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DUSUN DSM-04C Zigbee Cloud Module User Manual

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Introduction

Purpose& Description

DSM-04C is a low-power-consuming embedded Zigbee module developed By Dusun. It consists of the highly integrated wireless radio processor chip, EFR32MG1B232F256GM32, and several peripherals, with a built-in 802.15.4 PHY/MAC Zigbee network protocol stack and robust library functions.

This data terminal device is embedded with a low-power-consuming 32-bit 40MHz ARM Cortex®-M4 CPU, 256 KB flash memory, 32 KB RAM data memory, and robust peripheral resources. It is mainly used for Zigbee coordinator device to support ZigBee 3.0 protocol stack.

Product Feature Summary

- High-performance 32-bit 40 MHz ARM Cortex®-M4 with DSP instructions and floating point unit for efficient signal processing
- Up to 256kB Flash programming memory
- Up to 32kB RAM data memory
- Working voltage: 2.0 V to 3.8 V
- Zigbee operating feature
    - 802.15.4 MAC/PHY supported
    - Working channel: 11 to 26 @2.405 GHz to 2.480 GHz, with an air interface, rate of 250 Kbps
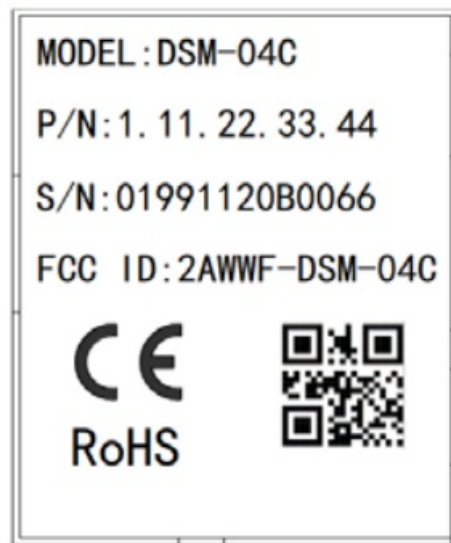- Dimension: 17 x 22 x 2.8 mm

- Working temperature: –40°C to +85°C
- Certification CE, FCC, SRRC

Scenario

- Intelligent Building
- Intelligent Home And Household Applications
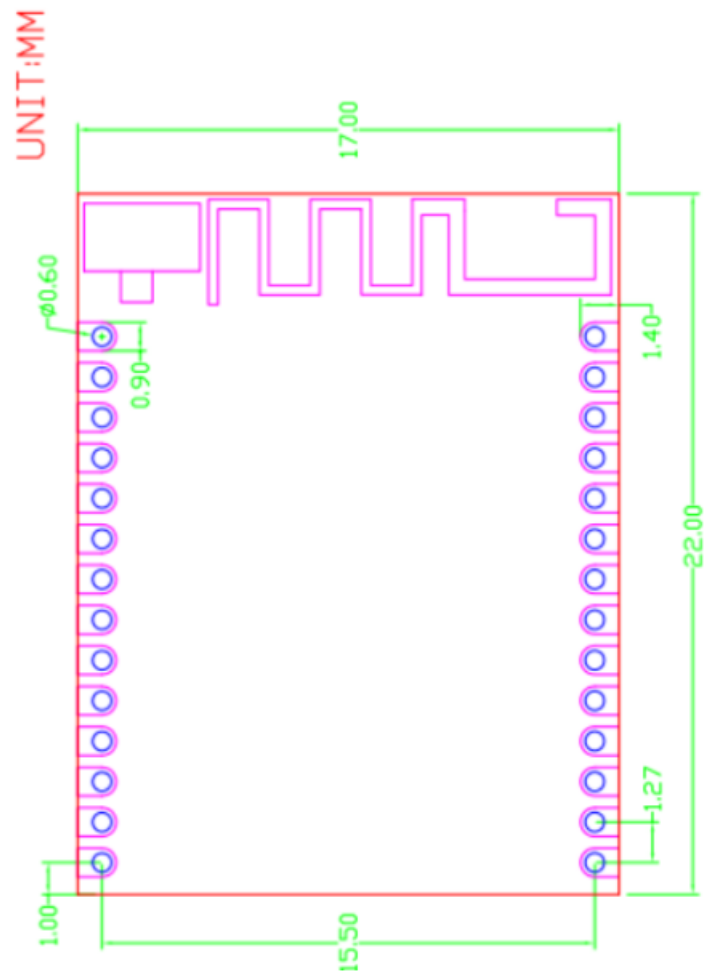- Industrial Wireless Control
- Intelligent Public Traffic

Mechanical Requirement

Drawing

Dimensions
DSM-04C 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).

Pin Definition

Pin Number	Symbol	IO Type	Function
1	NC		Not connect
2	NC		Not connect
3	NC		Not connect

4	NC		Not connect
5	NC		Not connect
6	TXD1	I/O	Corresponding to Uart_TXD1 of IC
7	RXD1	I/O	Corresponding to Uart_RXD1 of IC
8	PD15	I/O	Corresponding to PD15 of IC
9	PB11	I/O	Corresponding to PB11 of IC
10	PB12	I/O	Corresponding to PB12 of IC
11	PB13	I/O	Corresponding to PB13 of IC
12	PB14	I/O	Corresponding to PB14 of IC
13	PB15	I/O	Corresponding to PB15 of IC
14	NC		Not connect
15	nRST	I/O	Hardware reset pin, which is at a high level by default and is active at a low level
16	PC10	I/O	Corresponding to PF3 of IC
17	PC11	I/O	Corresponding to PF3 of IC
18	SWCLK	I/O	Corresponding to PF3 of IC
19	SWDIO	I/O	Corresponding to PF3 of IC
20	TDX0		Corresponding to PF3 of IC
21	RXD0		Corresponding to PF3 of IC
22	VCC	P	Power supply pin (3.3V)
23	GND	P	Power supply reference ground
24	NC		Not connect
25	PF2	I/O	Corresponding to PF2 of IC
26	PF3	I/O	Corresponding to PF3 of IC
27	NC		Not connect
28	NC		Not connect

P indicates power supply pins, I/O indicates input/output pins

Electrical parameters

Absolute electrical parameters

Parameter	Description	Typical value	Minimum value	Maximum value	Unit
Ts	Storage temperature		-50	105	°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

Working conditions

Parameter	Description	Minimum value	Maximum value	Typical Value	Unit
Ta	Working temperature	-40	85	–	°C
VCC	Power supply voltage	2.0	3.0	3.8	V
VIL	I/O low-level input	–	I0VDD*0.3		V
VIH	I/O high-level input	I0VDD*0.7	–	–	V
VOL	I/O low-level output	–	I0VDD*0.2	–	V
VOH	I/O high-level output	I0VDD*0.8	–	–	V

Current consumption during constant transmission and receiving

Working status	Mode	Rate	TX Power/ Receiving	Typical value	Average value	Unit
TX		250 Kbit/s	+15.43dBm		130	mA
TX		250 Kbit/s	+10dBm		35	mA
TX		250 Kbit/s	+0dBm		9.8	mA
RX		1Mbps	Constant		9	mA

			receiving			
RX		2Mbps	Constant receiving		10	mA
RX		250Mbps	Constant receiving		11	mA

RF features

Basic RF feature

Parameter	Description
Frequency band	2.405~2.480GHz
Standard	IEEE 802.15.4
Data transmission rate	250 Kbps
Antenna port	IPEX interface

TX performance (Performance during constant transmission)

Parameter	Minimum value	Typical value	Maximum value	Unit
Maximum output power	–	15.43	–	dBm
Minimum output power	–	-30	–	dBm
Output power adjustment step	–	0.5	1	dBm
Output spectrum adjacent-channel rejection ratio	–	-31	–	dBc
Frequency error	-15	–	15	ppm

RX performance (RX sensitivity)

Parameter	Minimum value	Typical value	Maximum value	Unit
PER<1%, RX sensitivity(Zigbee 250Kbps)	-103	-102	-100	dBm

Antenna

Antenna type

This product uses IPEX interface connect to stick antenna.

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.

Firmware

API
Support customized various product solutions, including temperature/door/window/PIR/leakage sensors, smart meter, smart lock, etc., and provide related API documents and support. Customers can pair the device to the gateway (Dusun gateway or Private gateway)according to the API description and standard Zigbee 3.0 protocol. API content includes reading sensor data, controlling device switches, changing device configuration, OTA, etc.

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
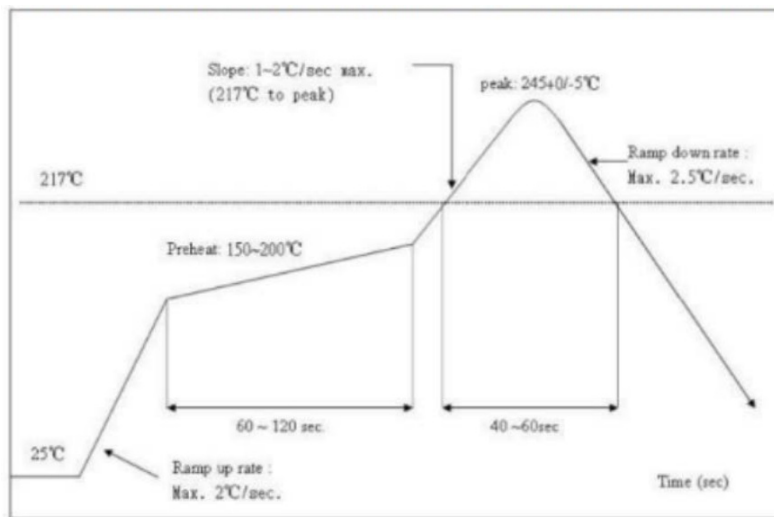2. Storage conditions for a delivered module are as follows:
   - The moisture-proof bag is placed in an environment where the temperature is below 30°C and the relative humidity is lower than 70%.
   - The shelf life of a dry-packaged product is six months from the date when the product is packaged and sealed.
   - The package contains a humidity indicator card (HIC).
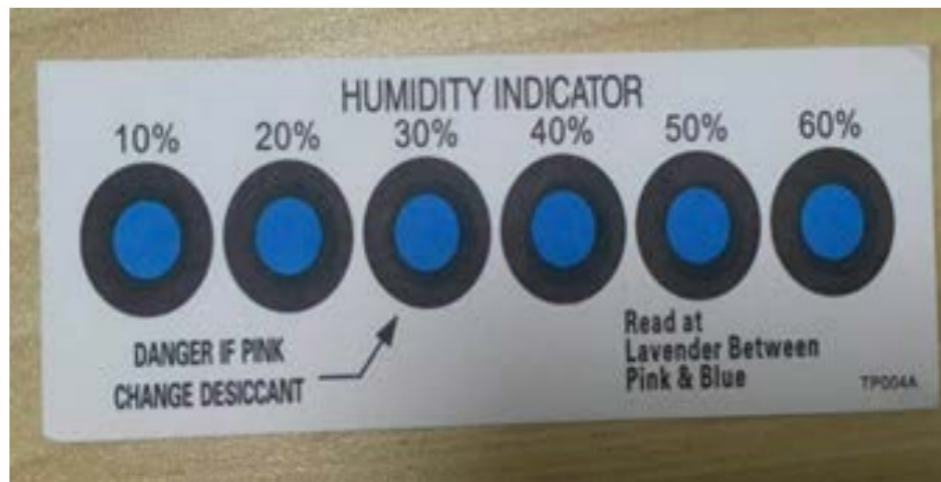
3. Bake a module based on HIC status as follows when you unpack the module package:

   - 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.

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.

Storage conditions

MOQ and packing

Product model	MOQ pcs	Packing method	Number of Modules in each reel pack	Number of reel packs in each box
DSM-04C	4000	Carrier tape and reel packing	1000	4

FCC

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. 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 interference that may cause undesired operation.

FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM

List of applicable FCC rules
CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular.

Specific operational use conditions
This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

Limited module procedures
Not applicable

Trace antenna designs
Not applicable

RF exposure considerations
To maintain compliance with FCC's RF Exposure guidelines, this equipment should be and operated with minimum distance of 20cm from your body.

Antennas
This radio transmitter FCC ID:2AWWF-DSM-04C has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna type	Maximum Antenna gain
Stick Antenna	1.78dBi

Label and compliance information

The final end product must be labeled in a visible area with the following " Contains FCCID:2AWWF-DSM-04C"

Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B

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Documents / Resources

	DUSUN DSM-04C Zigbee Cloud Module [pdf] User Manual DSM-04C, DSM04C, 2AWWF-DSM-04C, 2AWWFDSM04C, DSM-04C Zigbee Cloud Module, DSM-04C, Zigbee Cloud Module