

UPSC

802.15.4

Wireless Data Transceiver

Module installation Guide

MODEL No.: **U8100-P-A**

Approved By

NOTE

This document is a preliminary specification.

All information in this document is subject to change without prior notice.

Approved	Reviewed	Submitted

Record of Revision

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1 General Descriptions

1.1 *Background Information*

To provide a simple personal network service over the near field controlled devices, the IEEE 802.15.4 is doubtlessly superior to any other wireless systems such as WIFI, and Bluetooth, etc.

The U8100-P-A is a versatile standalone RF module widely used in the UPSC' wireless communication devices. It is a low power, low cost wireless module and is fully compliant with IEEE802.15.4 standard. The U8100-P-A features its simple yet versatile capabilities and hence suitable for various command, control, communications applications either in residential or industrial arena.

The U8100-P-A is an integral of a 8-bit RISC core, a 2.4GHz transceiver, and 512 bytes of RAM and hence alleviates from the need of an external memory. In addition, the hardwired MAC and highly secured AES encryption accelerator with integrated sleep oscillator and power saving facilities are all provided to make low power and minimum processor overhead possible.

Big differences to compare with all of the IEEE 802.15.4 based products in the market are that U8100-P-A is not a simple RF stamp-like module but with embedded solution which allows users to implement various kinds of applications. No need to worry the sophisticated development environment and lots of RD chores, simple settings via common PC will be sufficient.

Such high level of integration helps to reduce the overall system cost and simplifies the development efforts during the process. In particular, the standard device can also incorporate a wide range of digital and analog peripherals for further developments.

Where sometimes there's situations needed to extend the wireless control coverage over a far distance, a power amplifier (PA) circuit is also required to reach the goal. The P(RF) front end circuit equipped stamp is provided. By integrating a highly efficient and linear one-stage power amplifier (PA), RF switches, a low noise amplifier (LNA) and a band-pass filter (BPF). Using this highly integrated RF module, not only the required board space can be reduced, but also the external components.

1.2 Specifications

U8100-P-A

1. Small form factor, 19 x 19 mm² PCBA package
1. Utilizes globally available 2.4GHz ISM band.
2. AT commands provided for control and configure.
3. 65535 unique node addresses, IDs allow multiple large networks to coexist.
4. Transmit Power Output, 16.9 dBm
5. Complete IEEE 802.15.4 specification compliance
6. Typical Receiver Sensitivity -95 dBm
7. Typical throughput data rate 230,000bps
8. Non-Obstructed signal range to 75 ~ 500 meters
9. Multiple Low Power Operating modes.

1.3 Applications

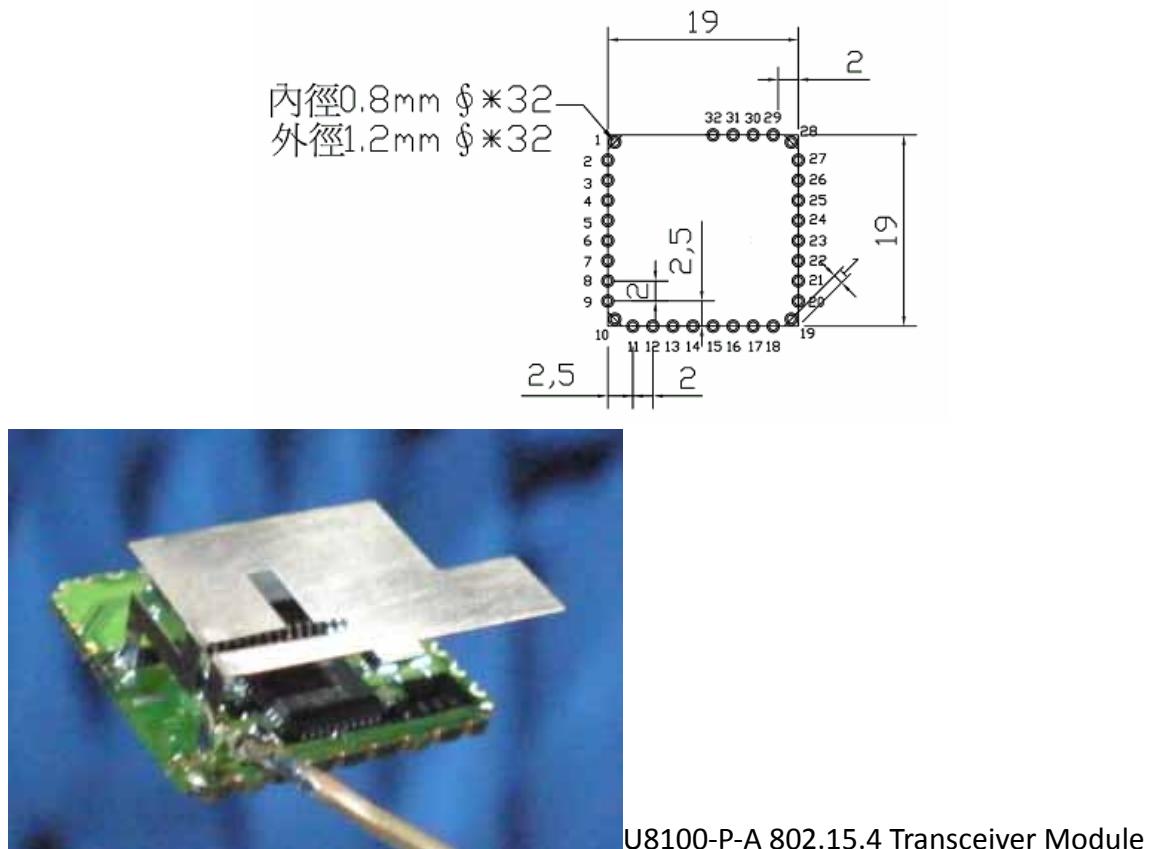
- Robust and secure low power wireless applications
- Wireless sensor networks, particularly IEEE802.15.4 / ZigBee systems
- Building automation (security, HVAC, AMR and lighting access control)
- Home automation (security, entertainment systems, HVAC and lighting access control)
- Industrial automation (asset management, process control, energy management)
- Industrial systems, SCADA applications
- Telemetry and utilities (e.g. AMR)
- Toys and gaming peripherals

1.4 Advantages

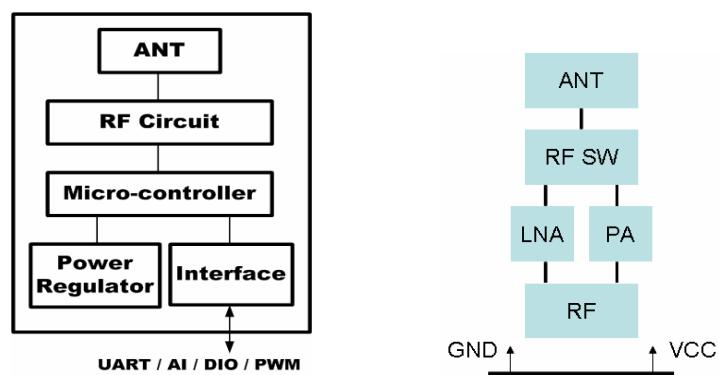
- Low cost - Extends wireless to virtually any sensor
- Low power consumption - Ideal for battery operation
- Small size, light weight - Easy to integrate
- Direct sequence spread spectrum - High noise immunity capability
- Easy to change the settings - Saves time and costs
- Worldwide license-free operation - Time to market

2 Device Overview

2.1 Mechanical Drawing



2.2 Block Diagram



2.3 Pin Assignments

To ease the efforts during integration, each pin of the designed module can be a simple general I/O pin with simple data I/O definitions. U8100-P-A can be integrated in a data transparent application platform with only 4 wires required which are **Rx**, **Tx**, **Vcc** and **GND**. For further application needs, there have some general I/O pins for data transmit flow control used or other I/O controlling which function can be reconfigured in AT command mode.

U8100-P-A A1 transceiver module is a stamp-like RF module, with pin definitions as follows:

Pin Description			
Pin#	Symbol	Pin#	Symbol
1	RF_INT	17	CEX0/P3,7
2	AIN1/P1,1	18	P2,5
3	AIN0/P1,0	19	RF_VCC
4	ECI/T0/P3,4	20	P2,6
5	P2,2	21	P2,7
6	P2,3	22	CEX2/P2,0
7	MCU_RESET	23	P3,0/UART_RX
8	INT1/P3,3	24	P3,1/UART_TX
9	XTLO	25	P2,1
10	XTLJ	26	AIN3/P1,3
11	INT0/P3,2	27	AIN2/P1,2
12	RF_RESET	28	GND
13	RF_SEN	29	RF_WAKE
14	VCC	30	RF_SCLK
15	CEX1/T1/P3,5	31	RF_SO
16	CEX3/P2,4	32	RF_SI

To provide an easier way of using the U8100-P-A stamp, U110 carrier board is provided a dongle carrier board design. Developers can install the dongle on PC or compatible platform to conducts data transparent application.



3 Electrical Specifications

3.1 DC Characteristics

V_{SS}=0V, TA = 25°C, V_{CC}= 3.3V unless otherwise specified

Parameters	Test Condition	Symbol	Limits			
			Units	Min	Typ	Max
Input High Voltage for P1 and P3	V _{CC} =3.3V	V _{IH1}	V	2.0	-	-
Input High Voltage for RESET pin	V _{CC} =3.3V	V _{IH2}	V	2.8	-	-
Input Low Voltage	V _{CC} =3.3V	V _{IL}	V	-	-	0.8
Output Low Current	V _{PIN} =0.45V	I _{OL}	mA	8	14	-
Output High Current(push-pull)	V _{PIN} =2.4V	I _{OH1}	mA	4	8	-
Output High Current(Quasi-Bidirectional)	V _{PIN} =2.4V	I _{OH2}	uA	-	64	-
Logic 0 Input Current(Quasi-Bidirectional)	V _{PIN} =0.45V	I _{IL1}	uA	-	7	50
Logic 0 Input Current(Input-Only)	V _{PIN} =0.45V	I _{IL2}	uA	-	0	10
Input Leakage Current(Open-Drain Output)	V _{PIN} =V _{CC}	I _{IK}	uA	-	0	10
Logic 1 to 0 Transition Current(P1,3)	V _{PIN} =1.4V	I _{H2L}	uA	-	100	600
Operating Current	F _{OSC} =12MHz	I _{OP}	mA	-	9	15
Idle Mode Current	F _{OSC} =12MHz	I _{IDLE}	mA	-	3.5	6
Power Down Current	V _{CC} =3.3V	I _{PD}	uA	-	0.1	50
Internal Reset Pull-Down resistance	V _{CC} =3.3V	R _{RST}	Kohm	-	100	-

This device's working voltage is 2.6V to 3.3V.

That tablet must use this range voltage only to design.

NCC Warning Statement

Article 12

Without permission, any company, firm or user shall not alter the frequency, increase the power, or change the characteristics and functions of the original design of the certified lower power frequency electric machinery.

Article 14

The application of low power frequency electric machineries shall not affect the avigation safety nor interfere a legal communication, if an interference is found, the service will be suspended until improvement is made and the interference no longer exists.

RF Exposure statement --

The equipment use distance from the human body is > 20cm

RF exposure warning: The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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

Information to OEM integrator

1. The antenna orientation in the intended application will have the antennas horizontally mounted at the bottom of conducted display section. As for grounding, the antenna cable must be grounded in close proximity to where it exits the enclosure of the host system.
2. Transmitting antenna(s) can only be installed at the display section of computer. When this device is installed other than notebook computers, at least 20 cm separation distance shall be maintained between the transmitting antenna(s) to the body of user or nearby person.
3. The antenna(s) used for this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter product procedures.
4. Only those antennas with same type and lesser gain filed under this FCC ID number

can be used with this device.

5. The regulatory label on the final system must include the statement: " Contains FCC ID: N32-U8100-P-A or using electronic labeling method as documented in KDB 784748.

6. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system.

7. The final host manual shall include the following regulatory statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

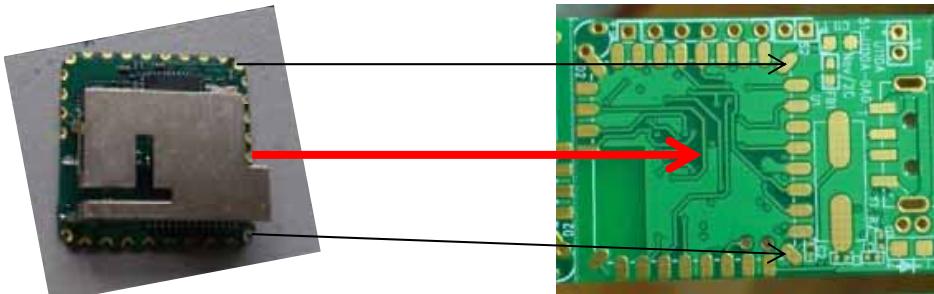
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

How to install the RF8100-PA module on the platform?

A: The platform have to design the schematic to fit the RF8100-PA module, include the foot pin and pin assignments, in most application, the platform only need provide Vcc, Gnd, Tx, Rx, Join, Rest point, in advanced application maybe require the GPIO points.

Assume the platform already have the placement for the RF8100-PA module:

Step 1: Place the RF8100-PA module point by point.



Step2: The module installing on the platform by welding each solder connect point.

