USER MANUAL

BLE Module

Model:BM300

NCC 警語

依據 低功率射頻器材技術規範

「取得審驗證明之低功率射頻器材,非經核准,公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信;經發現有干擾現象時,應立即停用,並改善至無干擾時方得繼續使用。前述合法通信,指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

FCC Statement:

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, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

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For a host using a certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: "Contains Transmitter Module FCC ID: [ADU-BM300A]." or "Contains FCC ID: [ADU-BM300A] " must be used.   The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

RF exposure statements
1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and   your body or nearby persons..

Feature :

Item	Specification	Remark
Chip	DA14531	
Standard	Bluetooth V5.1	
RF band	2402 ~ 2480MHz	
Interface	UART	
RF Output Power	-20dBm ~0 dBm	
Sensitivity	>-93 dBm	

Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	12.3 (W) * 15.4 (L) * 2 (H)	mm

Absolute Maximum Ratings
Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VDD	-	-0.1	+3.6	V
Operating Temperature	TOP	-	-0	+50	°C
Storage Temperature	TST	-	-20	+70	°C
Storage Humidity	HD	Ta $\leqq$ 40 °C	20	80	%RH

DC Electrical Characteristics
Module   GND = 0V, Ta = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	-	2.5	3.0	3.3	V
Input Signal Voltage	VIH	-	0.84	-	-	V
	VIL	-	-	-	0.36	V
Output Signal Voltage	VOH	-	1.88	-	-	V
	VOL	-	-	-	0.47	V
Supply Current	IDD	VCC =3.0V *1				mA
		VCC =3.0V *2				uA

BIONIME

Pin Definition:

Pin No.	Symbol	Function
1	BLE_ PCL	BLE_ PCL ，ON = L、OFF = H
2	BLE_STATUS	BLE_STATUS ，ON = L、OFF = H
3	P0.7	GPIO
4	---	Dummy
5	RST	INPUT. Reset signal (active high). Must be connected to GND if not used.
6	---	Dummy
7	SWDIO	This signal is the JTAG data I/O by default
8	SWDCLK	This signal is the JTAG clock by default
9	---	Dummy
10	Wake up BLE	Wake up BLE ，ON = L、OFF = H
11	VCC	Power supply for BLE. supply of 2.5V ~ 3.3V.
12	GND	Ground
13	---	Dummy
14	---	Dummy
15	BT_TX	UART data output pin，MCU data to BLE
16	---	Dummy
17	BT_RX	UART data input pin，BLE data to MCU
18	GND	Ground
19	---	Dummy
20	GND	Ground
21	---	Dummy
22	GND	Ground
23	---	Dummy
24	---	Dummy
25	---	Dummy
26	GND	Ground

Mechanical Diagram

12.25mm ± 0.15mm

15.26mm ± 0.30mm

E1 D1

26
20
19

1
10
11

0.90mm

1.90mm ± 0.20mm
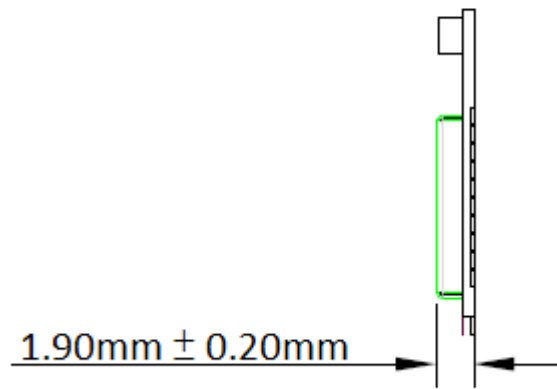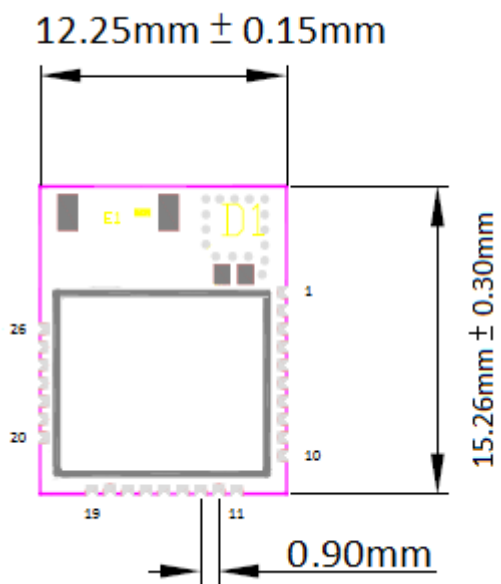
Block Diagram
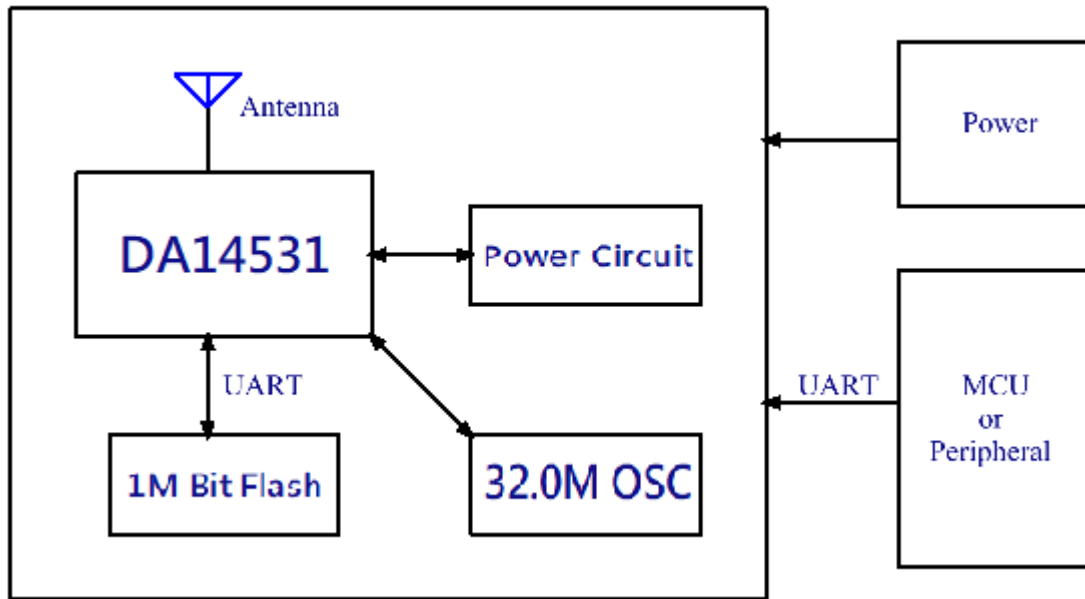
Module Application Circuit:
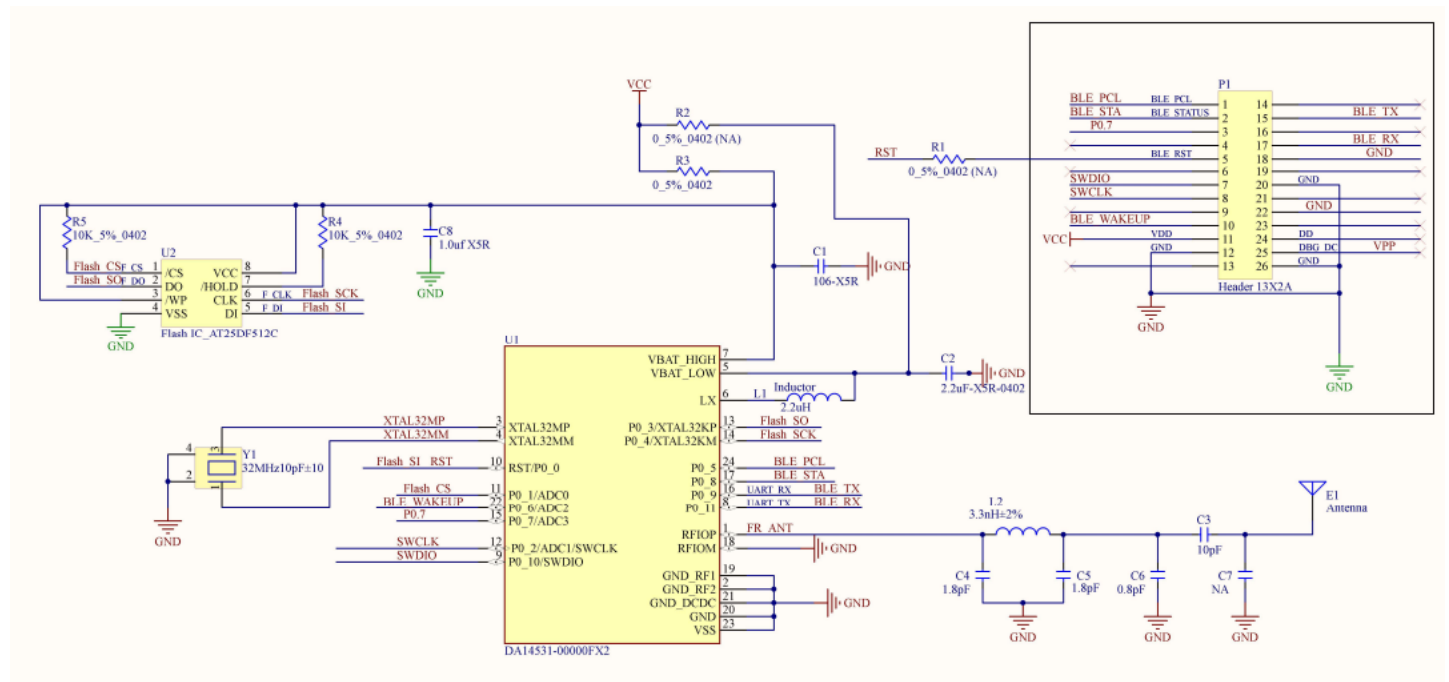
Module Bill of Material:

Item	Part No.	Comment	Designator
1	501-010002-020	R3	0Ω-5%-0402
2	501-011032-020	R4, R5	10KΩ-5%-0402
3	502-021067-040	C1	0402 X5R 10V ±20%
4	502-022247-010	C2	0402 X5R±10%6.3V
5	502-021005-040	C3	0201 C0G 50V ±2%
6	502-021805-020	C4, C5	0201 NPO 50V ±5%
7	502-020805-020	C6	0201 C0G 50V ±0.05pF
8	502-021057-020	C8	0201 X5R 6.3V ±20%
9	505-040000-0E0	E1	AT5020-B2R8HAA(LF)
10	505-040000-2K0	L1	MLF1608A2R2KT
11	505-040000-4R0	L2	LQW15AN3N3B80D
12	503-040000-1R0	U1	DA14531-00000FX2
13	503-040000-1C0	U2	MX25V1006FZUI
14	505-020000-0H0	Y1	Q22FA1280051711/32MHz 6pF±10
15	601-800000-070		洋白銅 T=0.15mm

Software & Operation Mode

UART Configuration

Baud Rate	9600 bps
Start Bit	1
Data Bits	8
Stop Bits	1
Parity Bit	None

Timeout : 500 ms

Instruction Set

Function	Instruction							
Set BGM Device ID Command	" { "	LEN	ID-1	ID-2	...	ID-n	CS	
	" } "	LEN	ID-1	ID-2	...	ID-n	CS	
Pairing	[	0x27	White List	CS				
	]	0xD8	Status Byte	CS				
Pair Completion	[	0x28	CS					
	]	0xD7	CS					
White List Full	[	0x29	CS					
	]	0xD6	CS					
Check BLE	]	0x5F	CS					
	[	0xA0	CS					
Clear White List	]	0x5B	CS					
	[	0xA4	Status Byte	CS				
Read BLE Flash	]	0x5A	indexL	indexH	CS			
	[	0xA5	indexL	indexH	data0	...	data9	CS
Write BLE Flash	]	0x59	indexL	indexH	data0	...	data9	CS
	[	0xA6	indexL	indexH	data0	...	data9	CS
BLE Flash writing area setting	]	0x58	Section Index	CS				
	[	0xA7	Section Index	CS				
Write BLE Flash End	]	0x57	CS					
	[	0xA8	CS					

Set BGM Device ID Command:

Byte Index	0	1	2	3	...	LEN+1	LEN+2
MCU to BLE Command	'}'	LEN	ID-1	ID-2	...	ID-n	CS
BLE to MCU Return Data	'{'	LEN	ID-1	ID-2	...	ID-n	CS

'}'   :   Header of MCU set command, ASCII Format.
'{'   :   Header of BLE return data. ASCII Format.
LEN   :   Length of BGM ID. HEX value.
ID-1 ~ ID-n   :   Unique ID of BGM. ASCII format.
              Range   0x01 ~ 0x14 (1~20)
CS   :   Checksum.
       Checksum Byte = (Byte[0] + byte[1] + ... Byte[n])   &   0xFF

Pairing:

Byte Index	0	1	2	3
BLE to MCU Command	'['	0x27	White List	CS
MCU to BLE Return Data	']'	0xD8	Status Byte	CS

'['   :   Header of BLE set command, ASCII Format.
']'   :   Header of MCU return data. ASCII Format.
White List   :   paired quantity
Status Byte :   0x00 : Agree
              0x01 : Deny
              0x02 : Wait

Pair Completion

Byte Index	0	1	2
BLE to MCU Command	'['	0x28	CS
MCU to BLE Return Data	']'	0xD7	CS

BLE module pairing is completed

White List Full

Byte Index	0	1	2
BLE to MCU Command	'['	0x29	CS
MCU to BLE Return Data	']'	0xD6	CS

Whitelist is full and can no longer new pairing

Check BLE

Byte Index	0	1	2
MCU to BLE Command	'] '	0x5F	CS
BLE to MCU Return Data	' ['	0xA0	CS

MCU tested for BLE module function test
BLE normal operation, reply to 0xA0

Clear White List

Byte Index	0	1	2	3
MCU to BLE Command	'] '	0x5B	CS	
BLE to MCU Return Data	' ['	0xA4	Status Byte	CS

MCU command BLE clear Whitelist
Status Byte： 0x00：BLE reply, Whitelist Clear Completed
0x01：BLE reply, Whitelist Cleanup failed

Read BLE Flash

Byte Index	0	1	2	3	4	...	13	14
MCU to BLE Command	'] '	0x5A	indexL	indexH	CS	...		
BLE to MCU Return Data	' ['	0xA5	indexL	indexH	data0	...	Data9	CS

Read BLE Flash

BLE 模組內可儲存資料 1200 筆

Flash 可存 1200 筆資料，每筆 10byte，index 範圍 0x0000~0x04AF

Write BLE Flash

Byte Index	0	1	2	3	4	...	13	14
MCU to BLE Command	'] '	0x59	indexL	indexH	data0	...	Data9	CS
BLE to MCU Return Data	' ['	0xA6	indexL	indexH	data0	...	Data9	CS

BLE Flash writing area setting

Byte Index	0	1	2	3
MCU to BLE Command	'] '	0x58	Section Index	CS
BLE to MCU Return Data	' ['	0xA7	Section Index	CS

Section Index： 0：
1：
2：

Write BLE Flash End

Byte Index	0	1	2	3
MCU to BLE Command	'] '	0x57	CS	
BLE to MCU Return Data	' ['	0xA8	CS	