RP-MR500 Manual

1. INTRODUCTION

RP-MR500 is a full single-chip solution that is compliant to the specification of IEEE802.15.4 and ZigBee specifications and is a complete wireless solution for ZigBee applications such as home control and sensor network. It consists of RF transceiver with baseband modem, a hardwired MAC and an embedded 8051 microcontroller with internal flash memory for application program. It also includes several general-purpose I/O pins and many peripheral devices such as timer and UART. The chip targets very low power and low voltage applications.

2. APPLICATIONS

- Home Automation and Security
- Automatic Meter Reading
- Factory Automation and Motor Control
- Replacement for legacy wired UART
- Energy Management
- Remote Keyless Entry with Acknowledgement
- Health-care equipments
- Pc peripherals and Toys

3. FEATURES

RF Transceiver

- Single-chip 2.4GHz ZigBee RF Transceiver module
- Low Power Consumption
- Operation Voltage : 1.9V ~ 3.3V
- high Sensitivity (-98dBm)
- On-chip VCO, LNA, and PA
- Programmable Output Power Max. 5dBm
- O-QPSK Modulation
- Scalable Data Rate: 250Kbps
- RSSI Measurement
- Compliant to IEEE802.15.4

8051-Compatible Microcontroller

- 8051 Compatible Microcontroller
- 96KB Embedded Flash Memory
- 8KB Data Memory
- 128-byte CPU dedicated Memory
- 1KB Boot ROM
- 24 General Purpose I/Os
- On-chip Power-on-Reset
- 4-channel 12-bit ADC
- ISP (In System Programming)
- Internal Temperature Sensor

Clock Inputs & Power

- 16MHz Crystal for System Clock
- Separate On-chip Regulators for Analog and Digital Circuitry
- Power Supply Range for Internal Regulator
- Battery Monitoring Support

4. SPECIFICATION

1) Description

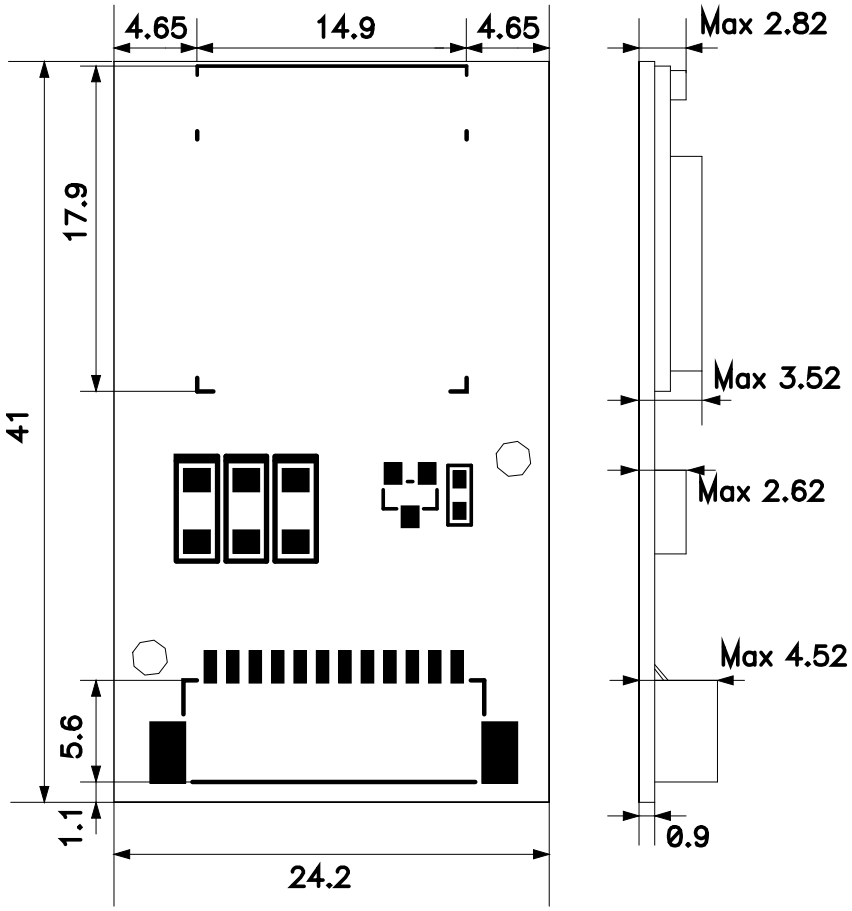
Item	Description
Application	Transceiver Module
Frequency Range	2.425 ~ 2.470 GHz (ISM Band)
I/O Supply Voltage	1.9~3.3V (Recommend)
Current	50 mA
Operating Temperature	0 ~ 40℃
Standard Spec.	IEEE802.15.4
Type	SMD Type
Size	24.2x 41 x 4.52mm

2) Electrical specifications

Parameter	Min	Typ	Max	Unit
RF Frequency Range	2425		2470	MHz
RF Bandwidth		2		MHz
Channel Bandwidth		5		MHz
RF Output Power		5		dBm
Receiver Sensitivity (PER≤1%, Packet length of 22-byte) Normal mode (250 kbps)		-98		dBm
Maximum Input Level			10	dBm
Current : RF Receive Mode		35		mA
Current : RF Transmit Mode		45		mA
Current : Sleep Mode		25	90	uA

5. Module Dimension

< Unit : mm >



6. PIN Description

Terminal	NAME	Interface	I/O	Description
1	ACH0	Analog	I/O	Sensor ADC input
2	ACH1	Analog	I/O	Sensor ADC input
3	ACH2	Analog	I/O	Sensor ADC input
4	ACH3	Analog	I/O	Sensor ADC input
5	AVDD_1.5V	Power	I/O	1.5V Power Supply input/output
6	AGND	Ground	-	RF Ground
7	MS0	Digital	I	Mode select
8	MS1	Digital	I	Mode select
9	MS2	Digital	I	Mode select
10	MSV	Digital	I	Mode select of voltage(0=1.5V)
11	RESETB	Digital	I	Reset (Active Low)
12	3V_IN	Power	I	3V Power supply
13	DGND	Ground	-	Ground for digital core and I/O
14	P1[7]	Digital	O	Port P1.7GPO/P0AND/TRSW
15	P1[6]	Digital	B	Port P1.6/TRSWB
16	P1[5]	Digital	B	Port P1.5
17	P1[4]	Digital	B	Port P1.4 /QUADZB/Sleep Timer OSC Buffer Input.
18	P1[3]	Digital	B	Port P1.3/QUADZA/Sleep Timer OSC Buffer Output/RTCLKOUT
19	P1[2]	Digital	B	Port P1.2
20	P1[1]	Digital	B	Port P1.1/TXD1
21	P1[0]	Digital	B	Port P1.0/RXD1
22	P3[7]	Digital	B	Port P3.7/12mA Drive capability /PWM3/CTS1/SPICSN(slave only)
23	P3[6]	Digital	B	Port P3.6/12 mA Drive capability /PWM2/RTS1/SPICLK

Terminal	NAME	Interface	I/O	Description
24	P3[5]	Digital	B	Port P3.5/T1/CTS0/QUADYB/SPIDO
25	P3[4]	Digital	B	Port P3.4/T0/RTS0/QUADYA/SPIDI
26	P3[3]	Digital	B	Port P3.3/INT1(active low)
27	P3[2]	Digital	B	Port P3.2/INT0(active low)
28	P3[1]	Digital	B	Port P3.1/TXD0/QUADXB
29	P3[0]	Digital	B	Port P3.0/RXD0/QUADXA
30	DGND	Ground	-	Ground for digital core and I/O
31	DVDD_1.5V	Power	I/O	1.5V Power Supply input/output
32	P0[7]	Digital	B	Port P0.7/I2STX_MCLK
33	P0[6]	Digital	B	Port P0.6/I2STX_BCLK
34	P0[5]	Digital	B	Port P0.5/I2STX_LRCK
35	P0[4]	Digital	B	Port P0.4/I2STX_DO
36	P0[3]	Digital	B	Port P0.3/I2SRX_MCLK
37	P0[2]	Digital	B	Port P0.2/I2SRX_BCLK
38	P0[1]	Digital	B	Port P0.1/I2SRX_LRCK
39	P0[0]	Digital	B	Port P0.0/I2SRX_DI
40	NC	NC	-	No Connection
41	NC	NC	-	No Connection
42	AGND	Ground	-	RF Ground
43	DGND	Ground	-	Ground for digital core and I/O
44	DGND	Ground	-	Ground for digital core and I/O
45	AGND	Ground	-	RF Ground

7. Contact Information

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FCC Statement

Federal Communication Commission Interference Statement

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 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 Caution:

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

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC

compliance requirement of the end product, which integrates this module. 20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for a population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: 2ABBPRPMR500". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.