

BLE Module User manual

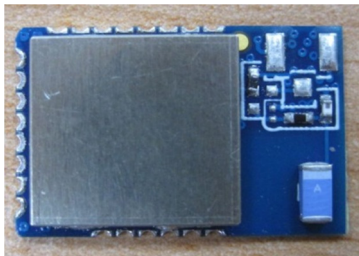
BLE Module

Brand Name: ADATA

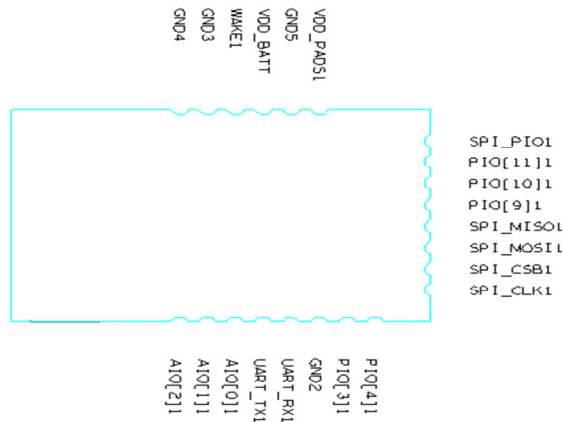
Model No. : BT10ZAC1

KEY FEATURES:

- Bluetooth® v4.1 specification compliant
- Bluetooth Smart
- 128KB memory: 64KB RAM and 64KB ROM
- Support for Bluetooth v4.1 specification host stack including ATT, GATT, SMP, L2CAP, GAP
- RSSI monitoring for proximity applications
- 32kHz and 16MHz crystal or system clock
- Switch-mode power supply
- Programmable general purpose PIO controller
- 10-bit ADC
- 12 digital PIOs
- 3 analogue AIOs
- UART
- Debug SPI
- 4 PWM modules
- <900nA current consumption in dormant mode
- Wake-up interrupt and watchdog timer
- Radio performance
 - TX power: +8dBm
 - RX sensitivity: -88dBm



Pinout and Terminal Description



Pin Number	Pin Name	Pin Type	Description
1	GND4	GND	GND
2	GND3	GND	GND
3	WAKE_1	Input has no internal pull-up or pull-down, use external pull down.	Input to wake module from hibernate or dormant.
4	VDD_BATT	Supply voltage	Supply voltage 1.8V - 3.6V
5	GND5	GND	GND
6	VDD_PADS1	Positive supply for all digital I/O ports	Supply voltage 1.2V - 3.6V
7	SPI_PIO1	Input with strong internal pull-down	Selects SPI debug on PIO[8:5]
8	PIO[11]1	Bidirectional with programmable strength internal pull up/down	Programmable I/O line.
9	PIO[10]1		
10	PIO[9]1		
11	SPI_MISO1	Bidirectional with programmable strength internal	Programmable I/O line or debug SPI MISO selected by SPI_PIO8

12	SPI_MOSI1	pull up/ down	Programmable I/O line or debug SPI MOSI selected by SPI_PIO7.
13	SPI_CSB1		Programmable I/O line or debug SPI chip select (CS#) selected by SPI_PIO6.
14	SPI_CLK1		Programmable I/O line or debug SPI CLK selected by SPI_PIO5.
15	PIO[4]1	Bidirectional with programmable strength internal pull up/ down	Programmable I/O line or SPI serial flash chip select (SF_CS#)
16	PIO[3]1		Programmable I/O line or SPI serial flash data (SF_DIN) input. If connecting to SPI serial flash, this pin connects to SI on the serial flash.
17	GND2	GND	
18	UART_RX1	Bidirectional with programmable strength internal pull up/ down	Programmable I/O line PIO[1] or UART RX.
19	UART_TX1		Programmable I/O line PIO[0] or UART TX.
20	AIO[0]1	Bidirectional analogue	Analogue programmable I/O line.
21	AIO[1]1		
22	AIO[2]1		

SPI Master Interface

SPI Flash Interface	Pin
Flash_VDD	PIO[2]
SF_DIN	PIO[3]
SF_CS#	PIO[4]
SF_CLK	I2C_SCL
SF_DOUT	I2C_SDA

Electrical Characteristics

A. Absolute Maximum Ratings

Rating	Min	Max
Storage temperature	-20	85 °C
Battery (VDD_BATT) operation	1.8	3.6 V
I/O supply voltage	-0.4	3.6 V
Other terminal voltages	VSS - 0.4	VDD + 0.4

B. Recommended Operating Conditions

Operating Condition	Min	Max
Operating temperature range	-20	85 °C
Battery (VDD_BATT) operation	1.8	3.6 V
I/O supply voltage (VDD_PADS1)	1.2	3.6 V

Parameter	Min	Typ	Max	Unit
Logic-0 input voltage	-0.4	—	0.3 xVDD_PADS1	V
Logic-1 input voltage	0.7 xVDD_PADS1	—	VDD_PADS1 +0.4	V
Logic-0 output voltage (Load 4 mA)	—	—	0.4	V
Logic-1 output voltage (Load 4 mA)	0.75 xVDD_PADS1	—	—	V
IOL output current low, VOL max		8	10	mA
IOH output current high, VOH min		8	10	mA
With strong pull-up	-150	-40	-10	uA
I ² C with strong pull-up	-250			uA

With strong pull-down	10	40	150	uA
With weak pull-up	-5	-1	-0.33	uA
With weak pull-down	0.33	1	5	uA

AIO Input/Output Voltage Levels	Min	Typ	Max	Unit
Input voltage	0	–	1.35	V
Output voltage	0	–	1.35	V

Auxiliary ADC	Min	Typ	Max	Unit
Resolution	–	–	10	Bits
Input voltage range	0	–	1.35	V
Accuracy INL	-1	–	1	LSB
Accuracy DNL	0	–	1	
Offset	-1	–	1	
Gain error	-0.80%	–	0.80%	%
Input bandwidth	–	100	–	kHz
Conversion time	1.38	1.69	2.75	µs
Sample rate	–	–	21000	Samples/s
ADC block conversion current	–	410	–	µA

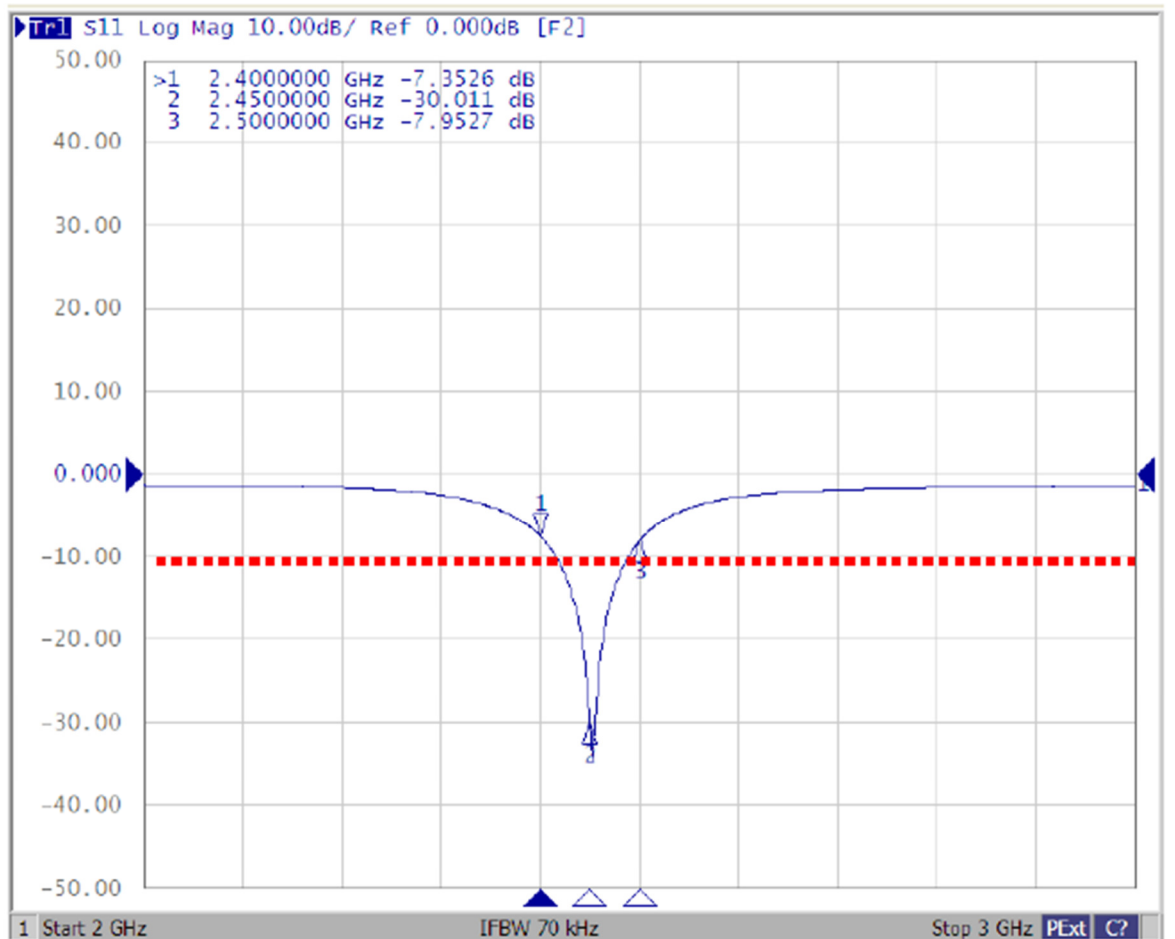
Auxiliary DAC	Min	Typ	Max	Unit
Resolution	–	–	10	Bits
Supply voltage	1.3	1.35	1.4	V
Output voltage range	0	–	1.35	
Full-scale output voltage	1.3	1.35	1.4	
LSB size	0	1.32	2.64	mV
Offset	-1.32	0	1.32	mV
Integral non-linearity	-1	0	1	LSB
Settling time	–	–	250	ns

Antenna characteristics

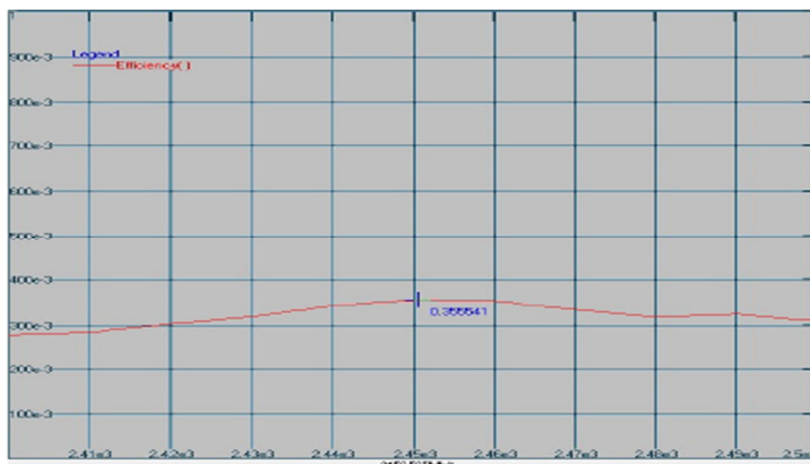
The antenna radiation pattern depends on the mother board layout, placement and external mechanical housing.

The following RF characteristics are measured from EVB board.

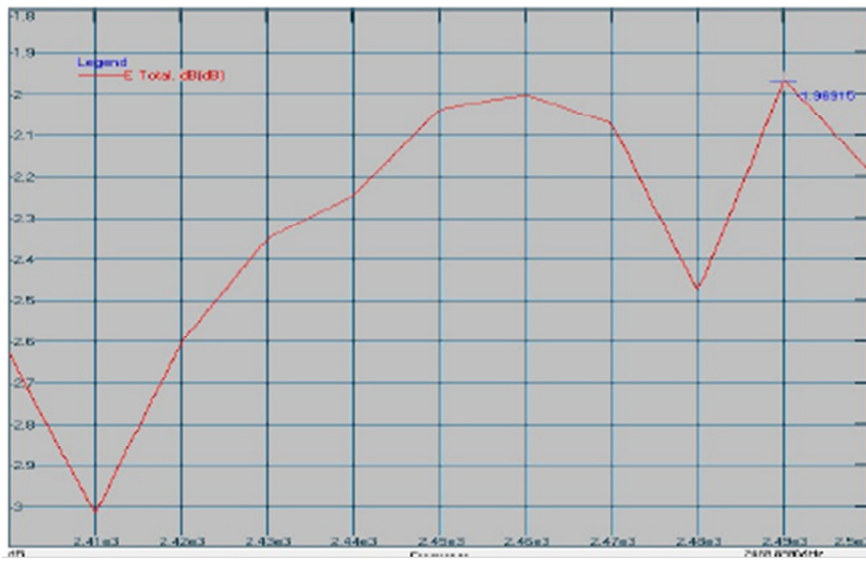
1. Impedance



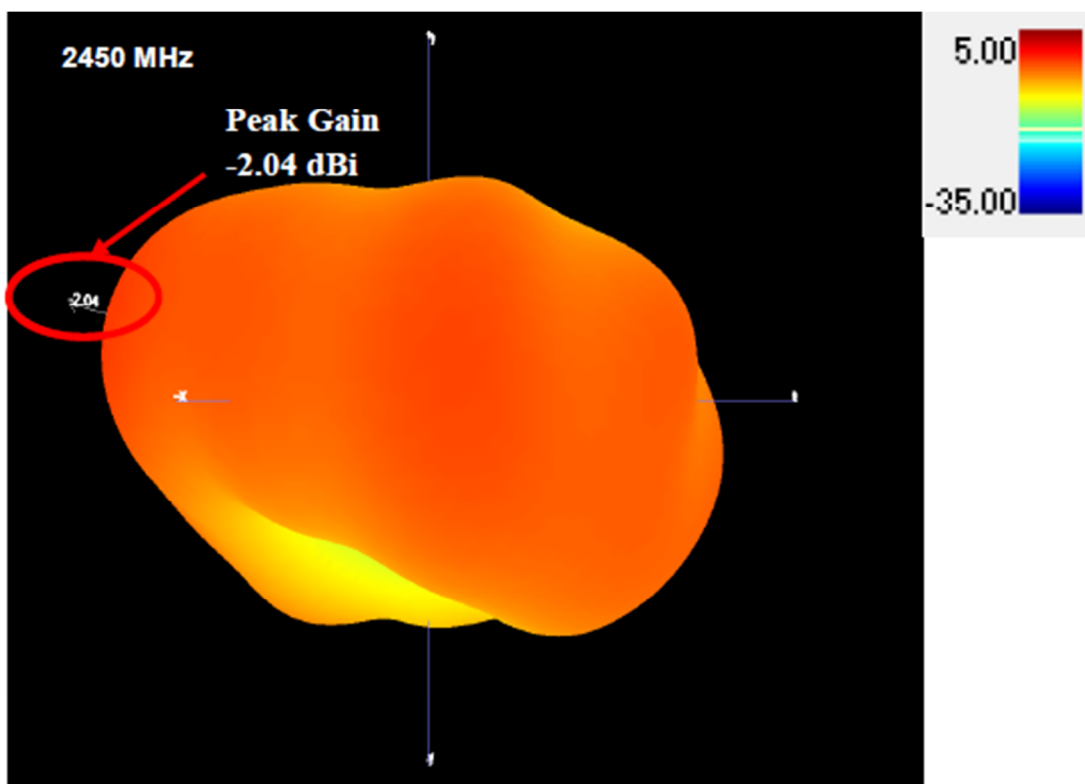
2. Antenna Efficiency and Peak Gain



Maximum Efficiency at 2450 MHz : 35 %

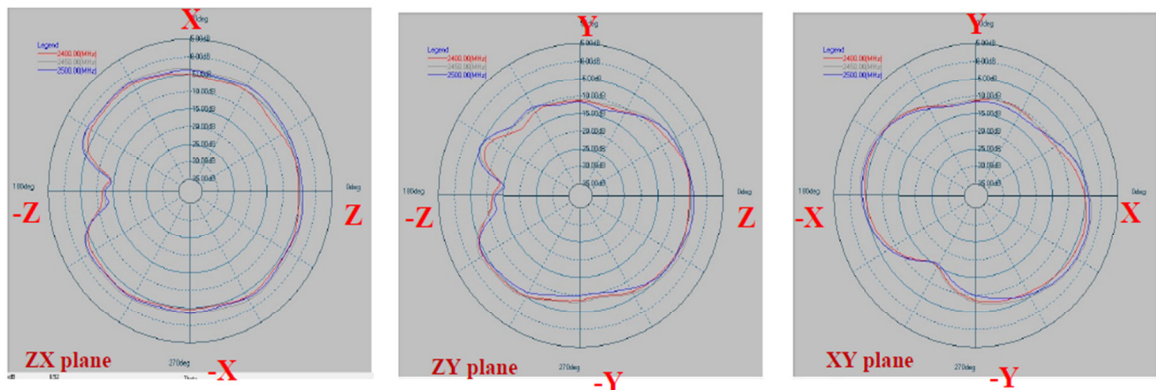


Maximum Peak Gain at 2489 MHz : -1.96 dBi



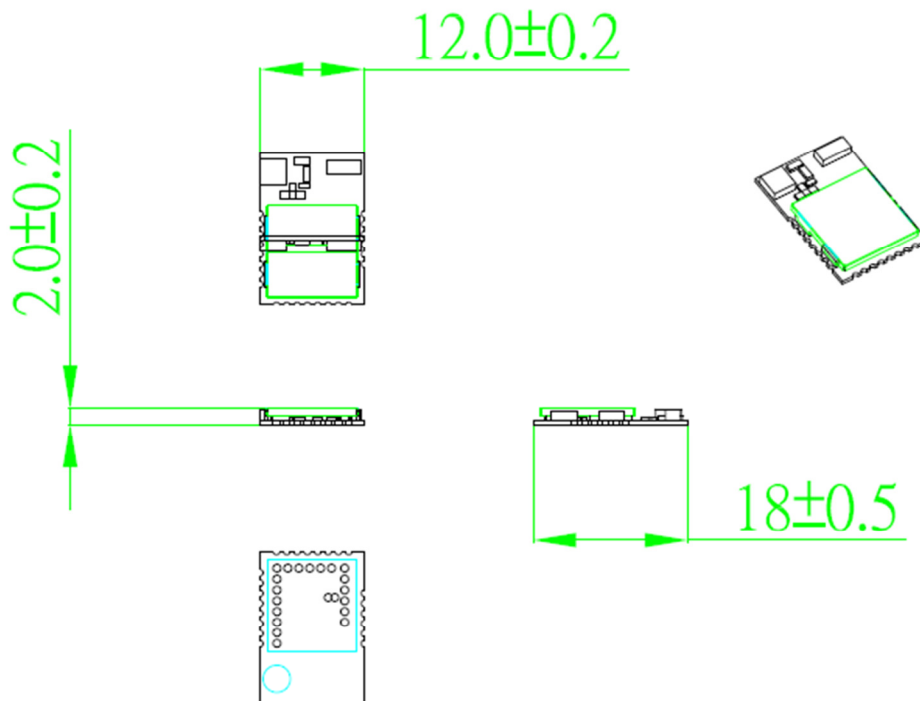
3D Radiation Patterns

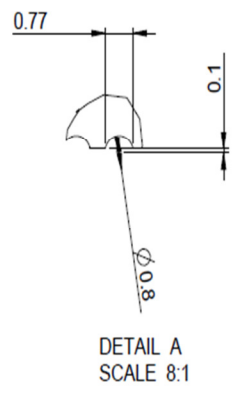
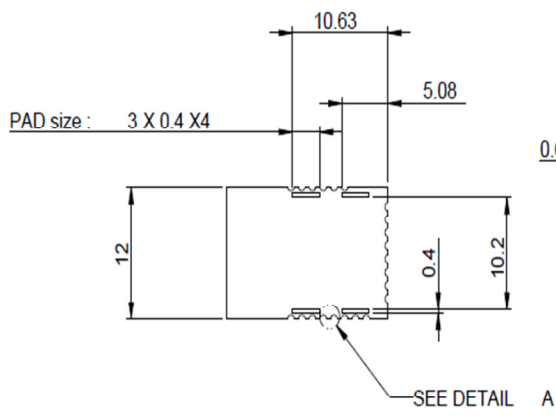
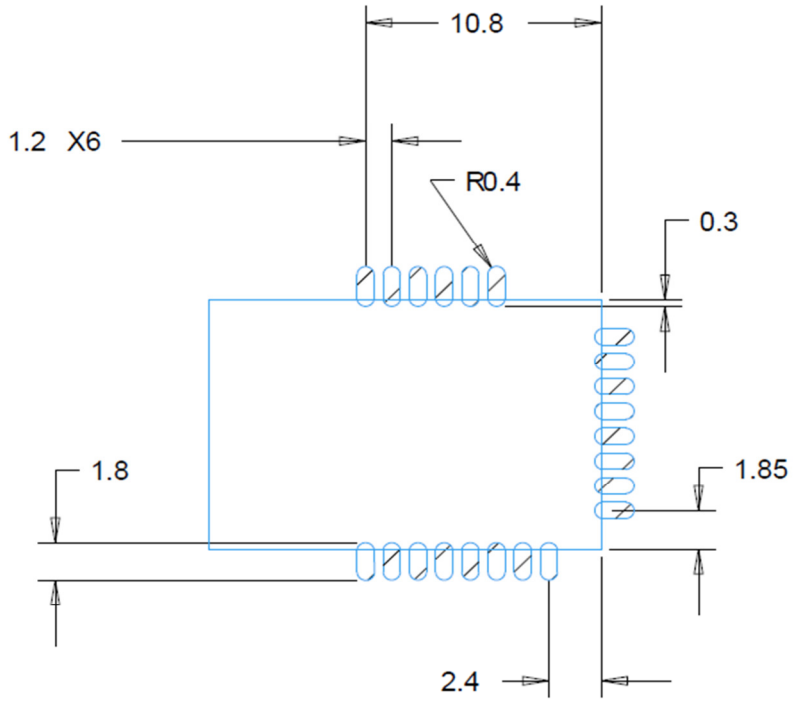
3. 2 D Radiation Patterns



Frequency [MHz]	ZX plane		ZY plane		XY plane	
	Max Value [dB]	Average [dB]	Max Value [dB]	Average [dB]	Max Value [dB]	Average [dB]
2400	-3.17	-4.88	-4.88	-7.37	-3.86	-7.22
2450	-2.26	-3.74	-3.74	-6.60	-2.27	-6.10
2500	-2.21	-4.07	-4.07	-7.22	-2.70	-6.66

Physical Dimensions





FCC

FEDERAL COMMUNICATIONS COMMISSION (FCC) STATEMENT

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)

Federal Communications Commission (FCC) Statement

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.

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 of the device.

FCC RF Radiation Exposure Statement:

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.

End Product Labeling:

The final end product must be labeled in a visible area with the following: "Contains FCC ID:RLY-BLE01"

NCC

根據 NCC 低功率電波輻射性電機管理辦法 規定:	
第十二條	經型式認證合格之低功率射頻電機，非經許可，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。
第十四條	低功率射頻電機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。前項合法通信，指依電信法規定作業之無線電通信。 低功率射頻電機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。

此模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組:ID 編號」字樣。