RP-M2470BP
Datasheet

V1.2

(No. BRP0403)

REVISION HISTORY

Version	Date	Description
V1.0	2013.10.21	▪ First Version Release
V1.1	2014.03.14	▪ Sec 1.2.1 and Sec 3.3 are modified. ▪ Sec 1.2.2 is added.
V1.2	2014.09.17	▪ Attention is added in Sec 3.1. - Do not use external connection about Pin14 (P1_7) and Pin25 (P3_4). - Pin14 (P1_7) and Pin25 (P3_4) are NC for external Board.

CONTENTS

1. FEATURES

This specification is applied to IEEE802.15.4 & RF4CE Module. This module is embedded with   Amplifier, 32MHz X-TAL and Single chip.

1.1. Description

RF Transceiver

■ Single-chip 2.4 ~ 2.4835GHz RF Transceiver

■ Low Power Consumption

■ High Sensitivity of -98dBm at 250Kbps

■ No External T/R Switch or Filter Needed

■ On-chip VCO, LNA, and PA

■ Programmable Output Power up to +8.5dBm

■ Direct Sequence Spread Spectrum

■ O-QPSK Modulation

■ Scalable Data Rate Including 250Kbps Specified in IEEE 802.15.4: 250Kbps ~ 1Mbps

■ RSSI Measurement

■ Compliant to IEEE 802.15.4

Hardwired MAC

■ Two 256-byte Circular FIFOs

■ FIFO Management

■ AES Encryption/Decryption engine(128bit)

■ CRC-16 computation and check

8051-Compatible MCU

■ 8051 compatible(Single Cycle Execution)

■ 64KB embedded flash memory

■ 6KB data memory

■ 128-byte CPU Dedicated memory

■ 1KB Boot ROM

■ Dual DPTR support

■ I2S/PCM interface with two 256-byte FIFOs

■ μ-law/a-law/ADPCM voice Encoder/ Decoder

■ Two high-speed UARTs with two 16-byte FIFOs(up to 1Mbps)

■ Four timer/counters

■ 5 PWM Channels

■ Watchdog timer

■ Sleep timer using the 32KHz RC-OSC clock

■ Quadrature Signal Decoder

■ 22 General Purpose I/Os

■ Internal 32KHz RC Oscillator for sleep timer

■ 16MHz RC Oscillator for the fast start-up from reset & power-down mode

■ On-chip Power-on-Reset and Brown-out detector

■ 4-Channel 12-bit ADC(ENOB > 10-bit)

■ SPI Master/Slave Interface with two 16-byte FIFOs

■ I2C Master/Slave with 16-byte FIFO

■ Programmable IR(Infra-Red) modulator

■ ISP(In System Programming)

■ External clock output function(500KHz, 1/2/4/8/16/32MHz Selectable)

Clock Inputs

■ 32MHz crystal for system clock

Power

■ 1.8V(Core)/2.0~3.6V(I/O) operation

■ Power management scheme with deep sleep mode

■ Separate on-chip regulators for analog and digital circuitry

■ Power supply range for internal regulator(2.0V(Min) ~ 3.6V(Max))

Front-End Module Features
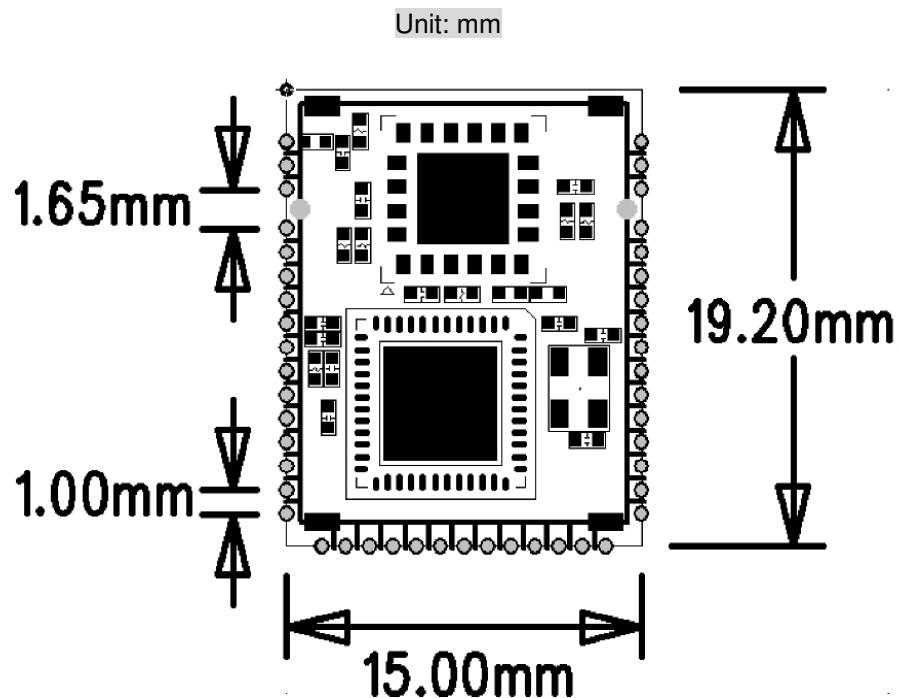
■ Transmitter output power   <+20dBm

■ Receiver path NF<2.5dB

■ Internal switching and control circuits

■ Configurable transmit/receive paths

■ Internal RF match and bias circuits

■ Single DC supply= 3.3V

■ All RF parts are internally DC blocked

Package
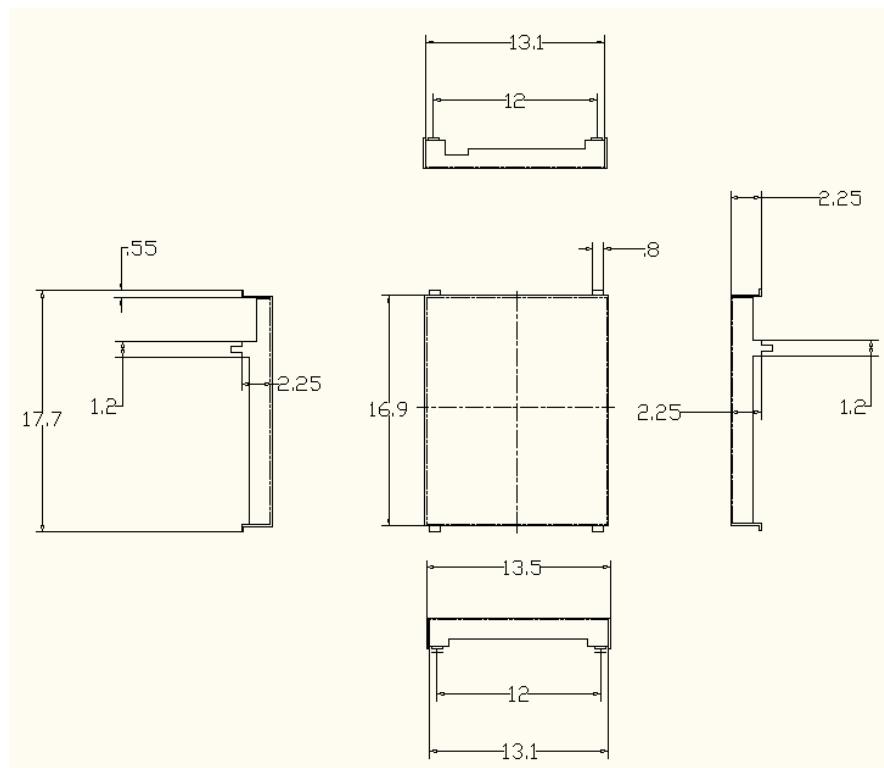
■ 45-pin, 15X19 mm SMT package

1.2. Drawing
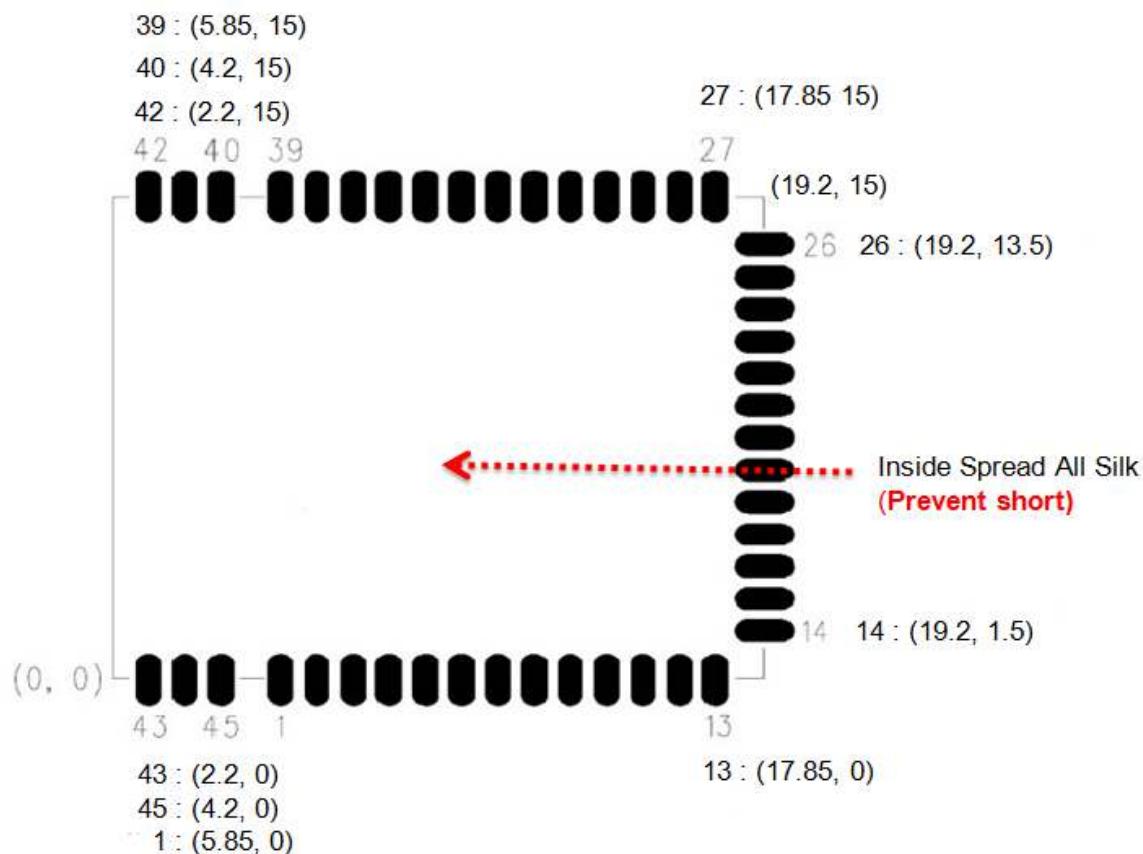
1.2.1. Outline Top View

Unit: mm
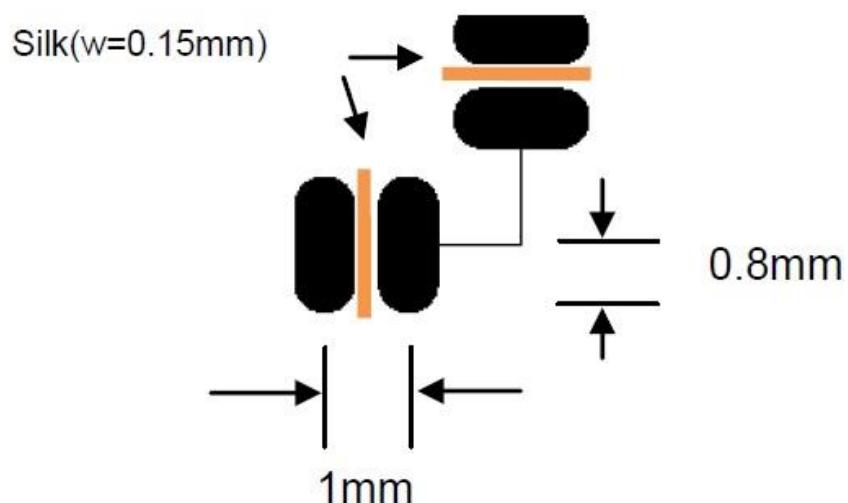
1.2.2. Shield Can Drawing View

1.2.3. PCB drawing Top View

39 : (5.85, 15)
40 : (4.2, 15)
42 : (2.2, 15)

27 : (17.85 15)

42   40   39   27

(19.2, 15)

26   26 : (19.2, 13.5)

Inside Spread All Silk
(Prevent short)

14   14 : (19.2, 1.5)

(0, 0)

43   45   1   13

43 : (2.2, 0)
45 : (4.2, 0)
1 : (5.85, 0)

13 : (17.85, 0)
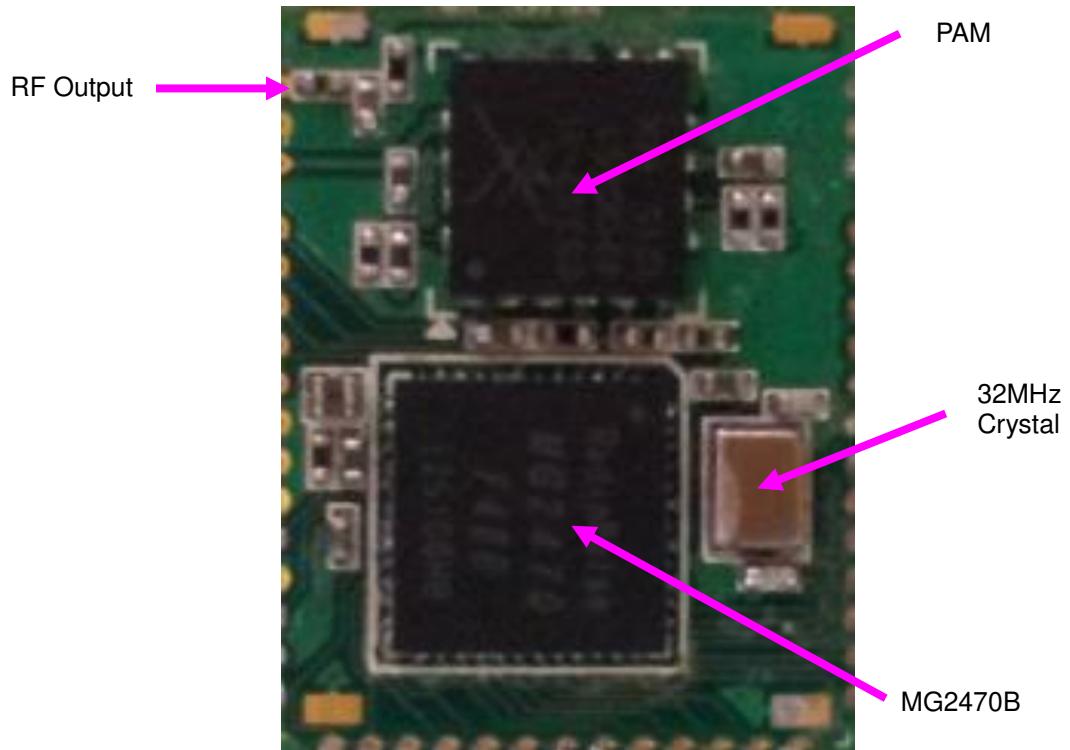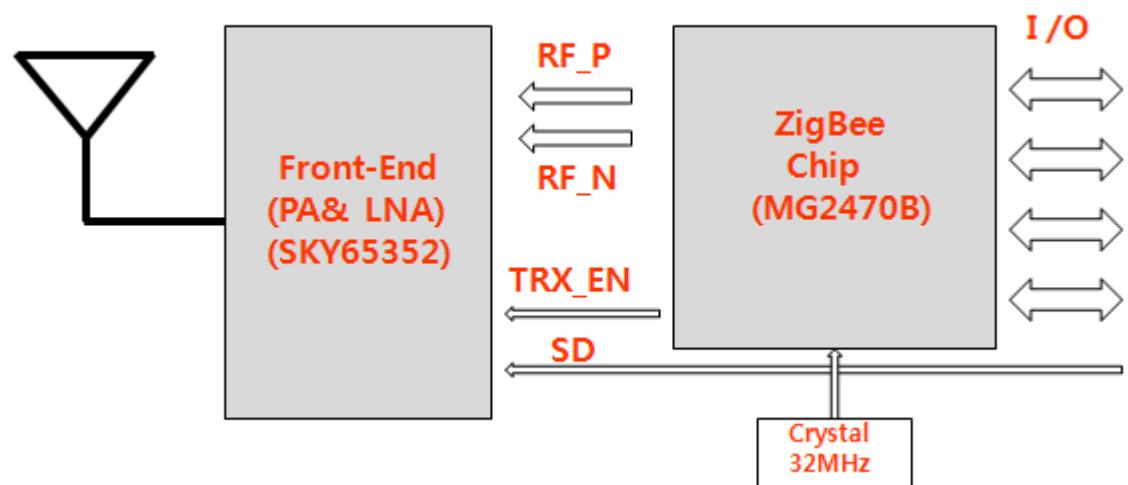
Pads of   pin 1~45 ; (W*L: 0.65*1.6mm)

Silk(w=0.15mm)

0.8mm

1mm

1.2.4. PCB (top view)

RF Output

PAM

32MHz
Crystal

MG2470B

< 4Layer, 1T >

1.2.5. Module Block Diagram

2. ELECTRICAL SPECIFICATIONS

2.1. Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VDD	Chip core supply voltage	-0.3 to 2	V
3.3V_IN	I/O supply voltage	-0.3 to 3.6	V
RF IN	Input RF level	+5	dBm
ST	Storage Temperature	-30 to 80	℃
OT	Operating Temperature	-20 to 70	℃

2.2. DC Characteristics

Parameter	Name	MIN	TYP	MAX	Unit
Logic-low input voltage		-0.3		0.8	V
Logic-high input voltage		2		VDD	V
I/O pin pull-up and pull-down resistors			48		KΩ
Logic-low output voltage				0.4	V
Logic-high output voltage		2.4			V

Note) All voltage values are based on ground. All input and output voltage levels are TTL-compatible.

2.3. Electrical Specifications

(Condition: EVM Board , at 25℃, VCCQuadrature_IN=3.3V, VDD(AVDD,DVDD=1.8V)

Item	Spec.	Remark
Supply input voltage	+3.3Vdc	
Normal Mode	TX: 145mA RX: 30mA	TX Output Level : 17.5dBm
Sleep Current PM1 (Not include 32.768KHz Crystal oscillator)	35μA	Max : 41uA

2.4. RF Characteristics(+25℃)

Item		Spec.	Remark
Frequency Range		2400~2483.5MHz	
Frequency Tolerance		$<\pm$20ppm	
Occupied B.W		<2.2MHz	
Output Power (Normal)		20dBm (+0/-2dB)	
VSWR		<2.0 : 1	
Flatness		<2dB	
Spurious Emissions 1GHz Under		<-50dBm	
1GHz ~ 2.4GHz		<-50dBm	
~ 12GHz		<-50dBm	
2nd Harmonic		<-50dBm	
3rd Harmonic		<-50dBm	
PSD	$\pm$3.5MHz	>30dBc	20dBc over
Secondary Radiated Emission		<-70dBm	Limit of secondary radiated emissions. -54dBm under
Rx Sensitivity		<-98dBm	22-byte, 1%

2.5. Environment Condition

Item	Spec.	Remarks
Storage Temp.	-30 ~ +80 ℃	
Operating Temp.	-20 ~ +70 ℃	

3. SCHEMATIC for APPLICATION
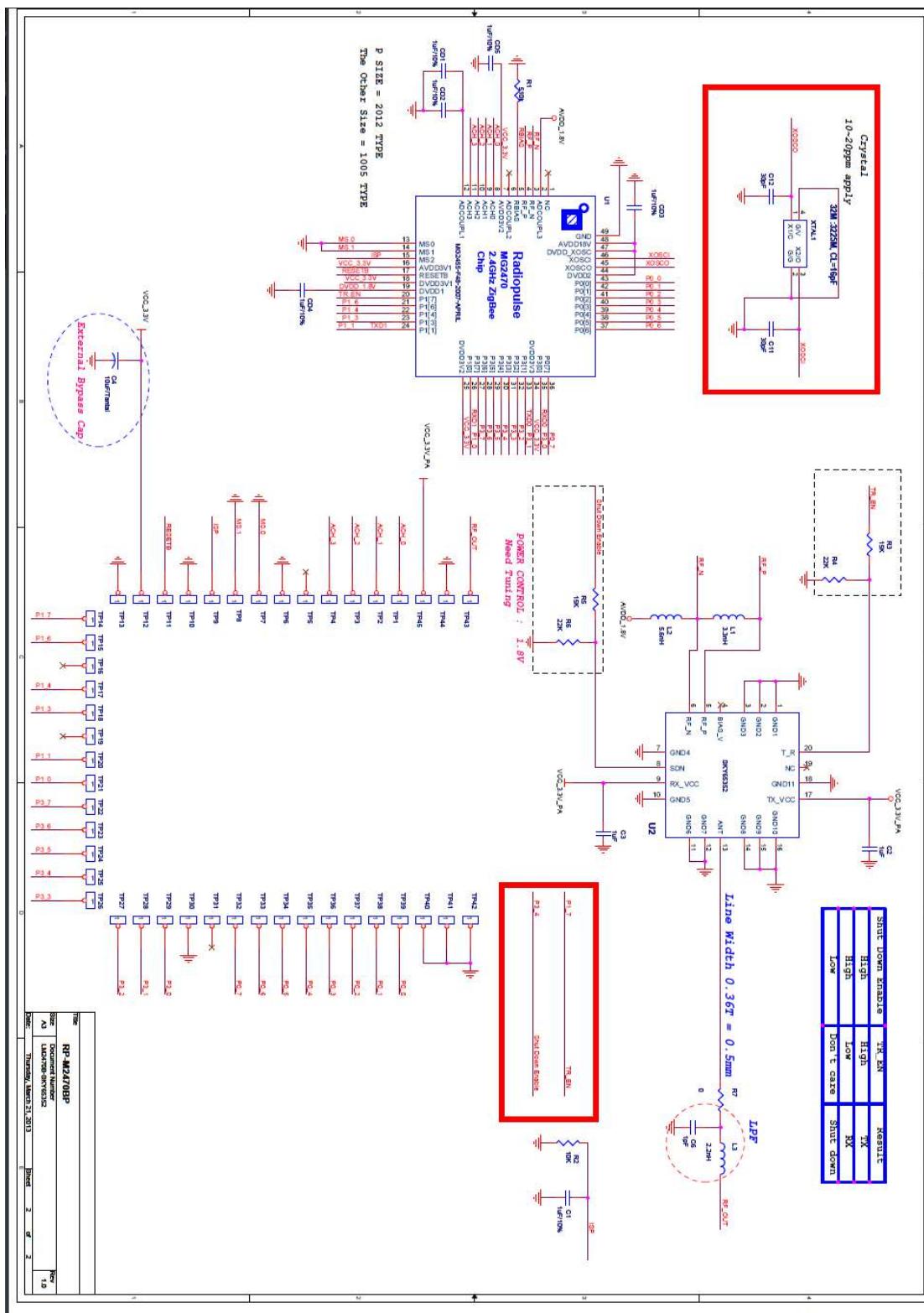
3.1. Pin Description

Terminal	NAME	Inter face	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	NC	-	-	-
6	GND	Ground	-	Ground
7	MS[0]	Ground	-	Ground
8	MS[1]	Ground	-	Ground
9	MS[2]	Digital	I	ISP
10	NC	-	-	-
11	RESETB	Digital	I	Reset (Active Low)
12	3.3V_IN	Power	I	3.3V Power supply
13	GND	Ground	-	Ground
14	P1[7]	Digital	B	Port P1.7/I2C_SDA/TRSW
15	P1[6]	Digital	B	Port P1.6/I2C_SCL/TRSWB
16	NC	-	-	-
17	P1[4]	Digital	B	Port P1.4/QUADZB/EXT_RTC_CLK/PTC_GATE4/XOSC32K_IN
18	P1[3]	Digital	B	Port P1.3/QUADZA/PTC_GATE3/IR_TX/CLK_OUT/XOSC32K_OUT
19	NC	-	-	-
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/CTS1/SPICSN
23	P3[6]	Digital	B	Port P3.6/RTS1/SPICLK
24	P3[5]	Digital	B	Port P3.5/CTS0/QUADYB/SPIDO/T1
25	P3[4]	Digital	B	Port P3.4/RTS0/QUADYA/SPIDI/T0
26	P3[3]	Digital	B	Port P3.3/nINT1(active low)
27	P3[2]	Digital	B	Port P3.2/nINT0(active low)
28	P3[1]	Digital	B	Port P3.1/TXD0/QUADXB
29	P3[0]	Digital	B	Port P3.0/RXD0/QUADXA
30	GND	Ground	-	Ground
31	NC	-	-	-
32	P0[7]	Digital	B	Port P0.7/I2STX_MCLK/PTC_GATE2
33	P0[6]	Digital	B	Port P0.6/I2STX_BCLK/PTC_GATE1
34	P0[5]	Digital	B	Port P0.5/I2STX_LRCLK/PTC_GATE0
35	P0[4]	Digital	B	Port P0.4/I2STX_DO/PWM4, 16mA drive capability
36	P0[3]	Digital	B	Port P0.3/I2SRX_MCLK/PWM3, 16mA drive capability
37	P0[2]	Digital	B	Port P0.2/I2SRX_BCLK/PWM2, 16mA drive capability

38	P0[1]	Digital	B	Port P0.1/I2SRX_LRCLK/PWM1, 16mA drive capability
39	P0[0]	Digital	B	Port P0.0/I2SRX_DI/PWM0, 16mA drive capability
40,41,42,44	GND	Ground	-	Ground
43	RF_OUT		-	
45	3.3V_PA_IN	Power	I	PA 3.3V Power supply

* Attention : Do not use external connection about Pin14 (P1_7) and Pin25 (P3_4). Pin14 (P1_7) and Pin25 (P3_4) are NC for external Board.

3.2. Module Circuit

3.3. Parts List

No	Vender P/N	Item	Specification	Unit	Q'TY	Location	Size	Vendor
	TEESVP0J106M8R	Chip-Tantal	10uF/ 6.3V, 20%, 2012	pc	1	**C4 (External)**	**2012**	Samsung
1	**0402X105K6R3CT**	Chip-C	1uF, 10%, 6.3V, 1005	pc	8	**C1, C2, C3, CD1,CD2, CD3, CD4, CD5**	1005	Samsung
2	**0402N300J500LT**	Chip-C	30pF, 5%, 50V, 1005	pc	2	**C11,C12**	1005	Samsung
3	**0402N1R0C500LT**	Chip-C	1pF,5%, 50V, 1005	pc	1	**C6**	1005	Samsung
4	**1005GC2T5N6SLF**	Chip-L	5.6nH, ±0.3nH, 1005	pc	1	**L2**	1005	Murata
5	**1005GC2T3N3SLF**	Chip-L	3.3nH, ±0.3nH, 1005	pc	1	**L1**	1005	Murata
6	**1005GC2T2N2SLF**	Chip-L	2.2nH, ±0.3nH, 1005	pc	1	**L3**	1005	Murata
7	**WR04X000PTL**	Chip-R	0 ohm, 1005	pc	1	**R7**	1005	Walsin
8	**WR06X103JTL**	Chip-R	10K, 5%,1005	pc	1	**R2**	1005	Walsin
9	**WR06X153JTL**	Chip-R	15K, 5%,1005	pc	2	**R3,R5**	1005	Walsin
10	**WR06X223JTL**	Chip-R	22K, 5%,1005	pc	2	**R4,R6**	1005	Walsin
11	**WR04X514JTL**	Chip-R	510K,5%,1005	pc	1	**R1**	1005	Walsin
12	**MG2470B**	Chip-IC	MG2470-F48B	pc	1	**U1**		Radiopulse
13	**SKY65352**	Chip-IC	SKY65352	pc	1	**U2**		SKYWORKS
14	**FL3200034**	X-TAL	32M :3225M, CL=16pF	pc	1	**XTAL1**	3225	eCERA
15		PCB	pcb, 15x19mm, 1T, 4-Layer, FR-4	pc	1			

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About RadioPulse Inc.

RadioPulse is a Being Wireless solution provider offering wireless communication & network technologies and developing next generation wireless networking technologies.

The new wireless networking solutions envisioned by RadioPulse will enable user to enjoy wireless technologies with easy interface.

Founded in April of 2003, the company maintains it headquarters and R&D center in Seoul, Korea.