

TFE HONG KONG LIMITED

Transceiver Technical Manual

Model: TRFM915

FCC ID: Y32-ERFBANT0915

Version: 1.0

TFE: Ken

7/6/2011

This is the user guide of RF module TRFM915.

TFE: Ken

0

Table of Contents

- 1 General**
- 2 Feature Summary**
- 3 Block Diagram**
- 4 Pin Assignment**
- 5 Electrical**
 - 5.1 ABSOLUTE MAXIMUM RATINGS
 - 5.2 OPERATING CONDITIONS
 - 5.3 ELECTRICAL SPECIFICATION
- 6 Mechanical Dimension**
- 7 Installation Guide**
- 8 Federal Communication Commission Interference Statement**

Figures:

Figure 1 RF Module Block Diagram

Figure 2 Pins Assignment

Figure 3 PCB Size

1. General

This user guide is used for the model TRFM915. It is included circuitry block diagram, pin assignment, electrical specification, mechanical dimension and installation guide as well as the Federal Communication Commission Interference Statement.

2. Feature Summary

- Integrated PCB trace Antenna
- Optional MMCX connector for external antenna
- 10 RF channels
- Output Power up to 10mW
- Serial UART interface
- Low Power Consumption
- Compliance Certification:
- RoHS Compliant
- 2dBi external antenna gain
- Frequency Table

| Channel 1 | Channel 2 | Channel 3 | Channel 4 | Channel 5 |
|-----------|-----------|-----------|-----------|------------|
| 906MHz | 908MHz | 910MHz | 912MHz | 914MHz |
| Channel 6 | Channel 7 | Channel 8 | Channel 9 | Channel 10 |
| 916MHz | 918MHz | 920MHz | 922MHz | 924MHz |

3. Block Diagram

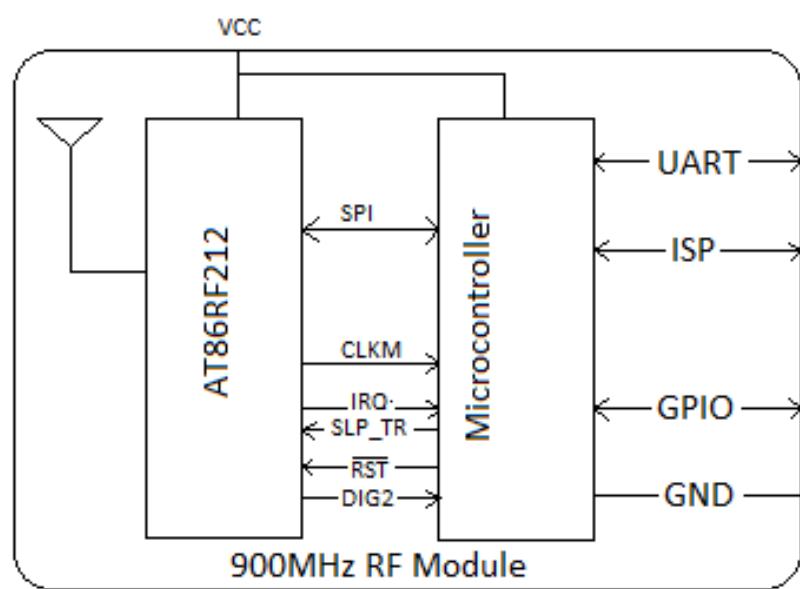


Fig. 1 RF Module Block Diagram

4. Pin Assignment:

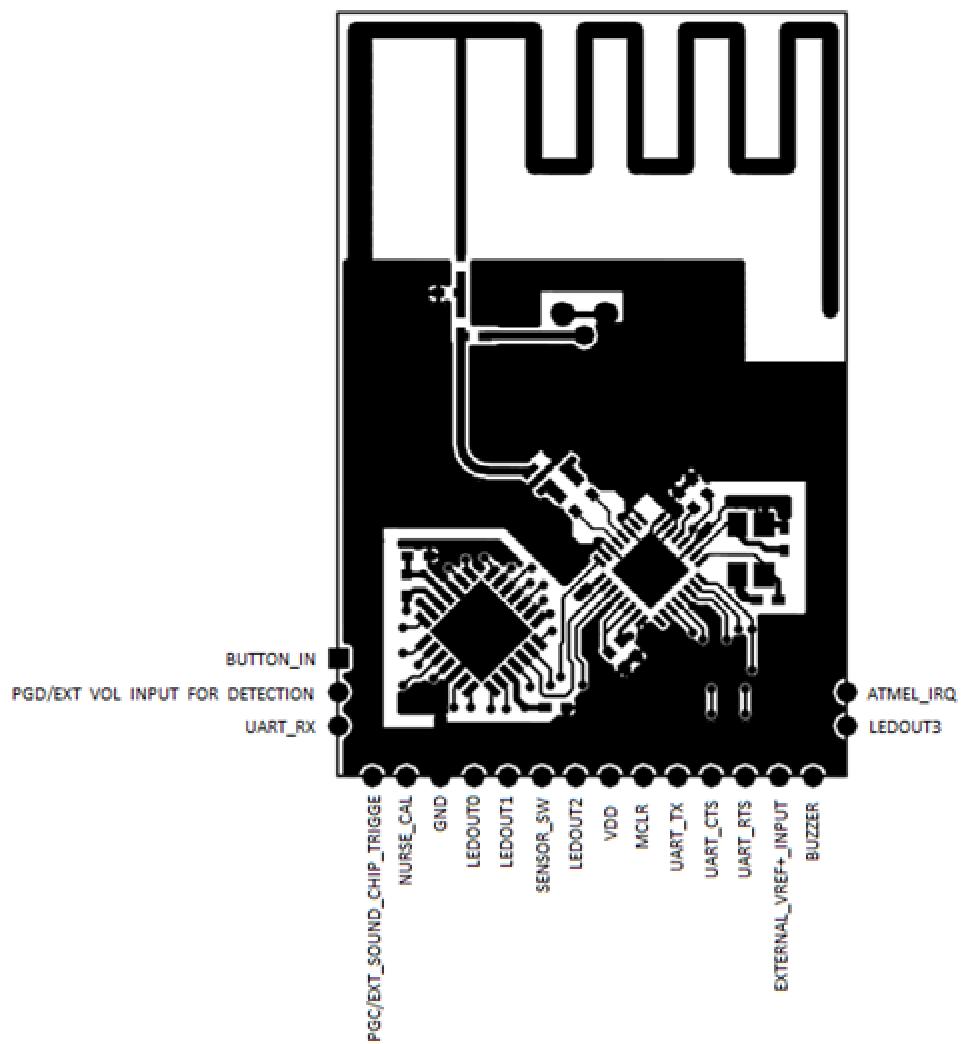


Fig. 2 Pin Assignment

5. Electrical

| Pin No. | Pin Name | Notes |
|---------|-------------------------------------|---|
| 1 | BUTTON_IN | I/O pin. It is used as input pin of keys. |
| 2 | PGD/EXT_VOL_INPUT _FOR_DETECTION | One of the programming pins. |
| 3 | UART_RX | One of series communication pins. |
| 4 | PGC/EXT_SOUND _CHIP_TRIGGER | One of the programming pins. |
| 5 | NURSE_CALL | I/O pin. |
| 6 | GND | Ground pin. |
| 7 | LEDOUT0 | I/O pin. Use to drive LEDs. |
| 8 | LEDOUT1 | I/O pin. Use to drive LEDs. |
| 9 | SENSOR_SW | I/O pin. |
| 10 | LEDOUT2 | I/O pin. Use to drive LEDs. |
| 11 | VDD | Power supply pin. |
| 12 | MCLR | One of the programming pins. |
| 13 | UART_TX | One of series communication pins. |
| 14 | UART_CTS | One of series communication pins. |
| 15 | UART_RTS | One of series communication pins. |
| 16 | EXTERNAL_VREF+ _INPUT | I/O pin. |
| 17 | BUZZER | I/O pin. Used as buzzer signal output. |
| 18 | LEDOUT3 | I/O pin. Use to drive LEDs. |
| 19 | ATMEL_IRQ | |

5.1 ABSOLUTE MAXIMUM RATINGS

| Rating | Value | Unit |
|----------------------------|-------------------|------|
| Power Supply Voltage | 3.6 | Vdc |
| Voltage on Any Digital Pin | -0.3 to (Vdd+0.3) | Vdc |
| RF Input Power | +10 | dBm |
| Storage Temperature Range | -40 to 125 | °C |

5.2 OPERATING CONDITIONS

| Characteristic | Min | Typ | Max | Unit |
|----------------------------|-----|-----|--------|------|
| Power Supply Voltage (Vdd) | 1.8 | 3.0 | 3.6 | Vdc |
| Input Frequency | 902 | --- | 928 | MHz |
| Ambient Temperature Range | -40 | 25 | 85 | °C |
| Logic input Low Voltage | Vss | --- | 0.2Vdd | V |
| Logic Input High Voltage | 0.8 | --- | Vdd | V |

5.3 Electrical Specification (@25°C Vdd = 3.3V, unless otherwise noted)

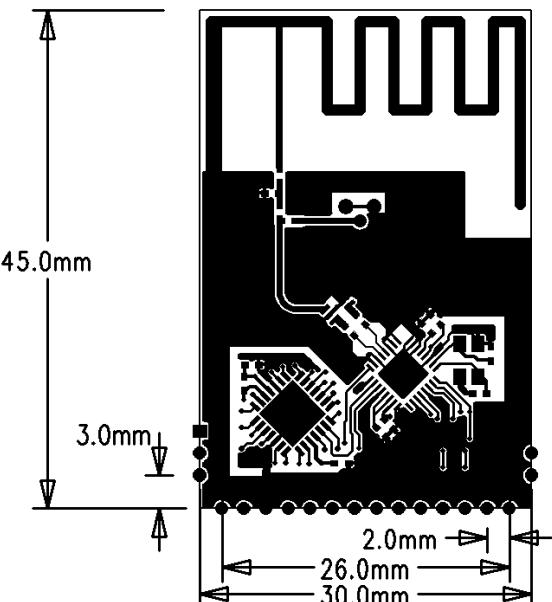
| Parameter | Min | Typ | Max | Unit |
|--|-----|------|-------|-------|
| General Characteristics | | | | |
| RF Frequency Range | 903 | | 928.5 | MHz |
| RF Data Rate | | 40 | | kbps |
| Host Data Rate | | 19.2 | | kbps |
| Flash | | 16 | | KB |
| RAM | | 1.5 | | KB |
| EEPROM | | 512 | | Bytes |
| Power Consumption | | | | |
| Transmit Mode | | 40 | | mA |
| Receive Mode | | 14 | | mA |
| Standby Mode | | 9 | | µA |
| Transmitter | | | | |
| Nominal Output Power | | 10 | | dBm |
| Programmable Output Power Range | -11 | | 10 | dBm |
| Error Vector Magnitude | | 6 | | % |
| Receiver | | | | |
| Module Sensitivity (1% PER) | | -89 | | dBm |
| Receiver Sensitivity (1% PER) | | -93 | | dBm |
| Saturation (Maximum Input) | | -5 | | dBm |
| Control AC Characteristics | | | | |
| Load Condition -1 (for all pins except OSC0) (RL) | | 464 | | Ω |

| | | | | |
|--|--------|----|--------|----|
| Load Condition -1 (for all pins except OSCO) (CL) | | 50 | | pF |
| Load Condition -2 (for OSCO)(CL) | | 15 | | pF |
| Control DC Characteristics | | | | |
| Logic Input Low | Vss | | 0.2Vdd | V |
| Logic Input High | 0.8Vdd | | Vdd | V |
| Logic Output Low | | | 0.4 | V |
| Logic Output High | 3.0 | | | V |
| I/O pin pull-up and pull-down resistor | | 2 | | kΩ |

6. Mechanical Dimension

- **PCB Thickness:** 1.6mm
- **Thickness with shield:** 4.5mm
- **Thickness w/MCCX Connector:** 6.0mm

Fig. 3 PCB Size



7. Installation Guide

1. This RF Module can be mounted to the end product by direct soldering.
2. Please follow the pin assignment and dimension of RF module for the end product design.
3. The thick and short PCB trace for VDD and GND should be made.
4. Decoupling capacitor is recommended to place next to the VDD pin.
5. Make sure there are no metallic objects placed on to or below the RF module after it is installed.

6. Only one antenna should be used when the RF module installed, either trace antenna or external antenna.
7. Each antenna has relative capacitor to be populated, C12 is for external antenna and the C11 is for trace antenna.
8. Make sure that the specified supply voltage is not exceeded.
9. Make sure that the power supply is clean from noise and ripple.
10. Unused pins should be disconnected.
11. The RF module is self-sufficient to function without the need of external components.
12. One type specified external antenna was provided. Other type of external antenna shall not be used.

Important notes:

Please note that the module is only approved for use when installed in devices produced by a specific manufacturer for professional installation.

8. Federal Communication Commission

Interference Statement

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.

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 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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important notes to third party user for transceiver module:

The transceiver Module complies with Part15 of the FCC rules and regulations. Compliance with the labeling requirements, FCC notices and antenna usage guidelines is required. To fulfill FCC Certification, the third party user must comply with the following regulations:

1. The third party user must ensure that the text on the external label provided with this device is placed on the outside of the final product. Contains FCC ID: Y32-ERFBANT0915. The enclosed 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.
2. The transceiver Module may only be used with the onboard PCB antenna or supplied external antenna that have been tested and approved for use with this module.
3. The transceiver Module have been certified by the FCC for use with other products without any further certification. Modifications not approved by TFE could void the user's authority to operate the equipment.
4. Third party users must test final product to comply with unintentional radiators before declaring compliance of their final product to Part 15 of the FCC Rules.