XM-05/06 Bluetooth Module Hardware Datasheet Rev 1.0
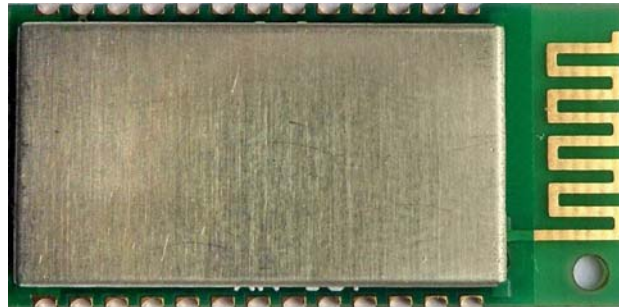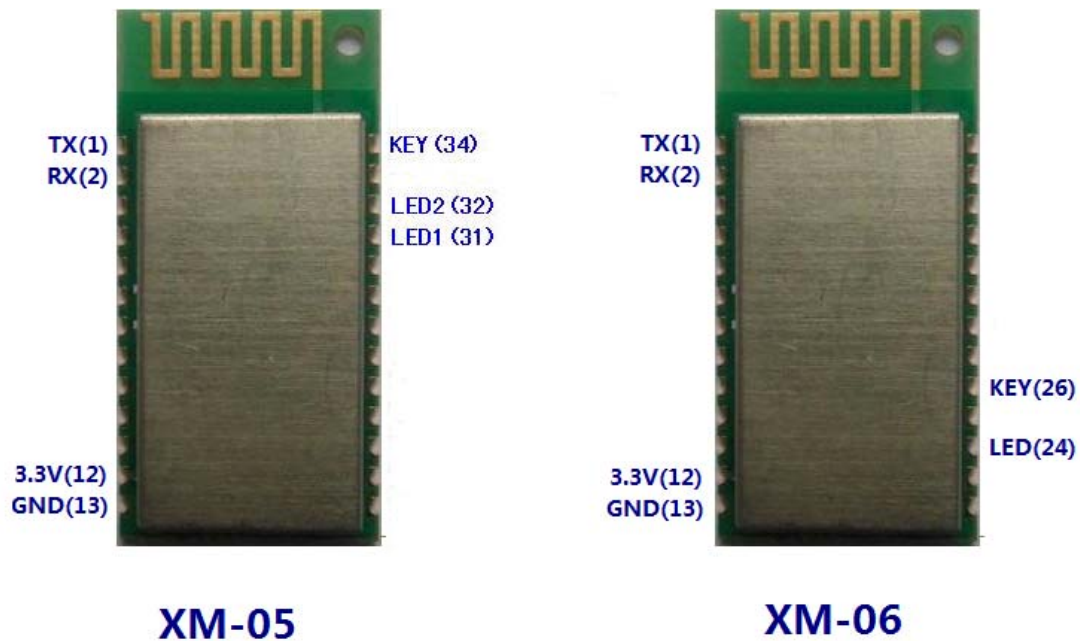

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Contents

XM-05/06 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 π/4 DQPSK and 8DPSK modulation

    1.8   A built-in hardware watchdog.

    1.9   Surface-mount, Size: L×W×H = 27.0×13.0×2.2

               （unit：mm   error = ±0.2mm）

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
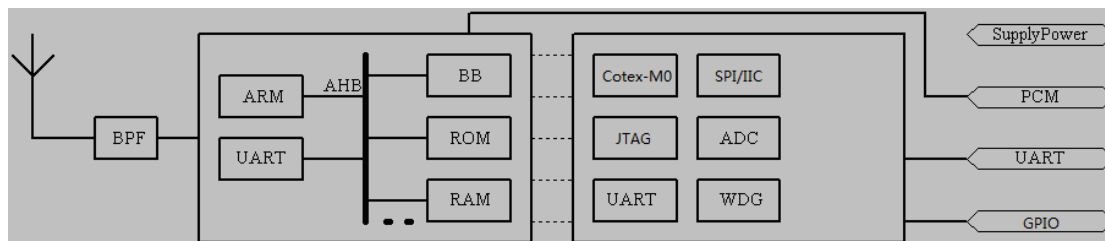
5. Pin Descriptions

　　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×VCC	V
Vih	Input high level voltage	0.7×VCC	VCC	VCC+0.3	V
Vol	Output low level		0.3	1(1)	V
Voh	Output high level	2.1	VCC		V
Ilkg	Input leakage current analog and digital VSS ≤ VIN ≤ VDD			±1	uA
Ilkg ana	Analog input leakage current VSS ≤ VIN ≤ VDD			±250	nA
Rpu	Pull-up resistor @ VCC=5V	30	55	80	kΩ

(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
△f1avg Maximum modulation			/	164	/	kHz
△f2max Minimum modulation			/	145	/	kHz
△f2avg/△f1avg			0.8	/	/	/
ICFT			/	+4	/	kHz
Drift rate			/	0.1	/	kHz/50us

			/	-2	/	kHz
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
π/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
π/4 DQPSK max w0			/	+7.4	/	kHz
π/4 DQPSK max wi			/	+6.7	/	kHz
π/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

π/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
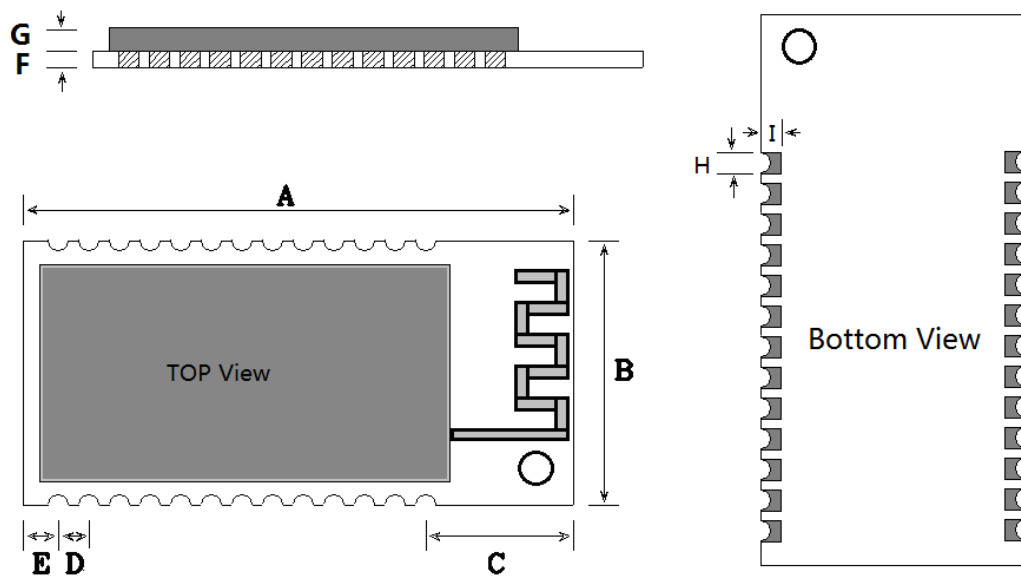
9. RESETB

Table RESETB pin characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Vil(RESETB)	RESETB Input low level voltage (1)		-0.3		0.3× VCC	V
Vih(RESETB)	RESETB Input high level voltage (1)		0.7× VCC		VCC+0.3	V

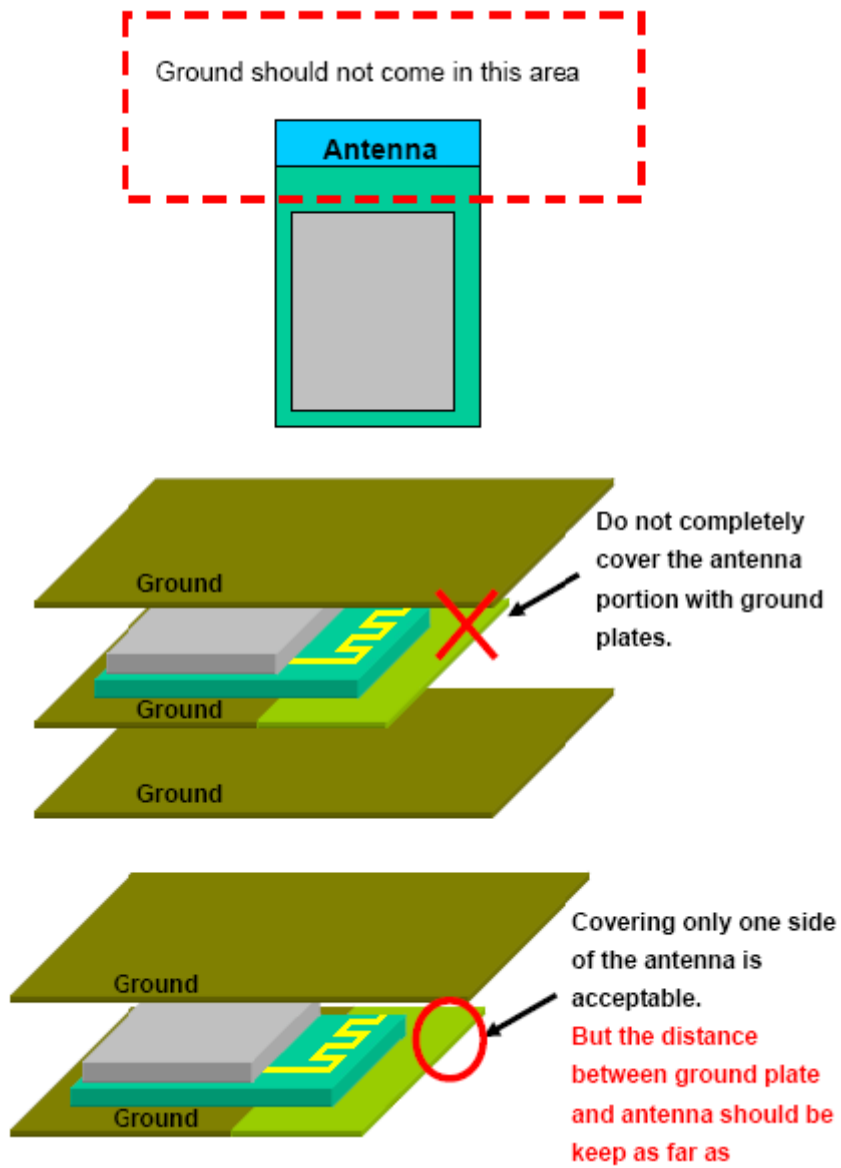The XM-05/06 Bluetooth module is integrated inside the RC reset circuit.
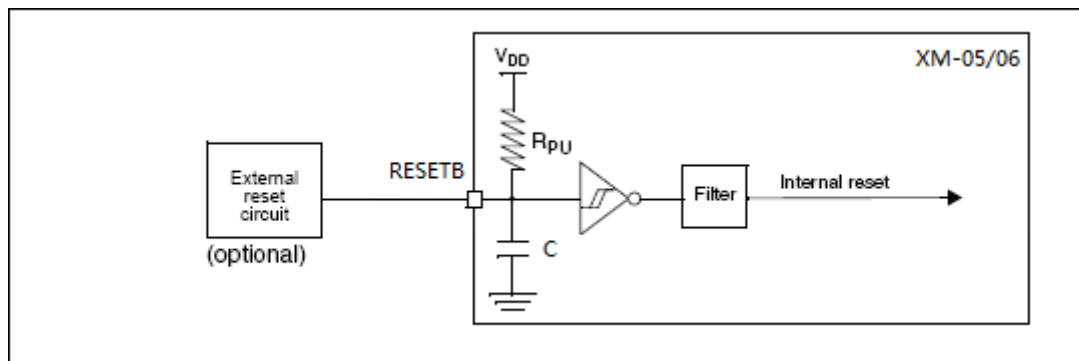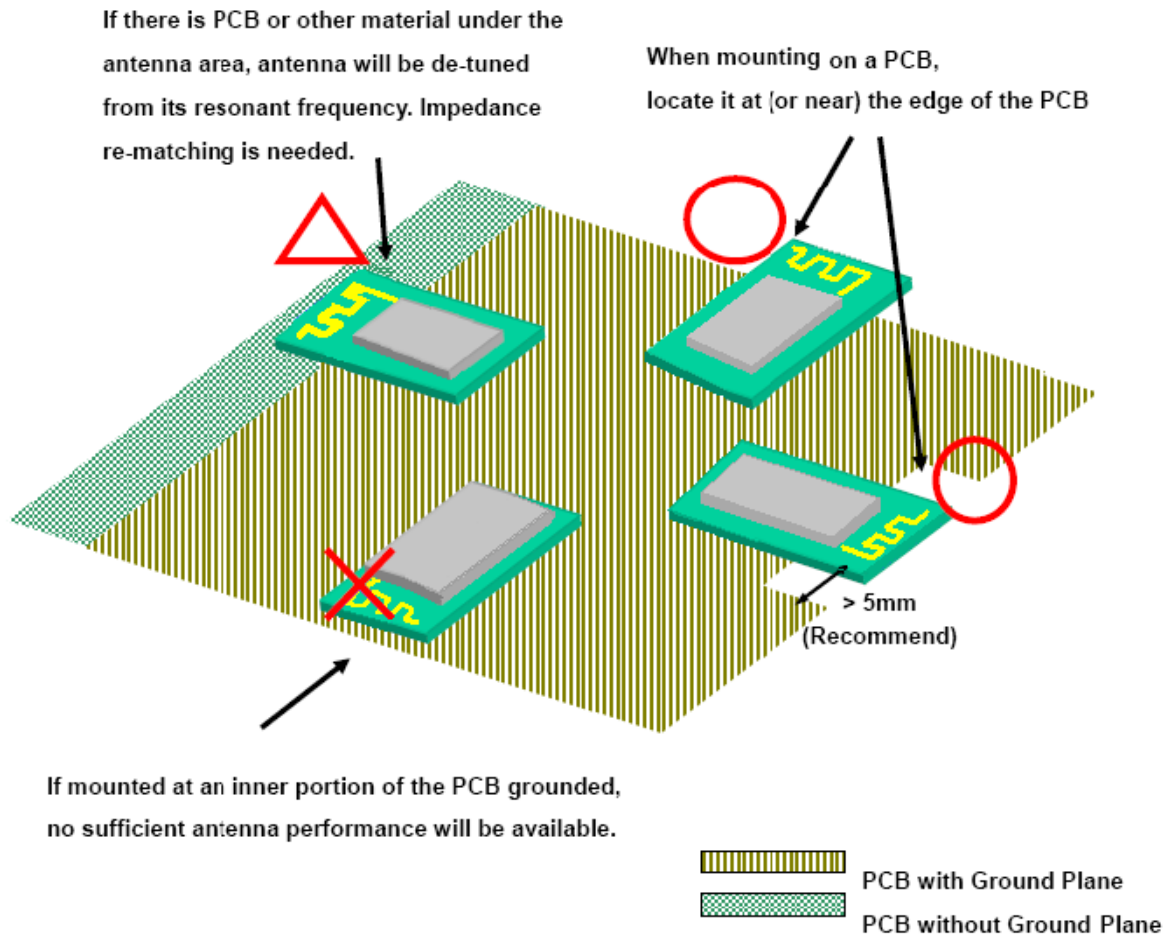
10. Package Dimensions

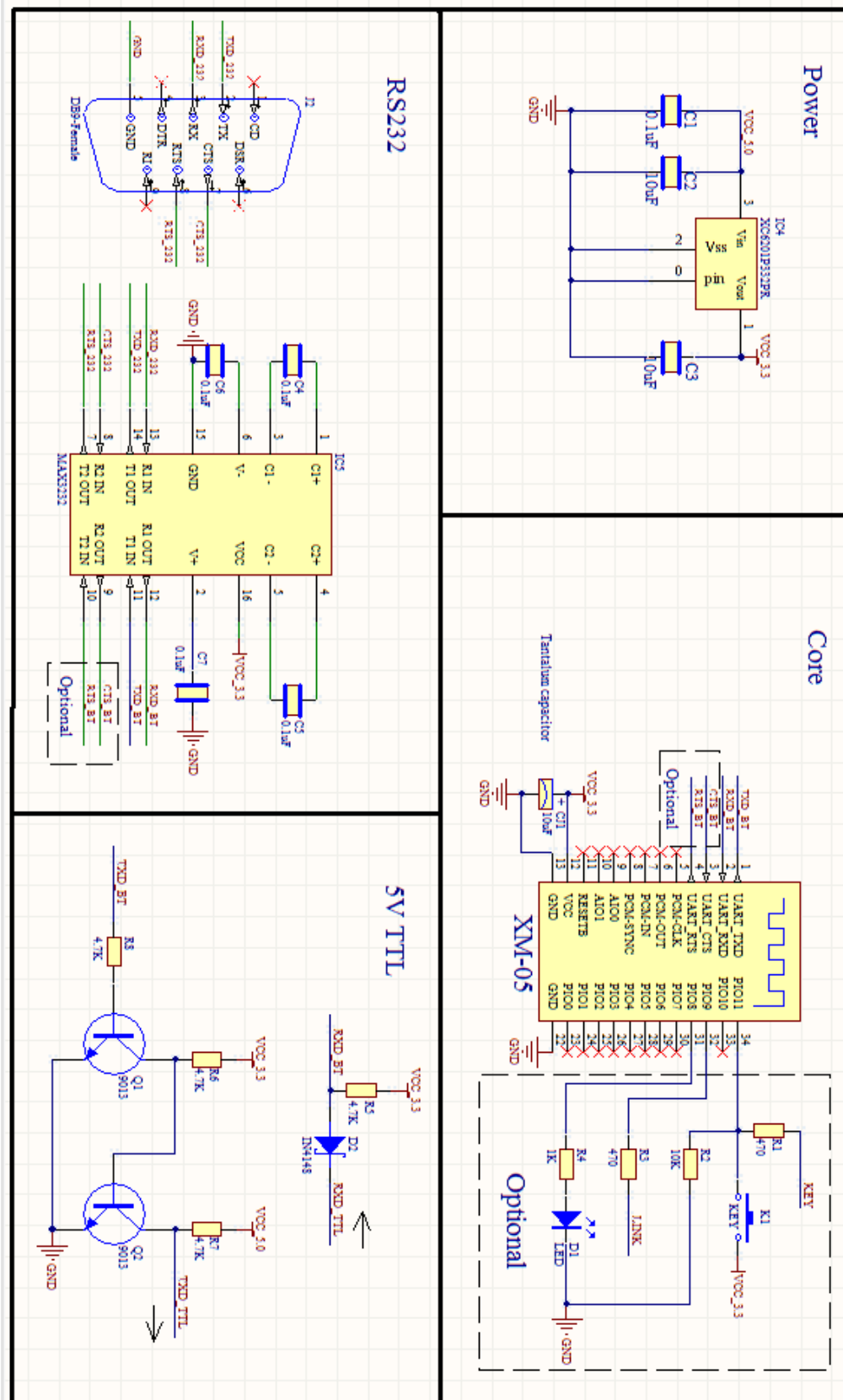| A	B	C	D	E	F	G	H	I	Unit
1063	511.8	285.4	59.1	68.9	31.5	55.1	20	32	mil
27	13	7.25	1.5	1.75	0.8	1.4	1.0	0.8	mm

11. Guide for Antenna Radiation

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

Ground should not come in this area

Antenna

Do not completely cover the antenna portion with ground plates.

Ground

Ground

Ground

Covering only one side of the antenna is acceptable.
But the distance between ground plate and antenna should be keep as far as

Ground

Ground

If there is PCB or other material under the
antenna area, antenna will be de-tuned
from its resonant frequency. Impedance
re-matching is needed.

When mounting on a PCB,
locate it at (or near) the edge of the PCB

> 5mm
(Recommend)

If mounted at an inner portion of the PCB grounded,
no sufficient antenna performance will be available.

PCB with Ground Plane
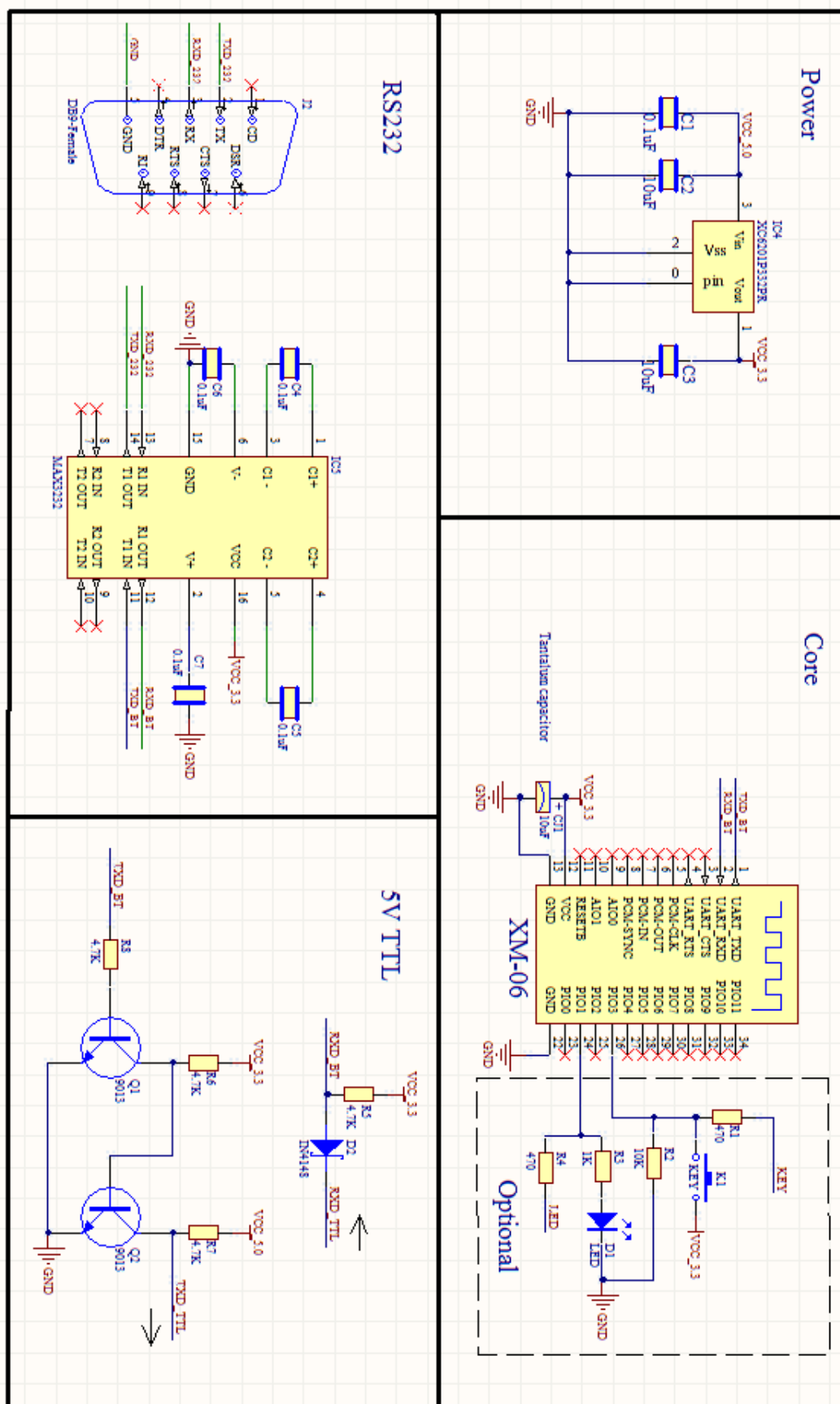PCB without Ground Plane

12. TYPICAL APPLICATION CIRCUIT

12.1   XM-05 Bluetooth Module

12.2   XM-06 Bluetooth Module

13. Contact information

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