User Manual

Version 2.0

History

Version	Date	Note
V1.0	2010-7-16	Initial Release
V1.1	2010-10-26	Update the PCB footprint for the module
V2.0	2011-07-18	Update the PCB LAYOUT

Notes：

Hardware version 1.2

Product Description

The ZigBee RF module Z100B offered by NETVOX is low power, 2.4GHz ISM band transceiver based on the Ember357 single chip ZigBee Pro™ / IEEE 802.15.4 solution.

The Z100B comes in three different versions. On-board chip antenna, metal antenna and I-PEX version.
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Z100B(Metal Antenna)

Z100B(I-PEX Antenna)

Z100B(Chip Antenna)

Figure 1

The Z100B is designed to be SMD-mounted onto a host PCB. SMD-mounting provides the best RF performance at the lowest cost. Additionally the Z100B is designed to occupy minimal board space on the host PCB, which already includes plentiful interfacing ports and power management circuits. So it can be easily integrated into other device without the need for RF experience and expertise.
The Z100B operates in the 2.4-2.4835 GHz unlicensed worldwide ISM band.

Applications

- ✓ Safety and security
- ✓ Healthcare applications
- ✓ Asset management
- ✓ Home/Building Automation
- ✓ AMR – Automatic Meter Reading
- ✓ Wireless Alarms and Security
- ✓ Industrial Controlling and Automation
- ✓ Wireless Telemetric Application
- ✓ Wireless POS/PDA
- ✓ Wireless RS-232/485 Networking

Versions

The Z100B module supports ultra-low-power applications, in combination with long transmission range.
The Z100BC version features an on-module chip antenna. It is ideally suited for all multi purpose wireless mesh solutions.
The Z100BI version where the RF signal connects to an external antenna ideally suited to optimize antenna directivity and/or extended ranges.

Key Features

- ✓ High performance and low power 32-bit ARM Cortex-M3 microprocessor
- ✓ 2.4 GHz IEEE 802.15.4 compliant RF transceiver
- ✓ Integrated IEEE 802.15.4 PHY and lower MAC with DMA
- ✓ Only 1.5µA current consumption in power-down mode, where external interrupts or the RTC can wake up the system
- ✓ 1 µA current consumption in stand-by mode, where external interrupts can wake up the system.
- ✓ Up to 7dBm power output
- ✓ CSMA/CA hardware support.
- ✓ Wide supply voltage range (2.1V – 3.6V DC)
- ✓ Digital RSSI / LQI support and Powerful DMA functionality
- ✓ 12-bit ADC with up to six inputs
- ✓ AES security coprocessor
- ✓ Two Serial Controllers with DMA
- ✓ Two 16-bit general-purpose timers and one 16-bit sleep timer
- ✓ Watchdog timer and power-on-reset circuitry
- ✓ Powerful and flexible development tools available

netvox™

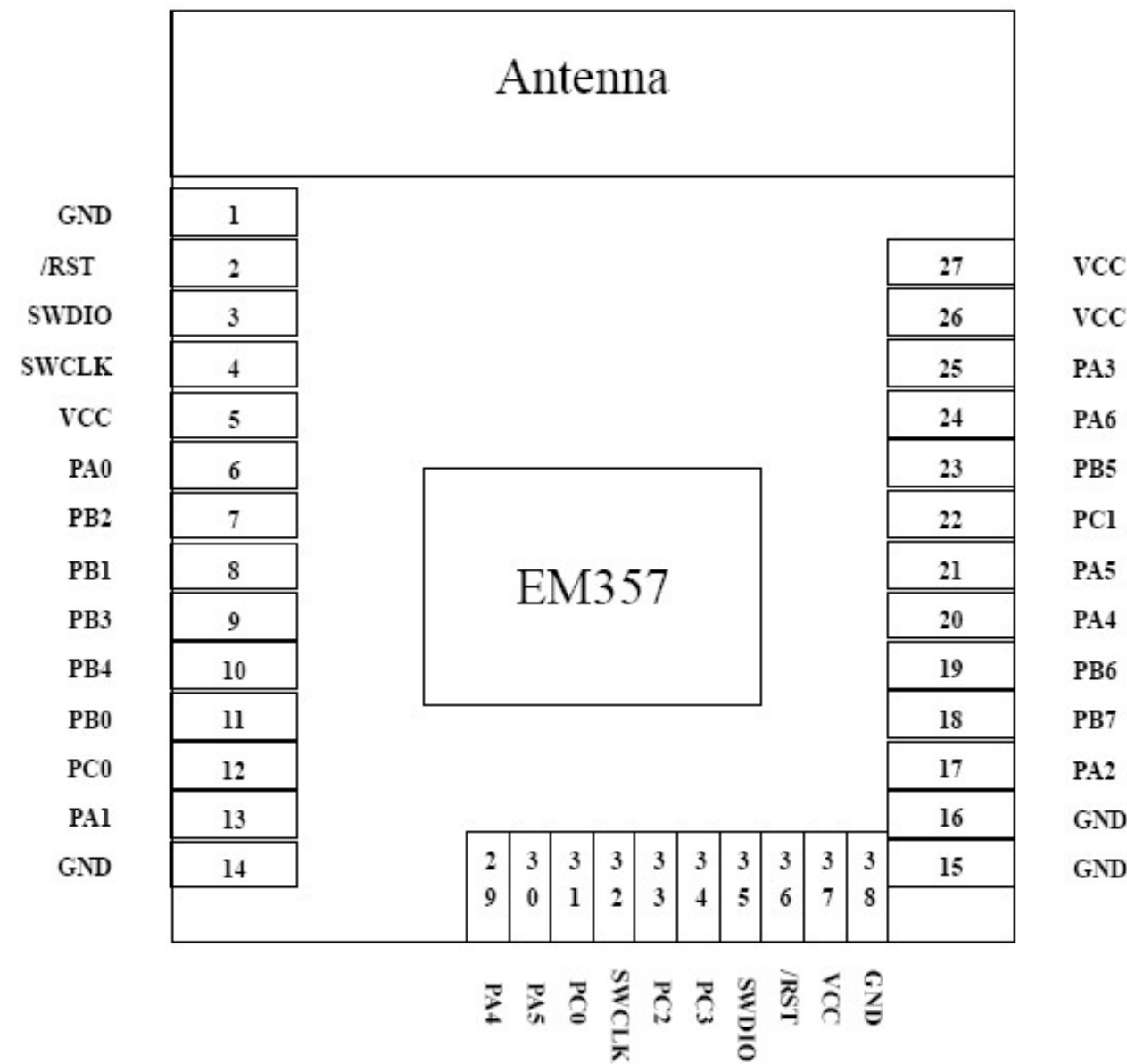## Pin Assignment

Figure 1 Pin assignment

Pin Description

Pin NO.	Pin name	Pin type	Description
1	GND	Ground	GND
2	/RST	I	Active low chip reset
3	SWDIO	I/O	Programming and debug interface
4	SWCLK	I/O	Programming and debug interface
5	VCC	Power	2.1V-3.6V DC power supply
6	PA0	Digital I/O	GPIO
7	PB2	Digital I/O	GPIO / MI / RXD / MSCL
8	PB1	Digital I/O	GPIO / MO / TXD / MSDA
9	PB3	Digital I/O	GPIO / CLK / nCTS
10	PB4	Digital I/O	GPIO / SS / nRTS
11	PB0	Digital I/O	GPIO / IRQA
12	PC0	Digital I/O	GPIO / IRQD
13	PA1	Digital I/O	GPIO
14	GND	Ground	GND
15	GND	Ground	GND
16	GND	Ground	GND
17	PA2	Digital I/O	GPIO
18	PB7	Digital I/O	GPIO / IRQC
19	PB6	Digital I/O	GPIO / IRQB
20	PA4	Digital I/O	GPIO / ADC0
21	PA5	Digital I/O	GPIO / ADC1
22	PC1	Digital I/O	GPIO / ADC2
23	PB5	Digital I/O	GPIO / ADC3
24	PA6	Digital I/O	GPIO
25	PA3	Digital I/O	GPIO
26	VCC	Power	2.1V-3.6V DC power supply
27	VCC	Power	2.1V-3.6V DC power supply
28	NC	No Connection	
29	PA4	Digital I/O	GPIO / ADC0
30	PA5	Digital I/O	GPIO / ADC1
31	PC0	I/O	Programming and debug interface
32	SWCLK/JCLK	I/O	Programming and debug interface
33	PC2	I/O	Programming and debug interface
34	PC3	I/O	Programming and debug interface
35	PC4/SWDIO	I/O	Programming and debug interface
36	/RST	I	Active low chip reset
37	VCC	Power	2.1V-3.6V DC power supply
38	GND	Ground	GND

Debugging interface

Pin29~38 of the module are arranged for burning and debugging interface.

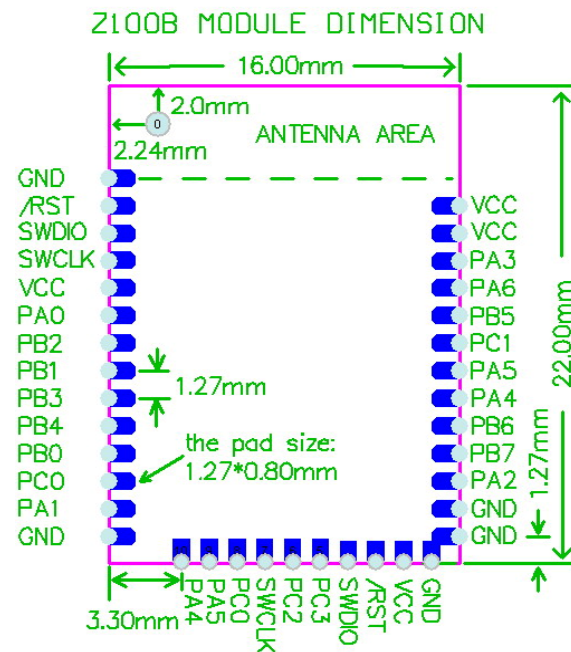# Mechanical Drawing and Dimensions

Figure 2 Mechanical Drawing and Dimensions
The module size is 16.0*22.0*3.7mm

Antenna and Range Considerations

The Z100BC module is delivered with an integrated antenna. This is highly recommended for most applications, as this gives a very compact solution containing all the critical RF parts within the module.

The radiation pattern from the antenna is similar to the donut-shaped obtained from a quarter wave antenna. That is, the maximum radiation is in the plane perpendicular to the length axis of the antenna. For best achievable radiation the module should be oriented so that the antenna is vertical.

The antenna should be kept more than 10 millimeters away from metallic or other conductive and dielectric materials. Any metallic enclosures would shield the antenna and reduce the communication range drastically. In applications where the module must be placed in a metallic enclosure, an external antenna would give best signal strength. The external antenna is attachable from the i-PEX connector of the Z100BI module. The RF input/output is matched to 50 Ohm.

PCB Layout Recommendations

ZiOOB MODULE APPLICATION
PCB LAYOUT DIMENSION

None any substance area

GND
/RST
SWDIO
SWCLK
VCC
PA0
PB2
PB1
PB3
PB4
PB0
PC0
PA1
GND

18.4mm

17.1mm

the pad size:
0.8*2.2mm

1.27mm

VCC
VCC
PA3
PA6
PB5
PC1
PA5
PA4
PB6
PB7
PA2
GND
GND

16.0mm
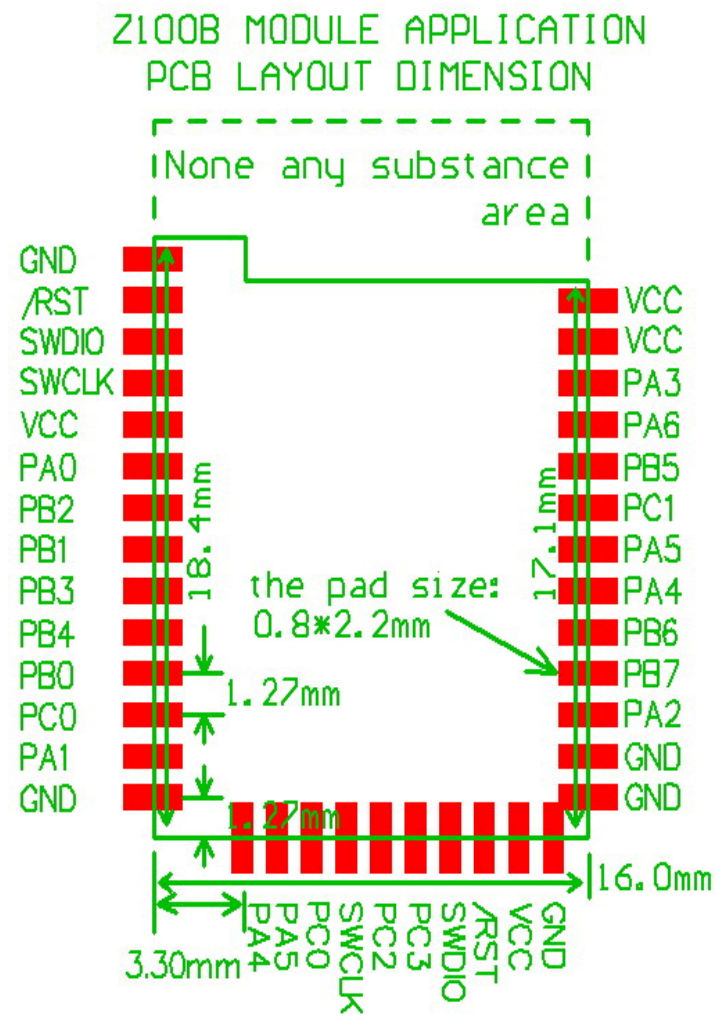
PA4
PA5
PC0
SWCLK
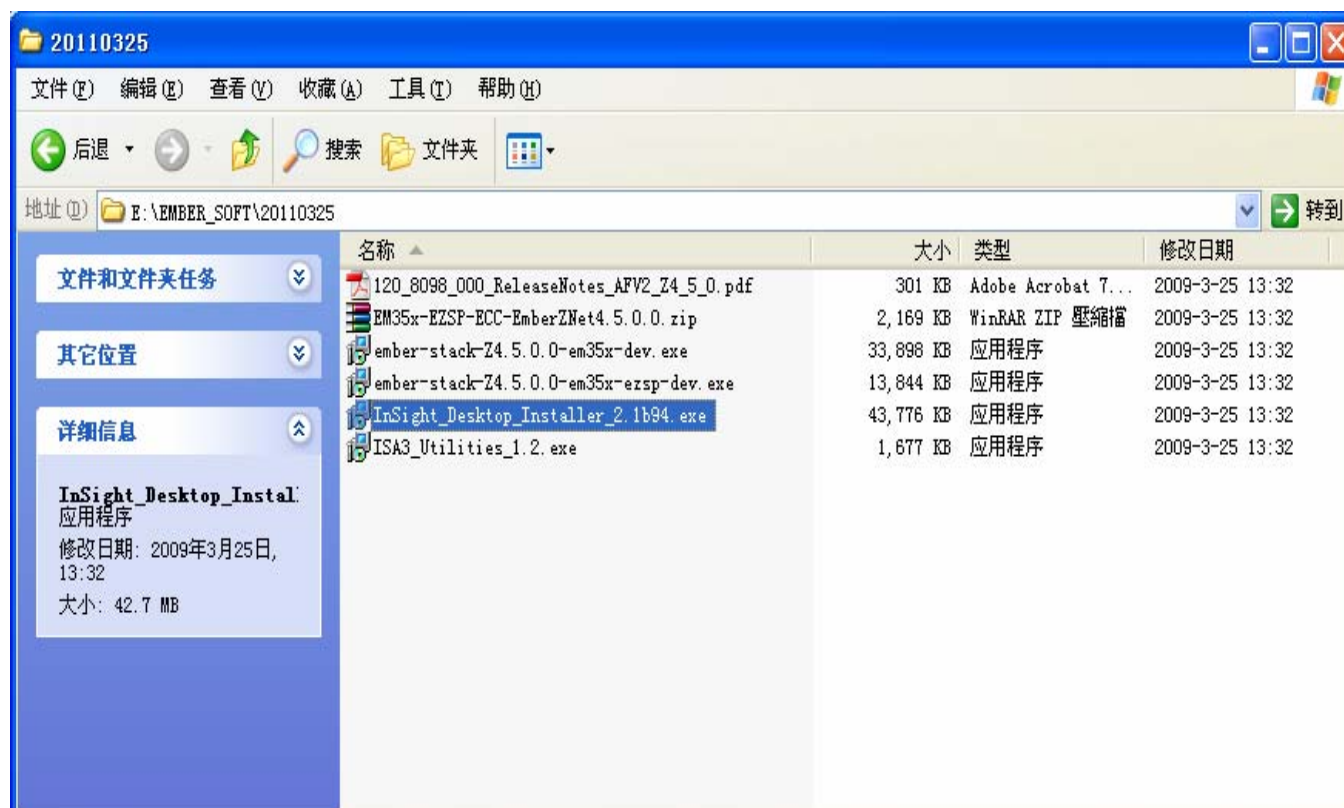PC2
PC3
SWDIO
/RST
VCC
GND

3.30mm

Figure 3

Steps:
Install EMBER InSight Desktop

I. Install the EMBER InSight Desktop onto your PC for burning unencrypted EM357 firmware.

On the PC, select and double-click on the executable InSight_Desktop_Installer_2.1b94, then follow the prompt to complete the installation.

II. Wiring Setup before Burning Firmware

After Step I, you are ready to setup wires between the InSight Adapter (ISA3) and the RF module.

Now wire the cable on the Ember InSight Adapter (ISA3) to the RF module. The pin labels are shown in the figure below.
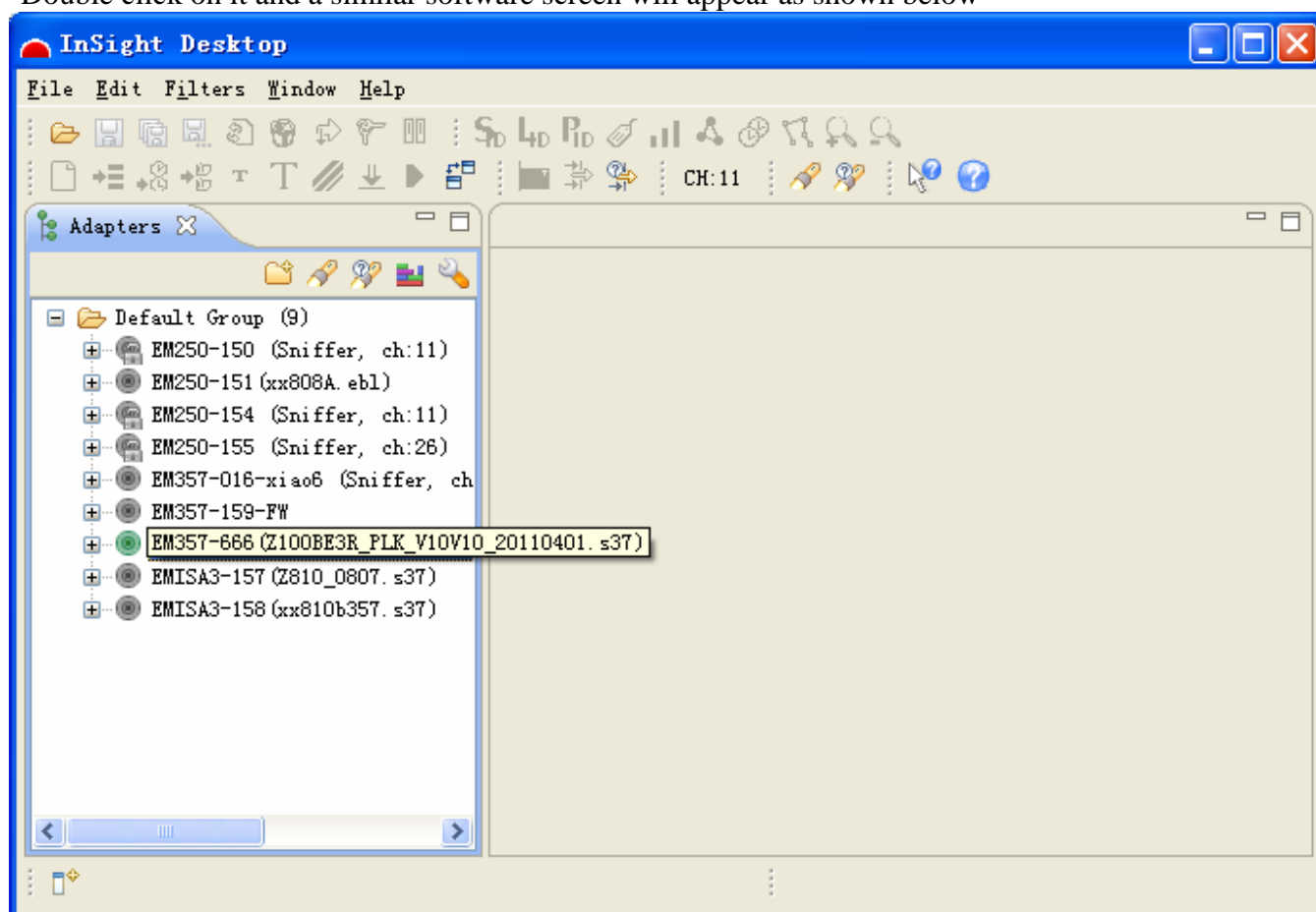
2 9	3 0	3 1	3 2	3 3	3 4	3 5	3 6	3 7	3 8

PA4 PA5 PC0 SWCLK PC2 PC3 SWDIO /RST VCC GND

III. Burn a firmware

When the above operation is done, a shortcut is then created for you on your desktop as shown in the figure below:


Double click on it and a similar software screen will appear as shown below

Before burning your firmware into the EMBER357, please make sure that all the cables of InSight Adapter (ISA3) are attached to the RF module according to the pin assignment mentioned earlier.

Now select the firmware file with s37 extension that you wish to write. Click Upload Application, a similar software screen will appear as shown below:
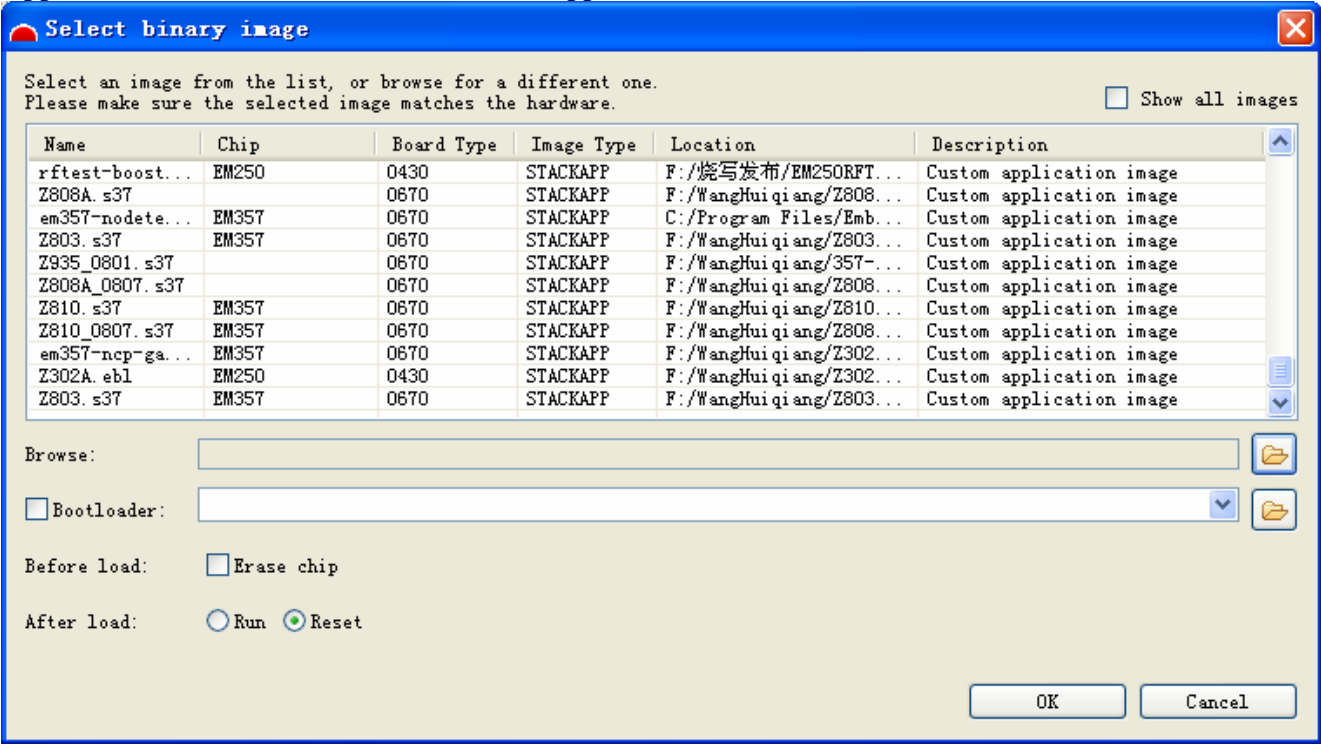
Click the button and go to the file.
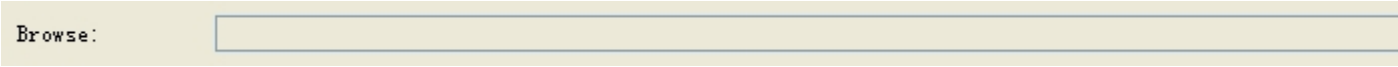
To write the firmware, simply click on .

The OEM integrator has to be aware of not to providing information to end users regarding how to install or remove this RF module in the user manual of the end product. The user manual which is provided by OEM integrators for end users must include the following information in a prominent location.

"To comply with FCC RF exposure compliance requirements, the antenna user for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

Label for the end product must include "Contains FCC ID: NRH-ZB-Z100B"or "A RF transmitter inside, FCC ID: NRH-ZB-Z100B"

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

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.

FCC RF Radiation Exposure Statement:
1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

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