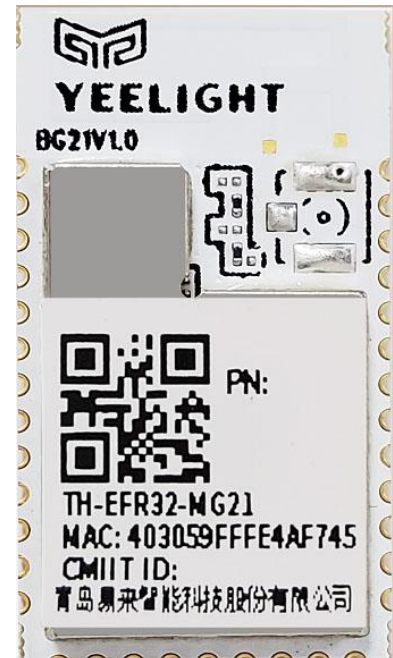


## TH-EFR32-MG21

### IoT Module With Thread

#### Features:

- **Supported Wireless Systems**  
BT5.0; IEEE 802.15.4
- **Chip Solution**  
EFR32MG21A010F1024IM32-D
- **Single Band**  
2.4G ISM
- **Size**  
13.1mm x 23.5mm x 2.5mm



**Sichuan AI-Link Technology Co., Ltd.**

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Feedback of customer’s Confirmation

We accept the specification after Confirmed

Customer name	Customer signature	Confirmation Date

Please feed back this paper and first paper after your signature by the address, thanks!

ADD: Anzhou,Industrial park, Mianyang, Sichuan

Factory: Sichuan AI-Link Technology Co., Ltd.

Approved	Checked	Designed	Product	BT MODULE
FAN, Xijun	FAN, Xijun	ZHANG Li	Model	TH-EFR32-MG21
			Date	2025-04-25

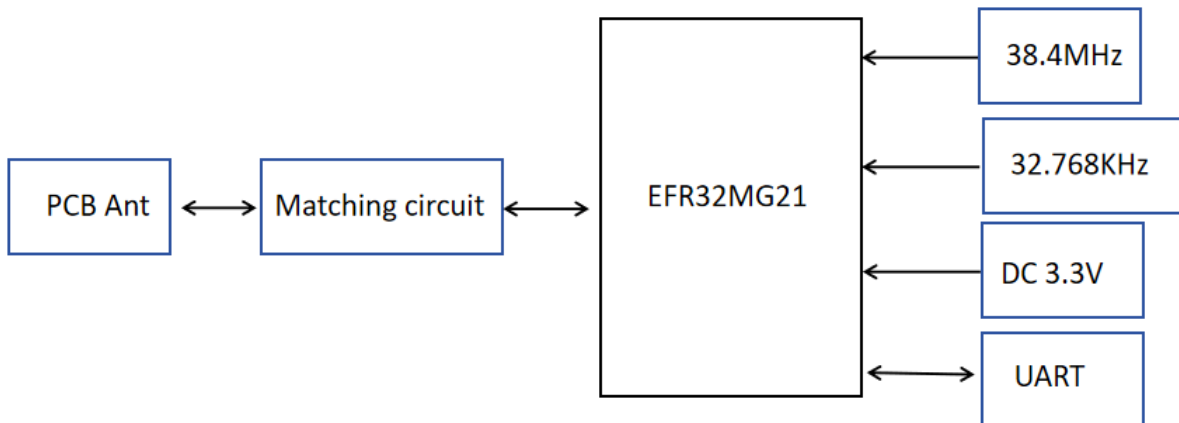
Record of Modification

No	Date of modification	Main content of modification	Reason of modification	Serial number of modification	Confirm
V0.1	2025.04.25				Zhang Li

## 1. Brief description:

IoT MODULE TH-EFR32-MG21 is based on Silicon Labs EFR32MG21A010F1024IM32-D complied with thread standard from 2.4GHz ISM band. Supported for 250kbps speed wireless network connection and 1 Mbps,2Mbps speed wireless network connection

### 1.1 Block Diagram



### 1.2 Specification Reference

This specification is based on additional references listed below.

BT5.0

IEEE 802.15.4

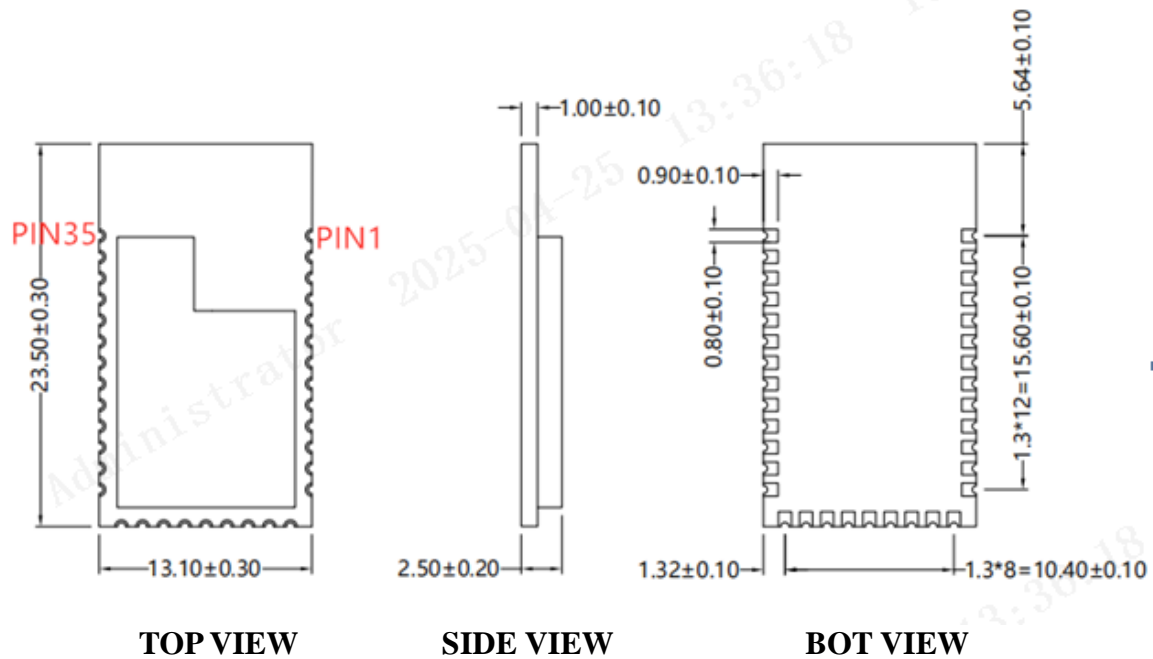
### 1.3 System Feature

No.	Feature	Description
1	Main Chip	EFR32MG21A010F1024IM32-D
2	Flash	1024KB
3	RAM	96KB
4	Operating Frequency	2.4G ISM
5	Modulation	GFSK;OQPSK
6	Data rates	1Mbps,2Mbps,250kbps
7	Form factor	Half stamp hole(35 pins)
8	Host Interface	UART
9	PCB Stack	4-layers design
10	Antenna Type	Integral PCB trace antenna
11	Operation Voltage	DC 3.3V+/-0.3
12	Radio Current Consumption	9.4mA@RX active,2Mbps at 3.0V 34mA@TX 10dBm output power at 3.0V
13	Operation Temperature	-20°C to +85°C
14	Storage Temperature	-40°C to +125°C

Table1: General Specification

## 2. Package Outline and Mounting(units:mm)

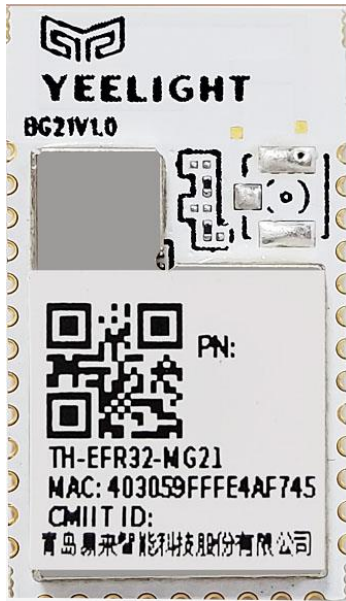
### 2.1 Mechanical Outline(units:mm)



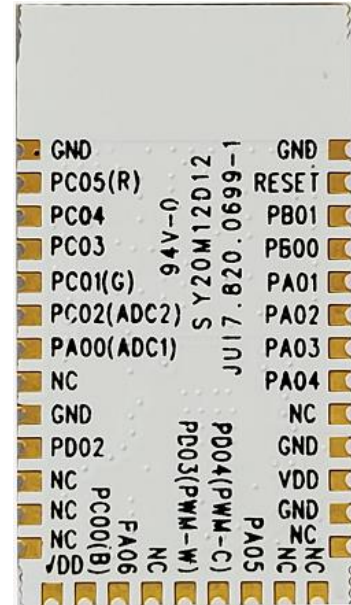
### 2.2 Pin Definition:

Pin	Symbol	Description	Pin	Symbol	Description
1, 9, 24, 26, 35	GND	Connected to ground	18	PD03	GPIO,PWM-W
2	PC05	GPIO	19	PD04	GPIO,PWM-C
3	PC04	GPIO	20	PA05	GPIO
4	PC03	GPIO	25	VDD	+3.3V DC power supply input
5	PC01	GPIO	28	PA04	GPIO
6	PC02	GPIO	29	PA03	GPIO
7	PA00	GPIO	30	PA02	GPIO,SWDIO
8,11,12,13,17, 21,22,23,27	NC	GPIO	31	PA01	GPIO,SWCLK
10	PD02	GPIO,Switch between DTM and user mode.Connect 10K resistor to ground,enter user mode.	32	PB00	GPIO
14	VDD	+3.3V DC power supply input	33	PB01	GPIO
15	PC00	GPIO	34	RESET	Reset input,active low,normally need to connect 10k resistor to pull up.
16	PA06	GPIO			

### 2.3 Product Picture



### Top View



### Bottom View

Note: "PN: XXXXXXXXXXXX "is the customer PN, which varies depending on the customer's application project;

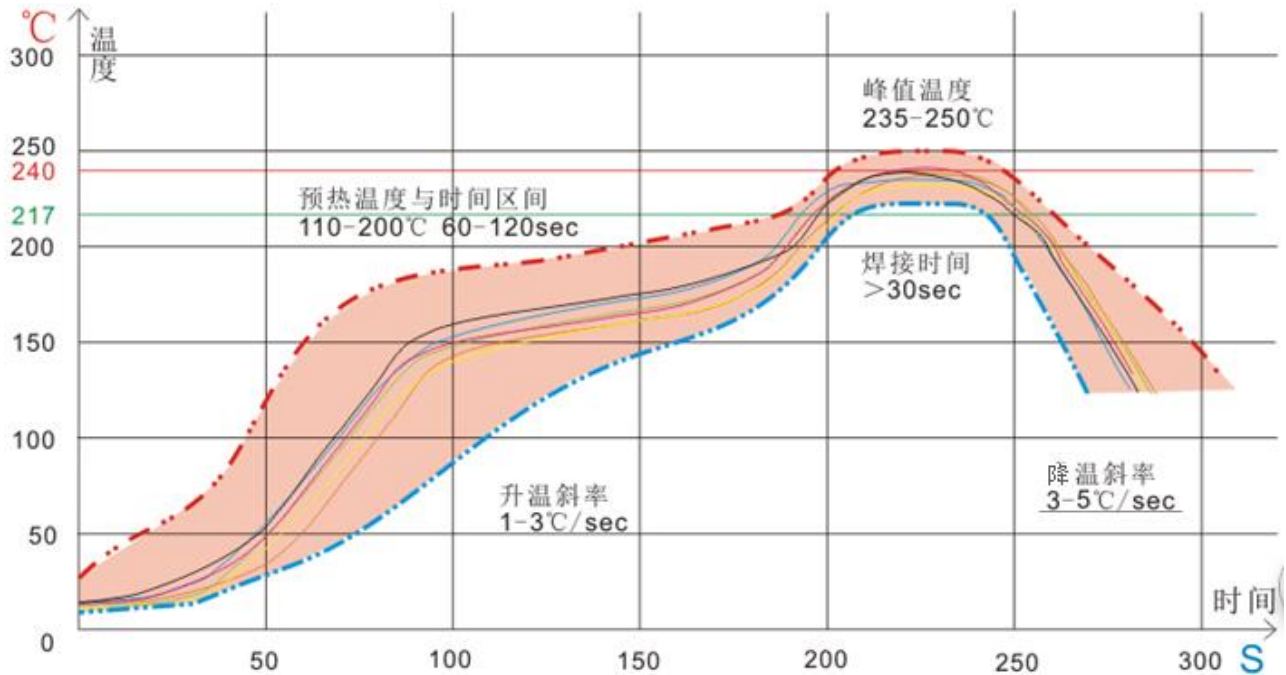
### 3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature (0°C, +25°C, +85°C) and overall voltage (3.0V, 3.3V, 3.6V).

### IEEE 802.15 Section:

Items	Contents				
Specification	IEEE802.15.4				
Frequency	2400~2483.5MHz				
Channel	CH10 to CH26				
Data rate	250kbps/MAX				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics					
1. Power Levels(Configured to 8.5dBm)	7.5dBm	9.5	11.5dBm		
2. Spectrum Mask @ target power	/	0%	5.12%		
3 Constellation Error(EVM)@ target power	0%	10%	35%		
4. Frequency Error	-40	-13	40	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity(each chain)	/	-95	-87	dBm	
6 Maximum Input Level	/	/	-20	dBm	

#### 4. Refelow Standard Condition



Heating zone: temperature:<150 °C, time: between 60-90 seconds, slope controlled between 1-3 °C/s.

Preheating constant temperature zone: temperature: 150 °C~200 °C, time: between 60-120 seconds, slope between 0.3-0.8.

Reflow soldering area: peak temperature 235 °C ~250 °C (recommended peak temperature<245 °C), time 30-70 seconds.

Cooling zone: Temperature: 217 °C~170 °C, slope between 3~5 °C/S.

The solder material is tin silver copper alloy lead-free solder/Sn&Ag&Cu Lead free solder (SAC305).

#### 5. Key Materials

Item	Category	MPN	Description	MFR	Note
1	IC	EFR32MG21A010F1024IM32-D	32-QFN	Silicon Labs	
2	PCB	JUI7.820.0699-1 series	FR-4,4LAY	IQE RJX BC	
3	Crystal Oscillator		2520,38.4M,10pF,±10ppm	TKD ECEC HOSONIC JWT	



1. The product placement direction, label pasting position, and packaging should be carried out according to the schematic diagram;
2. Each roll contains 1000 products, and each small box contains 1 roll. There are a total of 5 small boxes in the large box, with a total of 5000 products per box;
3. Outer box size: 370mm \* 300mm \* 370mm, small box size: 355mm \* 355mm \* 55mm;
4. Place 2 bags of 2g desiccant and 1 6-color humidity card inside the vacuum bag;
5. Other matters not covered shall be handled according to the customer's packaging requirements.



## 7. FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular be installed in any portable device, for example, USB dongle like transmitters is forbidden. This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be collocated or operating in conjunction with antenna or transmitter. If the FCC identification 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 label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ABEU-THMG21 when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. 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 undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

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.

## 8、Disposal Considerations

The disposal of our company's products should comply with applicable local/higher-level regional/national/international regulations