

# Product Specification

Product Name: Zigbee/matter/BLE Cloud Module

Model Name: DSM-04B

## Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2020-12-30		New version release	Alpha

## Approvals

<i>Organization</i>	<i>Name</i>	<i>Title</i>	<i>Date</i>

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## 1 Introduction

### 1.1 Purpose& Description

DSM-04B is a low power-consuming embedded Zigbee/matter/BLE module developed By Dusun. It consists of the highly integrated wireless radio processor chip, EFR32MG21 series, and several peripherals, with a built-in 802.15.4 PHY/MAC Zigbee/matter/BLE network protocol stack and robust library functions.

This data terminal device is embedded with a low power-consuming 32-bit ARM Cortex-M33 core, 1024/768 KB flash memory, 64 KB RAM data memory, and robust peripheral resources. Besides, it runs on the FreeRTOS platform that integrates all Zigbee/matter/BLE MAC library functions. You can develop built-in Zigbee/matter products as required.

### 1.2 Product Feature Summary

- Embedded low-power 32-bit MCU, which can also function as an application processor
  - Dominant frequency: 80 MHz
- Working voltage: 2.0 V to 3.8 V
- Support Zigbee、matter and BLE protocol (When using the MATTER protocol, the mod can only be used on the host side)
- Peripherals: 1ADC, 9xGPIOs, and 1 universal asynchronous receiver/transmitter (UART)
- Zigbee operating feature
  - 802.15.4 MAC/PHY supported
  - Working channel: 11 to 26 @2.400 GHz to 2.483 GHz, with an air interface, rate of 250 Kbit/s
  - Maximum output power: +20 dBm; dynamic difference of output power: > 35 dB
  - Power consumption when it is working: 60 μA/MHz; current when it is in sleep mode: 5 μA
  - Proactive network configuration for terminals
- BLE operating feature
  - BLE 5.1
  - Working channel: 0-39@2400~2483MHz
- Matter(only for gateway)
- Dimension: 17 x 22 x 2.8 mm
- Working temperature: -40°C to +105°C
- Certification CE, FCC, SRRC

### 1.3 Scenario

- Intelligent Building
- Intelligent Home And Household Applications
- Intelligent Socket And Smart Lighting
- Industrial Wireless Control
- Baby Monitor
- IP Camera
- Intelligent Public Traffic

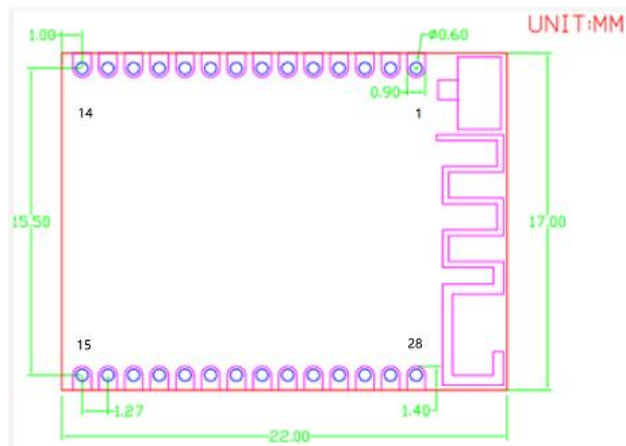
## 2 Mechanical Requirement

### 2.1 Drawing

### 2.2 Dimensions

DSM-04B provides two rows of pins(2 \*14) with the pin pitch of 1.27±0.1mm

Dimensions: 17±0.35 mm (W) x 22±0.35 mm (L) x 2.8±0.15 mm (H).



### 2.3 Pin Definition

Pin Number	Symbol	IO Type	Function
1	GND	P	Power supply reference ground pin
2	ANT	RF	RF signal input/output port, which corresponds to ANT of IC
3	GND	P	Power supply reference ground pin
4	NC		Not connect
5	PA0	I/O	Corresponding to PA0 of IC
6	PC5	I/O	Corresponding to PC5 of IC
7	PC4	I/O	Corresponding to PC4 of IC
8	PA3	I/O	Corresponding to PA3 of IC
9	PA4	I/O	Corresponding to PA4 of IC
10	PC1	I/O	Corresponding to PC1 of IC
11	PC0	I/O	Corresponding to PC0 of IC
12	PD4	I/O	Corresponding to PD4 of IC
13	PD3	I/O	Corresponding to PD3 of IC
14	PD2	I/O	Corresponding to PD2 of IC
15	NC		Not connect
16	NC		Not connect
17	PB0	I/O	Corresponding to PB0 of IC

18	PB1	I/O	Corresponding to PB1 of IC
19	NC		Not connect
20	GND	P	Power supply reference ground pin
21	VCC	P	Power supply pin (3.3V)
22	RX0	I	Corresponding to internal RXD0 of IC
23	TX0	O	Corresponding to internal TXD0 of IC
24	SWDIO	I/O	Corresponding to internal SWDIO of IC
25	SWCLK	I/O	Corresponding to PF2 of IC
26	PC3	I/O	Corresponding to PF3 of IC
27	PC2	I/O	Not connect
28	nRESET	I	Hardware reset pin, which is at a high level by default and is active at a low level

- P indicates power supply pins, I/O indicates input/output pins, and AI indicates analog input pins.

### 3 Electrical parameters

#### 3.1 Absolute electrical parameters

Parameter	Description	Minimum	Maximum	Unit
Ts	Storage temperature	-50	125	°C
VCC	Power supply voltage	2.0	3.8	V
Static electricity voltage (human body model)	TAMB-25°C	-	2	KV
Static electricity voltage (machine model)	TAMB-25°C	-	0.5	KV

#### 3.2 Working conditions

Parameter	Description	Minimum	Typical	Maximum	Unit
Ta	Working temperature	-40	-105	-	°C
VCC	Power supply voltage	2.0	3.0	3.8	V
VIL	I/O low-level input	-	10VDD*0.3	-	V
VIH	I/O high-level input	10VDD*0.7	-	-	V
VOL	I/O low-level output	-	10VDD*0.2	-	V
VOH	I/O high-level output	10VDD*0.8	-	-	V

#### 3.3 Current consumption during constant transmission and receiving

Working status	Rate	TX Power/ Receiving	Typical	Maximum	Unit
TX	250 Kbit/s	+20dBm	200	206	mA
TX	250 Kbit/s	+10dBm	62	64	mA
TX	250 Kbit/s	+0dBm	26	28	mA

RX	250 Kbit/s	Constant receiving	10	12	mA
RX	250 Kbit/s	Constant receiving	10	12	mA
RX	250 Kbit/s	Constant receiving	10	12	mA

### 3.4 Working current

Working mode	Working status (Ta = 25°C)	Average	Maximum	Unit
EZ	The module is in EZ mode.	10	40	mA
Connected and idle	The module is connected to the network.	4.2	5	mA
Deep sleep mode	The module is in deep sleep mode, with 64 KB flash memory.	5	-	uA

## 4 RF features

### 4.1 Basic RF feature

Parameter	Description
Frequency band	2.412~2.484GHz
Protocol standard	Zigbee 3.0/BLE 5.1/Matter
Data transmission rate	250 Kbit/s
Antenna type	PCB antenna with a gain of 1dBi. IPEX (optional)

### 4.2 TX performance (Performance during constant transmission)

Parameter	Minimum	Typical	Maximum	Unit
Maximum output power(250Kbps)	-	20	-	dBm
Minimum output power(250Kbps)	-	-30	-	dBm
Output power adjustment step	-	0.5	1	dBm
Output spectrum adjacent-channel rejection ratio	-	-31	-	dBc
Frequency error	-15	-	15	ppm

### 4.3 RX performance (RX sensitivity)

Parameter	Minimum	Typical	Maximum	Unit
PER<8%, RX sensitivity(250Kbps)	-102	-101	-99	dBm

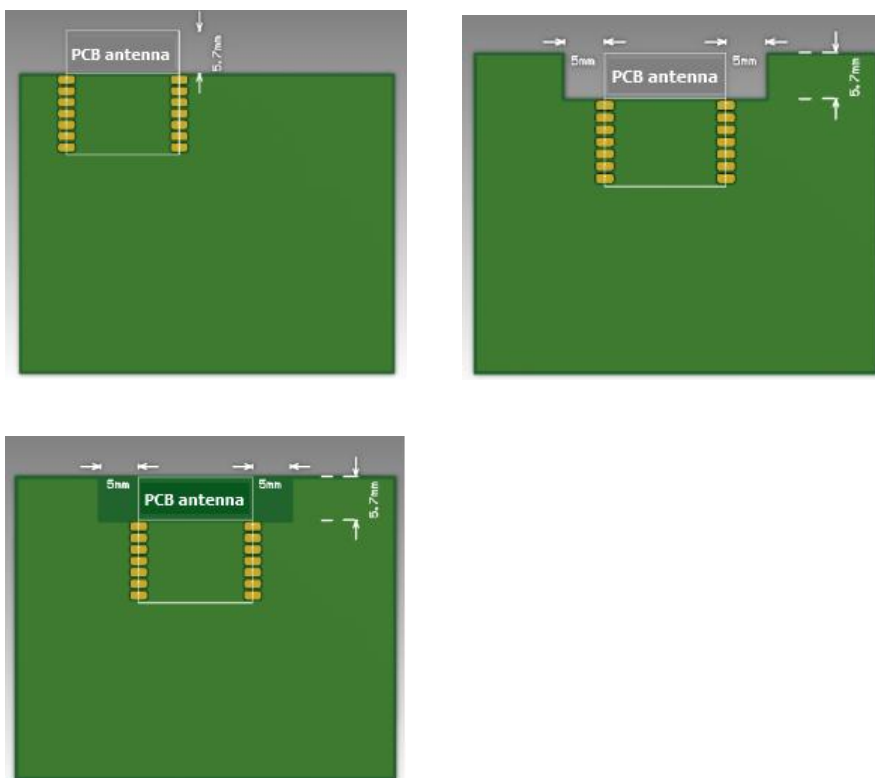
## 5 Antenna

### 5.1 Antenna type

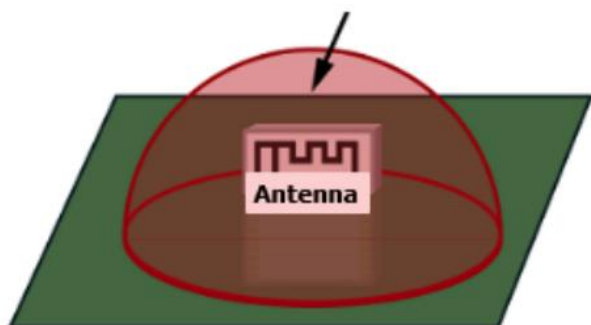
This product uses an onboard PCB antenna, whose gain is 1dBi

### 5.2 Antenna interference reduction

To ensure optimal RF performance, it is recommended that the antenna be at least 15 mm away from other metal parts. If metal materials are wrapped around the antenna, the wireless signals will be reduced greatly, deteriorating the RF performance.



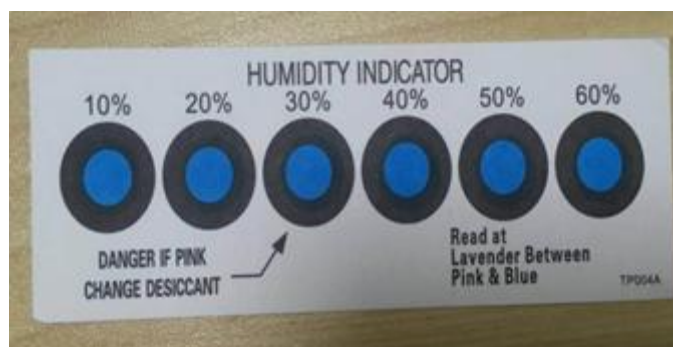
Do not place any metal in the red area above the antenna.  
The recommended diameter of the circular arc is greater than 3cm.



## 6 Production instructions

1. Use an SMT placement machine to mount components to the stamp hole module that Dusun produces within 24 hours after the module is unpacked and the firmware is burned. If not, vacuum packs the module again. Bake the module before mounting components to the module.

- SMT placement equipment:
    - Reflow soldering machine
    - Automated optical inspection (AOI) equipment
    - Nozzle with a 6 mm to 8 mm diameter
  - Baking equipment:
    - Cabinet oven
    - Anti-static heat-resistant trays
    - Anti-static heat-resistant gloves
2. Storage conditions for a delivered module are as follows:
- The moisture-proof bag is placed in an environment where the temperature is below 30°C and the relative humidity is lower than 70%.
  - The shelf life of a dry-packaged product is six months from the date when the product is packaged and sealed.
  - The package contains a humidity indicator card (HIC).



3. Bake a module based on HIC status as follows when you unpack the module package:
- ◆ If the 30%, 40%, and 50% circles are blue, bake the module for 2 consecutive hours.
  - ◆ If the 30% circle is pink, bake the module for 4 consecutive hours.
  - ◆ If the 30% and 40% circles are pink, bake the module for 6 consecutive hours.
  - ◆ If the 30%, 40%, and 50% circles are pink, bake the module for 12 consecutive hours.
4. Baking settings:
- ◆ Baking temperature: 125±5°C
  - ◆ Alarm temperature: 130°C
  - ◆ SMT placement ready temperature after natural cooling: < 36°C
  - ◆ Number of drying times: 1
  - ◆ Rebaking condition: The module is not soldered within 12 hours after baking.
5. Do not use SMT to process modules that have been unpacked for over three months. Electroless nickel immersion gold (ENIG) is used for the PCBs. If the solder pads are exposed to the air for over three months, they will be oxidized severely and dry joints or solder skips may occur. Dusun is not liable for such problems and consequences.
6. Before SMT placement, take electrostatic discharge (ESD) protective measures.
7. To reduce the reflow defect rate, draw 10% of the products for visual inspection and AOI before first SMT placement to determine a proper oven temperature and component placement method. Draw 5 to 10 modules every hour from subsequent batches for visual inspection and AOI.

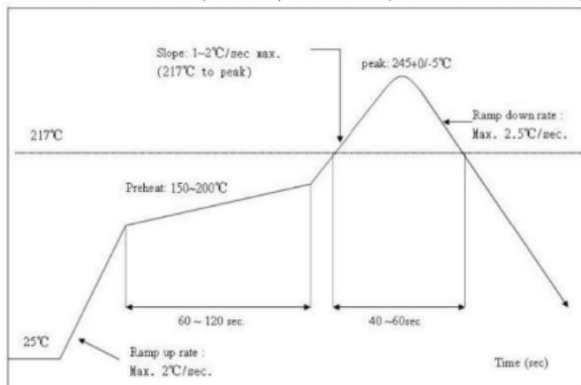


### 7 Recommended oven temperature curve

Perform SMT placement based on the following reflow oven temperature curve. The highest temperature is 245°C.

Based on the IPC/JEDEC standard, perform reflow soldering on a module at most twice.

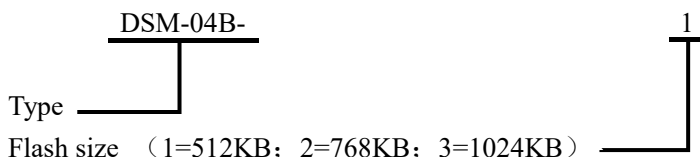
Refer to IPC/JEDEC standard; Peak Temperature: <245°C; Number of Times: ≤2 times;



### 8 Storage conditions



### 9 Ordering information



### 10 MOQ and packing

Product model	MOQ (pcs)	Packing method	Number of Modules in each reel pack	Number of reel packs in each box
DSM-04B	2800	Carrier tape and reel packing	700	4