RP-M2455AP
Datasheet

V1.1

(No. BRP0101)

REVISION HISTORY

Version	Date	Description
V1.0	2013.10.16	▪ First Version Release.
V1.1	2014.09.17	▪ Attention is added in Sec 3.1. - Do not use external connection about Pin9 (P1_7) and Pin18 (P3_4). - Pin9 (P1_7) and Pin18 (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, 16MHz X-TAL and Single chip.

1.1. Description

RF Transceiver

- Single-chip 2.4 ~ 2.4835GHz RF Transceiver
- Low Power Consumption
- Low Operating Voltage of 1.5V
- High Sensitivity of -98dBm at 250Kbps@1.5V
- No External T/R Switch or Filter Needed
- On-chip VCO, LNA, and PA
- Programmable Output Power up to +8dBm@1.5V
- 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-128 Engine
- CRC-16 computation and check

8051-Compatible MCU

- Max. 12x Performance of standard 8051
- 96KB embedded flash memory
- 8KB data memory
- 128-byte CPU Dedicated memory
- 1KB Boot ROM
- Dual DPTR support
- I2S/PCM interface with two 128-byte FIFOs
- µ-law/a-law/ADPCM voice Codec
- Two high-speed UARTs with two 16-byte FIFOs(up to 1Mbps)
- 4 timers/2 PWMs
- Watchdog timer

- Sleep timer
- Quadrature Signal Decoder
- 22 General Purpose I/Os
- Internal RC Oscillator for sleep timer
- On-chip Power-on-Reset
- 4-Channel 8-bit ADC)
- SPI Master/Slave Interface
- ISP (In System Programming)
- Temperature Sensor

Clock Inputs

- 16MHz crystal for system clock

Power

- When using Internal Regulator of MG2455
  1.5V (Core)/1.9 ~ 3.3V (I/O) operation
- When NOT using Internal Regulator of MG2455
  1.5V (Core)/1.5V (I/O) operation
- Power management scheme with deep sleep mode Support
- Two On-chip Voltage Regulator for Analog part and Digital part separately
- Power supply range for internal regulator(1.9V(Min) ~ 3.6V(Max))
- Battery Monitoring Support

Front-End Module FEATURES

- Transmitter output power <+18dBm
- 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

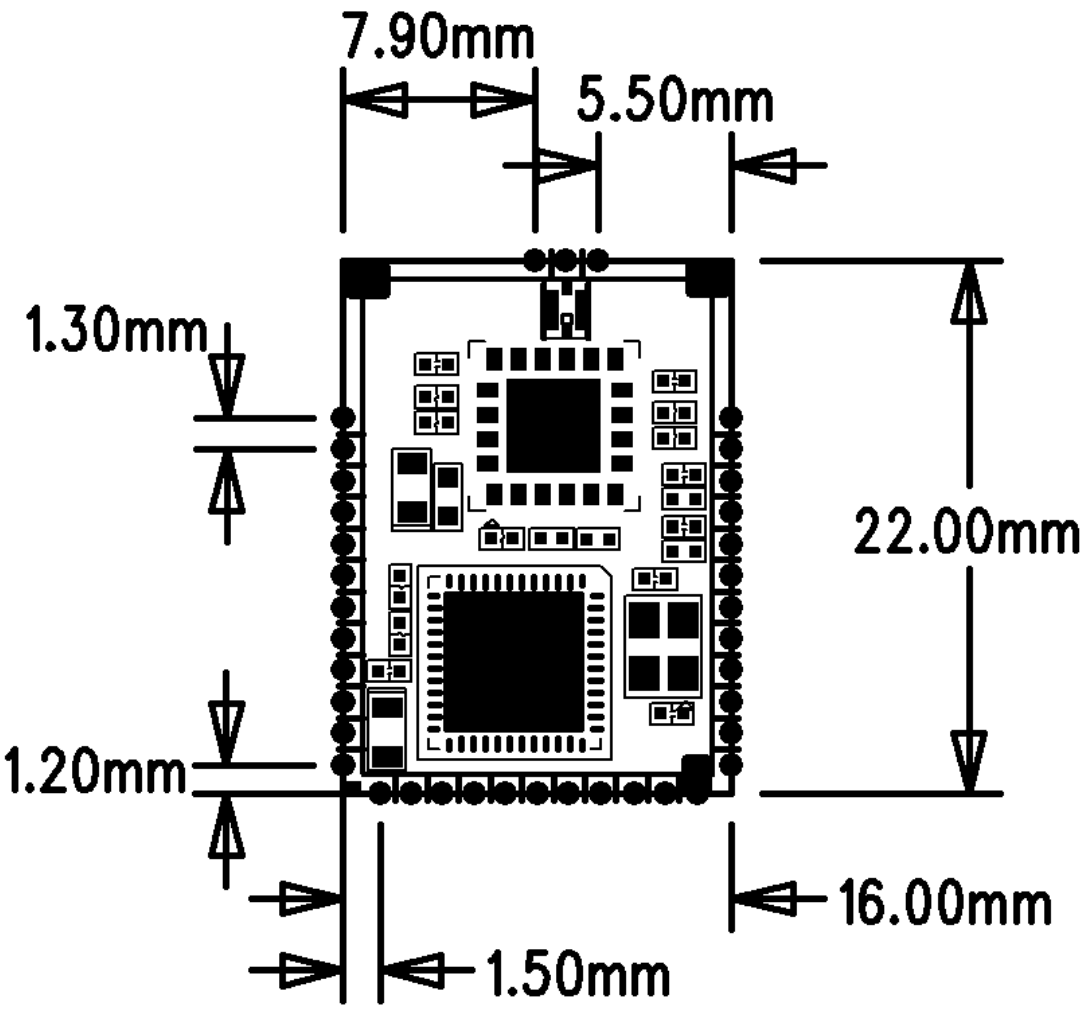
Package

- 38-pin, 16X22 mm SMT package

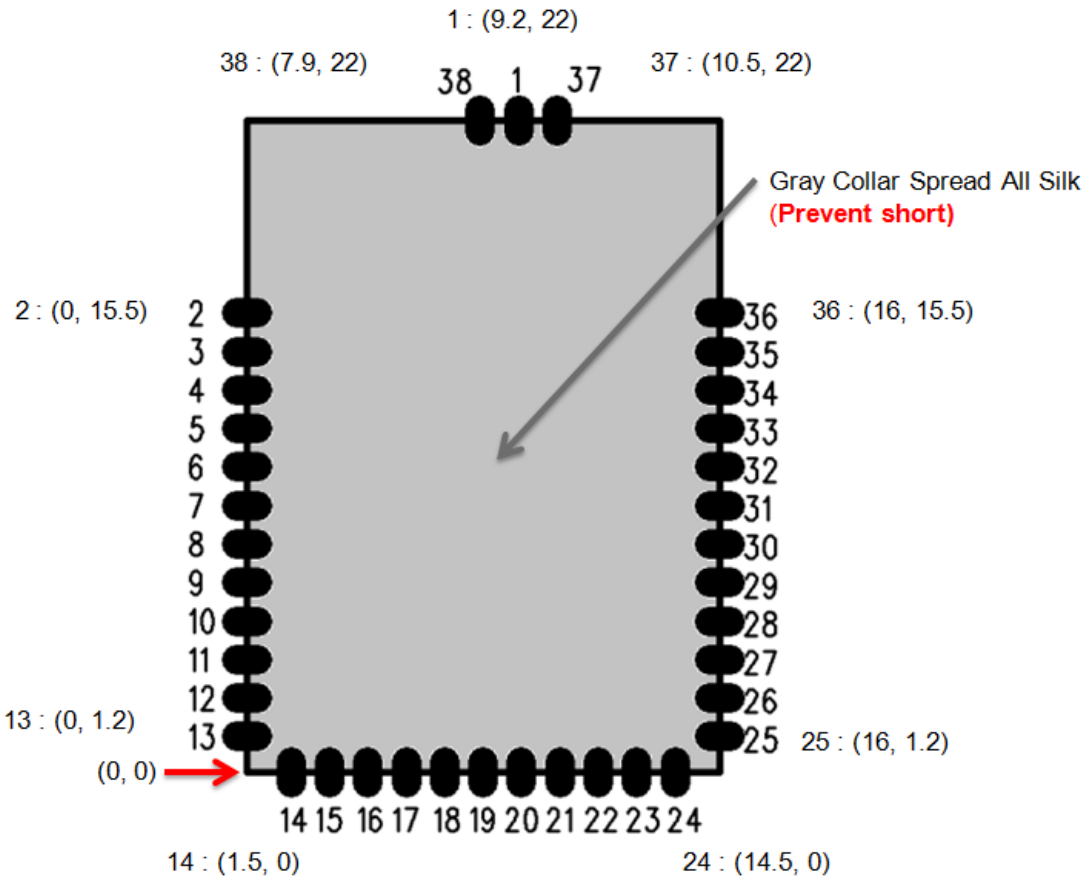
1.2. Drawing

1.2.1. Outline Top View

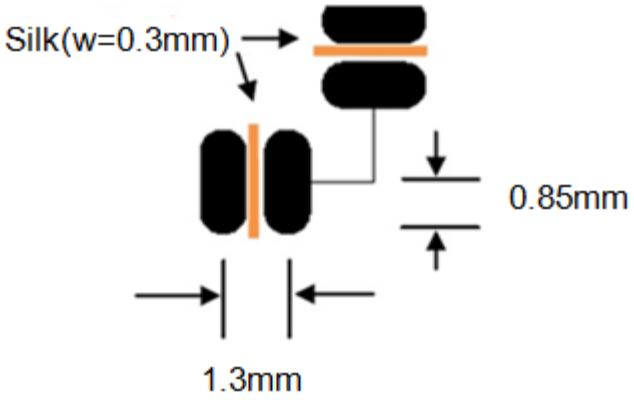
Unit: mm



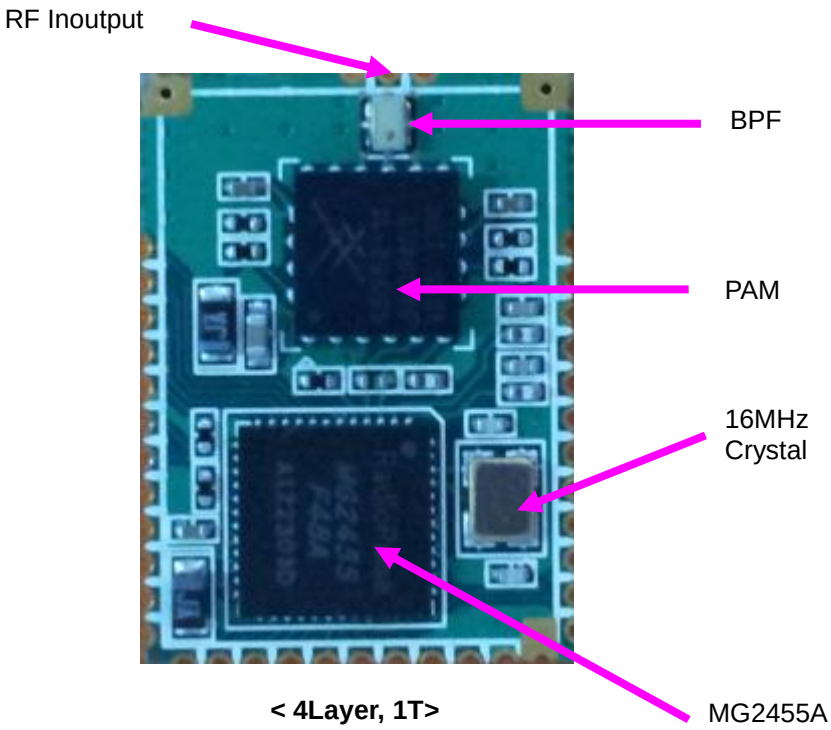
1.2.2. PCB drawing Top View



Pads of Pin 1 ~ 38 ; (W*L : 1 * 1.7mm)



1.2.3. PCB (top view)



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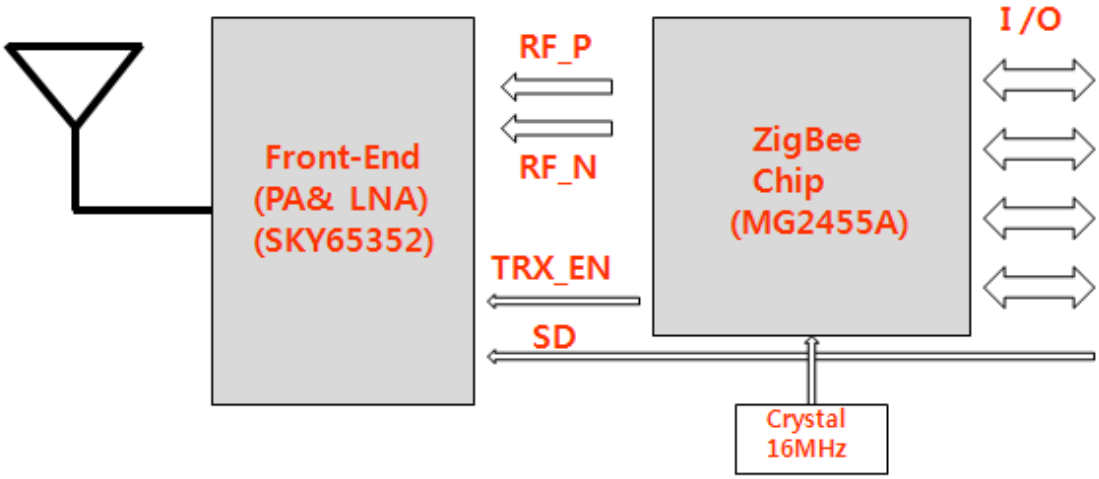
1.2.4. Module Block Diagram



2. ELECTRICAL SPECIFICATIONS

2.1. Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VDD	Chip core supply voltage	-0.3 to 1.65	V
VDDIO	I/O supply voltage(3V_IN)	-0.3 to 3.3	V
RFIN	Input RF level	10	dBm
TSTG	Storage Temperature	-30 to 80	℃
ESD	HBM(JESD22-A114-F)	2000	V
	MM(JESD22-A115-A)	150	V
	CDM(JESD22-C101-E)	500	V

2.2. DC Characteristics

Symbol	Parameter	Min	Typ.	Max	Unit
VDD	Chip core supply voltage (AVDD_1.5V,DVDD_1.5V)	1.35	1.5	1.65	V
VDDIO	I/O supply voltage(3V_IN)	1.35(*)	3.0	3.3	V
VIH	High level input voltage	0.7X VDDIO		VDDIO	V
VIL	Low level input voltage	0		0.3X VDDIO	V
VOH	High level output voltage	VDDIO -0.5		VDDIO	V
VOL	Low level output voltage	0		0.4	V
TA	Air temperature	-20		70	℃

(*) : MSV= output voltage(regulator drop voltage), 3VIN=2.7~3.3V is Recommended.

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℃, VCC _IN=3.3V, VDD(AVDD,DVDD=1.5V)

Item	Spec	Remark
Supply input voltage	+3.3Vdc	
Normal Mode	TX: 158mA RX: 42mA	TX Output Level: 17.8dBm
Sleep Current PM1 (BOD enable)	64μA	Max : 149uA

2.4. RF Characteristics(+25℃)

Item	Spec	Remark
Frequency Range	2405~2483.5MHz	
Frequency Tolerance	<±20ppm	
Occupied B.W	<2.2MHz	
Output Power (Normal)	MAX18dBm (+0/-2dB)	
VSWR	<2.0 : 1	
Flatness	<2dB	
Spurious Emissions 1GHz Under 1GHz ~ 2.4GHz 2.4GHz ~ 3GHz 3GHz ~ 12GHz	 <-50dBm <-50dBm <-33dBm <-50dBm	
2nd Harmonic	<-50dBm	
3rd Harmonic	<-50dBm	
PSD ±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 ℃	

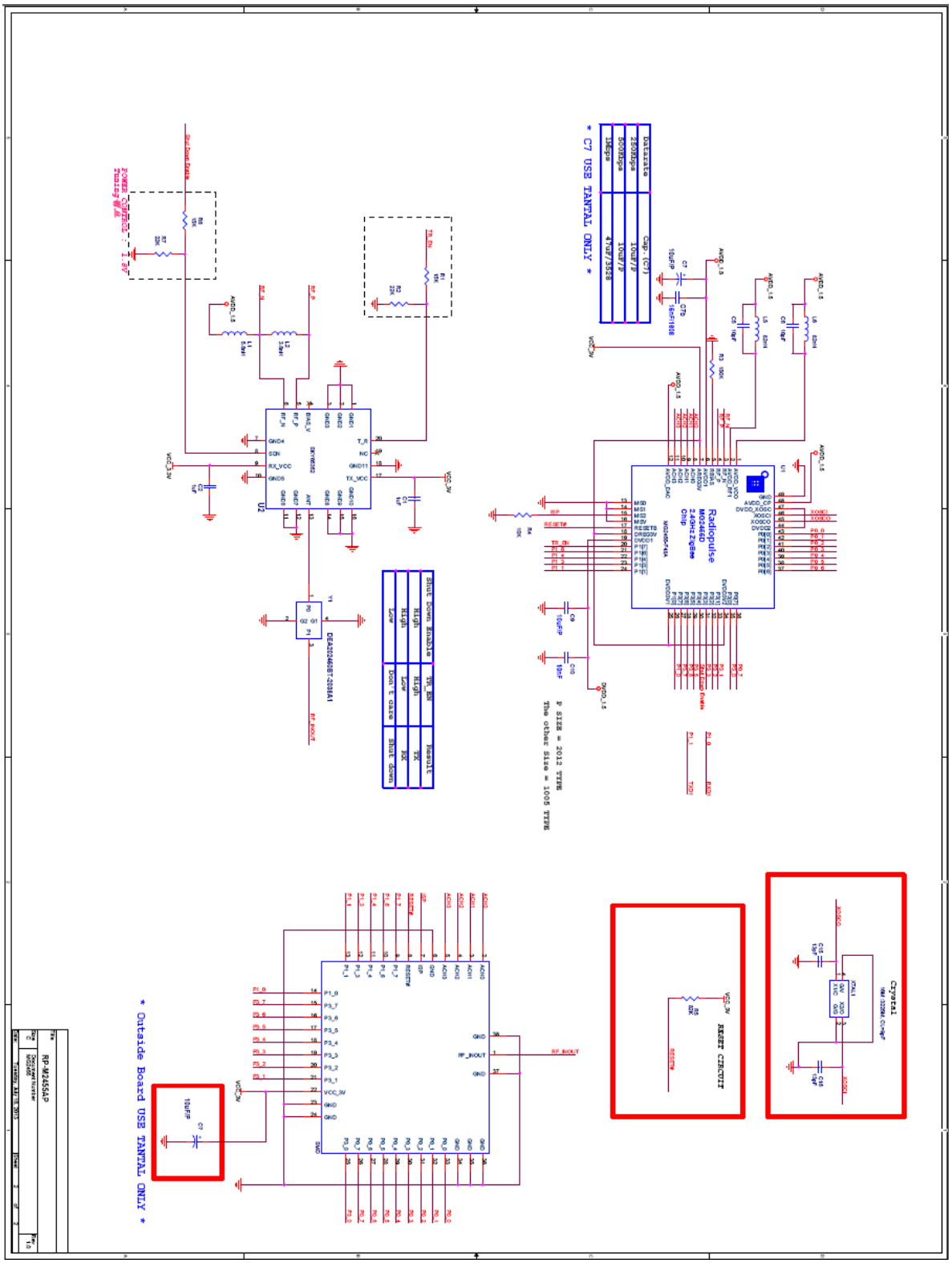
3. SCHEMATIC for APPLICATION

3.1. Pin Description

Terminal	NAME	Inter face	I/O	Description
1	RF_INOUT			
2	ACH0	Analog	I/O	Sensor ADC input
3	ACH1	Analog	I/O	Sensor ADC input
4	ACH2	Analog	I/O	Sensor ADC input
5	ACH3	Analog	I/O	Sensor ADC input
6	GND	Ground	-	Ground
7	ISP	Digital	I	ISP
8	RESETB	Digital	I	Reset (Active Low)
9	P1[7]	Digital	O	Port P1.7GPO/P0AND/TRSW
10	P1[6]	Digital	B	Port P1.6/TRSWB
11	P1[4]	Digital	B	Port P1.4 /QUADZB/Sleep Timer OSC Buffer Input.
12	P1[3]	Digital	B	Port P1.3/QUADZA/Sleep Timer OSC Buffer Output/RTCLKOUT
13	P1[1]	Digital	B	Port P1.1/TXD1
14	P1[0]	Digital	B	Port P1.0/RXD1
15	P3[7]	Digital	B	Port P3.7/12mA Drive capability /PWM3/CTS1/SPICSN(slave only)
16	P3[6]	Digital	B	Port P3.6/12 mA Drive capability /PWM2/RTS1/SPICLK
17	P3[5]	Digital	B	Port P3.5/T1/CTS0/QUADYB/SPIDO
18	P3[4]	Digital	B	Port P3.4/T0/RTS0/QUADYA/SPIDI
19	P3[3]	Digital	B	Port P3.3/INT1(active low)
20	P3[2]	Digital	B	Port P3.2/INT0(active low)
21	P3[1]	Digital	B	Port P3.1/TXD0/QUADXB
22	3.3V_IN	Power	I	3.3V Power supply
23	GND	Ground	-	Ground
24	GND	Ground	-	Ground
25	P3[0]	Digital	B	Port P3.0/RXD0/QUADXA
26	P0[7]	Digital	B	Port P0.7/I2STX_MCLK
27	P0[6]	Digital	B	Port P0.6/I2STX_BCLK
28	P0[5]	Digital	B	Port P0.5/I2STX_LRCK
29	P0[4]	Digital	B	Port P0.4/I2STX_DO
30	P0[3]	Digital	B	Port P0.3/I2SRX_MCLK
31	P0[2]	Digital	B	Port P0.2/I2SRX_BCLK
32	P0[1]	Digital	B	Port P0.1/I2SRX_LRCK
33	P0[0]	Digital	B	Port P0.0/I2SRX_DI
34	GND	Ground	-	Ground
35	GND	Ground	-	Ground
36	GND	Ground	-	Ground
37	GND	Ground	-	Ground
38	GND	Ground	-	Ground

*** Attention : Do not use external connection about Pin9 (P1_7) and Pin18 (P3_4). Pin9 (P1_7) and Pin18 (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
1	**TEESVP0J106M8R**	Chip-Tantal	10uF/ 6.3V, 20%, 2012	pc	2	**C7,C9**	**2012**	NEC TOKIN
2	**0603B153K500CT**	Chip-C	15nF, 10%, 50V, 1608	pc	1	**C7B**	1608	PILKOR
3	**0402X105K6R3CT**	Chip-C	1uF, 10%, 6.3V, 1005	pc	2	**C1,C2**	1005	PILKOR
4	**0402B103K500CT**	Chip-C	10nF, 10%, 10V, 1005	pc	1	**C10**	1005	Walsin
5	**0402N100J500LT**	Chip-C	10pF, 5%, 50V, 1005	pc	2	**C5,C6**	1005	Walsin
6	**0402N130J500LT**	Chip-C	13pF, 5%, 50V, 1005	pc	2	**C15,C16**	1005	Walsin
7	**1005GC2T5N6SLF**	Chip-L	5.6nH, ±0.3nH, 1005	pc	1	**L1**	1005	PILKOR
8	**1005GC2T3N6SLF**	Chip-L	3.6nH, ±0.3nH, 1005	pc	1	**L2**	1005	PILKOR
9	**1005GC2T82NJLF**	Chip-L	82nH, 5%, 1005	pc	2	**L5,L6**	1005	PILKOR
10	**WR06X103JTL**	Chip-R	10K, 5%,1005	pc	1	**R4**	1005	PILKOR
11	**WR06X153JTL**	Chip-R	15K, 5%,1005	pc	2	**R1,R6**	1005	PILKOR
12	**WR06X223JTL**	Chip-R	22K, 5%,1005	pc	2	**R2,R7**	1005	PILKOR
13	**WR04X823JTL**	Chip-R	82K ohm, 5%, 1005	pc	1	**R5**	1005	Walsin
14	**WR04X514JTL**	Chip-R	150K,5%,1005	pc	1	**R3**	1005	Walsin
15	**MG2455**	Chip-IC	MG2455-F48A	pc	1	**U1**		Radiopulse
16	**SKY65352**	Chip-IC	SKY65352	pc	1	**U2**		SKYWORKS
17	**DEA202450BT-2038A1**	BPF	DEA202450BT-2038A1	pc	1	**Y1**		TDK
18	**FL1600003**	X-TAL	16M :3225M, CL=9pF	pc	1	**XTAL1**	3225	eCERA
19		PCB	pcb, 16x22mm, 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.