Handfree Mini Reader Module User Manual

1 Scope

Radio Frequency Identification (RFID) has been included in the 21st century one of the 10 major technologies. RF is the automatic identification object recognition technology. Readers are to read in the attached electronic tags on objects such as to carry out card access to the information, animal tracking, checking inventory and merchandise checkout, and sales of the whole supply chain management. This will become a model to change human consumption patterns emerging technology.

The main operation principle of RFID is utilizing the reading device (Reader) Send RF wave for the electronic label that is planted into or stuck on the things (Tag) in order to distinguish the wireless materials. The composition component of RFID system includes Reader, Tag, PAD or cell-phone and the contents which are in reader or tag.

When the application system wants to distinguishing things, the host can be passed by RS-232 to control reader and sends radio wave energy. When Tag senses this energy that there is asking the answering machine inside (Transponder) and the mechanism will change power into energy that passes a series of discernment materials giving back to reader and host that are in order to distinguish the things.

The specification of HANDFREE MINI READER MODULE is in compliance with EPC Class-1 Gen 2 that is a specification for RFID air interface.

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

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 instruction, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose 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 the interference 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.

To OEM installer:
1. FCC ID label on the final system must be labeled with "Contains FCC ID: XSL00000UHFISTC01" or "Contains transmitter module FCC ID: XSL00000UHFISTC01 ".

2.In the user manual, final system integrator must be ensured that there is no instruction provided in the user manual to install or remove the transmitter module.

3. Transmitter module must be installed and used in strict accordance with the manufacturer is instructions as described in the user documentation that comes with the product. This device complies with the following radio frequency and safety standards.

The user manual of the final host system must contain the following statements:

USA-Federal Communication Commission (FCC)
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 instruction, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose 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 the interference 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.

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.

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

To inherit the modular approval, the antennas 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.

2 The list of references:

Item	Referances
1	EPC Class-1 Generation-2 UHF RFID version 1.1.0
2	ISO/IEC WD 18000-6 REV1

Table 1

3 Abbreviated Terms

Term	Definitions
ASK	Amplitude-Shift Keying
EPC	Electronic Product Code
PIE	Pulse Interval Encoding
ppm	Parts-per-million
PSK	Phase-Shift Keying
Reader	Interrogator
RF	Radio Frequency
RFID	Radio Frequency Identification
TAG	Transponder IC
FW	Firmware

Table 2

4 System Specification

Reader is mainly used to read the materials from tag to carry on the work of distinguishing of the things with PDA or the cell-phone. When PDA or the cell-phone assigns the order for Reader, reader will transmit RF wave with data out through antenna.   Once tags are receiving the information, the tag will backscatter the data with 96-bit EPC C1G2 protocol to Reader through RF mechanism that is built inside.   Reader receives after the data that will give PDA or the cell-phone the work of distinguishing which carries on the things.

For the wired RS232 interface of entity among PDA, cell-phone and readers, the industrial communication protocols are interchanging in order to reach the data. It is depending on the untouchable RF wave between reader and tag to reach the data to interchange with the communication protocol that is defined by EPC C1G2。

4.1 System Structure

There are five parts of PDA or the cell-phone for system structures that are including the power, digit, radio frequency, base and FW respectively.

4.1.1 Radio Frequency Circuit

This is a transceiver module with ISM of the electromagnetic wave for a transmission and receiving. It is among them transceiver inside that is in transmitter and the receiver function as follows:

- The function of the Transmitter:
  The function of the transmitter is controlled and produced the signal carrier by the synthesizer of the microprocessor. The signal that will be modulated in amplitude to be an ASK signal used to offer the power that the tag is used to read data from its memory as well as using the pulse to adjust the way of changing to write the data into the tag。

- The function of the Receiver:
  The function in receiving information from tags has been demodulated to several digital signals. The signals are also amplified and straining waves to deal with microprocessor.

4.1.2 The Interface of Power Supplies

The power system is offered 3.3V by HANDFREE MINI READER MODULE interface of PDA or the cell-phone with Max. 2A.

- 3.3V-5.2.5 (1) ：The microprocessor and UART using.

- 3.3V-5.2.5 (2) ：ISM RF transceiver using.

- 3.3V-5.2.5 (3) ：Power Amplify using

4.1.3 Hardware User Manual

The HANDFREE MINI READER MODULE connects to the host via a 16 pins header for data, communications and 4-pin header for power. The 3 data lines are: Ground, Data Transmit (TX) and Data receive (RX) for UART. The communication header also contains the additional pins which are interfaces for USB or JTAG. Those pins can be used to provide data to another sensor or auxiliary board. The power header pins supplying power to the HANDFREE MINI READER MODULE is 3.3 Volts (and must be low-noise and regulated). A diagram of the pins are given below.
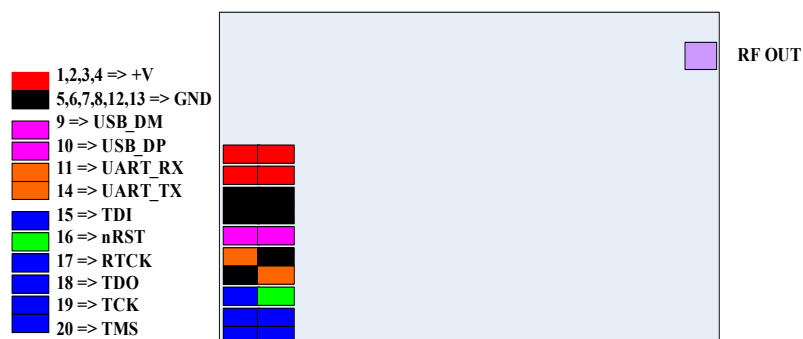

1,2,3,4 => +V
5,6,7,8,12,13 => GND
9 => USB_DM
10 => USB_DP
11 => UART_RX
14 => UART_TX
15 => TDI
16 => nRST
17 => RTCK
18 => TDO
19 => TCK
20 => TMS

RF OUT

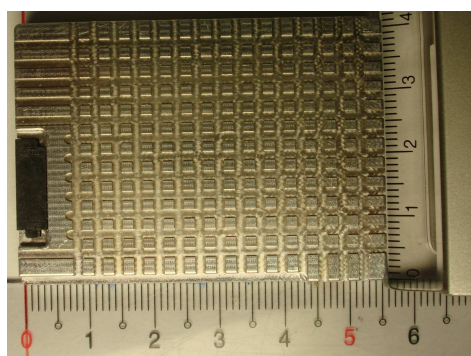Fig 4-4. Pin Out for Handfree Mini Reader Module

Fig 4-5. Photograph of Handfree Mini Reader Module

4.1.4 Module Operation

The HANDFREE MINI READER MODULE is a single-antenna reader module. The backscatter signal is demodulated to baseband through a standard mixer stage and is filtered and amplified. The baseband signal is then sampled and processed by a microcontroller.

The entire RF section of the reader module can be completely turned OFF under software control by the microcontroller. This allows the HANDFREE MINI READER MODULE to consume very low power when in standby mode. During RFID operation, the transmit power of the HANDFREE MINI READER MODULE is 1W, so the total power consumption is 1.8A during the fraction of a second that is required to read the tags in the field.

4.1.5 Interfacing with Handfree Mini Reader Module

The Handfree Mini Reader Module is designed to interface with another circuit board (i.e. PDA as following photo) and communicate using a simple 3-wire serial interface. However, for testing purposes, it is possible to connect the Handfree Mini Reader Module to a computer using a serial RS-232 adapter. In this case, the Handfree mini Reader module Control Panel software can be used.

4.1.6 Starting Windows Demo Program

After installing the demo program, you can connect the reader to the computer using a serial cable (standard DB9 connectors). Please make sure that you have an antenna connected to the reader.

The program supplied with the kit is able to interface to all the RFID readers made by Proview. You should open the program (Proview reader control panel), then go to the Reader menu and selected . Then go to the ComPort menu and select the proper COM port where you connected the reader. You should then verify that the BaudRate setting is correct (9600), then you can click the CONNECT button.

After you run the program for the first time, the software settings will be saved automatically so you should not need to reconfigure the control program unless you switch to another reader product.