Bluetooth Low Energy Module MMT1211.1

User Manual

MoMAGIC
Data Driven Intelligence

User Manual

MoMAGIC Bluetooth module MMT1211 is built on Airoha **AB1611** SoC platform, a highly optimized single chip solution integrating baseband, radio and flash memory for game controllers, wearables, mobile payments etc. It supports Bluetooth 5.0 specifications, with flexible embedded 512 Kb flash it makes custom software development a breeze.

MMT1211 incorporates **GPIO**, **SPI**, **UART**, **I2C, PWM, ADC** which give allows user to develop the project without the need of host of MCU.

Features of the module:

Embedded 2.4GHz transceiver supports Bluetooth 5.0
Compact size with (L) 21x (W) 16.5x (H) 2.5 mm
On board Chip antenna
Compatible with a most of the mobile phones, tablets and computers.
Fully coverage of BLE software stack.
4 different power control modes.

It provides 9 AIO's for game controller applications.
The AB1611 MCU is Andes N801S RISC V based machine which is optimized for embedded applications.
The MCU provides 64K boot RAM, 512 Kb flash memory and 64Kb SRAM.
The peripherals available on board are I2S (three modes), I2C, SPI and PWM.

Application area:

- Smart homes
- Smart sensor networks
- Industrial IoT sensors and controllers
- Personal Area Networks
- Health / fitness sensor and monitor device
- Medical device and Connected Health
- Entertainment devices
- Advanced remote controls
- Gaming controller
- Wearables
- personal fitness devices
- Security/ Proximity
- PC Peripherals
- Assisted Living
- Mesh Network

Specifications

Technical Specs

Operating supply voltage: from 1.7 to 3.6 V

Operating temperature range: -20 °C to 85 °C

High performance, ultra-low power Andes 32-bit RISC V architecture core with 16/72 MHz clock rate.

Programmable 512 kB Flash

64 kB SRAM

2 x UART interface

1 x SPI interface

1 x I2C interface

3 x 32 bit timer

5 AIOs for game controller

18 GPIOs

3 mode I2S

12-bit ADC

Tx power 0 dBm

Rx sensitivity -94 dB@1 Mbps/-103 dBm@125Kbps

Integrated 1.8V switching regulator and 1.8 V LDO.

Accurate RSSI to allow power control

Specifications

Specification

Any technical spec shall refer to AB1611 official documents as final reference.

Absolute maximum rating

Item	Min.	Max.	UNIT
I/O supply voltage (VCCIO)	-0.3	3.6	V
Analog/RF supply voltage (VCCANA, VCCRF)	-0.3	2.0	V
Operating temperature	-20	+85	°C
Storage temperature	-40	+125	°C

Operating Conditions

Item	Min.	TYP.	Max.	UNIT
Battery supply voltage (VBAT)	1.9		3.6	V
Analog supply voltage (VCCANA)		1.5		V
RF supply voltage (VCCRF)*		1.7/1.9V		V
I/O supply voltage (VCCIO)	1.7		3.6	V

Crystal Specification

Item	Min.	Typ.	Max.	Unit
Nominal Frequency		32		MHz
Load Capacitance		9		pF
Frequency Stability over Temperature		±20		ppm
Crystal (optional 32.768KHz already Mounted)				
Nominal Frequency		32.768		KHz
Load Capacitance		7		pF
Frequency Stability over Temperature		±250		ppm

Specifications

Radio Transmitter

Item		Min.	Typ.	Max.	Unit
RF power accuracy				±3	dB
Maximum RF transmit power			0		dB
In-band emissions	≥ +3MHz			-30	dBm
	+2MHz			-20	dBm
	-2MHz			-20	dBm
	<= -3MHz			-30	dBm
Modulation Characteristics	Δf1avg	225		275	KHz
	Δf2avg/Δf1avg >185 kHz	99.9		100	%
	Δf2avg/Δf1avg				
Centre freq. deviation, Fn (n = 0,1,2,….k)		-150		+150	KHz
Freq. drift, |F0 - F | (n = 2,3,4,…k)		-50		+50	KHz
Initial freq. drift, |F1 - F0|		-20		+20	KHz
Max. freq. drift rate, |Fn - Fn-5| (n = 6,7,8,…k)		-20		+20	KHz/50us
Harmonics (cable mode)			-45		dBm

Receiver

Item		Min.	Typ.	Max.	Unit
Sensitivity			-92		dBm
Maximum input level		-10			dBm
Co-Channel interference, C/I				21	dB
Adjacent channel interference, C/I	F = F0+1MHz			15	dB
	F = F0-1MHz			15	dB
	F = F0+2MHz			-17	dB
	F = F0-2MHz (image+1)			-15	dB
	F = F0+3MHz			-27	dB
	F = F0-3MHz (image)			-9	dB
Intermodulation		-50			dBm
	30-2000 MHz	-30			dBm
	2003-2399 MHz	-35			dBm
	2484-2997 MHz	-35			dBm
	3000-12750 MHz	-30			dBm
PER report integrity			50		%

Specifications

Typical Current Consumption

Parameter	Current (avg.)	Uni
Tx current @0dBm	11.44	mA
Rx current @1Mbps (0dBm)	8.4	mA
Sleep	4	uA
Deep-sleep	0.6	uA
Shutdown	0.2	uA

Pin Out & Description

The module available in 33 pins SMT package with size of
(L) 21x (W) 16.5x (H) 2.5 mm

The pin out configuration for BLE module is
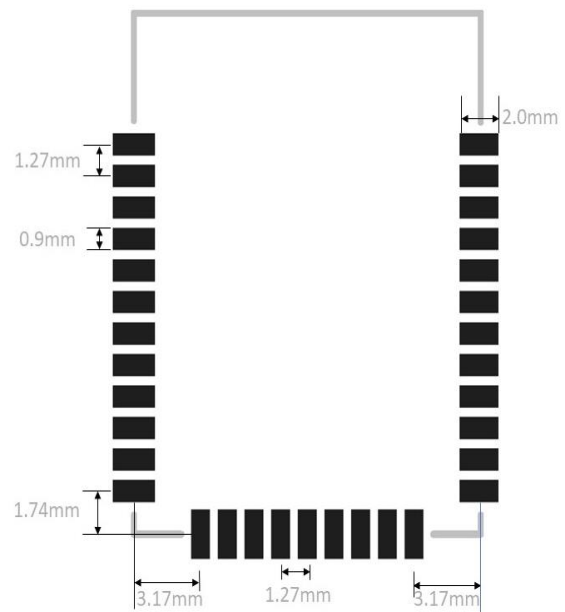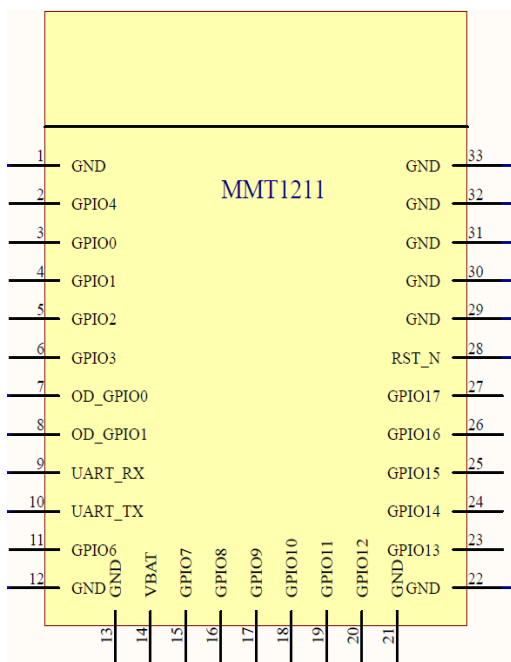
| PIN #	Pin Name	Description	Alternate
1	GND	GROUND	
2	GPIO4	GPIO	
3	GPIO0	GPIO	
4	GPIO1	GPIO	
5	GPIO2	GPIO	
6	GPIO3	GPIO	
7	OD_GPIO0	GPIO, OPEN DRAIN	
8	OD_GPIO1	GPIO, OPEN DRAIN	
9	UART_RX	UART Rx	
10	UART_TX	UART Tx	
11	GPIO6	GPIO	
12	GND	GROUND	
13	GND	GROUND	
14	VBAT	POWER	
15	GPIO7	GPIO	SPI_MOSI
16	GPIO8	GPIO	SPI_MISO
17	GPIO9	GPIO	SPI_SCK
18	GPIO10	GPIO	I2C_SCL
19	GPIO11	GPIO	I2C_SDA
20	GPOI12	GPIO	
21	GND	GROUND	
22	GND	GROUND	
23	GPIO13	GPIO	AIO
24	GPIO14	GPIO	AIO
25	GPIO15	GPIO	AIO
26	GPIO16	GPIO	AIO
27	GPIO17	GPIO	AIO
28	RST_N	RESET	
29	GND	GROUND	
30	GND	GROUND	
31	GND	GROUND	
32	GND	GROUND	
33	GND	GROUND	

Product Dimension
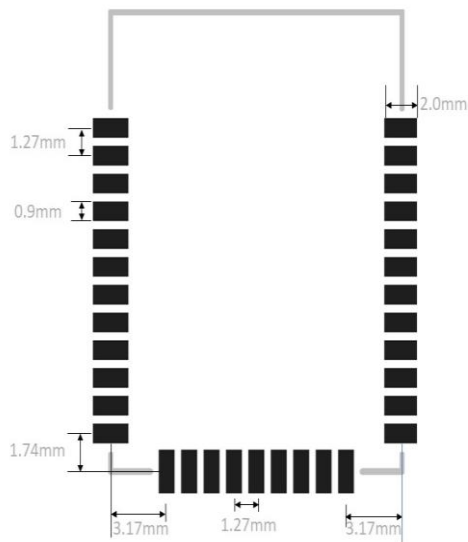
PCB Footprint
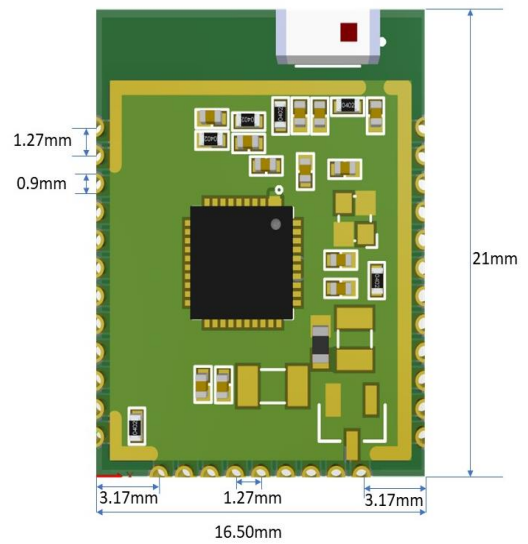
Dimensions
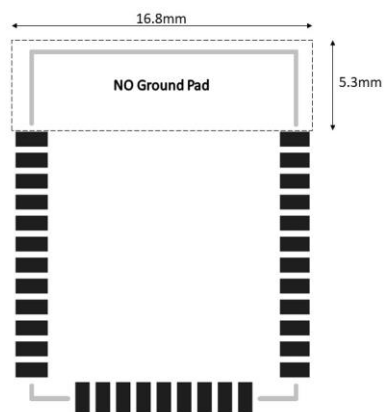
Recommended Layout

Block Diagram
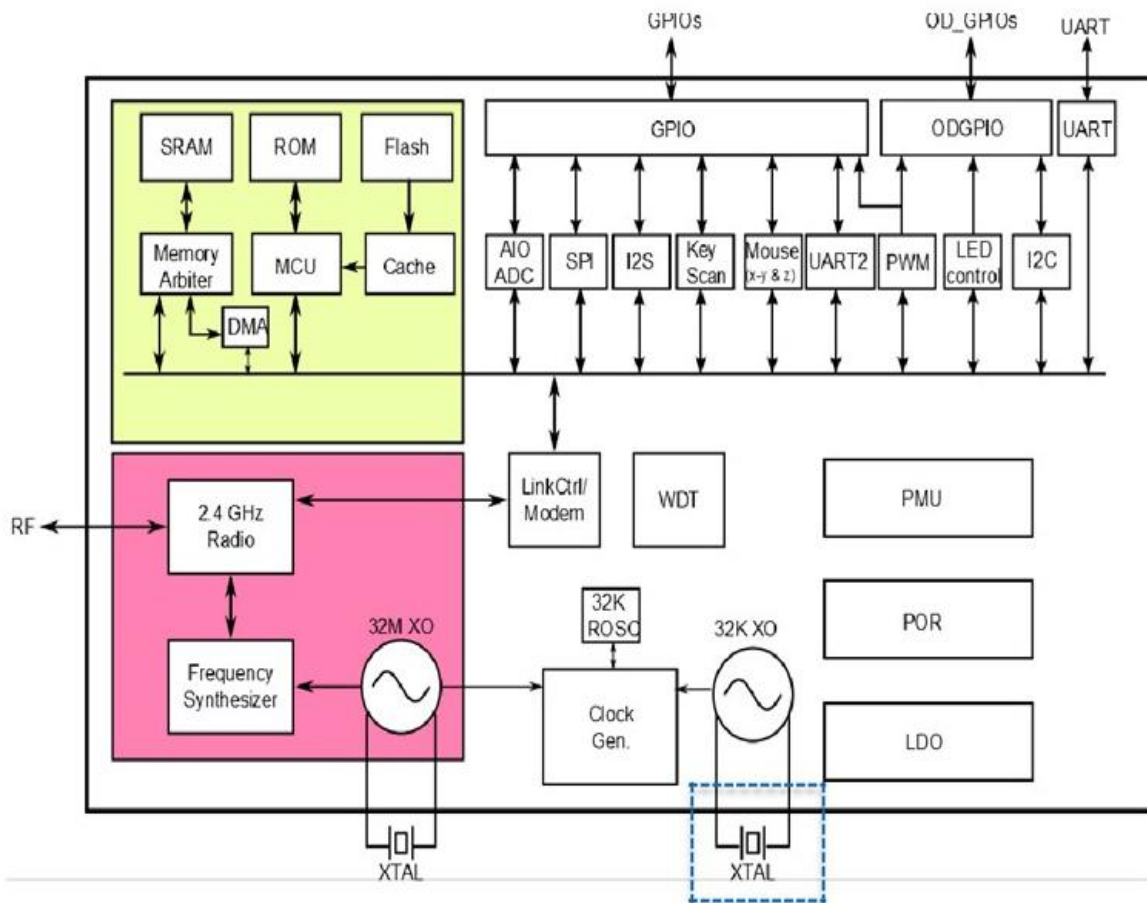
FCC Compliance

FCCID:2A2OT-MMT1211

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.
2. This device must accept any interference received, including, an interference that may
cause undesired operation.

Caution:

• Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
• For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the handset a minimum of 5mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

INFORMATION TO THE USER

NOTE: 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 or more 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.

End Product Labelling

The proposed FCC label format is to be placed on the module. If it is not visible when the module is installed into the system, Contains FCC ID: **2A2OTMMT1211** shall be placed on the outside of final host system.

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Strategic Investors: MEDIATEK FOXCONN