

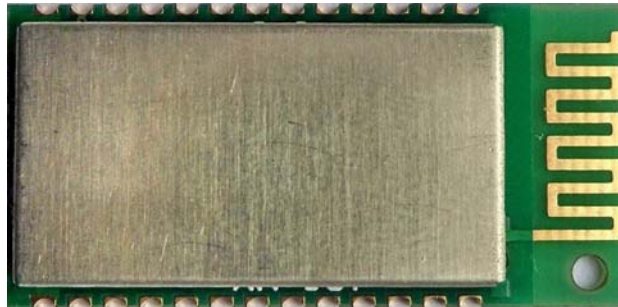
XM-15

Bluetooth Module

Hardware

Datasheet

Rev 1.0

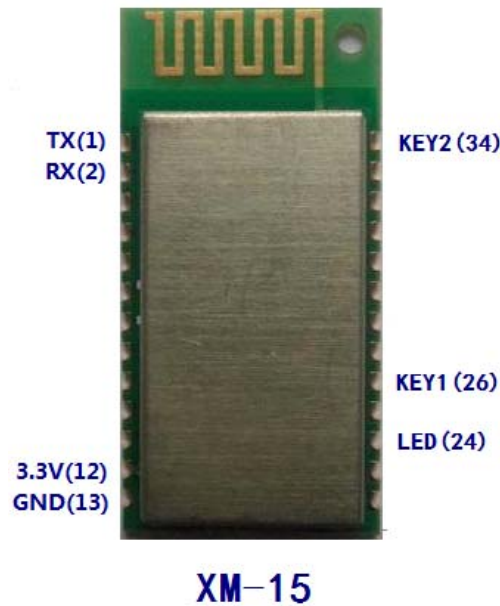


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XM-15 Bluetooth Module

1. Features

- 1.1 Compliant with Bluetooth 2.1 + EDR specification
- 1.2 Provides +10dbm transmitting power
- 1.3 NZIF receiver with -90dBm sensitivity
- 1.4 Class 2 (/1.5) type Output Power
- 1.5 UART Host Interface
- 1.6 PCM Audio Interface
- 1.7 Supports $\pi/4$ DQPSK and 8DPSK modulation
- 1.8 A built-in hardware **watchdog**.
- 1.9 Surface-mount, Size: $L \times W \times H = 27.0 \times 13.0 \times 2.2$
(unit: mm error = $\pm 0.2\text{mm}$)

2. Product Description

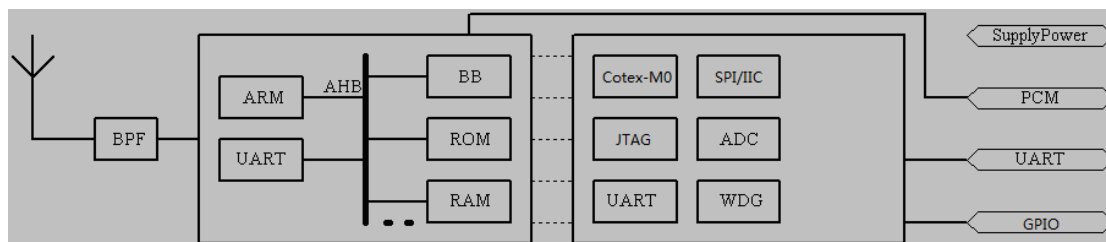
The Bluetooth Module is a Class 2/1.5 Bluetooth module using RDA chipset. It provides a fully compliant Bluetooth system for data and voice communications, and provides a fully compliant with CSR chipset. Interfaces with a host via UART and support full data rate up to 3M modulation modes. Voice interface supported PCM protocol. The module and device firmware is fully compliant with the Bluetooth specification v2.1+EDR.

3. Applications

- 3.1 OBDII Scanner
- 3.2 PCs, PDAs
- 3.3 Mice, Keyboard, Joysticks
- 3.4 Cordless Phone
- 3.5 FAX, Printer Adaptors
- 3.6 Digital Camera

3.7 Access Points to LAN and/or Dial-up network

4. Block Diagram



5. Pin Descriptions

5.1 Device Terminal

No.	Des		Des	No.
1	UART_TX		PIO11	34
2	UART_RX		PIO10	33
3	UART_CTS		PIO9	32
4	UART_RTS		PIO8	31
5	PCM_CLK		PIO7	30
6	PCM_OUT		PIO6	29
7	PCM_IN		PIO5	28
8	PCM_SYNC		PIO4	27
9	AIO0		PIO3	26
10	AIO1		PIO2	25
11	RESETB		PIO1	24
12	VCC		PIO0	23
13	GND		GND	22
14~21	N/A			

Note:

1. VCC = 3.0 ~ 3.6V, Type = 3.3V。
2. AIN Max = VCC

5.2 Device Terminal Functions

Pin	NAME	I/O Type	DESCRIPTION
1	UART_TXD	O	UART data output
2	UART_RXD	I	UART data input
3	UART_CTS	I	UART clear to send active low
4	UART_RTS	O	UART request to send active low
5	PCM_CLK	I	Synchronous data clock
6	PCM_OUT	O	Synchronous data data out
7	PCM_IN	I	Synchronous data data in
8	PCM_SYNC	I	Synchronous data sync
9	AIO0	I/O	Programmable input/output line

10	AIO1	I/O	Programmable input/output line
11	RESETB	I	Integrated inside the RC reset circuit, Reset if low. Input debounced so must be low for >5ms to cause a reset
12	VCC	S	Power Supply
13	GND	S	Ground
14~21	N/A		Pad does not exist in this version.
22	GND		Ground
23	PIO0	I/O	Programmable input/output line
24	PIO1	I/O	Programmable input/output line
25	PIO2	I/O	Programmable input/output line
26	PIO3	I/O	Programmable input/output line
27	PIO4	I/O	Programmable input/output line
28	PIO5	I/O	Programmable input/output line
29	PIO6	I/O	Programmable input/output line
30	PIO7	I/O	Programmable input/output line
31	PIO8	I/O	Programmable input/output line
32	PIO9	I/O	Programmable input/output line
33	PIO10	I/O	Programmable input/output line
34	PIO11	I/O	Programmable input/output line

Support A-law, μ -law and CVSD digitize audio CODEC in PCM interface

6. Electrical Specifications

6.1 Voltage characteristics

Symbol	DESCRIPTION	Min	TYP	Max	Unit
VSS/GND	Ground	--	--	--	--
VCC	power supply	3.0	3.3	3.6	V

6.2 Input/Output Terminal Characteristics

Vil	Input low level voltage	VSS-0.3	VSS	$0.3 \times VCC$	V
Vih	Input high level voltage	$0.7 \times VCC$	VCC	$VCC + 0.3$	V
Vol	Output low level		0.3	1(1)	V
Voh	Output high level	2.1	VCC		V
Iikg	Input leakage current analog and digital $VSS \leq VIN \leq VDD$			± 1	μA
Iikg ana	Analog input leakage current $VSS \leq VIN \leq VDD$			± 250	nA
Rpu	Pull-up resistor @ VCC=5V	30	55	80	k Ω

(1) Data based on characterization results, not tested in production

7. Bluetooth Section Radio Characteristics

Table 7-1 Receiver Characteristics ----- Basic Data Rate

(VCC = 3.3 V, TA = 27°C, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
General specifications						
	Sensitivity @0.1% BER		/	-90	/	dBm
	Maximum received signal@0.1% BER		0	/	/	dBm
	C/I c-channel		/	+10	/	dB
Adjacent channel selectivity C/I	F=F0 + 1MHz		/	/	-5	dB
	F=F0 - 1MHz		/	/	0	dB
	F=F0 + 2MHz		/	/	-33	dB
	F=F0 - 2MHz		/	/	-30	dB
	F=F0 + 3 MHz		/	/	-45	dB
	F=F0 - 3MHz		/	/	-40	dB
	Adjacent channel selectivity C/I	F=Fimage	/	/	0	dB
Out-of-band blocking performance	30MHz~2000MHz		-10	/	/	dBm
	2000MHz~2400MHz		-27	/	/	dBm
	2500MHz~3000MHz		-27	/	/	dBm
	3000MHz~12.5GHz		-10	/	/	dBm
	Intermodulation		-35			dBm
	Spurious output level		-150			dBm/Hz

Table 7-2 Transmit Characteristics ----- Basic Data Rate

(VCC = 3.3 V, TA = 27°C, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
General specifications						
	Maximum RF transmit power		/	+4	+10	dBm
	RF power control range		25	/	/	dB
	20dB band width		/	0.9	/	MHz
Adjacent channel transmit power	F=F0 + 1MHz		/	-20	/	dBm
	F=F0 - 1MHz		/	-20	/	dBm
	F=F0 + 2MHz		/	-35	/	dBm
	F=F0 - 2MHz		/	-35	/	dBm
	F=F0 + 3MHz		/	-40	/	dBm
	F=F0 - 3MHz		/	-40	/	dBm
	F=F0 + >3MHz		/	/	-46	dBm
	F=F0 - >3MHz		-46	/	/	dBm
	Δf_{1avg} Maximum modulation		/	164	/	kHz
	Δf_{2max} Minimum modulation		/	145	/	kHz
	$\Delta f_{2avg}/\Delta f_{1avg}$		0.8	/	/	/
	ICFT		/	+4	/	kHz
	Drift rate		/	0.1	/	kHz/50us

Drift (1 slot packet)		/	-2	/	kHz
Drift (5 slot packet)		/	-2	/	kHz

Table 7-3 Receiver Characteristics ----- Enhanced Data Rate

(VCC = 3.3 V, TA = 27°C, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
$\pi/4$ DQPSK						
	Sensitivity @0.1% BER		/	-86	/	dBm
	Maximum received signal@0.1% BER		0	/	/	dBm
	C/I c-channel		/	/	+13	dB
Adjacent channel selectivity C/I	F=F0 + 1MHz		/	/	+5	dB
	F=F0 - 1MHz		/	/	0	dB
	F=F0 + 2MHz		/	/	-20	dB
	F=F0 - 2MHz		/	/	-20	dB
	F=F0 + 3MHz		/	/	-40	dB
	F=F0 - 3MHz		/	/	-40	dB
	Adjacent channel selectivity C/I	F=Fimage	/	/	-7	dB
8DPSK						
	Sensitivity @0.01% BER		/	-83	/	dBm
	Maximum received signal@0.1% BER		0	/	/	dBm
	C/I c-channel		/	/	+18	dB
Adjacent channel selectivity C/I	F=F0 + 1MHz		/	/	+5	dB
	F=F0 - 1MHz		/	/	+5	dB
	F=F0 + 2MHz		/	/	-20	dB
	F=F0 - 2MHz		/	/	-20	dB
	F=F0 + 3MHz		/	/	-35	dB
	F=F0 - 3MHz		/	/	-35	dB
	Adjacent channel selectivity C/I	F=Fimage	/	/	0	dB

Table 7-4 Transmit Characteristics ----- Enhanced Data Rate

(VCC = 3.3 V, TA = 27°C, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
General specifications						
	Maximum RF transmit power		/	+2	/	dBm
	Relative transmit control		/	-1.6	/	dB
						kHz
	$\pi/4$ DQPSK max w0		/	+7.4	/	kHz
	$\pi/4$ DQPSK max wi		/	+6.7	/	kHz
	$\pi/4$ DQPSK max wi + w0		/	+2.4	/	kHz
	8DPSK max w0		/	+7.1	/	kHz
	8DPSK max wi		/	+4.4	/	kHz
	8DPSK max wi + w0		/	+2.7	/	kHz

$\pi/4$ DQPSK Modulation Accuracy	RMS DEVM	/	4.7	/	%
	99% DEVM	/	/	30	%
	Peak DEVM	/	8.8	/	%
8DPSK Modulation Accuracy	RMS DEVM	/	4.6	/	%
	99% DEVM	/	/	20	%
	Peak DEVM	/	11.3	/	%
In-band spurious emissions	F=F0 + 1MHz	/	-14.7	/	dBm
	F=F0 - 1MHz	/	-15.2	/	dBm
	F=F0 + 2MHz	/	-51	/	dBm
	F=F0 - 2MHz	/	-51.2	/	dBm
	F=F0 + 3MHz	/	-30	/	dBm
	F=F0 - 3MHz	/	-30	/	dBm
	F=F0 +/- > 3MHz	/	/	-32	dBm
EDR Differential Phase Coding		/	100	/	%

8. UART Interface

- Full duplex, asynchronous communications
- Separate receive / transmit 16/16 bytes entry FIFO for data payloads
- Support hardware auto flow control/flow control function (CTS, RTS) and programmable RTS flow control trigger level
- Programmable receiver buffer trigger level
- Support programmable baud-rate generator for each channel individually
- Support CTS wake up function
- Support 8 bit receiver buffer time out detection function
- Programmable transmitting data delay time between the last stop and the next start bit by setting UA_TOR [DLY] register
- Support break error, frame error, parity error and receive / transmit buffer overflow detect function
- Fully programmable serial-interface characteristics
- Programmable number of data bit, 5, 6, 7, 8 bit character
- Programmable parity bit, even, odd, no parity or stick parity bit generation and detection
- Programmable stop bit, 1, 1.5, or 2 stop bit generation
- Support IrDA SIR function mode
- Support for 3/16 bit duration for normal mode
- Support LIN function mode
- Support LIN master/slave mode
- Support programmable break generation function for transmitter

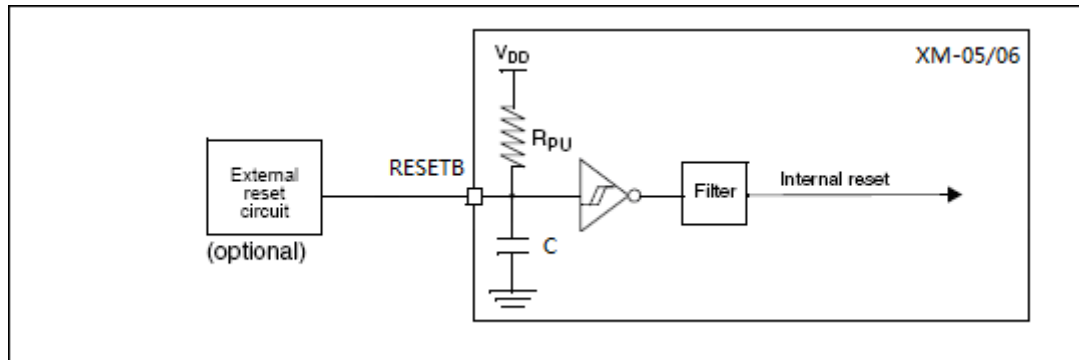
- Support break detect function for receiver
- Support RS-485 function mode.
- Support RS-485 9bit mode
- Support hardware or software enable to program RTS pin to control RS-485 transmission direction directly

9. RESETB

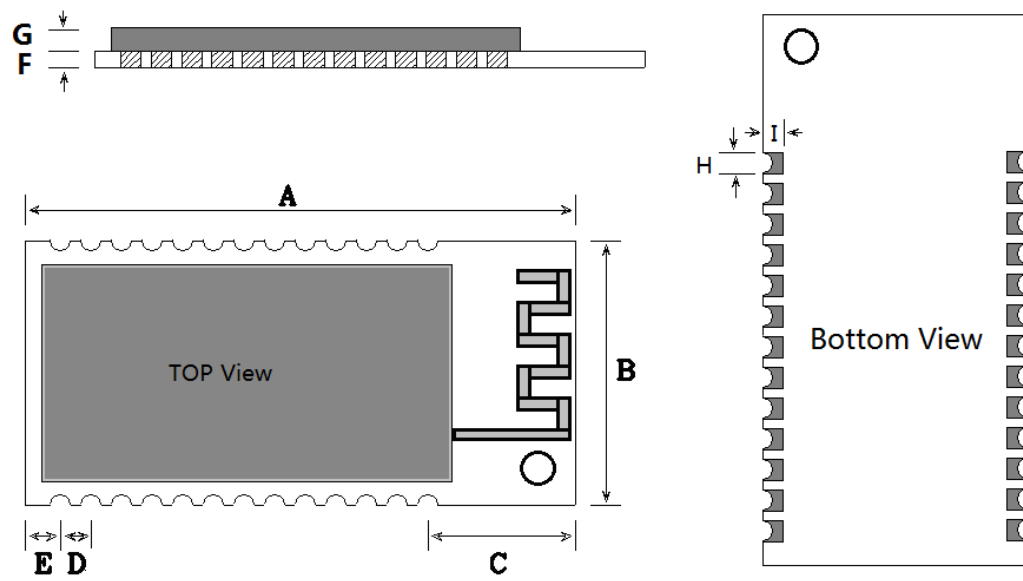
Table RESETB pin characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Vil(RESETB)	RESETB Input low level voltage (1)		-0.3		$0.3 \times V_{CC}$	V
Vih(RESETB)	RESETB Input high level voltage (1)		$0.7 \times V_{CC}$		$V_{CC} + 0.3$	V

The XM-15 Bluetooth module is integrated inside the RC reset circuit.



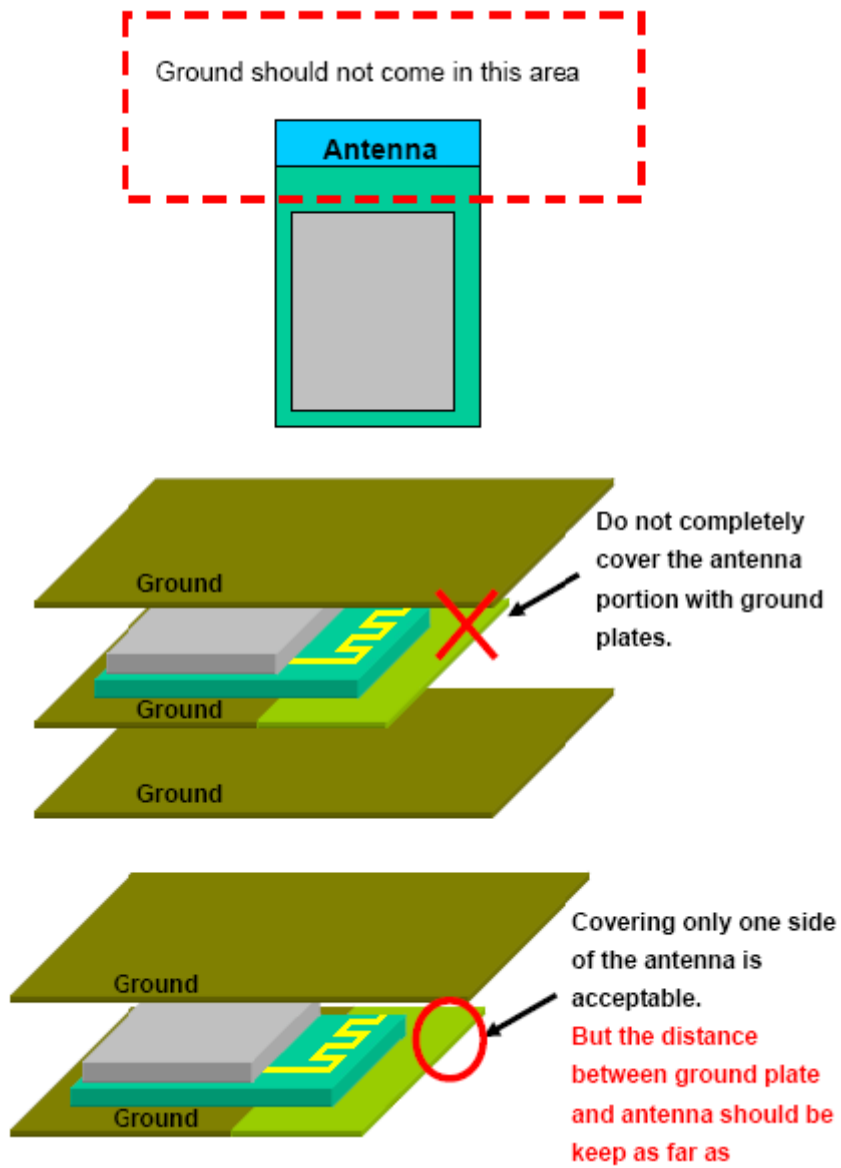
10. Package Dimensions

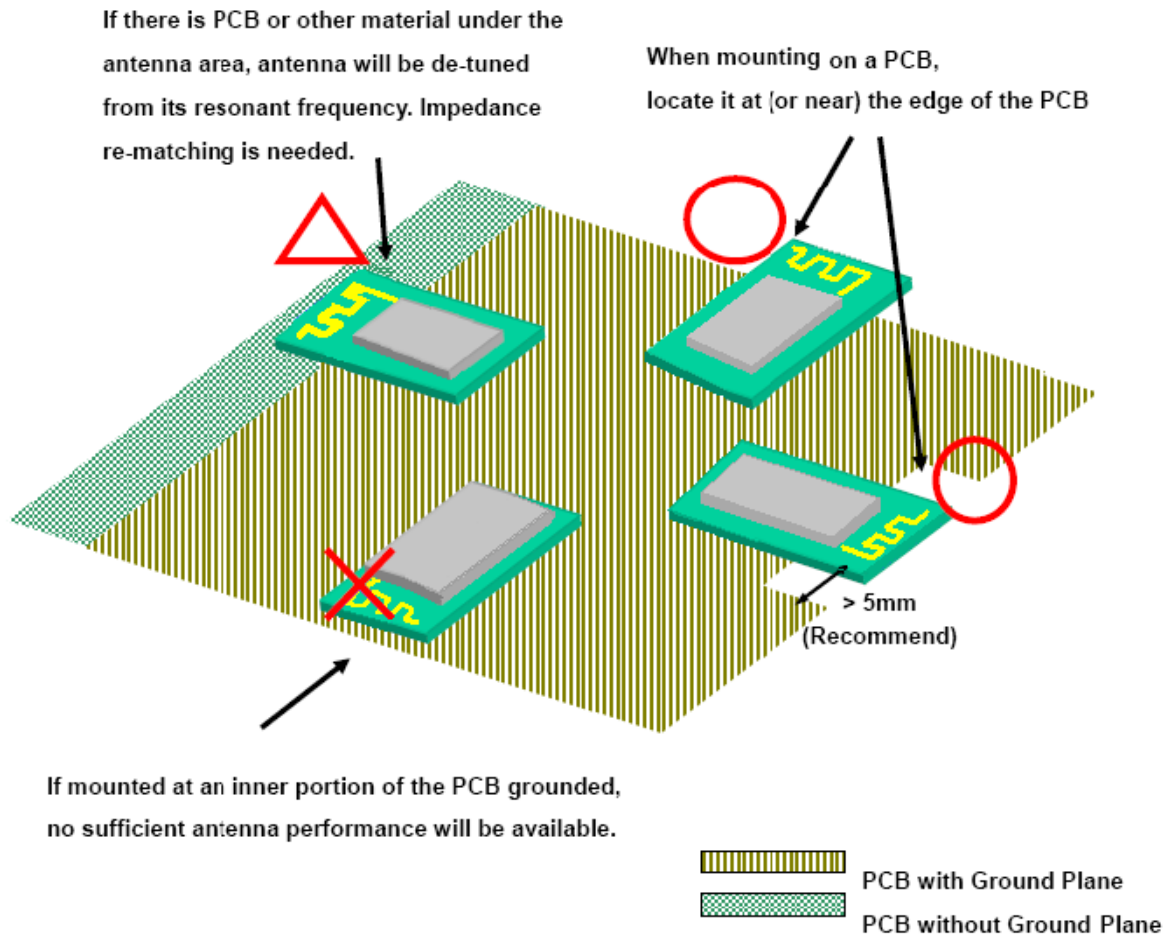


A	B	C	D	E	F	G	H	I	Unit
1063	511.8	285.4	59.1	68.9	31.5	55.1	20	32	mil
27	13	7.25	1.5	1.75	0.8	1.4	1.0	0.8	mm

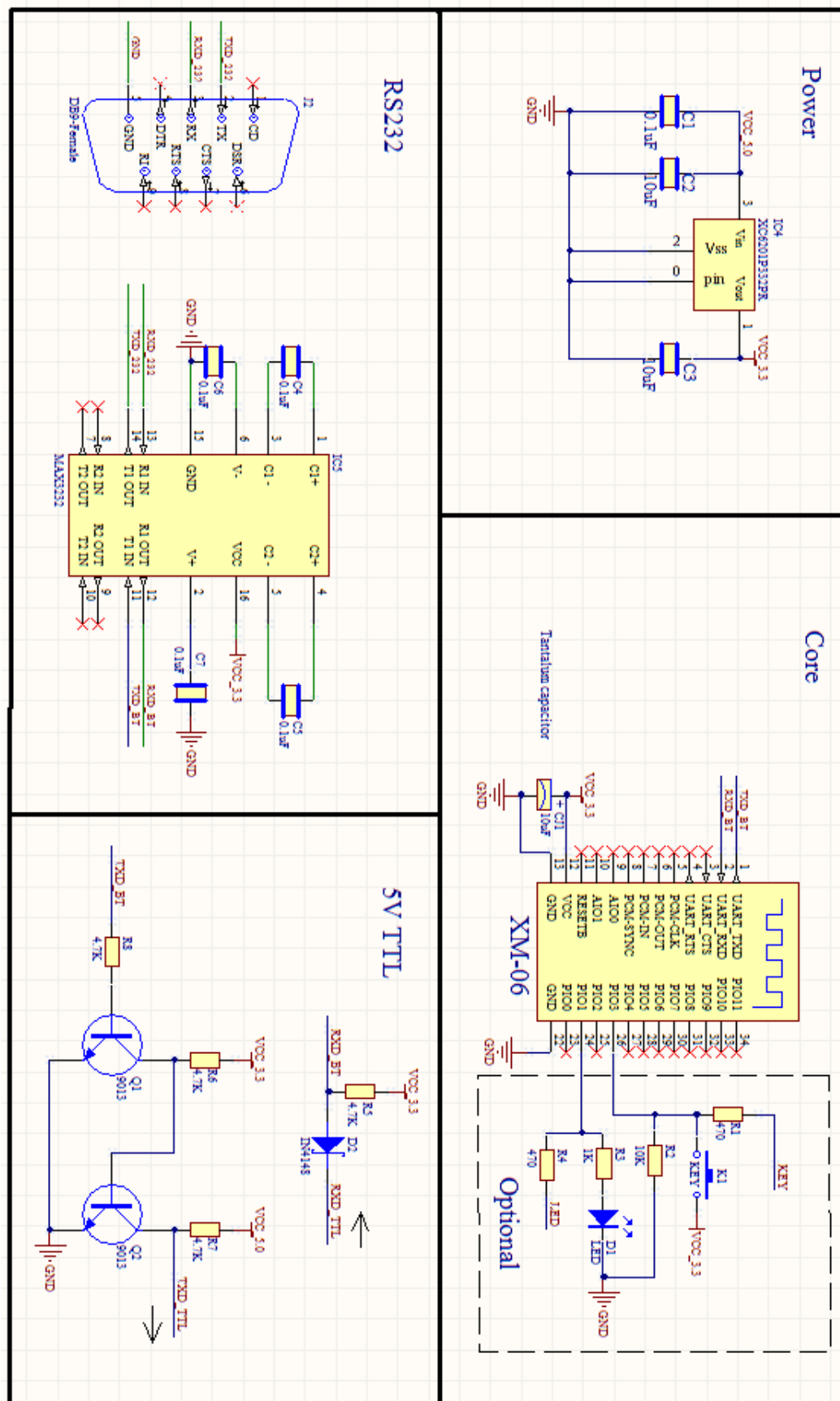
11. Guide for Antenna Radiation

In order to achieve longest communication range, please keep the area surrounding antenna free of grounding or metal housing.





12. TYPICAL APPLICATION CIRCUIT



13. Contact information

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