Wireless Wearable Presence Tag with Emergency Button and Inactivity Detection

Z309
User Manual

Table of Contents

1. Introduction

Netvox Z309, an emergency button, acts as an End Device in ZigBee network. It does not perform permit-join function as a coordinator or a router for other devices to join the network. Users could simply push the button when asking for urgent assistance. Z309 will notify the central security unit, CIE (Control and Indicating Equipment) device, to send commands to a Warning Device to trigger alarm sound or lighting alert for immediate help.

At the same time, Z309 is equipped with a vibration sensor for inactivity detection.

When the device has not detected the active state for more than the set time, it will report an inactivity detection alarm.

What is ZigBee?

ZigBee is a short range wireless transmission technology based on IEEE802.15.4 standard and supports multiple network topologies such as point-to-point, point-to-multipoint, and mesh networks. It is defined for a general-purpose, cost-effective, low-power-consumption, low-data-rate, and easy-to-install wireless solution for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation and home automation, etc.

2. Product Appearance

Watch strap style

Key chain/ pendant style

3. Specification

- Fully IEEE 802.15.4 compliant
- Utilizes 2.4GHz ISM band; up to 16 channels
- Power supply: 2 x CR2032 button battery
- The wireless communication distance is 210 meters (depending on the specific environment)
- Easy installation and configuration

4. Setting up Z309

4-1 Power On

1. Open the battery back cover
2. Take two CR2032 button batteries, with the negative electrode toward the circuit board and the positive electrode toward the battery spring piece, and put them into the battery holder
3. Cover the back cover and lock the screws
4. Long press the emergency button emergency button for about 3-5 seconds, and the LED lights will flash once, indicating that the power on is successful

4-2 Turn On/Turn Off

To manually turn on or turn off Z309, please use the following instructions:

Turn it on: Press and hold the emergency button for 3 seconds.

The indicators will flash once, and the device is ready to be used.

When Z309 is in a ZigBee network → the indicator will flash green 5 times.

Turn it off: Long press the emergency button for 6 seconds (the red indicator will flash once after 6 seconds, and release it when the red indicator starts to flash).

The red indicator will flash 10 times for 5 seconds. If you press the emergency button again within 5 seconds, Z309 will shut down and the red indicator will be extinguished immediately.

If the emergency button is not pressed for confirmation within 5 seconds, the red indicator

will go off after 5 seconds, and Z309 will remain in the working mode.

4-3 Join the ZigBee Network

After Z309 is turned on, it will search for an existing ZigBee network and send a request to join the network automatically. While Z309 is under the coverage from a coordinator or a router whose permit-join feature is enabled, Z309 will be permitted to join the network.

Step1. Enable the permit-join function (valid for 60 seconds) of a coordinator or a router.

Step2. After long pressing the emergency button for 3 seconds to enter the power on state, it will actively search for the network and ask to join the network of its channel After long pressing the emergency button for 3 seconds to enter the power on state, it will actively search for the network and ask to join the network of its channel

Step3. If the network is successfully added, the green indicator flashes for 5 times, otherwise the indicator does not act. If the network time exceeds 3 minutes, the device will shut down automatically; If you want to request for additional screening, just press and hold the emergency button for 3 seconds again.

Note:

After joining a network, Z309 would try to enroll in the ZigBee security system. Please make sure Z309 and CIE (Control and Indicating Equipment) device have enough power.

4-4 Enroll in the ZigBee Security System

Z309 is a Zone device in the ZigBee security system. Right after Z309 join the ZigBee network, it will automatically find out a CIE (Control and Indicating Equipment) device and send a registration request to the CIE device to enroll in the security system. The enrollment has these 3 situations:

A. There is no CIE device or no compatible CIE device in the network
   → the indicator flashes red twice.

B. There is a compatible CIE device in the network, but it is failed to enroll
   → the indicator flashes red 4 times. Users can reboot Z309 to initiate the registration.

C. The enrollment is completed → the indicator flashes red 6 times.

Note:

Users had better NOT enroll multiple Zone devices at the same time to prevent registration failure.

4-5 Trigger

The Zone Type of Z309 is Key fob, and the value is 0x0115.

In the alarm command sent by Z309, the Alarm2 bit of Zone status is 1.

After the registration is successful, press the emergency button for a short time, and Z309 sends an alarm command through ZigBee wireless network to trigger the registered CIE

(If there is a cluster ID: 0x0500 bound to the device, it will also be sent to the bound device).

CIE will control the alarm device to send an emergency alarm sound for alarm.

If the Z309 has not been registered successfully when the emergency button is pressed for a short time, the registration will start at this time. When the registration is successful, the alarm command will be issued immediately.

The format of ZoneStastChange command is as follows:

The command is 0x00. The command format is:

Bits:8	8	8	var	
Frame control	Transaction Sequence number	Command identifier	Frame payload	
			16-Bit Enumeration	8-Bit Enumeration
0x09		0x00	ZoneStatus	ExtendedStatus

(Clusterid: 0x0500)

Values of the ZoneStauts payload

ZoneStatus Attribute Bit Number	Meaning	Values
0	Alarm1	1 – opened or alarmed 0 – closed or not alarmed
1	Alarm2	1 – opened or alarmed 0 – closed or not alarmed
2	Tamper	1 – Tampered 0 – Not tampered
3	Battery	1 – Low battery 0 – Battery OK
4	Supervision reports	1 – Reports 0 – Does not report
5	Restore reports	1 – Reports restore 0 – Does not report restore
6	Trouble	1 – Trouble/Failure 0 – OK
7	AC (mains)	1 – AC/Mains fault 0 – AC/Mains OK
8-15	Reserved	

Values of the ExtendedStatus payload

ExtendedStatus Attribute Bit Number	Meaning	Values
0-6	ZoneID	
7	ZoneStatusChange Or Heartbeat	1 – HeartBeat 0 – ZoneStatusChange

4-6 Simple Positioning

Z309 has a simple positioning function, that is, it reports the routing devices near the device to the target device bound with cluster ID: 0xFE60.

After the registration is successful, press the emergency button for a short time, and Z309 sends an alarm command through ZigBee wireless network to trigger the registered CIE (if there is a cluster ID: 0x0500 bound to the device, it will also be sent to the bound device). CIE will control the alarm device

to send an emergency alarm sound for alarm. At the same time, the RSSI value of the nearby routing device is reported to the binding device through the user-defined command (see the following user-defined command format).

If Z309 fails to register when the emergency button is pressed for a short time, it will start to register and report the RSSI value of the nearby routing device to the binding device.
Z309 reports the RSSI value of the nearby routing device to the binding device after performing simple positioning once in a 120s cycle by default.
The command format is 0x5F. The command format is:

Bits:8	16	8	8	var					
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Frame payload					
				Count	Nodeid	RSSI	…	Nodeid	RSSI
0x05	0x109F		0x5F	Byte	2byte	Signed			

(Clusterid：0x FE60)

4-7 Long-Time Inactivity Detection

Z309 series has a long-time inactivity detection function.
When the vibration sensor on Z309 detects an inactive state for more than the set time, it will report an inactivity detection alarm. (Default is 1 hour)
At the same time, Z309 supports the configuration of turning off the long-time inactivity detection alarm function during a specific time range, e.g. the sleeping hour. (Default is 00:00-06:00)

Configuring start hour and end hour to the same value can disable long-time inactivity detection function.
For example, when both the start hour and end hour are configured to be “00”, it means long-time inactivity detection function is disabled.
(Customers can choose whether this function is disabled by default or not)

Time Synchronization Request

The command is 0x99 (Z309 Coordinator)

The command format is

Bits:8	16	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier
0x0D	0x109F		0x99

(Clusterid: 0xFE00)

Time Synchronization Response

The command is 0x99 (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8	8	8	8	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Year	Month	Day	Hour	Minute	Second
0x15	0x109F		0x99						

(Clusterid: 0xFE00)

Year – byte – 0x16 (22)

Month – byte – 0x0C (12)

Day – byte – 0x15 (21)

Hour – byte – 0x0E (14)

Minute – byte – 0x1E (30)

Second – byte – 0x00 (00)

Represent: 2022-12-21 14:30:00

Set Interval Time of Stopping Inactivity-Detection Request

The command is 0x9A (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8	8
Frame control	Manufacturer code	Transaction Sequence	Command identifier	Start Hour	End Hour

		number			
0x15	0x109F		0x9A		

(Clusterid: 0xFE00)

Start Hour – byte – 0x16 (22)

End Hour – byte –0x05 (05)

Represent: 22:00-05:00

Set Interval Time of Stopping Inactivity-Detection Response

The command is 0x9A (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Status
0x1D	0x109F		0x9A	

(Clusterid: 0xFE00)

Status – byte – 0x00_ Success 0x01_Failure

Get Interval Time of Stopping Inactivity-Detection Request

The command is 0x9B (Z309 Coordinator)

The command format is

Bits:8	16	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier
0x15	0x109F		0x9B

(Clusterid: 0xFE00)

Get Interval Time of Stopping Inactivity-Detection Response

The command is 0x9B (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Start Hour	End Hour
0x1D	0x109F		0x9B		

(Clusterid: 0xFE00)

Start Hour – byte – 0x16 (22)

End Hour – byte – 0x05 (05)

Represent: 22:00-05:00

Set Inactivity Period Request

The command is 0x9C (Z309 Coordinator)

The command format is

Bits:8	16	8	8	16
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	No Active Alarm Time
0x15	0x109F		0x9C	

(Clusterid: 0xFE00)

NoActiveTime – 2bytes – 0x3C (60)

Represent: 60mins

Set Inactivity Period Response

The command is 0x9C (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Status
0x1D	0x109F		0x9C	

(Clusterid: 0xFE00)

Status – byte – 0x00_ Success 0x01_Failure

Get Inactivity Period Request

The command is 0x9D (Z309 Coordinator)

The command format is

Bits:8	16	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier
0x15	0x109F		0x9D

(Clusterid: 0xFE00)

Get Inactivity Period Response

The command is 0x9D (Z309 Coordinator)

The command format is

Bits:8	16	8	8	16
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	NoActive AlarmTime
0x1D	0x109F		0x9C	

(Clusterid: 0xFE00)

NoActiveTime – 2bytes – 0x3C (60)
Represent: 60mins

Get the Current Time Request

The command is 0x9F (Z309 Coordinator)

The command format is

Bits:8	16	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier

0x15	0x109F		0x9F

(Clusterid: 0xFE00)

Get the Current Time Response

The command is 0x9F (Z309 Coordinator)

The command format is

Bits:8	16	8	8	8	8	8	8	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier	Year	Month	Day	Hour	Minute	Second
0x1D	0x109F		0x9F						

(Clusterid: 0xFE00)

Year – byte – 0x16 (22)

Month – byte – 0x0C (12)

Day – byte – 0x15 (21)

Hour – byte – 0x0E (14)

Minute – byte – 0x1E (30)

Second – byte – 0x00 (00)

Represent: 2022-12-21 14:30:00

Inactivity Alarm

The command is 0x9E (Z309 Coordinator)

The command format is

Bits:8	16	8	8
Frame control	Manufacturer code	Transaction Sequence number	Command identifier
0x0D	0x109F		0x9E

(Clusterid: 0xFE00)

4-8 Product Active Status

In order to save power, this product is generally in sleep state. If you need to obtain its data and properties or set them, please follow the following operations to make it enter active state.

Operation method:
Press and hold the alarm button for 3 seconds, and the red indicator flashes once. At this time, release the button. If the device is still in the network state, the green indicator flashes 5 times, and an announcement broadcast is sent to notify the products in the network of their IEEE address and network address. Within the next 2 minutes, the product is activated and can communicate with it; If not, try to search for available networks

4-9 Restore to Factory Setting

The Z309 has the function of saving data in case of power failure. Once it cannot be associated with its registered device or a new Zigbee network is to be added, the following operations need to be performed first to restore the saved data to the factory value.

Step1. Press and hold the Panic Button or 15 seconds.

Step2. Release the button after the indicator shows fast red flashes to complete the restore.

Step 3. After the red indicator flashes 10 times, the device enters the shutdown state and the red indicator goes out.

4-10 Read Battery Voltage

The battery voltage attribute (ID: 0x0020) of the Power configuration cluster (ID: 0x0001) indicates the current battery voltage. Users can read this attribute to know the current battery voltage, or configure it to send battery voltage data to the binding device regularly.

4-11 Low Battery

The working voltage of Z309 is 2.3-3.3V. When it is detected that the battery voltage is lower than 2.3V, the red indicator flashes once; At the same time, the state change of the voltage from normal to low voltage is sent to the registered CIE.

4-12 Heartbeat

Heartbeat function, that is, the function of sending the current Zone status regularly. After the product is successfully registered in CIE, it will set the CIE and heartbeat cycle of Zone at regular intervals.

Set the CIE and heartbeat cycle of Zone", the initial value is 2 minutes (the default time of heartbeat can be specified during production) to send the current status of the product—with the heart beat function, with the function of automatic alarm cancellation, whether a low voltage alarm occurs, and whether it is in an alarm state—to its registered CIE.

4-13 Specify the Functions of the CIE

No matter whether the current Z309 has been registered on a CIE or not, other devices can send an over the air command to the IAS of the product_ CIE_ Address attribute is set to a specified IEEE address, so as to restart the matching and registration process and register Z309 to the specified CIE.

(1) If Z309 has been registered on a CIE at this time, and the specified CIE is exactly this CIE, the red Z309 will send the unenroll command to the CIE when the registration is successful, delete its own information from the CIE, and the red indicator will flash 6 times to indicate success.

(2) If Z309 is not registered on a CIE at this time, the action of the designated CIE is to start the matching and registration process. The prompt of success is the same as point 4.

4-14 Indication of Remaining Battery Power

In the zone status change notification alarm command sent by Z309 to CIE, the percentage value of remaining battery power is put in the high byte of zone status, and CIE can know the battery power of Z309 after receiving it.

4-15 Sleeping Mode

1. After the device joins the network, the device enters the sleep mode with a sleep cycle of 5 minutes.
2. After the device joins the network, if the device is disconnected from the network, the device enters the sleep mode with a sleep cycle of 5min. Every time the device wakes up from sleep, it tries to find the original network.

Note:

In order to save power, it is recommended to shut down the device if it is in case 2.

4-16 Home Automation Clusters for Z309

1. End Point(s): 0x01:
2. Device ID：IAS Zone0x0402 ）
3. EndPoint Cluster ID

Cluster ID for Z309	
Server side	Client side
EP 0x01 (Device ID: IAS Zone(0x0402))	
Basic(0x0000)	None
Power configuration (0x0001)	
Identify (0x0003)	
IAS zone (0x0500)	
Commissioning (0x0015)	
Poll Control (0x0020)	
Diagnostics (0x0B05)	

4. The attributes supported by each cluster ID

(1) Attributes of the Basic Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0000	*ZCLVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x03	M
0x0001	*Application Version*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x0A	O
0x0002	*StackVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x38	O
0x0003	*HWVersion*	Unsigned 8-bit integer	0x00 – 0xff	Read only	0x01	O
0x0004	*Manufacturer Name*	Character string	0 – 32 bytes	Read only	netvox	O
0x0005	*ModelIdentifier*	Character string	0 – 32 bytes	Read only	Z309E3ED	O
0x0006	*DateCode*	Character string	0 – 16 bytes	Read only	20220718	O
0x0007	*PowerSource*	8-bit Enumeration	0x00 – 0xff	Read only	0x03	M
0x0010	*Location Description*	Character string	0 – 16 bytes	Read/write		O
0x0011	*Physical Environment*	8-bit Enumeration	0x00 – 0xff	Read/write	0x00	O
0x0012	*DeviceEnabled*	Boolean	0x00 – 0x01	Read/write	0x01	M

(2) Attributes of the Power Configuration Information

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0020	*Battery voltage*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	--	O

Identifier	Name	Type	Range	Access	Default	Mandatory / Optional
0x0031	*BatterySize*	8-bit Enumeration	0x00 –0xff	Read / write	2	O
0x0033	*BatteryQuantity*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	2	O
0x0035	*BatteryAlarm Mask*	Bitmap (8-bits)	0000 000x	Read / write	0000 0000	O
0x0036	*BatteryVoltage MinThreshold*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	0x17	O
0x0037	*BatteryVoltage Threshold1*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	0x18	O
0x0038	*BatteryVoltage Threshold2*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	0x19	O
0x0039	*BatteryVoltage Threshold3*	Unsigned 8-bit integer	0x00 – 0xff	Read / write	0x1A	O
0x003e	*BatteryAlarm State*	32-bit Bitmap	0x00… x	Read	0x000… 0	O

4-17 Product Properties can be Described by Report

Cluster ID(0x0001):

The voltage attribute Battery voltage Attr uses the Attribute ID: 0x0020.

BatteryAlarmstate Attr uses attribute ID: 0x003E.

4-18 Offline Activation Trigger

After the device is disconnected, it will wake up every 5min to try to retrieve the network. If it needs to retrieve the network immediately without waiting for the 5min cycle time, it can immediately return to the network in the following two ways.

Manual activation:

Press and hold the emergency button for 3 seconds. Release the button when the indicator flashes red once. Then release the button, and the device will immediately try to retrieve the network.

Alarm triggering:

In the off network state, press the button briefly to trigger the alarm, and the device will immediately try to retrieve the network.

5. Important Maintenance Instructions

- Please keep the device in a dry place. Precipitation, humidity, and all types of liquids or moisture can contain minerals that corrode electronic circuits. In cases of accidental liquid spills to a device, please leave the device dry properly before storing or using.
- Do not use or store the device in dusty or dirty areas.
- Do not use or store the device in extremely hot temperatures. High temperatures may damage the device or battery.
- Do not use or store the device in extremely cold temperatures. When the device warms to its normal temperature, moisture can form inside the device and damage the device or battery.
- Do not drop, knock, or shake the device. Rough handling would break it.
- Do not use strong chemicals or washing to clean the device.
- Do not paint the device. Paint would cause improper operation.

Handle your device, battery, and accessories with care. The suggestions above help you keep your device operational. For damaged device, please contact the authorized service center in your area.

6. Description of Waterproof Grade

1: According to Enclosure Protection Class

This standard is equivalent to IEC 60529:2001 Degrees of Protection Provided by Enclosures (IP Code)

2: The test method of IP65 waterproof grade is: spray the device in all directions under 12.5L/min water flow for 3min, and the internal electronic function is normal.

The test method of IP67 waterproof grade is: the device is immersed in 1m deep water for 30min, and the internal electronic function is normal.

IP65, dust-proof and to prevent damage caused by water from nozzles in all directions from invading electrical appliances. It can be used in general indoor environment and sheltered outdoor environment. It is not suitable for use in environments with high water pressure, high temperature and high humidity, such as long time direct sunlight outdoors and possible direct exposure to rainstorm.