User Manual

Product Name: Zwave Module

Main Model: DSM-102

Series Model: DSM-102-IPEX

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2021-12-30		New version release	Alpha

Approvals

Organization	Name	Title	Date

Zhejiang Dusun Electron Co., Ltd

1 Introduction

1.1 Purpose& Description

DSM-102 is a low power-consuming embedded Z-wave module developed By Roombanker. It consists of the highly integrated wireless radio processor chip, ZGM130S037HGN1, and several peripherals, with a built-in ZWAVE protocol stack and robust library functions.

This data terminal device is embedded with the high-performance 32-bit 39 MHz ARM Cortex®-M4 CPU with DSP instructions and floating point unit for efficient signal processing, 512 KB flash memory, 64 KB RAM data memory, and robust peripheral resources. It is mainly used for Z-WAVE coordinator device.

1.2 Product Feature Summary

- High-performance 32-bit 39 MHz ARM Cortex®-M4 with DSP instructions and floating point unit for efficient signal processing
- Up to 512kB Flash programming memory
- Up to 64kB RAM data memory
- Working voltage: 1.8 V to 3.8 V
- Z-wave operating feature
  ➢ Supporting 908.42MHz, rate of 100Kbps
- Dimension: 17 x 22 x 2.8 mm
- Working temperature: –40°C to +85°C
- Certification CE, FCC, SRRC

1.3 Scenario

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

2 Mechanical Requirement

2.1 Drawing

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MODEL:DSM-102
P/N:1.11.22.33.44
S/N:01991120B0066
FCC ID:2AWWF-DSM-102

CE
RoHS
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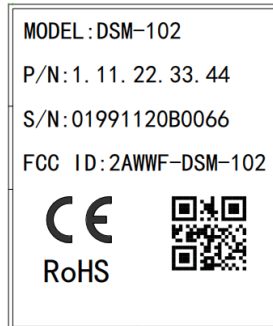
2.2 Dimensions

DSM-102 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).
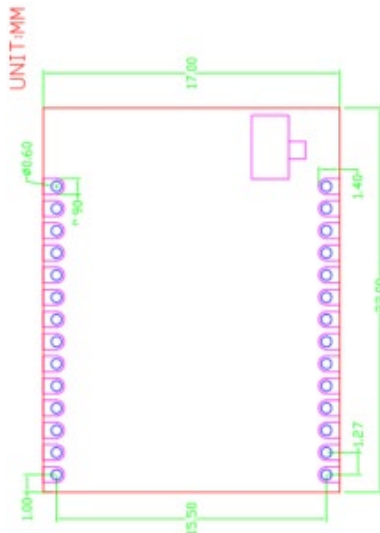
2.3 Pin Definition

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	NC		Not connect

6	PD13	I/O	Corresponding to PD13 of IC
7	PD14	I/O	Corresponding to PD14 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 P15 of IC
14	NC		Not connect
15	NC		Not connect
16	NC		Not connect
17	PF3	I/O	Corresponding to PF3 of IC
18	PF2	I/O	Corresponding to PF2 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 internal SWCLK of IC
26	PC11	I/O	Corresponding to PC11 of IC
27	PC10	I/O	Corresponding to PC10 of IC
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

3 Electrical parameters

3.1 Absolute electrical parameters

Parameter	Description	Typical value	Minimum value	Maximum value	Unit
Ts	Storage temperature		-40	85	℃
VCC	Power supply voltage		-0.3	3.8	V
Static electricity voltage (human body model)	TAMB-25℃		-		KV
Static electricity voltage (machine model)	TAMB-25℃		-		KV

3.2 Working conditions

Parameter	Description	Minimum value	Maximum value	Typical Value	Unit
Ta	Working temperature	-40	85	-25	℃
VCC	Power supply voltage	1.8	3.8	3.3	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

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4 RF features

4.1 Basic RF feature

Parameter	Description
Frequency band	908.42
Wireless technology	Z-wave
Data transmission rate	100kbps max
Antenna port	IPEX interface

4.2 TX performance (Performance during constant transmission)

Parameter	Minimum value	Typical value	Maximum value	Unit
Maximum output power	-	-	-	dBm
Minimum output power	-	-30	-	dBm
Output power adjustment step	-	0.5		dBm
Output spectrum adjacent-channel rejection ratio	-49	-47	-30	dBc
Frequency error	-15	-	15	ppm

4.3 RX performance (RX sensitivity)

| Parameter	Minimum value	Typical value	Maximum value	Unit
PER<1%, RX sensitivity	-102.6	-	-97.5	dBm

5 Antenna

5.1 Antenna type

This product uses IPEX interface connect to external antenna such as stick antenna.

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.

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℃ 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).
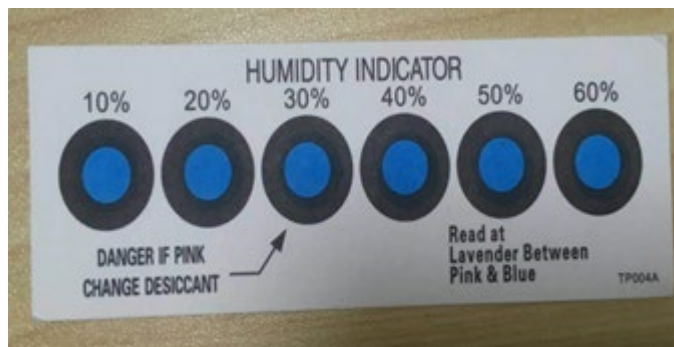
3. Bake a module based on HIC status as follows when you unpack the module package:

- 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℃

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- Alarm temperature: 130℃
- SMT placement ready temperature after natural cooling: < 36℃
- 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. Roombanker is not liable for such problems and consequences.
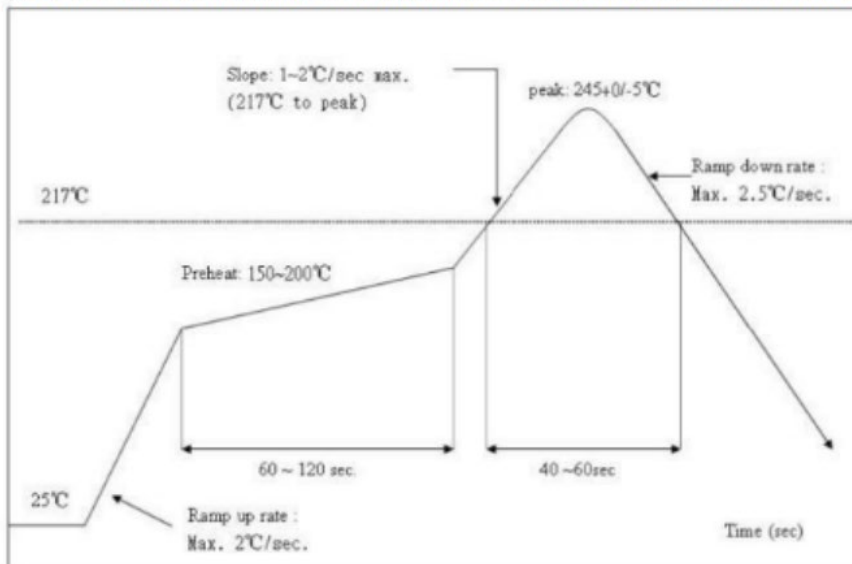
6. Before SMT placement, take electrostatic discharge (ESD) protective measures.

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.

6.1 Recommended oven temperature curve

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

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

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

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6.2 Storage conditions

CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL
3
If Blank, see adjacent
bar code label

1. Calculated shelf life in sealed bag: 12 months at < 40°C and < 90% relative humidity (RH)

2. Peak package body temperature: _____260_____ °C
   If Blank, see adjacent bar code label

3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must
   a) Mounted within: _____168_____ hrs. of factory conditions
      If Blank, see adjacent bar code label
      ≤ 30°C/60%RH, OR
   b) Stored at <10% RH

4. Devices require bake, before mounting, if:
   a) Humidity Indicator Card is > 10% when read at 23 ± 5°C
   b) 3a or 3b not met.

5. If baking is required, devices may be baked for 48 hrs. at 125 ± 5°C

   Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure

Bag Seal Date: _____
               If Blank, see adjacent bar code label

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

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7 MOQ and packing

Product model	MOQ (pcs)	Packing method	Number of Modules in each reel pack	Number of reel packs in each box
DSM-102	4000	Carrier tape and reel packing	1000	4

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8 FCC

Caution:

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, and (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.

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.

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the module.

2.3 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.

2.4 Limited module procedures
Not applicable

2.5 Trace antenna designs
Not applicable

2.6 RF exposure considerations
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

2.7 Antennas
This radio transmitter FCC ID: 2AWWF-DSM-102 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	2 dBi

2.8 Label and compliance information
The final end product must be labeled in a visible area with the following " Contains FCC ID:2AWWF-DSM-102".

2.9 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.

2.10 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 CFR 47 FCC PART 15 SUBPART B.