

E180-ZG120B User Manual

EFR32 2.4GHz ZigBee

SoC wireless module



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1.Overview

1.1 Brief introduction

E180-ZG120B is a small, low-power, high-reliability, 2.4GHz ZIGBEE module based on Silicon Labs EFR32MG1B, which is designed and produced by Chengdu Ebyte. The chip comes with high-performance 32-bit ARM Cortex. -M4 core, integrated internal power amplifier, transmit power up to 20dBm.

EFR32 is a wireless microcontroller for smart home, IoT transformation and industrial automation. EFR32 network characteristics belong to ZIGBEE 3.0 standard and provide a complete application integration solution based on IEEE802.15.4 standard ISM band.

E180-ZG120B was certified by a series of authoritative RF instruments, support serial port transparent transmission mode. It also integrates self-organizing network function, provides multi-channel configurable AD, IO, PWM interface.

1.2 Characteristic function

- Centralized network management: ZIGBEE 3.0 security standard centralized network access mechanism, data security and reliability;
- Green Power: ZIGBEE 3.0 power management mechanism, the entire network power consumption is lower, node power consumption uA level;
- Interoperability: ZigBee 3.0 standard network mechanism, compatible with protocols such as ZHA and ZLL.
- Large capacity: 256K flash, 32K RAM, network nodes can be extended to more than 100;
- Role switch: Users can switch freely between the coordinator, router, end-device and sleep-end-device via UART command.
- TOUCHLINK: Support TOUCHLINK network protocol, it is mainly used in lighting control, which simplifies ZigBee network form. It can also establish a simple and stable ZigBee network without coordinator.
- Support a variety of network topology: point-to-point, star network, MESH network;
- Network self-healing: when network intermediate nodes are lost, other networks automatically join or maintain the original network;
- Auto Routing: The module supports the network routing function;
- Address search: User can find the corresponding short address according to the MAC address (unique, fixed) of the
 added network node, and can also find the corresponding long address of each node in network according to the
 short address of the node;
- Data security: Integrated with ZigBee 3.0 security communication standard, the network contains multi-level security keys;
- UART configuration: Module built-in UART commands, the user can configure (view) the parameters and functions of module via UART command.
- Change network PAN_ID: Network PAN_ID switch freely. Users can define PAN_ID to join the corresponding network by themselves or automatically select PAN-ID to join the network.
- Network opening time can be configured and can be configured to open the network for a period of time. During



this period, ZigBee 3.0-compliant devices can join the network. After this period of time, the network will be shut down and no devices can join. It can also be configured to open permanently. Any ZigBee 3.0 standard device can be added;

- GPIO control:Local/remote GPIO control function, there are 4 IO for users to select.
- PWM control :Local/remote PWM control function, there are 5 PWM channels for users to select.
- ADC control: Read local/remote adc, there are 5 ADC channels for users to select.
- Onekey recovery of baud rate: The module supports onekey recovery of baud rate when users forget the baud rate. The baud rate is 115200(default).
- Serial port receiving wake-up: Support serial port receiving wake-up function. When the module is in sleep state, it will wake up when receiving a frame of data greater than or equal to 25 bytes. This data is wake-up frame used for wake-up module and will not be treated as data processing;
- Module restore: Users can restore the module via UART commands.
- Recover factory setting: Users recover the factory setting via UART commands.
- Air configuration: Users can use the air configuration command to remotely configure other devices in network.

1.3 Device type introduction

There are three types of logical devices in ZigBee Network: Coordinator, Router, End-Device, and Sleep-End-Device.

A ZigBee network consists of one Coordinator and multiple Routers and multiple End-Devices (the end nodes can be divided into Sleep-End-Device and End-Device.

1.3.1 End-Device

The main task of the device is to send and receive messages, and other nodes are not allowed to connect with the devices. The End-device is always in working state, and can receive and transmit data at any time. The standby current of this device type is about 4 mA.

1.3.2 Sleep-End-Device

The Sleep-End-Device enters the sleep state when there is no data receiving and sending, and the sleep current is as low as about 2.5uA.

Sleep terminal wakeup can also be awakened through the function pin WAKE. WAKE defaults to high level. Pull down the WAKE pin to wake up the module continuously, and release the WAKE pin to restore the default high level and the module resumes sleep.

When it is necessary to receive data, it is received through periodic wake-up. The longer the wake-up cycle is set, the later the reception will be. The wake-up cycle must be set less than 30 seconds. If you only need to upload data, you can set the wake-up cycle to be greater than 30 seconds or longer to reduce power consumption (default is 5 minutes), such as battery powered sensors.

1.3.3 Router

The other nodes are allowed to connect with the routing device to extend the coverage of the network. The main task is to forward packets, play the role of relay routing, and have all the functions of the end-device. If one node has multiple paths to another node, when one of the paths fails, the network automatically adjusts to other optimal paths for transmission to ensure data arrives. A router can establish its own network or join someone else's network. The router is always active, so it must be powered by the main power.

1.3.4 Coordinator

The coordinator has the function of establishing and managing the network, controlling whether other nodes are allowed to join the network, storing network information, and having all the functions of routing equipment. It's main task is to manage the network, record the information of sub nodes, forward messages, and at the same time, the coordinator needs to identify the authority of the end device requesting access to the network.

1.4 Application

- Smart home and industrial sensors;
- Security system and positioning system;
- Wireless remote control, UAV;
- Wireless game remote control;
- Health care products;
- Wireless voice, wireless headphones;
- Meter reading architecture (AMI);
- Automotive industry applications.
- Building automation solutions
- Automation application of agricultural greenhouse.

2. Technical parameter

2.1 Limit parameter

Main novemeter	Perfor	mance	Domork	
Main parameter	Min	Max	Kemark	
Voltage supply (V)	0 3.8		Voltage over 3.8V will cause permanent damage to module	
Dissiring new on (dDm)	10			Chances of burn is slim when modules are used in short
Blocking power (dBm)	-	10	distance	
Working temperature (°C)	-40	+85	Industrial grade	

2.2 Working parameters

Main parameter Performance Remark

		Min.	Тур.	Max.		
Opera	ting voltage (V)	1.9	3.3	3.8	≥3.3 V ensures output power	
Commu	nication level (V)		3.3		For 5V TTL, it may be at risk of burning down	
Working	g temperature (°C)	-40	-	+85	Industrial design	
Free	uency (MHz)	2405	-	2480	Support ISM band	
Power	TX current (mA)	135			Instant power consumption	
consumpt	RX current (mA)	10				
ion	Sleep current (μA)	2.5			Instant power consumption	
1	Max Tx power (dBm)	18	19	20	RF transmitting power up to 20dbm	
	Air data rate (bps)		250k		Air data rate is 250kbps	
Ma	in parameter		Descripti	ion	Remark	
					Between two points (ZigBee network supports	
Distance for reference		1300m			routing multi hop function, and the transmission	
					distance can be extended by increasing the router).	
Crystal frequency 38.4MHz						
	Protocol	Zigbee 3.0		.0	Standard ZigBee 3.0 protocol	
	Packing		SMD			
	Connector 1.27mm		1	Stamp hole		
	IC EFR32MG1B232F256GM32					
	FLASH 256KB					
	RAM 32KB					
	Core	Cortex-M4		14		
	Size	11.5*18mm		ım		
	Antenna	Stamp hole/IPEX		IPEX	50 ohm impedance	
	Weight		0.9±0.1g	g		

3. Mechanical characteristics



Weight : 0.9±0.1g Pad quantity : 37 Unit : mm

D:n No	Din itom	Pin	Application	
FIII NO.	P In ttem	direction	Аррисатion	
1	ANT	Input /Output	Externally connected with stamp hole	
2	GND		Ground, connecting to power source referential ground	
2	DD12	Innut	TOUCHLINK pin to be continuously pulled lower than 3000ms and it will	
5	PDIS	Input	initiate a ZLL network or join request	
			The WAKE pin is mainly used to wake up the sleeping terminal. It is high level	
4	PD14	Input	when power is on. When the pin is pulled low externally, the sleeping terminal	
			device will be woken up.	
5	PA0(TX)	Output	UART TX pin	
6	PA1(RX)	Input	UART RX pin	
7	NC			
8	NC			
0	DD16	I	Working mode switching pin. When the pull-down time is longer than 500ms,	
9	9 PD15 Input		the working mode is switched.	
10	DD11	Innut	The UART_BAUD_RESET pin is used to reset the device baud rate. The	
10 PB11 Input		Input	power-on default is high. In any mode, if this pin is pulled lower for more than	



			1000ms, the serial port parameters of the module will be restored to the default
			115200.
			The ACK pin is used to indicate the last user data transmission status. This pin
11	PB12	Output	is pulled low before the transmission is started, and the pin is pulled high after
			the transmission is successful.
12	PB13(GPIO0)	Input /Output	GPIO input/output port 0
13	VCC		
14	GND		
15	NC		
16	NC		
17	NC		
10	DC10	0.4.4	AUX pin indicates the current working state of the device. When the pin is low,
18	PC10	Output	it indicates that the device is busy, and high indicates that the device is idle.
19	PF2(GPIO2)	Input /Output	GPIO input/output port 2
20	NC		
21	PC11(ADC1)	Input	ADC Detection port 1
22	NC		
23	NC		
24	NC		
25	SWCLK	Input /Output	DBG_SWCLKTCK
26	SWDIO	Input /Output	DBG_SWDIOTMS
27	PB14(PWM0)	Output	PWM output port 0
28	PB15(PWM2)	Output	PWM output port 2
29	NC		
30	PF3	Output	LINK pin shows current network state, high level means access to network
31	NC		
32	NC		
33	NC		
34	NC		
35	NC		
36	GND	Input /Output	Ground
37	nRESET	Input	Reset

4. Operation mode

4.1 Transmission mode

When the module enters the transmission mode, any data received by the serial port will be sent out by wireless. The transmission mode is wireless communication between network nodes, including unicast, broadcast, multicast, etc.

4.2 Configuration mode

When the module enters the configuration mode, the data received by the serial port defaults to the configuration instruction, which configures and operates the function of the device. In the configuration mode, the data received by the serial port is regarded as the hex instruction.

4.3 Mode switch

4.3.1 Command switch

The module power on initialization defaults to the transmission mode

In transmission mode, when the serial port receives "2A 2D 2E" character, it will enter the configuration mode. After entering the configuration mode successfully, it will return "7A 7D 7E " character. In configuration mode, when the serial port of the module receives "2F 2C 2B " character, the module exits the configuration mode, enters the transmission mode, and returns "7F 7C 7B" character after entering the transmission mode successfully.

4.3.2 Pin switching

Working mode switch pin PB11, internal configuration pull-up resistance input mode, power on default high level, in any mode, when mode switch pin PB11 is pulled down more than 500ms, the module working mode switch, as shown in the figure below:



5.Transmission mode

5.1 Data transmission mode

The data transmission mode includes unicast, broadcast and multicast.

5.1.1 Broadcast mode

In broadcast mode, the sending device sends the data received by the serial port to each node in network (including itself), and all non-sleeping devices in network will receive data.

5.1.2 Multicast mode

In multicast mode, first set the group number (for grouping) for the devices in network. The sending device must specify the target group number (to which group to send the data). Then the sending device will send the data received by the serial port to the network, and the devices with the same group number in network will receive the data.

5.1.3 Explanation of periodic multicast and broadcast mechanism

ZigBee's broadcast, or multicast, mechanism allows broad cast data to be sent out, and other broadcast capable nodes to forward the broadcast packet when they receive it, thus jumping back and forth to ensure that the entire network receives the broadcast. Therefore, the ZigBee Alliance stipulates that in order to ensure network stability, a maximum of 8 broadcasts should be sent in 9 seconds, and packets with more than 8 broadcasts should be discarded. Periodic multicast data transmission cycle is recommended to be greater than or equal to 1000ms. Data blocking (or rounding out) may occur if less than 1000ms

5.2 Receive data output method

The receiving data output mode refers to a manner in which the serial port outputs data after the module receives the wireless data;

5.2.1 Transparent output

If the output mode of the configuration device is transparent output, the module will output the original data through the serial port after receiving the wireless data;

5.2.2 Data + short address

When the output mode is data + short address, after receiving the wireless data, the serial port will output the original data + the short address of the sending device;

5.2.3 Data+Long address

When the output mode is data + long address, after receiving the wireless data, the serial port will output the original data + the long address of the sending device;

5.2.4 Data+RSSI

When the output mode is data + RSSI, after the module receives the wireless data, the serial port will output the original data + receive the RSSI value of the data packet;

5.2.5 Data+short address+RSSI

When the output mode is data + short address + RSSI, after receiving the wireless data, the serial port will output the original data + the short address of the sending device + the RSSI value of the received data packet;

5.2.6 Data+long address+RSSI

When the output mode is data + long address + RSSI, after receiving the wireless data, the serial port will output the original data + the long address of the sending device + the RSSI value of the received data packet; Note: The maximum packet length supported by the sender for a single packet is 72 bytes.

6.Application function and instruction configuration

6.1 Function pin

6.1.1 LINK

LINK pin indicates the current network status, after the device is successfully connected to the network, the current pin is pulled high. When the device has no network or the parent node is lost, this pin is pulled low. The external device can query the device network status through the pin level. In coordinator mode, this pin indicates whether the module is establishing a network normally;

6.1.2 WAKE

The WAKE pin is mainly used to wake up the dormant terminal. It defaults to a high level when it is powered on. When the pin is externally pulled down, the dormant terminal device will continue to be awakened. When the pin is released externally, it will return to high level and enter sleep; Sleep time is determined by the duration of the external pull down of this pin; for non-sleeping devices, this pin is meaningless;

6.1.3 AUX

The AUX pin indicates the current working status of the device. When the pin is low, the device is busy; when the pin is high, the device is idle; when the device receives data, the module will pull the AUX pin low after AUX_delaytime, and the serial port will start outputting Data, used to wake up the external control device, AUX_delaytime is 4ms by default, which can be changed by the serial port command, and the customer can decide according to the wake-up time of the main chip;

6.1.4 ACK

ACK pin is used to indicate the status of the last user data transmission, The pin is pulled low before the transmission is started. After the transmission is successful, the pin is pulled high. The user can judge whether the data is successfully arrived by the status of the pin. This pin function does not instruct the coordinator to send a broadcast message.

6.1.5 TOUCHLINK

TOUCHLINK pin, which is continuously pulled low for more than 3000ms, will initiate a ZLL network setup or join request. ZLL's touch link protocol includes an initiator and a target. The initiator is End-device and Sleep-End-device. The target is generally a router. When the touch link pin is continuously pulled down for more than 3000ms, the initiator will send a network establishment or joining request to the target.

6.1.6 UART BAUD RESET

UART_BAUD_RESET pin is used to reset the baud rate, The default level is high when the device is powered on.

In any mode, the pin of the module is pulled down for more than 1000ms. The serial port parameters will be restored to the default 115200 and 8N1.

Function pin	Pin port
LINK	PF7
WAKE	PD14
AUX	PD15
ACK	PB13
TOUCHLINK	PD13
UART_BAUD_RESET	PB12

6.2 Wireless remote configuration function

The module supports remote configuration function. The 2-byte wireless configuration ID is identified by A8 8A by default. The user can modify the remote configuration ID. When the first two bytes of wireless air data received by the module are wireless configuration ID, the module judges that the data packet is a remote configuration command and executes the corresponding command operation. The data packet will not be output through the serial port.

6.3 Touch link Functional application

6.3.1 Touch link Introduction

Touch link belongs to the standard networking mechanism in ZigBee Light Link (ZLL) protocol. Touch link is a contact connection. When two modules are close to each other within a certain range, touch link is activated by button or command. A ZigBee communication network is established between the two modules.

The touch link of the ZLL protocol defines an initiator and a target. The primary responsibility of the initiator is to initiate the touch link process, which is usually defined as the initiator. The target's role is to wait for a nearby touch link request. If the initiator does not have a network, the target needs to establish a new network. If the initiator has a network, the target joins the initiator's network. The lower router will be defined as the target. In a typical light control application,

the remote is the end-device initiator and the light is the router target.

6.3.2 Steps of creating a touch link network

(1) First, before the initiator (end-device) initiates a touch link network, if the initiator (end-device) has joined other networks before, the information of the previous network must be removed to make the network state in the state of no network.

(2)Secondly, the initiator (end-device) initiates a touch link scan request to discover the target person (router) existing around, and the scanned person is as close as possible to the initiator in scanning process, and the other devices are far away from the scanning area as much as possible (the threshold of the scanning signal is -40 dBm), that is, devices with signal strength greater than -40dBm will be scanned), if scanning more than two target devices will affect the success rate of touch link

(3) Secondly, after the initiator scans the target device, if it initiates the touch link for the first time, it initiates a request to create a new network to the target; if the touch link has succeeded before, it initiates the touch link to the target. Network request.

(4) Finally, the target responds to the initiator's request to create a new network or join the touch link network.

After the above steps, a new ZLL touch link network has been completed. There may only be one initiator in network, and other nodes are all targets. Before the touch link, the initiator must first clear the previously added network. During the touch link process, only one device is close to one device at a time. The touch link network can be used without coordinator and only requires end-device and router, so that the network is simpler and more convenient, and is widely used in the field of lighting control.

6.4 Functional parameter description

The module provides a wide range of configurable parameters that can be flexibly adapted to the actual application needs to build different forms of network.

Configuration information	Property	Parameter range	Function Description		
			The PANID is the network identifier of ZIGBEE and is used to		
		00000~	determine the identity of the network to which it belongs. All		
PANID	Read/write	0x0000 ^{,~}	devices in the same network must have the same PANID. When		
		UXITIT	the end-device or router is configured as 0xFFFF, it can join any		
			network that already exists on the same channel;		
			It is used to distinguish each node in network. Each device is in		
Local network		0x0000~ 0xFFFF	the same network. The local network address must be unique.		
	Read		When the network is not added, the network address of the device		
address			is 0xFFFF. After joining, the short address of the device is		
			allocated by the coordinator. The coordinator is fixed at: 0x0000;		
			Indicates the network status of the current device, including no		
Naturally status	Dead	0、1、2、3、 4	network, currently joining the network, successfully joining the		
Network status	Read		network, having the network but losing the parent node, leaving		
			the current network, and so on;		
Target network	Deed/wwite	$0\mathrm{x}0000\sim$	The current device communication destination (short address) can		
address	ss Read/write 0xFFFF		be switched at any time through configuration commands;		
Local MAC address	Read	64bitMAC	Module factory MAC address, user can not be changed		

Target MAC address	Read/Write	64bitMAC	In fixed-point mode, use long address to send;		
Device type	Read/Write	C, R, E, S	They are: coordinator, router, end-device and sleep end-device;		
Channel	Read/Write	CH11~26	The physical channel through which ZIGBEE works;		
		0, 1, 2, 3,	The transmission modes of the configuration module are: broadcast mode,		
		4, 5	multicast mode, short address on demand mode, long address on demand		
Transmit mode	Read/Write		mode, protocol on demand, and protocol multicast. For details, please see		
			the corresponding mode function introduction;		
			The data output mode is:		
			Transparent transmission;		
			Data + short address;		
Output mode	Read/Write	0, 1, 2, 3,	Data + long address;		
		4、5	Data + RSSI;		
			Data + short address + RSSI:		
			Data + long address + RSSI:		
			Module output power: 0 to 20dbm: high power consumption		
Transmitting	Read/Write	$0\sim 20$ dbm	requirements where the distance is not required the transmission		
power	110000 (11100	0 2000111	nower can be reduced to save average power consumption:		
			It is used to determine whether the data received by the air in the		
Remote			air is a remote configuration command. The customer can change		
configuration	Read/Write	2 byte	the unlimited configuration ID according to the requirements. The		
ID			default is A 8 8 A.		
Local network					
group number	Read/Write	0~255	Used to configure the device number of the device in network;		
Target network			Group number corresponding to the target when configuring device		
group number	Read/Write	0~255	multicast:		
			It is used to configure the wake-up cycle of the end-device sleep device.		
Wake-up period	Read/Write	0~2010s	The larger the cycle is, the lower the overall power consumption is, but		
(sleep time)			the greater the delay of receiving data is:		
			It is used to configure the opening and closing of network security		
Network	Read/Write	$10 \sim 2540 s$	During the opening period, the device can join the network and during		
opening time	110000 (11100	10 20100	the closing period, the device cannot join:		
Lost parent node					
reconnection	Read/Write	1~255	When the parent node is lost (the coordinator is powered down), the end-		
period	itead/ wille	minutes	device reconnects the previous network at regular intervals;		
period			After the parent node is lost the maximum number of		
Maximum		1 to 255	reconnections if it has not been reconnected successfully clears		
number of	Read/Write	times	the previous network information resears the new network and		
reconnections		times	the scanning period is equal to the reconnection period:		
IO state	Read/Write	High/Low	Access/control module level status of the GPIO channel:		
	Read/ Wille	Tigh/Low	Access/control module duty avale and period of the DWM		
PWM	Read/Write	1~65535ms	Access/control module duty cycle and period of the PWM		
			Developed the ADC such as the days in the ADC such as the ADC such as the days in the ADC such as the ADC		
ADC value	Read	0~3700mv	Kead the ADC value of the device, where 0 channel can read the		
			device power voltage value, and the ADC can detect 3.7V voltage		

when the voltage is up to 3.7V;

6.5 HEX User instruction set

6.5.1 Instruction rule

Local serial port read format: Network parameter reading FE LEN CMD FF Peripheral parameter reading FE LEN CMD CHANNEL FF FE : fixed head LEN: Actual length of DATA CMD: Actual named ID CHANNEL: Channel selection for PWM, ADC, GPIO read FF: Command terminator Read return format: FB CMD DATA FB : fixed head CMD: Command ID DATA: parameter Local serial port configuration format: FD LEN CMD DATA FF FD : fixed head LEN: Actual length of DATA CMD: Actual named ID DATA: Actual parameter FF: Command terminator Configuration return: FA CMD FA: fixed head CMD: Command ID Return when reading / configuring access: F7 FF does not exist the information / reading / configuration / format failed Wireless remote reading/ configuration format: add the wireless configuration ID before the instruction format of local serial port mode The default is A8 8A (The value can be modified), for example: The configuration format is A8 8A FD LEN CMD DATA FF Parameter reading format: A8 8A FE LEN CMD (CHANNEL) FF

Network operation format: F5 LEN CMD DATA FF F5 : fixed head LEN: Actual length of DATA CMD: Actual named ID DATA: Actual parameter FF: Command terminator Configuration return: FC CMD STATUS FC: Fixed head CMD: Actual named ID Status: 00 operation succeeded 01 operation failed

6.5.2 Read instruction set

Command description	Command	Command format	Command example
	ID		
Decidencies from a		Send: FE 01 01 FF	Send: FE 01 01 FF
Read device type	01	Return: FB 01 dev_type	Return: FB 01 03
Dead notwork state	02	Send: FE 01 02 FF	Send: FE 01 02 FF
Read network state	02	Return: FB 02 nwk_state	Return: FB 02 02
Read network PAN_ID	02	Send: FE 02 03 FF	Send: FE 02 03 FF
	03	Return: FB 03 pan_id	Send: FB 03 FE 5B
Dood loool short address	05	Send: FE 02 05 FF	Send: FE 02 05 FF
Read local short address	05	Return: FB 05 Short_Addr	Return: FB 05 F6 FA
			Send: FE 08 06 FF
Read local MAC address	06	Send: FE 08 06 FF	Return: FB 06 1F 1C 21 FE
		Return: FB 06 Mac_Addr	FF 57 B4 14
Read short address of father		Send: FE 02 07 FF	S 1 EE 02 07 EE
nodes	07	Return: FB 07	Send: FE 02 07 FF
		Coor_shortAddr	Return: FB 07 00 00
Deed short MAC address of	08	Send: FE 08 08 FF	Send: FE 08 08 FF
Read short MAC address of		Return: FB 08 Coor	Return: FB 08 0C 46 0C FE
father nodes		_Mac_Addr	FF 9F FD 90
Read network group number	00	Send: FE 01 09 FF	Send: FE 01 09 FF
	09	Return: FB 09 group	Return: FB 09 01
Read communication channel	0A	Send: FE 01 0A FF	Send: FE 01 0A FF
		Return: FB 0A channel	Return: FB 0A 0B
Read Send power	0D	Send: FE 01 0B FF	Send: FE 01 0B FF
	0B	Return: FB 0B txpower	Return: FB 0B 0A
	0.0	Send: FE 01 0C FF	Send: FE 01 0C FF
Read UARI baud rate	00	Return: FB 0C baud	Return: FB 0C 09
		Send. FE 01 0D FE	Send: FE 01 0D FF
Read sleep time	0D	Paturn, FR 0D clean time	Return: FB 0D 54
		Return: TB 0D steep_time	
Read target short network		Send: FE 02 23 FF	Send, FF 02 23 FF
address	23	Return: FB 23	Return: FB 23.00.00
		Dec_ShortAddr	Retuint. 1 B 23 00 00
Read target network group	24	Send: FE 01 24 FF	Send: FE 01 24 FF
number	<u>∠</u> ⊤	Return: FB 24 Dec_netid	Return: FB 24 00
Read target long address	25	Send: FE 08 25 FF	Send: FE 08 25 FF
Kead target long address	23	Return: FB 25 Dec_mac	Return: FB 25 0A 1C 21

			FE FF 57 B4 14
Read system transmitting	26	Send: FE 01 26 FF	Send: FE 01 26 FF
mode	20	Return: FB 26 send_mode	Return: FB 26 02
D	27	Send: FE 01 27 FF	Send: FE 01 27 FF
Read data output mode	27	Return: FB 27 out_mode	Return: FB 27 00
Read centralized network	20	Send: FE 01 28 FF	Send: FE 01 28 FF
open time	28	Return: FB 28 net_opentime	Return: FB 28 FF
The parent node loses the		Send: FE 01 29 FF	
network reconnection	29	Return: FB 29	Send: FE 01 29 FF
period		net_rejoinperiod	Return: FB 29 05
The maximum number of		Send: FE 01 30 FF	
times the parent node lost	30	Return: FB 30	Send: FE 01 30 FF
network reconnection		net_rejoincount	Return: FB 30 05
Read wireless	21	Send: FE 02 31 FF	Send: FE 02 31 FF
configuration ID	31	Return: FB 31 header	Return: FB 31 A8 8A
Read all device data	FE	Send: FE 2F FE FF Return: FB FE all_info	Send: FE 2F FE FF Return: FB FE 03 02 FE 5B F6 FA 1F 1C 21 FE FF 57 B4 14 00 00 0C 46 0C FE FF 9F FD 90 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A
Read remote/local GPIO level	20	Send: FE 03 20 Gpiold FF Return: FB 20 Gpiold In/Out level	Send: FE 03 20 00 FF Return: FB 20 00 01 01
Read remote/local PWM state	21	Command: FE 06 21 PWMId FF Return: FB 21 PWMId start/stop Period Period duty duty	Send: FE 06 21 00 FF Return: FB 21 00 01 0A 3E 63 50
Read local /remote ADC state	22	Command: FE 03 22 adcid FF Return: FB 22 adcid voltage1 voltage2	Send: FE 03 22 00 FF Return: FB 22 00 0C E4
Number of end-device		Command, FE 01 22 FE	Send, FF 01 32 FF
nodes reading the parent node	32	Return: FB 32 child_count	Return: FB 32 0A
Read the parent node's end-device node schedule	33	Command: FE 0E 33 FF Return: FB 33 index dev_type Short_Addr Mac_Addr	Send: FE 0E 33 FF Return: FB 33 00 03 FE 5B 0A 1C 21 FE FF 57 B4 14
I		I	1
Read the firmware 3	4 Comma	nd: FE 03 34 FF Set	nd: FE 03 34 FF



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version number		Return: FB 34 FirmwareVersion	Return: FB 34 82 69 01
Read the delayed printing	35		
time of AUX wake up		Send: FE 01 35 FF	Send: FE 01 35 FF
external MCU serial port		Return: FB 35 AUX_delaytime	Return: FB 35 04
in wireless receiving state			
Read UART wake up	36	Send: FE 01 36 FF	Send: FE 01 36 FF
keep time		Return: FB 36 Uart_holdtime	Return: FB 36 64
Read port info.	37	Send. FE 05 37 FE	Send: FE 05 37 FF
		Send: FE 05 37 FF	Return: FB 37 01 FE B0
		Return: FB 57 Endpoint_into	05 04
Read link key of trust	38		Send: FE 10 38 FF
center		Send: FE 10 38 FF	Return: FB 38
		Return: FB 10 TrustCentLinkKey	5A 69 67 42 65 65 41 6C
			6C 69 61 6E 63 65 30 39
Read the RSSI threshold	39	Send: FE 02 39 FF	Send: FE 02 39 FF
of touchlink connection		Return: FB 39 TouchLinkRssi	Return: FB 39 00 3C

6.5.3 Configuration instruction set

Configura davias tura	Send: FD 01 01 dev_type FF	Send: FD 01 01 03 FF	
Configure device type	Return: FA 01	Return: FA 01	
Carfinana DAN ID	Send: FD 02 03 pan_id FF	Send: FD 02 03 FE 5B FF	
Conligure PAN_ID	Return: FA 03	Return: FA 03	
Configure the network	Send: FD 01 09 group FF	Send: FD 01 09 01 FF	
group number	Return: FA 09	Return: FA 09	
Configuring	Send: FD 01 0A channel FF	Send: FD 01 0A 0B FF	
communication channel	Return: FA 0A	Return: FA 0A	
C	Send: FD 01 0B txpower FF	Send: FD 01 0B 0A FF	
Configure transmit power	Return: FA 0B	Return: FA 0B	
Carforne and a set have done to	Send: FD 01 0C baud FF	Send: FD 01 0C 09 FF	
Configure serial port baud rate	Return: FA 0C	Return: FA 0C	
Configure sleep time	Send: FD 01 0D sleep_time FF	Send: FD 01 0D 54 FF	
(end-device valid)	Return: FA 0D	Return: FA 0D	
Configure the target	Send: FD 02 23 dec_addr FF	Send: FD 02 23 00 00 FF	
network short address	Return: FA 23	Return: FA 23	
Configure the target	Send: FD 01 24 netid FF	Send: FD 01 24 00 FF	
network group number	Return: FA 24	Return: FA 24	
		Send: FD 08 25 0A 1C 21	
Configure target long	Send: FD 08 25 dec_mac FF	FE FF 57 B4 14 FF	
address	Return: FA 25	Return: FA 25	
Configure system send	Send: FD 01 26 mode FF	Send: FD 01 26 02 FF	
mode	Return: FA 26	Return: FA 26	
Configure the data output	Send: FD 01 27 mode FF	Send: FD 01 27 00 FF	

mode	Return: FA 27	Return: FA 26
Configure to open	Send: FD 01 28 time FF	Send: FD 01 28 FF FF
centralized network time	Return: FA 28	Return: FA 28
Configure the period of		
rejoin after the end-device	Send: FD 01 29 time FF	Send: FD 01 29 05 FF
node loses the parent node.	Return: FA 29	Return: FA 29
The maximum number of		
rejoins after the end-device	Send: FD 01 30 time FF	Send: FD 01 30 05 FF
node loses the parent node	Return: FA 30	Return: FA 30
Configuring the wireless	Send: FD 02 31 header FF	Send: FD 02 31 A8 8A FF
remote configuration ID	Return: FA 31	Return: FA 31
		Send: FD 1A FE 03 FE 5B
		01 0B 0A 09 54 00 00 00 0A
Configure all network	Send: FD IA FE all_info FF	1C 21 FE FF 57 B4 14 02 00
parameters	Return: FA FE	FF 05 05 A8 8A FF
		Return: FA FE
Configure Remote/Local		
GPIO Input and Output	Send: FD 03 20 Gpiold In/Out level FF	Send: FD 03 20 00 01 01 FF
Status	Return: FA 20	Return: FA 20
	指令: FD 06 21 PwmId start/stop	Send: FD 06 21 00 FF 03 65
Configure remote/local	Period1 Period2 duty1 duty2 FF	02 48 FF
PWM status	Return: FA 21	Return: FA 21
	Send: FD 00 12 FF	Send: FD 01 12 FF
Device restart	Return: FA 12	Return: FA 12
	Send: FD 00 13 FF	Send: FD 01 13 FF
Restore factory settings	Return: FA 13	Return: FA 13
Read the delayed printing time		
of AUX wake up external	Send: FD 01 35 AUX delaytime FF	Send: FD 01 35 04 FF
MCU serial port in wireless	Return: FA 35	Return: FA 35
receiving state		
Read UART wake up keep	Send: FD 01 36 Uart holdtime FF	Send: FD 01 36 64 FF
time	Return: FA 36	Return: FA 36
		Send: FD 05 37 01 FE B0
Read port info.	Send: FD 05 37 Endpoint_info FF	05 04 FF
	Return: FA 37	Return: FA 37
		Send: FD 10 38
		5A 69 67 42 65 65 41 6C
Read link key of trust center	Send: FD 10 38 TrustCentLinkKey FF	6C 69 61 6E 63 65 30 39
	Return: FA 38	FF
		Return: FA 38
Configure RSSI thresholds for	Send: FD 02 39 TouchLinkRssi FF	Send: FD 02 39 00 3C FF
touchlink connections	Return: FA 39	Return: FA 39
1	1	

6.5.4 Network operation instruction set

Onen network	Send: F5 01 40 01 FF	Send: F5 01 40 01 FF	
Open network	Return: FC 40 00	Return: FC 40 00	
Lagra Natural	Send: F5 01 40 02 FF	Send: F5 01 40 02 FF	
Leave Network	Return: FC 40 00	Return: FC 40 00	
Create notwork	Send: F5 01 40 03 FF	Send: F5 01 40 03 FF	
Create network	Return: FC 40 00	Return: FC 40 00	
Start Taughlink	Send: F5 01 40 04 FF	Send: F5 01 40 04 FF	
Start Touchink	Return: FC 40 00	Return: FC 40 00	

6.6 HEX Parameter description

6.6.1 System transmitting mode

mode:

 $0x00 \ Broadcast \ (default)$;

0x01 (need to configure the target group number in configuration mode first);

0x02 Transparent transmission on demand + short address (need to configure the target short

address in configuration mode);

0x03 transparent transmission on demand + long address (need to configure the target long address in configuration mode);

0x04 protocol on demand + short address (the first two bytes in the transmission mode are the short address of the target device network);

0x05 protocol multicast (the first byte in the transmission mode is the target network group

number);

6.6.2 Receiving data output mode

mode:

0x00 transparent transmission (default); 0x01 data+short address; 0x02 data+long address; 0x03 data+RSSI; 0x04 data+short address+RSSI; 0x05 data+long address+RSSI;

Note: the maximum package length is 72

6.6.3 Network node type

dev_type:

0x01 Coordinator 0x02 Router 0x03 End-device (default) 0x04 Sleep-End-device

6.6.4 Network state

nwk_state:

0x00 no network 0x01 Currently joining the network 0x02 joined the network 0x03 A network exists, but the parent node is lost 0x04 Leaving the current network

6.6.5 Network PAN ID

pan_id:

0x0000~0xFFFE fixed network PAN ID

0xFFFF stochastic network PAN_ID

PANID Parameters need to be configured before setting up or joining the network.

6.6.6 Network short address:

Short Addr: 2 Byte Address randomly assigned by coordinator

6.6.7 MAC address

Mac Addr: 8 Byte Factory unique physical address is fixed

6.6.8 Short address of father nodes

Coor_shortAddr: 2 Byte Short address of the parent node of the current node, If coordinator, should be 0x0000

6.6.9 MAC address of father nodes

Coor_Mac_Addr: 8 Byte The parent node's long address of the current node

6.6.10 Network group number group

group: Group number range 0x01~0xFF (default 0 means no group system default broadcast)

6.6.11 Network Channel

channel Channel range $0x0B(11) \sim 0x1A(26)$ (default 11 channels) channel The parameters need to be configured before entering the network or establishing a network.

6.6.12 Transmitting Power

txpower Transmitting power level (default 20dBm)

Adjustable range 0~20dbm

txpower: Parameters need to be established before the network or before joining the network.

6.6.13 Buad rate

Baud rate parameter baud comparison table:

	Buad	Baud rate	Buad	Baud rate
	01	4800	08	76800
To change the baud	02	9600	09	115200 (default)
of serial	03	14400	0A	128000
you need to restart	04	19200	0B	230400
changed baud rate	05	38400	0C	256000
changed badd fate	06	50000	0D	460800
6.6.14 Sleep	07	57600		

rate configuration communication, the device, and the will take effect.

(1~60) Sleep wake

sleep_time:

cycle representation 1~60 Unit (s)

 $(61 \sim 255)$ Sleep wake cycle representation $60+(61-60) *10 \sim 60+(255-60)*10$ Unit(s)

6.6.15 Storage time of father nodes

Time: The maximum setting of ZigBee protocol stack is 30S, If end-device node needs to accept the parent node data, the sleep time configuration cannot be greater than 30S.

6.6.16 Centralized network opening time

Open time : $(1 \sim 254)$ The time range of network opening is $(1 \sim 254)$ *10 Unit(S) 255 Network permanent development

6.6.17 Period of network reconnection after loss of parent node

Rejoin period: $(1 \sim 255)$ Reconnection cycle range $1 \sim 255$ Unit(Minute)

6.6.18 The maximum number of attempts to reconnect

Rejoin maxcount: $(0 \sim 255)$ The range of the maximum number of rejoins is $0 \sim 255$

0: Indicates that the terminal will not perform automatic reconnection after losing its parent node

255: Indicates that the network will always be reconnected to restore the previous network, and the network clear operation will not be performed

Note: After the maximum number of rejoin attempts, if the previous network has not been restored, the previous network information will be cleared. The power consumption of the new network scanned by Rejoin period is higher than that of the network before the restoration. Therefore, for devices with high power consumption requirements, the two parameters of rejoin period and Rejoin maxcount need to be set larger by default, both of which are set to 5

6.6.19 Wireless remote configuration ID

Remote Header: 0x0000 0x0000 indicates the wireless network configuration is turned off, $0x0001 \sim 0xFFFF$ indicates the remote configuration is turned on, and the default setting is 0xa88a (0xa8 0x8a).

6.6.20 User gpio parameter

Gpio: Format of peripheral configuration data (3 bytes) GpioId In/Out level gpioid : Channel ID

Channel ID	GPIO Port
00	PB14 Port
01	PB15 Port
02	PC6 Port
03	PC7 Port

In/Out: Channel output / input mode

0 Output

1 Input

level: Channel Level state

0 Low level

1 High level

2 Flip

Note: When configured as input, the level indicates the input level value is 0 (low level) or 1 (high level). When the output is configured, the level indicates 0 (low level), 1 (high level), 2 (Level flip) output.

6.6.21 User pwm parameter

Pwm Peripheral configuration data format (6 Byte) : PwmId start/stop Period1 Period2 duty1 duty2 PwmId : Channel ID

Channel ID	PWM GPIO Port
0x00	PF2 Port
0x01	PF3 Port
0x02	PF4 Port
0x03	PF5 Port
0x04	PF6 Port

start/stop:Start/stop channel PWM output

0xFF Start PWM

0x00 Stop PWM

period: pwm period time (Unit 1 = 1 ms)

Recommended setting range 0x0A~0xFFFF

Period1 High 8 bits of period

Period2 Low 8 bits of period

If: period=0x0352

Then: Period1=0x03 Period2=0x52

duty: pwm duty cycle time (Unit 1 = 1ms)

Can be set from 0x0A~0xFFFF

duty1 Indicates the upper 8 bits of duty cycle

duty2 Indicates the lower 8 bits of duty cycle

If: duty=0x028A

Then: Period1=0x02 Period2=0x8A

Note: The cycle period value must be greater than duty cycle duty, and the difference between the recommended cycle period and the duty cycle duty is greater than 2ms. If the cycle is less than the duty cycle, The system default cycle period is equal to twice the duty cycle duty, and the duty cycle here represents the high level time.

6.6.22 User adc parameter

Adc Peripheral read data format (3 Byte) : adcid voltage1 voltage2

adcid: ADC channel ID

Channel ID	ADC GPIO Port
0×00	VDD Power supply voltage
0x00	detection
0x01	PC8 Port
0x02	PC9 Port
0x03	PC10 Port
0x04	PC11 Port

Voltage: Read ADC channel voltage value (mV)

Detectable range $0x0000 \sim 0x0E74$ ($0 \sim 3700$) voltage 1 Indicates high 8 digits

voltage 2 Indicates lower 8 bits

If Read value: voltage =0x0C voltage =0xE4

Then voltage: voltage =0x0CE4

Note: If the power supply voltage is the highest 3.7V, the detection range of the ADC can reach 3.7V.

6.6.23 Configure all network parameters

all_info: FD 1A FE 03 FE 5B 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A FF

Node type 03; Network PANID FE 5B; Network group number 01; Channel 0B; Transmitting power 0A; Baud rate 09; Sleep time 54; Target network short address 00 00; Target network group number 00; Target long address 0A 1C 21 FE FF 57 B4 14; System transmitting mode 02; Data output mode 00; Network open time FF; rejoin period 05; rejoin times 05; Wireless ID A8 8A;

6.6.24 Configure all network parameters

all_info: FB FE	<mark>03</mark> 02 <mark>FE 5B</mark> F6 FA	IF 1C 21 FE FF 57 B4 14	<mark> 00 00</mark> 0C 46	5 0C FE FF 9F FD 90	01 0B 0A 09 54	00 00 <mark>00</mark> 0A 1C
21 FE FF 57 B4 14 <mark>02</mark>	<mark>2 00 FF 05 05 <mark>A8 8A</mark></mark>					
Node type 03;	Network status (2; Network PANID	FE 5B;	local network short a	ddress F6 FA;	Local MAC
address 1F 1C 21 Fl	E FF 57 B4 14; Parer	t node network short add	ress 00 00;	Parent node MAC a	ddress 0C 46 0	C FE FF 9F FD
90; Network group	01; Channel 0B; Tra	nsmitting power 0A; E	Baud rate 09;	sleep time 54; Targe	et network short a	address 00 00;

Target network group 00; Target long address 0A 1C 21 FE FF 57 B4 14; System transmitting mode 02; Data output mode 00; Network open time FF; rejoin period 05; rejoin times 05; Wireless ID A8 8A;

6.6.25 Number of end-devices of the parent node

Child_count:Refers to the number of end-device nodes currently managed by the coordinator or router, and manages up to 50 end-device devices.

6.6.26 Parent node's end-device list

index: Indicates the serial number of the end-device node, the range is from 0 to child_count-1, 1 byte

dev_type: device type of end-device node, 1 byte

Short_Addr: Network short address of the end-device node, 2 bytes

Mac_Addr: MAC address of the end-device node, 8 byte

After receiving the instruction "FE 0E 33 FF" to read the end-device list, the coordinator or router node will print out the end-device node information every 50ms interval according to the sequence number (index) of the end-device node from 0 to child_count-1. Such as:

Receive: FE 0	E 33 FF			
Retuen: FB 33	0	03	34 F3	0B 03 21 FE FF 57 B4 14
50ms				
FB 33	1	04	F2 7B	02 1F 21 FE FF 57 B4 14
50ms				
FB 33	2	04	A0 82	27 6E 21 FE FF 57 B4 14
50ms				
FB 33	3	03	F4 3E	F3 7C 21 FE FF 57 B4 14
50ms		•	•	
FB 33 ind	ex dev	_type Sho	rt_Addr	Mac_Addr

6.6.27 Configure the delayed printing time of AUX wake up external MCU serial port in wireless

receiving state

AUX_delaytime: $1 \sim 255$ unit is ms, the default parameter is 4ms, that is, after the module receives wireless data, first pull down the AUX pin to wake up the external MCU, and then delay 4ms to output the serial port data to the external MCU.

6.6.28 Configure serial port wake-up hold time

Uart_holdtime: The unit of $1 \sim 255$ is 10ms, the default parameter is 100, that is, the serial port will keep waking up for 100*10ms after waking up, and then going to sleep after 1000ms.

6.6.29 Configure endpoint information

Endpoint_info: data format of 5 bytes are endpoint clusterId_H clusterId_L profileId_H profileId_L

Default is endpoint 0x01, clusterId 0xfeb0, profileId 0x0504

endpoint	clusterId		profileId	
	clusterId_H clusterId_L		profileId_H	profileId_L
01	FE	B0	05	04

6.6.30 Set Link key of trust center

TrustCentLinkKey: data length of 16 bytes, default key of ZigBee alliance is

0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39

Take effect once restart

Note: Only the connected device holding the same link key (LinkKey) as the trust center (coordinator) can it connect to the network of the trust center (coordinator), and the trust center (coordinator) transmits the network key to the connected device , The connected device completes the process of joining the network to obtain the network key for normal communication.

6.6.31 Configure RSSI thresholds for touchlink connections

TouchLinkRssi: The first byte 00 is negative, 01 is positive, and the second byte is the absolute value of RSSI. The default value is - 60dbm, which means 00 3C. The device restart parameter takes effect.

Instructions: according to the actual use environment, configure the specific threshold, the default is - 60dbm, then the two devices must be in the range of 20-30mm to connect successfully, and - 40dbm, then the two devices must be very close or close together for connection. The device to be touched and linked needs to clear the saved network (execute the command to leave the network), and restart the module to allow to be touched and connected within 5 minutes.

6.6.32 firmware version number

Firmware_version: EF 32 02

EF 32 means EFR32 chip

02 means firmware version number

7.Quick start

7.1 Quickly build ZigBee network

Quickly and easily establish a ZigBee network via PC software. The steps are as follows:

(1)Connect Zigbee ad hoc module via USB to UART converter, Open host computer software "E180-ZG120B-Setting", select Com port and set baud rate as 115200(default), then open port.

Open Port	COM6	- Co	nfiguratio	C	Get Nw	k	Param I	Reset	中文	Sho
Baud rate:	115200	∕ Co	mmunicat	9	Set Nw	k	Clea	ir	Module	
Communication	n param Fixe	ed point	network Fun	ction	n param	Fund	ction param	Commu	nication param	Remote
Network par Node	ameters	4	Transmit	11		-	Message	Box:		
PAN ID:	FFFF	÷	Transmit	0.0)	÷				
Baud		~	Net	1		-				
			Sleep	0		-				
Output						~				
Network of	open time	1	Max num	of	1	-				
Parent not	de	1 韋	Wireless		FFFF	-				

(2) After the serial port is opened, first click "Enter Configuration Mode", the message box prompts "Enter the configuration status successfully, read parameter successfully". The main network parameters include: the node type defaults to the end-device, channel 11(default), PAN ID random (default), transmit power is 10 (default).

E180-ZG	120A-Setting	g-V1.1							
EB))) ®	成 Che	都亿 angdu E	by	特 e Ele	ct	子科技 ronic Techr	有限/	、 I,Ltd.
Close Port	COM69 ~	Co	nfiguratio	(Get Nw	k	Param Reset	中文	Show
Baud rate:	115200 🕓	Cor	mmunicat	1	Set Nw	k	Clear	Module	
Communication	n param Fixed	d point	network Fur	oction	n param	Fun	ction param Comm	inication param	Remote n 4
Node	Terminal	4	Transmit	11		-			~
PAN ID:	FFFF	+	Transmit	20	.0	-			
Baud	115200bps	~	Net	0		-			
			Sleep	84		÷			
Output	Transparent	t outpu	t			~			
Network o	pen time	255 🖨	Max num	of	5	-			
Parent noc	de 5	•	Wireless		A88A	-			
Module addr	ess param								
Local shor	t O	÷	the first second s						
Local MAC	7E 05 2	28 FE F	F CC CC CC						~

(3) Modify node type as coordinator, and click the Enter button, the message box prompts "Configure device type

success". The general ZigBee 3.0 network is established by the coordinator node, so the factory default end-device node type needs to be changed to the coordinator before establishing the network.

E180-ZG120A-Setting-V	1.1			22								
		佰特电	子科技 ronic Tech	有限2 nology Co	入司 o.,Ltd.))) ®	成都亿	佰特电	子科技	有限2	公司
Close Port COM69 V	Configuratio	Get Nwk	Param Reset	中文	Show			,			3,	
Baud rate: 115200 ~ 0	Communicat	Set Nwk	Clear	Module		关闭串口	COM29 👻	进入配置模式	读取网络参数	恢复出厂设置	English	显示指令
Communication param Duradies	and a second second second	atao ang Ta	ution annual Comm		Denote a 4	波特率:	115200 👻	进入传输模式	写入网络参数	清空消息框	模块重启	
Network parameters	Int network Fun	icuori parami Fui	Message Box:	unication param	Nemole ni	通信参数 😠	e点组网 本地	功能参数 远程	功能参数 远程通	信参数 远程组网	参数	
Node Coordinate V	↓ Transmit	21 🌲			· · · · ·	网络参数				消息框		
PAN ID: FFFF	Transmit	10.0 🜲	Enter configuratio	n state successi	uny: : :	节点类型:	协调器 ▼	● 发射信道:	11 💼	进入配置状态成	动!!!	^
Paud 115000-	Net	0	Read Param Succ	cess: : :		PAN ID:	FFFF	🗧 发射功率:	20.0	读取参数成功!	1.1	
1152000ps			Enter configuration	n state successf	ully:::	波特率:	115200bps	▼ 网络组号:	0	配置设备类型成	动!!!	
	sieep	•	Read Param Succ	cess!!!				休眠时间:	84 🌲			
Output Transparent ou	tput	~				输出方式:	透明输出		•			
Network open time 255	+ Max num	of 5 🗘				网络开放时	间(秒): 255	5 🗧 最大重连	次数: 5 🔶			
Parent node 5	+ Wireless	A88A 🚖				父节点重连	周期(秒): 5	→ 无线配置	D: A88A 🌲			
Module address param						模块地址参	数					
Local short FFFE	÷					本地短地	HE: FFFE	×.				
Local MAC 7E 05 28 F	E FF CC CC CC				\sim	本地MAC地	址: OC 46 0	C FE FF 9F FD	90			-

(4) After the node type is successfully written, modify the ZigBee network required for establishing some network parameters (you can also use the default value without modifying the parameters). Modify the channel, network PANID and transmit power. After modifying the parameters, click "Write Network Parameters". ", the message box will prompt "Write parameters successfully"

5200 🗸									
CONTRACTOR NO.	Con	nmunicat	9	Set Nw	k	Clea	ar	Module	
am Fixed p	oint n	etwork Fun	ctior	n param	Fun	ction param	Commu	inication param	Remote n
ers			-			Message	Box:		
ordinate 🗸	4	Transmit	21		•				
7	+	Transmit	10	.0	-				
5200bps	~	Net	0		÷				
	1	Sleep	0		-				
ransparent o	utput				~				
time 25	5 🜲	Max num	of	5	-				
5	÷	Wireless		A88A	+				
	am Fixed p ers ordinate ~ 7 5200bps ransparent o time 25 5	m Fixed point n ers ordinatc ∨ (4) 7 ↓ 5200bps ∨ 1 ransparent output time 255 ↓ 5 ↓	Fixed point network Fun ers ordinat: ✓ ↓ Transmit 7 ♦ Transmit 5200bps ✓ Net Sleep ransparent output time 255 € Max num 5 € Wirreless	m Fixed point network Function ers ordinat: ↓ ↓ Transmit 21 7	m Fixed point network Function paramers ordinat: ✓ ↓ Transmit 21 7	m Fixed point network Function param Fun ers ordinat: ✓ ↓ Transmit 21 ↓ 7 ↓ Transmit 10.0 ↓ 5200bps ✓ Net 0 ↓ Sleep 0 ↓ ransparent output ✓ time 255 ↓ Max num of 5 ↓	am Fixed point network Function param Function param ers ordinat: ✓ ↓ Transmit 21 ↔ 7 ↔ Transmit 10.0 ↔ 5200cps ✓ Net 0 ↔ Sleep 0 ↔ ransparent output ✓ time 255 ↔ Max num of 5 ↔ 5 ↔ Wireless A88A ↔	m Fixed point network Function param Function param Communers ordinat: ✓ ↓ Transmit 21 ↔ 7	am Fixed point network Function param Function param Communication param ers ordinat: ✓ ↓ Transmit 21 ↔ 7

(5) The node type is modified, and the module needs to be restarted to take effect. Click "Module Restart", and the message box prompts "Module restart successful".

lose Port	COM69	Co	nfiguratio	(Get Nw	k	Param R	leset	中文	Show
Baud rate:	115200	Co	mmunicat	9	Set Nw	k	Clea	r	Module	
Communication	n param Fix	ed point	network Fu	nctior	n param	Fund	ction param	Commu	nication param	Remote n
Node	Coordinatc	~ e	Transmit	21		÷	Transform	BUX.	and the antara	a
PAN ID:	C97	-	Transmit	10	.0	-	Induster s	dius sui	cessiully entere	a: : :
Baud	115200bps	s ~	Net	0		-				
			Sleep	0		-				
Output	Transpare	ent outpu	ıt			~				
Network of	open time	255	Max nur	n of	5	-				
		1000	The second second second second	_		IL COL				

(6) After the module restarts, the transfer mode is entered by default. At this time, click "Enter Configuration Mode" again, the message box prompts "Enter the configuration status successfully, read parameters successfully". It can be seen that the parameters read out are the previously modified parameters, indicating that the network parameters are modified successfully.

Close Port	сом69 🗸	Configuratio	G	Get Nw	k	Param Reset	中文	Show
Baud rate:	115200 💛	Communicat	5	Set Nw	k	Clear	Module	
Communicatio	n pa <mark>ram</mark> Fixed	point network Fu	inction	param	Fund	ction param Comm	unication param	Remote n
Network par	Coordinate ~	Transmit	21		4	Message Box:		
PAN ID:	BBC3	🗧 Transmit	10.	.0	ŧ	Enter configuration	n state success	ully!!!
Baud	115200bps	✓ Net	0		*	Enter configuration	n state success	ully!!!
		Sleep	0		-	Read Param Succ	cess!!!	
Output	Transparent	output			~	Enter configuration	n state success	ully!!!
Network of	open time 2	55 🖨 Max nur	n of	5	-	Read Param Succ	cess!!!	
Parent no	de 5	+ Wireless		A88A	÷.			

(7) Select the fixed-point networking interface, display the network status as "joined network". The coordinator network is successfully created.



7.2 Quickly join a ZigBee network

(1) Open software "E180-ZG120B-Setting", choose port number, and set the serial port baud rate, open the serial port.

((())) ®	成都亿	佰特申	子科技	有限》	。
EB1	TE	Chengdu E	Get Nwk	Param Recet	nology Co	Show
Baud rate:	115200 🗸	Communicat	Set Nwk	Clear	Module	
Communication Network par	n param Fixed ameters	point network Fu	nction param Fun	nction param Comm Message Box:	unication param	Remote n
Node PAN ID:	FFFF	Transmit Transmit	0.0			
Baud		✓ Net				
Output		Jicep	×			
Network of Parent noo	open time 1 de 1	Max nurWireless	n of 1			
Module addr	ess param					
Local shor Local MAC	t 0	.				

(2) After the serial port is opened, first click "Enter Configuration Mode", the message box prompts "Enter the configuration status successfully, read parameters successfully". The main network parameters include: the node type defaults to the end-device, the channel 11 (default), the PAN ID defaults randomly, and the transmit power is 20. (default)

Close Port	COM6 🔍	Configuratio	G	Set Nw	k	Param P	leset	中文	Show
Baud rate:	115200 💛	Communicat	S	Set Nw	¢	Clea	r 🔤	Module	
Network par	ameters	point network Fur	1 11	param	Fund	Message	Commu Box:	inication param	Remote ni
PAN ID:	FFFF	+ Transmit	0.0)	÷				
Baud	115200bps	✓ Net Sleep	1 60		÷				
Output	Transparent	output			~				
		Max num	n of	5	-				
Parent not	de 5	+ Wireless		A88A	-				

(3) Modify the node type as sleep-end-device, click the Enter button, the message box prompts "Configure device type is successful", modify the network parameters, its PAN ID and transmit channel parameters must be the same as the network to be joined, click "Write network parameters", The message box prompts "Write parameters successfully."

_

Close Port	COM6 🗸	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate:	115200 💛	Communicat	Set Nwk	Clear	Module	
Communicatio	n param Fixed	point network Fur	nction param F	Function param Com	munication param	Remote n
Network par	ameters			Message Box:		
Node	Terminal ~	[↓] Transmit	21	2A 2D 2E		
PAN ID:	FFFF	🗧 Transmit	0.0	Enter configurat	ion state successf	ully!!!
Baud	115200bps	✓ Net	1	7A 7D 7E		
		Sleep	60	FE 2F FE FF		
Output	Transparent	output	~	Read Param Su	ccess!!!	
Parent nor	de 5	Max num	A88A	FB FE 03 00 FF FE 48 FF FE 00 00 09 3C 00 00 02 00 FF 05 05	FF FF FF 22 ED 0 00 00 00 00 00 00 01 FF FF FF FF FF A8 8A	B DE DA 3A 000 01 15 FF FF FF

(4) Click "Module Restart", the message box prompts "Module restart is successful", click "Enter configuration

E180-ZG120A-Setting-V1.1

mode", the message box prompts "Enter configuration status is successful, read parameters successfully", confirm whether the read PAN ID and transmit channel parameters are Modified value before.

E180-ZG	i120A-Setting	-V1.1							×
	»)) ®	成都亿 Chengdu E	E	特 te Ele	E ct	子科技 ronic Techr	有限化	、 Ltd.	
Close Port	COM6 🗸	Configuratio	(Get Nw	k	Param Reset	中文	Show	
Baud rate:	115200 💛	Communicat		Set Nw	k	Clear	Module		
Communication	n param Fixed	point network Fur	nctior	n pa <mark>ra</mark> m	Fun	ction param Commu	inication param	Remote n	•
Network par	ameters					Message Box:			
Node	Terminal 🗸	Transmit	21		-	00 09 3C 00 00 01 02 00 FF 05 05 A8	FF FF FF FF FF 8A	FF FF FF	^
PAN ID:	C97	Transmit	0.0	0	-	FD 00 12 FF			
Baud	115200bps	✓ Net	1		-	Module restart suc	cessful!!!		
		Sleep	60	1	-	FA 12			
Output	Transparent	output			~	2A 2D 2E			
		Max num	n of	5	÷	Enter configuration	n state successfu	dly!!!	
Parent noo	de 5	+ Wireless	S.	A88A	+	7A 7D 7E			
						FE 2F FE FF			
						Read Param Succ	ess!!!		
Module addr	ress param					FB FE 03 02 0C 9 3A FE 48 00 00 7	7 A2 08 22 ED 0 E 05 28 FE FF C0	B DE DA C CC CC 01	
Local shor	rt A208	÷				15 00 09 3C 00 00 FF 02 00 FF 05 05	01 FF FF FF FF A8 8A	FF FF FF	
Local MAC	22 ED 0	B DE DA 3A FE 48	ę.						¥

(5) Select the fixed-point networking interface and display the network status as "joined network". The sleepend-device node has joined the network created by the former coordinator.

Close Port	COM6 🔍	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate:	115200 🗸	Communicat	Set Nwk	Clear	Module	
Communication	n param Fixed	point network Fur	nction param Fur	nction param Commu	unication param	Remote n
Node PAN ID:	Terminal V C97	✔ Transmit♦ Transmit	21	00 09 3C 00 00 01 02 00 FF 05 05 A8	I FF FF FF FF FF 8 8A	FF FF FF
Baud	115200bps	✓ Net Sleep	60	Module restart suc	cessful!!!	
Output	Transparent	output Max num	~ n of 5 🜩	2A 2D 2E Enter configuration	n state successfi	ully!!!
Parent noo	de 5	Wireless	A88A 🚖	FE 2F FE FF Read Param Succ	ess!!!	
Module addr	ress param rt A208	-		FB FE 03 02 0C 9 3A FE 48 00 00 7 15 00 09 3C 00 00 FF 02 00 FF 05 05	7 A2 08 22 ED 0 E 05 28 FE FF C 0 01 FF FF FF FF A8 8A	B DE DA C CC CC 01 FF FF FF

Similarly, the routing node and the end-device node also join the ZigBee network according to the appeal method. If the node type does not need to be added to another ZigBee network, the Enter button rest to the node type configuration also needs to be clicked. Write the parameters after modifying the network parameters, and finally restart to join the new ZigBee network

7.3 ZigBee Network communication test

7.3.1 Unicast test

7.3.1.1 Unicast between end-device and coordinator in the form of short address

Enter the configuration mode, configure the target network address, and modify the target network address of the coordinator to the local short address (0xFCFA) of the end-device. The destination network address of the end-device is 0 by default. 0 is the coordinator's network short address (the coordinator's network short address is always 0). It does not need to be modified at this time. If the end-device communicates with the non-coordinator node, it needs to be modified (modified to the destination node's network local short address).

E180-ZG	120A-Setting	-V1.1					E180-2G	120A-Setting	J-V1.1			-	~
	»)) • • • • • • • • • • • • • • • • • •	成都亿 Chengdu El	佰特电 byte Elect	子科技 ronic Techr	有限2 hology Ca	入司 .,Ltd.	EB))) ®	成都亿 Chengdu E	佰特电	子科技 ronic Tech	有限/	入司 .,Ltd.
Close Port	COM69 🗸	Configuratio	Get Nwk	Param Reset	中文	Show	Close Port	COM6 🔍	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate:	115200 💛	Communicat	Set Nwk	Clear	Module		Baud rate:	115200 💛	Communicat	Set Nwk	Clear	Module	
Communication Transmission Device typ Parent nod 00 00 00 00 Point / Gn Destination 00 00 00 00 Target ne Trans	param Fixed parameter coordinator onined nwk FF FF 00 00 00 00 mup Broad nn MAC add 00 00 00 00 twc{A208 \$	point network Fur Message In the "on will receive When the Write Para rss:	ction param Fur Box: • demand + netwo • the valid data pa network group number is g m Success! ! !	k address "transmiss k address "transmiss cket + the network a mber is 0, it is equival meater than 0, the gro	unication param ion mode, the re ddress of the set ent to no groupit uping is valid. !	Remote nu	Communicatio Network par Node PAN ID: Baud Output Parent nod	n param Fixed ameters Terminal ~ C97 115200bps Transparent de 5	l point network Fu	nction param Fur 21 \$ 0.0 \$ 1 \$ 60 \$ 1 \$ 0.0 \$ 1 \$ 0.0 \$0.0 \$	Image Box Comm Message Box 00 09 20 00 00 00 00 00 00 00 00 00 00 00 00	Inication param I FF FF FF FF FF FF 8 8A cccessful! ! ! n state successf	Remote n. •
Net comman New net Leave net	d: Open TouchL	ink Clear	rea: 90ABCDEF Send	Hex Send V	Hex Display nd	bytes:30 bytes:2	Module add Local short Local MAC	ess param rt A208 22 ED 0	DE DA 3A FE 48		FB FE 03 02 0C 9 3A FE 48 00 00 7 15 00 09 3C 00 0 FF 02 00 FF 05 0	7 A2 08 22 ED 0 E 05 28 FE FF C 0 01 FF FF FF FF 5 A8 8A	DB DE DA C CC CC 01 FF FF FF

(2) After the target address between nodes is configured, click "enter transmission mode", and the message box will prompt "enter transmission mode successfully". Before communication, confirm whether the module is in transmission mode, and only in the transmission mode can the communication be realized. Input the data to be sent in the sending area, click send, and the received data can be seen in the end-device node message box.

	EB	TE	以前12 Chengdu El	日行电 oyte Electr	丁科 乃 ronic Tech	nology C	o.,Ltd.	EBY	TE	Chengdu El	BH Elect	于科技 ronic Tech	们成 nology C	公司 Co.,Ltd.	
	Close Port	сом69 🗸	Configuratio	Get Nwk	Param Reset	中文	Show	Close Port	COM6 v	Configuratio	Get Nwk	Param Reset	中文	Show	
	Baud rate:	115200 💛	Communicat	Set Nwk	Clear	Module		Baud rate:	115200 🗸	Communicat	Set Nwk	Clear	Module		
8) Si	Device typ] Network [Parent noc 00 00 00 00 Port / Gr Destination (00 00 00 00 Target nr Trans Net commar New net Leave ne	Loordinator Joined mwk g{FF FF 100 00 00 000 roup Broad on MAC add on MAC add 0 00 00 00 00 etwcA208 € Net Addre nd: t Open rtt Touch	In the 'on- will receive When the When the When the Transfer at Transfer at Transfer at Transfer at Sending a net 122456785 Clear	demand + network the valid data pack up number up of the valid data pack m Successfully er successfully er successfully er solaceDEF Send	k address' transmi ket + the network abers 0. It's equivalent abers 0. It's equivalent abers 1. It's equivalent abers 1. It's equivalent there of the second second the second second second second the second second second second the second second second second the second second second second second the second second second second second the second second second second second second the second second second second second second second the second seco	ssion mode, the address of the s address of the s valent to no group nouping is valid !] Hex Display n ms Recc	receiving node ending node sing the sing the sin	Device tyd Network Parent nod 7E 05 28 FE Port / Gra Destinatic FF FF FF FF Target ne Trans Net comman New net Leave net	eminal oined nwk (00 00 FF CC CC CC up Broad on MAC add FF FF FF FF twc(0 Net Addre d: Open	Iz 34 56 7	8 90 AB CD EF rea: Send	Hex Send I	Hex Display in ms Rec	nd bytes:26 : bytes:125	×
	2	, Liid v		icast to C	Coordina	ator									
(((•))	20A-Setting	,Dird(-V1.1 成都 Chengd	乙佰特 u Ebyte E		Coordina 科技祥	ator 	— ×	E180-ZG	120A-Sett	ing-V1.1 成都(Chengdo	乙佰株 I Ebyte E	电子和	斗技 Techno	与限2 plogy Co	公司 o.,Lto
0-ZG12 (((•)) BY	20A-Setting) ®	-V1.1	Z (The stice of the state of th	电子 lectronic wk Para	Coordina 科技 Techno	etor - logy Co +t	□ ×	E180-ZG	120А-Sett))) ® ГТЕ СОМ69	ing-V1.1 成都4 Chengdo	之佰株 Ebyte E	中国子和 Nwk Paran	Techno n Reset	一 う 限 2 ology Co 中文	S
80-ZG12 (((•)) BY Port (ate: 1	20A-Setting	-V1.1 Chengd Configura Commun	之后转 La Ebyte E atio Get N icat Set N	wk Para	Coordina 中 中 で に Particlear	ator 一 下文 Module) × 、〕 、」Ltd. Show	E 180-ZG	120A-Sett	ing-V1.1 武都 Changelu Configurat Communic	Z (G t N io Get N at Set N	地子和 lectronic lwk Paran lwk Cl	中 Techno n Reset lear	中文 Module	SI
0-ZG12 (((•)) Port (ate: ication p typ Tel prk Join 28 FE FI (Group ination FF FF F et netv s	20A-Setting 20A-Setting COM6 115200 COM6 COM	-V1.1 Configur. Configur. Commun point network 12: 25: 17: ************************************	Image: Second	wk Paran wk C n Function para D EF astuly entered	Techno m Reset Clear ! ! 7F 7C 78	ator 「限之 Nodule cation param	Remote n	E180-ZG	COM69 115200 n param Fr parameter Coordinator Joined nwk 4 FF FF 00 00 00 00 oup Broac on MAC a 0 00 00 00 etwc4208 Net Add	ing-V1.1 Chengdu Configurat Configurat Communic xed point network In the When When D Write a ddr: D Sss: drev v	C Get N io Get N function para age Box: "On - demand coever the valid the network g the group num Param Succes fer status succe	Awk Paran Wwk Cl Wwk Cl m Function para + network address data packet + the roup number is 0, i there is greater than s! ! ! essfully entered !	n Reset lear Commun * transmission network add R is equivaler 0.0 the group ! ! AB CD I	中文 中文 Module n mode, the re fress of the se at to no grouping is valid.! EF 01 23 45 6	Remcelving nding nd
Port 4 ate: incation p by Teres 28 FE FI 2 Ground ination 28 FE FI 7 Ground ination FF FF F 9et netv 15	20A-Setting 20A-S	-V1.1 Configur. Configur. Commun point network 25 27 r: sss: v	Carrie Carrier Carrier Section Carrier Section Function paran Section 28 Section 28	Italsi to C Italian Content In Function para D EF sstully entered!	COORDINA Techno Im Reset Clear ram Communic ! ! 7F 7C 7B	ator 「限企 Nodule cation param	Remote n	E180-ZG	COM69 COM69 115200 n param Pit parameter Coordinator Joined nwk 4(FF FF 00 00 00 00 coup Broac on MAC a 0 00 00 00 etw(A208 Net Adc nd:	ing-V1.1 Chengelt Configurat Configurat Communic Communic Communic Mess In the Whet If on Whet If on Seno	Z Get R io Get R at Set R Function para age Box: "on - demand ceive the valid h the network g the group nun Param Success fer status succe	Avvic Paran Nvvic Paran Nvvic Cl m Function para + network address data packet + the roup number is 0,1 her is greater thar s! ! ! essfully entered !	Techno n Reset ear "transmission network add t is equivaler 0.0 the group ! ! AB CD 1	中文 中文 Module incation param n mode, the re fress of the see it to no groupi sing is valid !	Remote Security 199
0-ZG12	20A-Setting	-V1.1 → Configur- Configur- Commun point networf 12 27: rss: v See net ABC	atio Get N icat Set N K Function paran Stage Box: Set N Set Set N Set N	Icast to C Icast	Techno T	ator 「限企 Nodule cation param	Remote p	EIBO-ZG	COM69 115200 n param Fit parameter Coordinator Joined nwk di FF FF 0000000 coup Broac on MAC a 0 00000 etwc4208 Net Adc nd: t Opu	Configurat Configurat Communic communic communic communic will re with trans ddr: 00 states are serve en net	io Get N at Set N Function para age Box: "on - demand ceive the valid the network of a the group num Param Success for status s	the sector of the sector	rechnick rechnick	中文 中文 Module n mode, the re ress of the set at to no group ing is valid.! EF 01 23 45 6	Remu Remu nding n ng. ? ? ? 89

7.3.1.2 Unicast in long address form between end-device and coordinator

(1) Before communication, enter the configuration mode first, configure the target MAC address. The coordinator end configures the target MAC address as the long MAC address of the end-device, and the end-device end configures the target MAC address as the long MAC address of the coordinator.

E180-ZG120A-Setting-V1.1				00		E180-ZG	120A-Settin	g-V1.1			-3	
		5特电	子科技 ronic Techr	有限化	、 Ltd.)))®	<mark>成都亿</mark>	乙佰特电 Ebyte Elect	上子科技 tronic Tech	有限之	入 J.,Ltd.
Close Port COM6 🗸 Cont	iguratio	Get Nwk	Param Reset	中文	Show	Close Port	COM6 V	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate: 115200 🗸 Com	municat	Set Nwk	Clear	Module		Baud rate:	115200 ~	Communica	t Set Nwk	Clear	Module	
Parent nod (00 00 Parent nod (00 00 7E 05 28 FE FF CC CC C Point√ Group Broad Destination MAC addr: FF FF FF FF FF FF FF Target netwo(0 €)ss: Trans Net Addre: ∨ Net command:	Sending area	x. 90 AB CD EF 1s successfully e	entered!!! 7F 7C	78	.~	Parasmission Device typ Network Parent nod 7E 05 28 FE Point / Gr Destinatic 7E 05 28 FI Target ne Trans	parameter eminal oined nwk (00 00 FF CC CC CC up Broad n MAC addc FF CC CC CC twc0 \$	Messa FD 1A FO 4 FO 4 Write F FA FE In the ' will rec Write F Ss: FA FE Sendir	ge Box: FE 01 0C 97 01 15 0 IS 05 A8 8A FF aram Success! ! ! aram success! ! ! aram Success! ! ! FE 01 0C 97 01 15 0 IS 05 A8 8A FF aram Success! ! !	0 09 3C 00 00 01 7E address ⁻ transmission acket + the MAC addr 0 09 3C 00 00 01 7E	05 28 FE FF CC mode, the receiv ess of the sendin 05 28 FE FF CC	CC CC 02 A ving node Ig node. CC CC 03
New net Open net	ABCDEF0123	3456789				New net	Open	net ABCDE	F0123456789			
Leave net	Clear	Send	Hex Send I	lex Display nd	bytes:37 ytes:136	Leave net		Cle	ar Send	Hex Send	Hex Display nd	bytes:108 sytes:197

(2) After the target MAC address is configured, the transmission mode needs to be configured. Change the "network address (short address)" to "MAC address", and then write the parameters again. At this time, the target address is configured to unicast in the form of MAC address.

E180-ZG120A-Sett	E180-ZG120A-Setting-V1.1					< E180-ZG	120A-Setti	ing-V1.1					
	成都亿 Chengdu E	佰特电 byte Elect	子科技 ronic Techr	は有限公司 hnology Co.,Ltd. ((い)) の 成都亿佰特电子科技 EBYTE Chengdu Ebyte Electronic Tec								有限2 nology Co	入司 o.,Ltd.
Close Port COM69	 Configuratio 	Get Nwk	Param Reset	中文	Show	Close Port	COM6	Cor	figuratio	Get Nwk	Param Reset	中文	Show
Baud rate: 115200	 Communicat 	Set Nwk	Clear	Module		Baud rate:	115200	Con	nmunicat	Set Nwk	Clear	Module	
Communication parameter Teranemission parameter Device typeCoordinator Network Joined mwk Parent nod{FF FF 00 00 00 00 00 00 00 00 00 PointJ Group Broad Destination MAC a 22 ED 0B DE DA 3A FI Target netw(A208 Trans MAC Ac	Nessage In multica roade) will Friter con Read Par NAC add Friter con Read Par Na Par	Exe: trode, all nodes receive multicast ease of the sending iguration state suc am Success! ! ! -demand + MAC ; the valid data pa network group number is g im Success! ! !	in the same network ; lata in the 'on - dema ving node will receive node. .ccessfully ! ! ! address" transmission cket + the MAC addr mber is 0, it is equival mber is 0, it is equival	group number(ex nd + MAC addre the valid data p mode, the receir ess of the sendir ent to no groupi uping is valid. !	cept sleep ss ² aacket + the ving node ng node. ng.	Transmission Transmission Device typ Network Parent noc 7E 05 28 FE Point √ Gr Destinativ 7E 05 28 F Target no Trans	In parameter Terminal Joined nwk (00 00 EFF CC CC CC oup Broad on MAC ar EFF CC CC etwq0 MAC Ac	cc ddr: CC ≑}ss: Idn ∨	Message FD 00 121 2A 2D 2E Enter conf 7A 7D 7E FE 2F FE Read Parc FB FE 03 CC CC CC 05 A8 8A	FF iguration state suc FF im Success! ! ! D2 0C 97 A2 08 22 05 15 00 09 3C 0	ccessfully ! ! ! 2 ED 08 DE DA 3A FI 0 00 01 7E 05 28 FE	E 48 00 00 7E 0	5 28 FE FF 3 00 FF 05
New net Ope	en net 12345678 chLink Clear	90ABCDEF Send	Hex Send I	Hex Display nd	bytes:44	New net	t Ope	en net	ABCDEF0	123456789	Hex Send	Hex Display nd	bytes:171

(3) After completing the above parameter configuration, click to enter the transmission mode, communicate in the transmission mode.

7.3.2 Multicast testing

(1) For example, if the end-device device is the receiving end, click "enter configuration mode", modify the network group number to "5", and then write the parameters. The message box will prompt "write parameters successfully". At this time, group ID 5 is assigned to the end-device.

Close Port	соме 🗸	Configuratio	Get N	vk	Param Reset	中文	Show	
Baud rate:	115200 🖂	Communicat	Set Nv	vk	Clear	Module		
Communication	ameters	point network Fur	nction param	Fun	ction param Commu Message Box:	inication param	Remote n.	•
Node PAN ID:	Terminal ~ C97	 ← Transmit 	0.0	÷	2A 2D 2E		^	
Baud	115200bps	~ Net	5	\$	7A 7D 7E	i state successi	ully: : :	
0.1.1	Turner	Sleep	60	•	FE 2F FE FF	aee I I I		
Parent noc	de 5	Max num	n of 5 A884	•	FB FE 03 02 0C 9 3A FE 48 00 00 78 15 00 09 3C 00 00 CC 03 00 FF 05 05	7 A2 08 22 ED 0 E 05 28 FE FF C 01 7E 05 28 F A8 8A	DB DE DA CC CC CC 01 E FF CC CC	
Module addr	ess param t A208				FD 1A FE 01 0C 9 7E 05 28 FE FF C0 8A FF Write Param Succ FA FE	7 05 15 00 09 3 C CC CC 03 00 1 ess! ! !	3C 00 00 01 FF 05 05 A8	

(2) For example, if the coordinator is the sender, click "enter configuration mode" to enter the fixed-point networking, select the multicast mode, and the message box will prompt "under multicast mode, all nodes with the same group number in the network will receive multicast data", modify the target group number to "5", and then write the parameter, and the message box will prompt "write the parameter successfully".

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((() EB)))) (TE	成都亿 Chengdu El	佰特电	<mark>子科技</mark>	有限化	入司 Ltd.
Close Port	COM69 🗸	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate:	115200 🔍	Communicat	Set Nwk	Clear	Module	
Transmission Device typ Network Parent noc 00 00 00 00 Point Gran Target g	n parameter Coordinator Joined nwk 4(FF FF 00 00 00 00 pup√ Broad rc5 (((•)))) [®]	Message Transfer at Forter content Read Para In multicas node) will n When the When the When the Enter confil Enter confil Forter confil Forte	Box: atus successfully guration state suu m Success! ! ! t mode, all nodes eceive multicast co eceive multicast co group number is g m Success! ! ! iguration state suc m Success! ! ! atus successfully	entered ! ! ! AB CC coessfully ! ! in the same network of lata. mber is 0, it is equival meter than 0, the gro coessfully ! ! entered ! !	D EF 01 23 45 67 group number(ex ent to no groupin uping is valid.!	789 cept sleep ng. !!
Net comman	nd:	Sending a	rea:			
New net	: Open	net 12345678	90ABCDEF			
Leave ne	t Touchl	Link Clear	Send	Hex Send Hex Send Hex Send	Hex Display nd	bytes:156 oytes:202

(3) Enter the transmission mode, the message box will prompt "enter the transmission mode successfully", and then carry out multicast data communication.

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))) ®	成都亿 Chengdu E	佰特电 byte Elect	子科技 tronic Tech	有限/	公司 o.,Ltd.))) ®	<mark>成都亿</mark>	<mark>佰特电</mark> byte Elect	I子科技 tronic Tech	有限之	、司 .,Ltd.
Close Port	COM6 🗸	Configuratio	Get Nwk	Param Reset	中文	Show	Close Port	COM69 🗸	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate:	115200 🖂	Communicat	Set Nwk	Clear	Module		Baud rate:	115200 🗸	Communicat	Set Nwk	Clear	Module	
Transmission Device typ Network Parent nod 7E 05 28 FE Point√ Gn Destinatic 7E 05 28 FI Target ne Trans	parameter cerminal coined nwk {00 00 FF CC CC CC coup Broad con MAC addin E FF CC CC CC etwold MAC Addin MAC Addin	Message FA FE In the 'on will receive PD 1A FE PD 1A FE PD 1A FE PD 1A FE PD 1A FE PD 1A FE PD 12 F2 C2B FA FE EF 12 34 56 T	- demand + MAC = the valid data pa 01 OC 97 01 15 0 15 A8 8A FF im Success! ! ! tatus successfully 78 90 AB CD EF	address" transmission acket + the MAC addr 0 09 3C 00 00 01 7E entered! ! ! 7F 7C	mode, the rece ess of the send 05 28 FE FF CC 7B 12 34 56 70	iving node ing node. : CC CC 03 8 90 AB CD	Transmission Device typ Network Parent noc 00 00 00 00 Point Gro Target g	a parameter Coordinator Joined nwk J{FF FF 00 00 00 00 Dup√ Broad rc5 [(((•)))) BYTE	Message Transfer Enter con Read Par In mutics When the Write Par Enter con Read Par Transfer S	Tatus successfully figuration state su am Successfully at mode, all nodes receive multicast group number is g am Successfully figuration state su am Successfully	entered ! ! AB CI cocessfully ! ! in the same network data. greater than 0, it is equival greater than 0, the gro ! cocessfully ! ! entered ! !	D EF 01 23 45 67 group number(ex lent to no groupin uping is valid.	Remote Nr.
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New net	Open i	Clear	123456789	Hex Send V	Hex Display no	bytes:160 bytes:275	New net	t Open t Touch	Link Clear	Send	Hex Send 🗹	Hex Display nd	bytes:164 ytes:202

(4) The end-device receiver enters the configuration mode, changes the network group number to "4", and writes the parameter. At this time, because the network group number is not "5", the coordinator multicast data cannot be received.

E180-ZG120A-Setting	I-V1.1		- Killer E180-ZG120A-Setting-V1.1								1	
(((;))) [®] EBYTE	<mark>成都亿</mark> Chengdu E	佰特电 byte Electr	子科技 ronic Techr	有限/	<mark>公司</mark> h.,Ltd.			<mark>成都亿</mark> Chengdu E	佰特电 byte Elect	日子科技 tronic Tech	有限/	<mark>入司</mark> Ltd.
Close Port COM6 🗸	Configuratio	Get Nwk	Param Reset	中文	Show	Close Port	COM69	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate: 115200 😔	Communicat	Set Nwk	Clear	Module		Baud rate:	115200	Communicat	Set Nwk	Clear	Module	
Network parameters Node Terminal PAN ID: C97 Baud 115200bps Output Transparent	int network Fur int network Fur Transmit Transmit Net Sleep output	ation param Fun 21 ↓ 0.0 ↓ 4 ↓ 60 ↓ ✓	Message Box: FD 1A FE 01 0C 9 7E 05 28 FE FF C 8A FF Write Param Succ FA FE 2A 2D 2E	77 04 15 00 09 3 C CC CC 03 00 1	IC 00 00 01 FF 05 05 A8	Communication Transmission Device type Network Parent noc 00 00 00 00 Point Gro Target g	a param rive a parameter Coordinator Joined nwk I√FF FF 00	Message Enter cor Read Par In multica node) will When the When the When the	Box: Box: figuration state su am Success ! ! st mode, all nodes receive multicast e network group nu- group number is g am Success ! !	ccessfully! ! ! in the same network data. ymber is 0, it is equiva greater than 0, the gro	group number(ex lent to no groupi uping is valid.!	Cept sleep
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7.3.3 Broadcast test

(1) For example, when the coordinator broadcasts, click "enter configuration mode", enter fixed-point networking, select broadcast mode, and then write parameters. The message box prompts "write parameters successfully"

Baud rate: 11520 Communication parame Device typ Coordina Network Joined m Parent nod (FF FF 00 00 00 00 00 00 00 Point Group Br	Fixed po eter ator nwk	Communicat pint network Fun Message I Enter confi Read Para Transfer st network wi Enter confi	Set Nwk Iction param Fur Box: iguration state suc m Success!!! atus successfully Il receive broadca	Clear nction param Comm ccessfully!!!! entered!!!! In bro st data	Module unication param adcast mode, all	Remote n.
Communication param Transmission parame Device typ Coordina Network Joined m Parent nod FF FF 00 00 00 00 00 00 Point Group Br	Fixed po leter ator nwk : 00 00	A contraction of the second se	iction param Fur Box: iguration state suc m Success!!! atus successfully ill receive broadca	nction param Comm ccessfully!!! ! entered!!!!n bro ast data	unication param	Remote n
	3road√))))®	Read Para In broadca When the When the Write Para	m Success!!! st mode, all node network group nu group number is g m Success!!!	s in the network will n imber is 0, it is equiva greater than 0, the gro	eceive broadcast lent to no groupin puping is valid. !	: data. ng. ! !
Net command:		Sending a	rea:			

(2) Enter the transmission mode, the message box will prompt "enter the transmission mode successfully", and then broadcast data communication, at this time, all nodes in the network will receive data, including the sending node

E180-ZG120	E180-ZG120A-Setting-V1.1 –						× 🔢 E180-ZG120A-Setting-V1.1						
	(((;))) [®] 成都亿佰特电子科技有限公 Chengdu Ebyte Electronic Technology Co.							tronic Techr	有限公司 Inology Co.,Ltd.				
Close Port	DM69 😔	Configuratio	Get Nwk	Param Reset	中文	Show	Close Port	COM6	Configuratio	Get Nwk	Param Reset	中文	Show
Baud rate: 11	15200 🔍	Communicat	Set Nwk	Clear	Module		Baud rate:	115200 🕓	Communicat	Set Nwk	Clear	Module	
Transmission par Device typ Coort Network Joine Parent nod/FF 00 00 00 00 00 00 Point Group	ameter dinator Ed nwk FF 30 00 00 Broad / (()))) ((() () () () () () (Message Enter com Read Para Transfer 3 retwork w Enter com Read Para In broadca When the When the When the When the When the So a but	Box: iguration state sus am Success! ! ! ill receive broadca iguration state sus am Success! ! ! ast mode, all node network group number is g im Success! ! ! tatus successfully AB CD EF 12 34 5	entered! ! ! In brootst data set data ccessfully ! ! ! s in the network will re- mber is 0, t is equival meter than 0, the gro entered ! ! ! 12 34 6 78 90 AB CD EF	adcast mode, al eceive broadcas lent to no groupi uping is valid. 56 78 90 AB CI	I nodes in the at data. ing. D EF 12 34	Transmission p Device typ Te Network Jo Parent nod 7E 05 28 FE F Point./ Grou Destination 7E 05 28 FE Target net Trans	parameter eminal 00 00 FF CC CC CC up Broad n MAC add FF CC CC CC wr{0 € MAC Add	Message EF 12 34 56 12	Box: 78 90 AB CD EF 78 90 AB CD EF			
Net command:	-	Sending a	IREA:				- Nave committed		ABCDEF)123456789			
New net	Open r TouchL	ink Clear	Send	Hex Send I I	Hex Display nd	bytes:232 bytes:288	Leave net		Clear	Send	Hex Send /	lex Display nd	bytes:160 pytes:331

8. Secondary development design reference

8.1 Mechanical dimensions and pin definitions



Weight : 0.9±0.1g Pad quantity : 37 Unit : mm

Pin No.	Pin name	Pin direction	Description
1	ANT	Input/Output	Antenna
2	GND	Input/Output	Ground, connecting to power source referential ground
3	PD13	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
4	PD14	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
5	PA0(TX)	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
6	PA1(RX)	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
7	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
8	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
9	PD15	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
10	PB11	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
11	PB12	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
12	PB13	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
13	VCC	Input	

14	GND	Input/Output	Ground, connecting to power source referential ground
15	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
16	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
17	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
18	PC10	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
19	PF2	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
20	NC	Input/Output	Ground, connecting to power source referential ground
21	PC11	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
22	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
23	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
24	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
25	CWCL V	It/Ortract	DBG_SWCLKTCK, configurable general IO port (See EFR32MG1
23	SWCLK	Input/Output	datasheet)
26	SWDIO	Input/Output	DBG_SWDIOTMS, configurable general IO port (See EFR32MG1
20	50010	input/Output	datasheet)
27	PB14	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
28	PB15	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
29	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
30	PF3	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
31	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
32	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
33	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
34	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
35	NC	Input/Output	Configurable general IO port (See EFR32MG1 datasheet)
36	GND	Input/Output	Ground, connecting to power source referential ground
37	nRESET	Input	Reset pin

8.2 Schematic design



8.3 Development

No	Keyword			Note	
1	Burning program	The module is S We provide den change and imp	GOC module with GPIO port. J-link no program for users' reference. Use lement their own functions based o Program downlo Pin VCC PF0 PF1 GND	Downloader is used for programming deers can download our compiled hex files n the original code. Dad interface definition J-LINK Interface VCC SWCLK SWDIO GND	lownload. directly, or
2	Test board	There is no test	board yet		

8.4 Hardware design

- It is recommended to use a DC stabilized power supply. The power supply ripple factor is as small as possible, and the module needs to be reliably grounded.
- Please pay attention to the correct connection of the positive and negative poles of the power supply.

- Reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure it is within the recommended voltage otherwise when it exceeds the maximum value the module will be permanently damaged;
- Please check the stability of the power supply, the voltage cannot be fluctuated frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, so the whole machine is beneficial for long-term stable operation.
- The module should be as far away as possible from the power supply, transformers, high-frequency wiring and other parts with large electromagnetic interference
- High-frequency digital routing, high-frequency analog routing, and power routing must be avoided under the module. If it is necessary to pass through the module, assume that the module is soldered to the Top Layer, and the copper is spread on the Top Layer of the module contact part(well grounded), it must be close to the digital part of the module and routed in the Bottom Layer;
- Assuming the module is soldered or placed over the Top Layer, it is wrong to randomly route over the Bottom Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees;
- It is assumed that there are devices with large electromagnetic interference around the module that will greatly affect the performance. It is recommended to keep them away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;
- Assume that there are traces with large electromagnetic interference (high-frequency digital, high-frequency analog, power traces) around the module that will greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference

If necessary, appropriate isolation and shielding can be done.

- If the communication line uses a 5V level, a 1k-5.1k resistor must be connected in series (not recommended, there is still a risk of damage);
- Try to stay away from some physical layers such as TTL protocol at 2.4GHz, for example: USB3.0;
- The mounting structure of antenna has a great influence on the performance of the module. It is necessary to ensure that the antenna is exposed, preferably vertically upward. When the module is mounted inside the case, use a good antenna extension cable to extend the antenna to the outside;
- The antenna must not be installed inside the metal case, which will cause the transmission distance to be greatly weakened.

8.5 Software Programming

- The core of the module is EFR32, the module's driving mode is exactly the same as EFR32. Users can operate according to with the EFR32 chip manual (see the EFR32 manual for more details).
- Burning program: The module is SOC module, with GPIO port. J-link Downloader is used for programming download.
- Program download interface definition:

Pin	J-LINK interface	
VCC	VCC	
PF0	SWCLK	
PF1	SWDIO	
GND	GND	

9.FAQ

9.1 Communication range is too short

- The communication distance will be affected when obstacle exists.
- Data lose rate will be affected by temperature, humidity and co-channel interference.
- The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground.
- Sea water has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea.
- The signal will be affected when the antenna is near metal object or put in a metal case.
- Power register was set incorrectly, air data rate is set as too high (the higher the air data rate, the shorter the distance).
- The power supply low voltage under room temperature is lower than 2.5V, the lower the voltage, the lower the transmitting power.
- Due to antenna quality or poor matching between antenna and module.

9.2 Module is easy to damage

- Please check the power supply source, ensure it is 2.0V~3.6V, voltage higher than 3.6V will damage the module.
- Please check the stability of power source, the voltage cannot fluctuate too much.
- Please make sure antistatic measure are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range, some parts are sensitive to humidity.
- Please avoid using modules under too high or too low temperature.

9.3 Bit error rate is too high

- There are co-channel signal interference nearby, please be away from interference sources or modify frequency and channel to avoid interference;
- Poor power supply may cause messy code. Make sure that the power supply is reliable.
- The extension line and feeder quality are poor or too long, so the bit error rate is high;

Revision history

Version	Date	Description	Issued by
1.0	-	Initial version	huaa
1.2	2019-9-2	Content modification	Lyl
1.4	2020-05-29	8.1 change of Pin 12 from PA1 to PB14	du

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