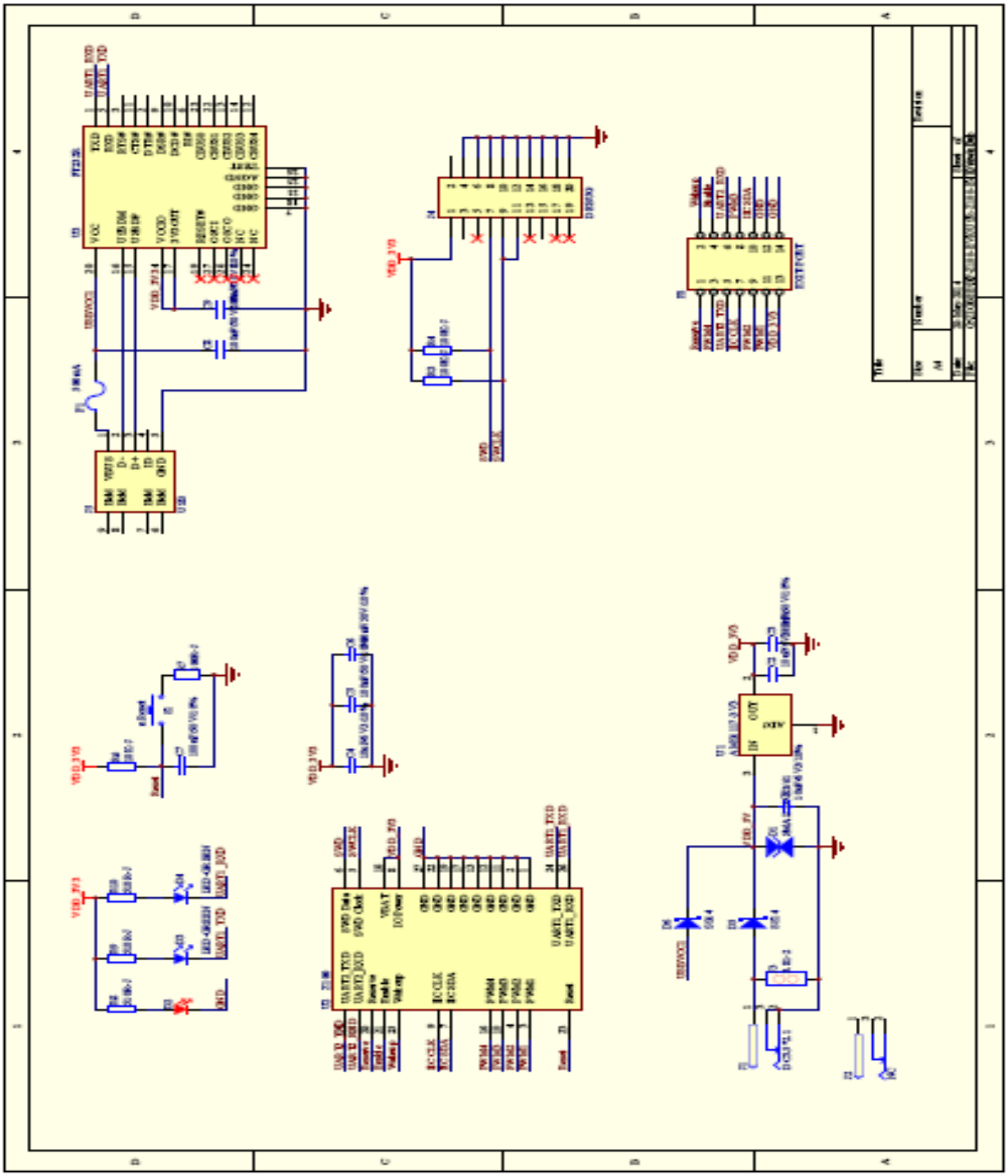
To Be Update

Note:

1 tape = 500pcs

1 box = 5 tapes = 5 * 500 pcs = 2500pcs

APPENDIX A: HW REFERENCE DESIGN



Detailed HF-Z100 Evluation Board design source files, pls access High-Flying web download page or contact with High-Flying technical support people to acquire.

APPENDIX B: CONTACT INFORMATION

Address: Room.511/510, Building 7, No.365, Chuanhong Road,Pudong New Area, Shanghai, China, 201202
Web:www.hi-flying.com
Service Online: 400-189-3108
Sales Contact: sales@hi-flying.com

For more information about High-Flying modules, applications, and solutions, please visit our web site http://www.hi-flying.com/en/

<END OF DOCUMENT>

FCC INFORMATION (USA) FCC STATEMENT

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.
CAUTION: 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 theinterference 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.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

OEM INTEGRATION INSTRUCTIONS:
This device is intended only for OEM integrators under the following conditions:The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported.
As long as these 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example,

digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot 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. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: 2ACSV-HF-Z100”.

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.