


SILICON LABS
EFR32MG21 ZigBee
Module



SILICON LABS EFR32MG21 ZigBee Module User Manual

[Home](#) » [SILICON LABS](#) » SILICON LABS EFR32MG21 ZigBee Module User Manual 

Contents

- 1 [SILICON LABS EFR32MG21 ZigBee Module](#)
- 2 [Product Specifications](#)
- 3 [Product Information](#)
 - 3.1 [Hardware Description](#)
 - 3.2 [Product Usage Instructions](#)
- 4 [FAQ](#)
- 5 [Product introduction](#)
 - 5.1 [Performance characteristics](#)
- 6 [Hardware Description](#)
- 7 [Specifications](#)
- 8 [Welding](#)
- 9 [OEM Guidance](#)
- 10 [FCC Statement](#)
- 11 [Radiation Exposure Statement](#)
- 12 [End Product Labeling](#)
- 13 [Manual Information to the End User](#)
- 14 [ISED Statement](#)
- 15 [Documents / Resources](#)
 - 15.1 [References](#)
- 16 [Related Posts](#)



SILICON LABS EFR32MG21 ZigBee Module



Product Specifications

- **Supply Voltage:** 3.3V
- **Stored Temperature:** -40°C to 85°C
- **Receiving Sensitivity:** -102dBm
- **Transmit Power:** 16.5dBm

Product Information

Product Introduction

The MSWUP-310A ZigBee wireless module is based on the silicon labs EM358x series chip. It operates in the ISM band, fully supports the IEEE802.15.4 standard, and utilizes the ZigBee-PRO protocol stack.

Hardware Description

- **Pin Description**

The pins of the MSWUP-310A series module include various power, IO, and communication ports. Refer to the user manual for detailed pin descriptions.

- **Package Size**

The package size of the module is not specified in the provided text.

Product Usage Instructions

- **Electrical Characteristics Limit Parameters**

The module must operate within specified conditions to prevent damage. Ensure that the supply voltage, stored temperature, and other parameters are within the given limits.

- **Working Conditions**

The module operates within a specific voltage range and ambient temperature. Ensure the working voltage and environmental temperature are suitable for proper functionality.

- **Working Current**

The module has different current requirements based on its operating modes such as sleep mode, RF reception, and RF transmission. Refer to the specifications for detailed current values.

RF Characteristics

The module's RF characteristics include receiving sensitivity, transmit power, center frequency offset, and RF output impedance. These parameters are crucial for wireless communication performance.

Welding

Reflow soldering is recommended for welding operations on the module. Follow the specified temperature curve for proper soldering without causing damage to the module.

FCC Certification

The module has received FCC certification and complies with FCC part 15C, section 15.247 rules. It is suitable for use in IoT devices under specific operational conditions mentioned in the certification guidance.

OEM Guidance

1. **Applicable FCC Rules:** The module complies with FCC rules for Single Modular Approval.
2. **Operational Conditions:** Input voltage is 3.3V DC, operational temperature range is -40°C to 85°C, and only the embedded PCB antenna is allowed.

FAQ

- **What are the main application scenarios for the MSWUP-310A ZigBee Module?**

The main application scenarios include Internet of Things, industrial control, smart home systems, intelligent lighting, smart remote control, health monitoring, and environmental monitoring.

- **What is the recommended soldering method for the module?**

Reflow soldering following the specified temperature curve is recommended for proper operation without causing damage to the module.

Product introduction

Summary

MSWUP-310A ZigBee wireless module, based on silicon labs EM358x series chip, has high performance, low power consumption, works in ISM band, fully supports IEEE802.15.4 standard, supports ZigBee-PRO protocol Stack.

Performance characteristics

Complete System-on-Chip

- 32-bit ARM® Cortex -M3 processor

- 2.4 GHz IEEE 802.15.4-2003 transceiver & lower MAC
- 256 or 512 kB flash, with optional read protection
- 32 or 64 kB RAM memory
- AES128 encryption accelerator

Low power consumption, advanced management

- RX Current (w/ CPU): 27 mA
- TX Current (w/ CPU, +3 dBm TX): 31 mA
- Low deep sleep current, with retained RAM and GPIO: 1.0 uA without/1.25 uA with sleep timer
- Low-frequency internal RC oscillator for low-power sleep timing
- High-frequency internal RC oscillator for fast (110 µs) processor start-up from sleep

Exceptional RF Performance

- Normal mode link budget up to 103 dB; configurable up to 110 dB
- 100 dBm normal RX sensitivity; configurable to –102 dBm (1% PER, 20 byte packet)

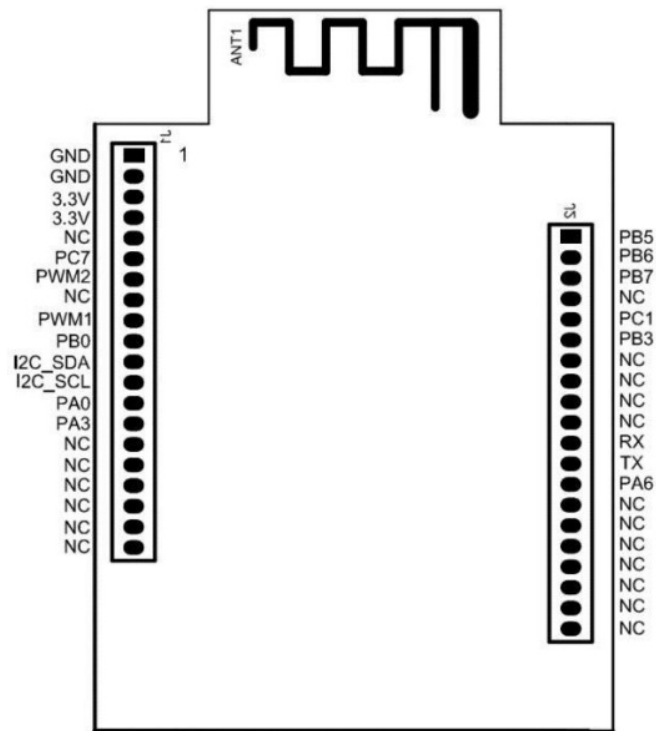
Application scenario

- Internet of Things
- Industrial control
- Smart Home
- Intelligent lighting
- Smart Remote control
- Health
- Environmental monitoring

Hardware Description

Pin Description

The pins of the MSWUP-310A series module are shown below.



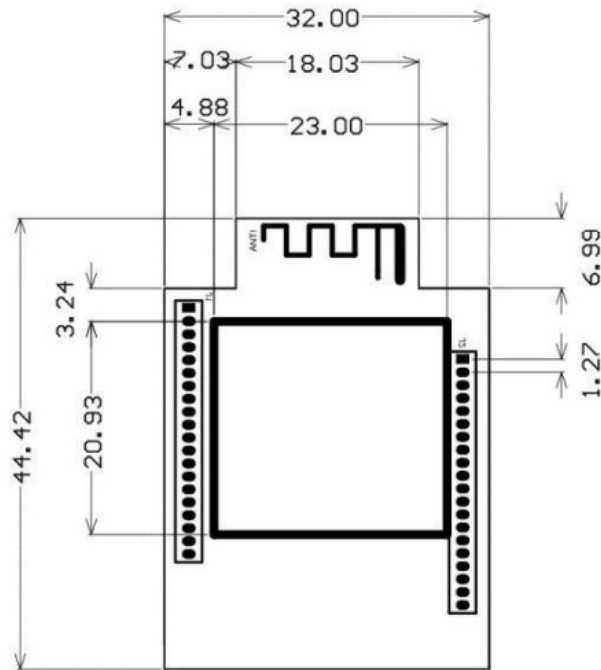
| No | Name of Pin | Type | Direction | Description |
|----|-------------|------|-----------|---------------------|
| 1 | GND | GND | Power | GND |
| 2 | GND | GND | Power | GND |
| 3 | 3.3V | VCC | Power | Supply Voltage 3.3V |
| 4 | 3.3V | VCC | Power | Supply Voltage 3.3V |
| 5 | NC | / | / | / |
| 6 | PC7 | CMOS | I/O | General IO port |
| 7 | PWM2 | CMOS | I/O | PWM2 |

| | | | | |
|----|---------|------|-----|---------------------------------------|
| 8 | NC | / | / | / |
| 9 | PWM1 | | | PWM1 |
| 10 | PB0 | CMOS | I/O | General IO port |
| 11 | I2C_SDA | CMOS | I/O | Two Wire serial Interface- data port |
| 12 | I2C_SCL | CMOS | I/O | Two Wire serial Interface- clock port |
| 13 | PA0 | CMOS | I/O | General IO port |
| 14 | PA3 | CMOS | I/O | General IO port |
| 15 | NC | / | / | / |
| 16 | NC | / | / | / |
| 17 | NC | / | / | / |
| 18 | NC | / | / | / |

| | | | | |
|----|-----|------|-----|-----------------|
| 19 | NC | / | / | / |
| 20 | NC | / | / | / |
| 21 | PB5 | CMOS | I/O | General IO port |
| 22 | PB6 | CMOS | I/O | General IO port |
| 23 | PB7 | CMOS | I/O | General IO port |
| 24 | NC | / | / | / |
| 25 | PC1 | CMOS | I/O | General IO port |
| 26 | PB3 | CMOS | I/O | General IO port |
| 27 | NC | / | / | / |
| 28 | NC | / | / | / |
| 29 | NC | / | / | / |
| 30 | NC | / | / | / |
| 31 | RX | CMOS | I/O | UART RX |
| 32 | TX | CMOS | I/O | UART tx |
| 33 | PA6 | CMOS | I/O | General IO port |
| 34 | NC | / | / | / |
| 35 | NC | / | / | / |
| 36 | NC | / | / | / |
| 37 | NC | / | / | / |
| 38 | NC | / | / | / |
| 39 | NC | / | / | / |
| 40 | NC | / | / | / |

Package size

The following figure shows the dimensions of the MSWUP-310A module. Including shield height $3.4 \pm 0.2\text{mm}$.



Specifications

Electrical characteristics limit parameters

Modules must be within the conditions described below and may cause damage beyond the range described in the table below.

| Parameter | Min. | Max. |
|--------------------|-------|----------|
| Supply voltage | -0.3V | 3.6V |
| All pins | -0.3V | VDD+0.3V |
| Stored temperature | -40°C | 150°C |

Working conditions

| Parameter | Min. | Max. |
|---------------------------|-------|------|
| Working voltage | 2.0V | 3.6V |
| Environmental temperature | -40°C | 85°C |

Working current

Test conditions VDD=3.0V @ +25°C

| Operating mode | Min. | Max. |
|-----------------|------|--------|
| Sleep mode | 1uA | 1.25uA |
| RF reception | 27mA | 28mA |
| RF transmission | 31mA | 60mA |

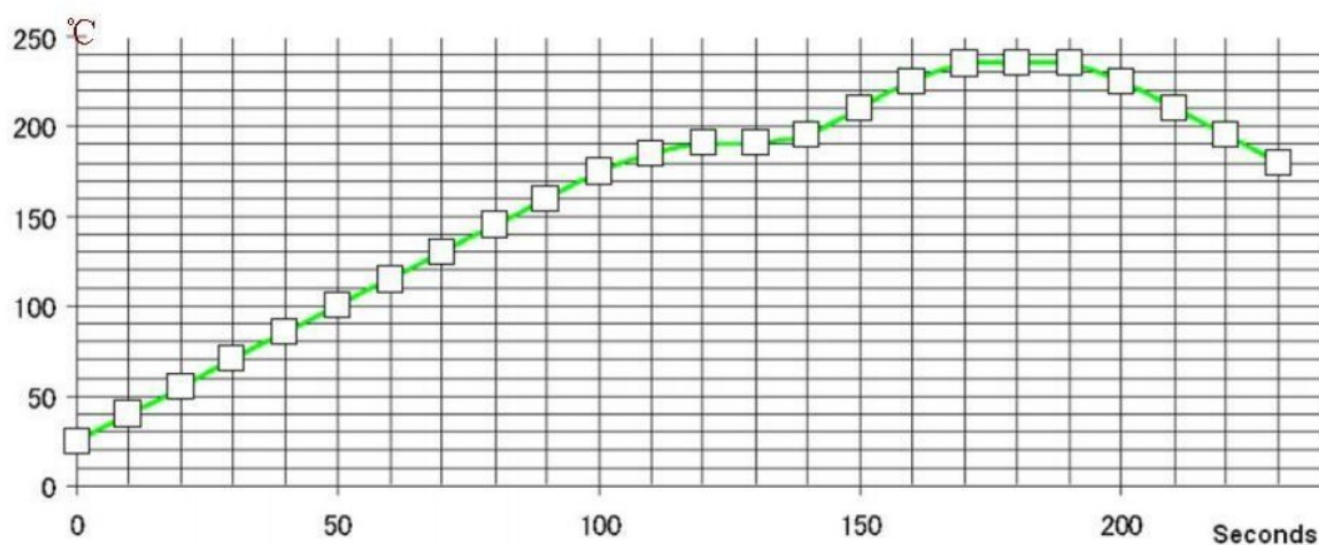
RF characteristics

| | | |
|-----------------------|---------|--|
| Receiving sensitivity | -102dBm | |
| Transmit power | 16.5dBm | |

| | | |
|-------------------------|--------|---------------------------------------|
| Center frequency offset | ±40ppm | including temperature range and aging |
| RF output impedance | 50Ω | |

Welding

Reflow soldering is recommended to operate according to the temperature curve shown below.



| | | | | | |
|----------------|----------|--------------|--------|-----------|--------------------|
| Temperature | 25 160°C | 160 190°C | >220°C | 220°C Pk. | Pk. Temp (235°C |
| Target time(s) | 90 130 | 30 60 | 20-50 | 10-15 | 150-270 |

OEM Guidance

1. Applicable FCC rules

This module is granted by Single Modular Approval. It complies to the requirements of FCC part 15C, section 15.247 rules.

2. The specific operational use conditions

This module can be used in IoT devices. The input voltage to the module is nominally 3.3V DC. The operational ambient temperature of the module is -40 to 85 degree C. Only the embedded PCB antenna is allowed. Any other external antenna is prohibited.

3. Limited module procedures

Not Limited module

4. Trace antenna design

Not using Trace antenna design

5. RF exposure considerations

The 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 and your body. If the equipment built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by 2.1093.

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

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 important announcement

Radiation Exposure Statement

1. 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 and your body.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
3. Country Code selection feature to be disabled for products marketed to the US/Canada.
4. This device is intended only for OEM integrators under the following conditions:
 1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
 2. The transmitter module may not be co-located with any other transmitter or antenna,
5. As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used

on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following” Contains FCC ID: 2AV5NMSWUP-310A ”

Manual Information to the End User

- The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
- The end user manual shall include all required regulatory information/warning as show in this manual.

List of applicable FCC rules

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

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

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.

Antennas

This radio transmitter FCC ID:2AV5NMSWUP-310A 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 No. | Model No. of a ntenna: | Type of antenna: | Gain of the antenna (Max.) | Frequency range: |
|-------------|------------------------|------------------|----------------------------|------------------|
| Zigbee | / | PCB Antenna | 0.0dBi | 2400-2500MHz |

Label and compliance information

The final end product must be labeled in a visible area with the following” Contains FCC ID:2AV5NMSWUP-310A”.

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.

Note EMI Considerations

Host manufacture is recommended to use D04 Module Integration Guide recommending as “best practice” RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

How to make changes

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. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.

ISED Statement

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:


1. This device may not cause interference,
2. This device must accept any interference, including interference that may cause undesired operation of the device.

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.
This equipment complies with Canada 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.

ISED Modular Usage Statement

NOTE 1: When the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use the wording “Contains transmitter module IC: 30046-MSWUP310A” or “Contains IC: 30046- MSWUP310A”.

Documents / Resources

| | |
|---|---|
|  | SILICON LABS EFR32MG21 ZigBee Module [pdf] User Manual MSWUP-310A, EFR32MG21 ZigBee Module, EFR32MG21, EFR32MG21 Module, ZigBee Module, Module |
|---|---|

References

- [User Manual](#)