GSM Water Leak Detection Device

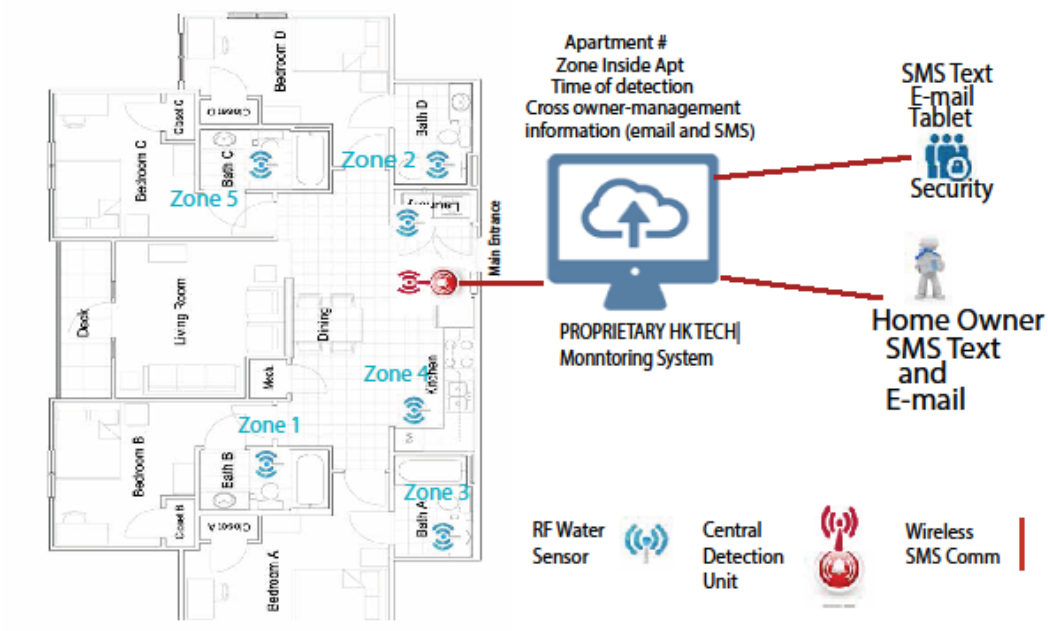
Panel Model Number: N4

Sensor Model Number: WS01

In this documentation it is a hardware description for N4 and WS01. Any people and any group do not copy this file without permission for business and technical reference.
2015-09-15

System Diagram

This system provide a “Early Water Leak Warning” Service. The below is system diagram. The water leak sensor (WS01) will inspect the water leak status in zones. When get a water leak action, WS01 will send a local alarm signal to the panel (N4) over local wireless ASK433, and N4 will send a SMS to monitor center with WS01 alarm message over GSM channel. At this time the monitor center will send a mail or SMS to home owner or water security server provider.

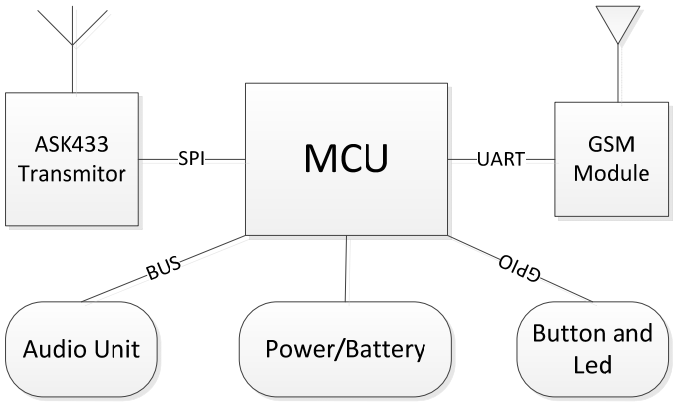


N4

Hardware Description

Item	Name	Part number	Spec	Appendix
1	MCU	GD32F103	8-bit Application Micro Processor Unit	
2	Memory		4K MCU built-in RAM	
3	Flash		128K MCU built-in Flash	
4	Audio	OAK-A10	Audio and ASK decode and encode chip, Sample frequency: 64K	
5	module	UC15A	WCDMA/GSM four frequency	
6	Battery	BT1000	3.7v/1000mAh Li-battery	
7	Local wireless	ASK-433	ASK mode/433MHz	
8	Module Antenna	WA-03	PCB Antenna	Average: 30dBm
9	ASK Antenna	AK-01	Spring Antenna/Cable Antenna	-110dBm
10	ASK distance		Unobstructed open area	150 Meters
11	Speaker	SP-03	Built-in Speaker/8oHm/1w	
12	Microphone	MP-02	Built-in Microphone	
13	Button		Service request button	
14	Led		Status led with two color	
15	Power	PW-02	+5V/500mA	
16	Static Current		<20mA	Sleep mode
17	Work current		<200mA	GSM Transmission
18	Temperature		Work temperature: -10~60 ℃	
19	Humidity		Work humidity: 15%~95%	

Architecture



N4 Picture

Status Description

Power On

N4 boot from flash. It will get the program from flash to memory, run timer , exception, GPIO, database table initial. And set power inspection, audio channel, ASK433 module channel and GSM module. Then MCU will send some commands to GSM module for GSM network register. When network register finished, the panel enter standby mode.

Standby mode

In this mode the panel power consumption is lower. MCU enter standby mode and waiting for some external trigger. The trigger is the below.

1. GSM command.
2. ASK433 message.
3. Button operation.

Led display

N4 have a dual-color led on the front panel, different color is different means.

1. Red on: Mobile network offline
2. Red off: Mobile network online
3. Green on: Arm
4. Green off: Disarm

Network Inspection

In zero o'clock the panel will send a SMS to identify the mobile network status every day. Use this function to make sure the panel is no problem and give SMS center a network status reference. The SMS like the below. This below SMS means GSM network is no disconnect exception in one day.
GSM / DISCONNECT / 0 TIMES

Parameter Setting

1. Monitor Center number setting
In this system only has one monitor center. All of SMS exchange via panel and monitor center over GSM channel. So in normal working mode the panel only storage one monitor center number in it. But for panel parameter setting a testing/setting number must join the panel firstly.
Setting a testing number using any mobile phone

Service Password	#2#	Testing Phone number

The service password is the panel service password. The initial is "888888".
Example: 888888#2#13522161431, this operation set the testing number 13522161431.
Setting a monitor center number using any mobile phone

Service Password	#1#	Testing Phone number

Example: 888888#2#13522161431, this operation set the monitor center number 13522161431.
Clear all number using any mobile phone

Service Password	#	

Example: 888888#, this operation clear all number in the panel include testing and monitor center number.
2. Sensor setting
1) Ensure the testing number or monitor center number is saved in the panel.
2) Using the testing phone or monitor center number send a sensor zone number (1,2,3,4,5,6,7,8,9), the panel receive this number and sound No.x sensor code is starting.
3) Push the water sensor back plane button to send a code to the panel. The panel will check this code. If the code is presence, the panel sound a tick "di" to tell the customer this code is duplicated. If the code is right, the panel will sound the sensor code.
4) If customer hear the sensor code voice, push the service button and hold 3 seconds, the customer will hear a code successful voice and the sensor code will be save.
5) When sensor code status, push the service button and release it immediately to force the panel exit the sensor code status.
6) When sensor code status, every sensor code time line is 120 second. If the time is up, the panel will exit the sensor code status automatically.

7) When a sensor code is successful, the panel will wait the next sensor code automatically until sensor code exit is reactive. When code sensor number is full (No.5), and finish No.5 sensor save operation and panel give a voice" coding end".

8) When exit the sensor code status, the panel will send a SMS message to mobile phone to identify this zone code result, like the below. The below SMS means zone 1 code five water sensors and every sensor code is in the list.

Zone 1:
1.903B
2.68BA
3.3345
4.B875
5.9D34

9) In power off status push the service button and hold, when power on until hear a "welcome" voice, the whole sensor code will be deleted.

3. Password setting

The panel built-in two password. One is Service password for the panel operation, another is super password for restore the service number by system administrator. If you are a system administrator, please contact the system provider for super password.

Restore the service password(Only for administrator use, the default is "9795", not change)

Super Password	#3#	Service Password

Example: 9795#3#9987, using this SMS command restore the service password 9987.

Change the service number using any mobile phone.

Old service Password	#0#	New Service Password

Example: 334576#0#998702, this operation change the service password from 334576 to 998702.

4. Fix disarm

When disaster on site and not fixed in two hours, the monitor center need force the panel to enter disarm status, the monitor center use SMS command "fixdisarm" for it. In this status the panel status will be hold until receive a "arm" command from monitor center and the panel enter into arm status.

5. Service Request

When housekeeping, the service people push the service button and force the panel to enter disarm status.

1) Push the button and hold 3 seconds and the panel enter into disarm status automatically.

2) In this status any mobile phone send "arm" command and force the panel to return arm status.

3) If no external command, the panel return arm status in 2 hours later.

SMS Command List

When a mobile phone send a wrong format SMS to the panel, the panel will give the phone a feedback "Command format error or unauthorized operation".

From any mobile phone to the panel

Item	SMS	ACK SMS
1	Password#0#	Password Update OK/Password Error
2	Password#1#	Monitoring Center Number set up/Password Error
3	Password#2#	Testing Number set up/Password Error
4	Password#	Number List Clear/Password Error
5	ARM/arm	Successful Arming
6	DISARM/disarm	SERVICE REQUEST

From monitor center to the panel

Item	SMS	ACK SMS
1	STATUS	ALL OK
2	Password#0#	Password Update OK/Password Error
3	Password#1#	Monitoring Center Number set up/Password Error
4	Password#2#	Testing Number set up/Password Error
5	Password#	Number List Clear/Password Error
6	ARM/arm	Successful Arming
7	DISARM/disarm	SERVICE REQUEST
8	1	Detectors (9) ZONE 1 set up
9	2	Detectors (9) ZONE 2 set up

10	3	Detectors (9) ZONE 3 set up
11	4	Detectors (9) ZONE 4 set up
12	5	Detectors (9) ZONE 5 set up
13	6	Detectors (9) ZONE 6 set up
14	7	Detectors (9) ZONE 7 set up
15	8	Detectors (9) ZONE 8 set up
16	9	Detectors (9) ZONE 9 set up
17	fixdisarm/FIXDISARM	Fixed disarm successfully
18	9795#3#	Customer password set up

From the panel to monitor center

Item	**SMS**	**ACK SMS**
1	Successful Arming	
2	SERVICE REQUEST	
3	Host terminal AC recover	
4	F2 wireless detector AC recover over F1 zone	
5	Host terminal AC dump.	
6	F2 wireless detector AC dump over F1 zone.	
7	ZONE F1 / WATER DETECTOR F2 / LOW BATTERY	
8	DEFAULT / SENSOR F2 ZONE F1	

9	Host terminal wrong password three times alarm.	
10	ZONE F1 / WATER F2 / ACTIVATED	
11	F2 wire detector in TF3 wiring terminal alarm over F1 zone	
12	Host terminal Zone inspection alarm	
13	Host terminal tamper alarm	
14	ZONE F1 / WATER DETECTOR / TAMPER	
15	CONTACT NOTIFICATION	

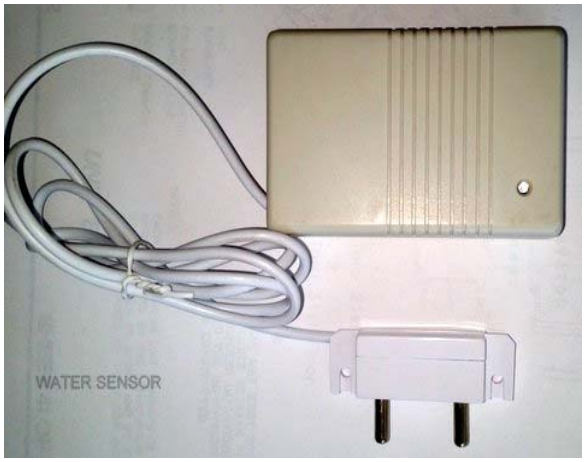
WS01

Hardware Description

Item	Name	Part number	Spec	Appendix
1	MCU	SI4010	8-bit MCU+RF Transmitter, Support OOK/ASK modulation, 27~960MHz	Silicon Labs

2	Antenna	AT10	10~20dB output power	
3	Battery	BC1000	3V/1000mAh for 3 years	
4	Sensor	T1000	Custom made switch sensor with shell	
5	Sensor cable	CB10	AVVR Cable	
6	Static Current		<10uA	Sleep mode
7	Work current		<10mA	Wireless transmission
8	Temperature		Work temperature: -10~60 ℃	
9	Humidity		Work humidity: 15%~95%	

Picture



Description

1. When the water switch sensor get a water alarm info, it generate a switch close signal and send it to MCU via the cable.
2. The MCU get the first alarm info, interval 10 seconds to check the signal active info in 30 seconds. If three time get the same alarm info, it will open the wireless and send a alarm code to the panel(N4).
3. If no external operation, the check and info transmission will continue until the alarm info is cancellation.
4. Support sleep mode, wake up mode and working mode.
5. The info transmission is over ASK433.92 modulation.
6. The wireless transmission length is 100m in unobstructed space.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

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

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.