



NAPC-CM2

USER MANUAL
(FCC)

Release 0.1

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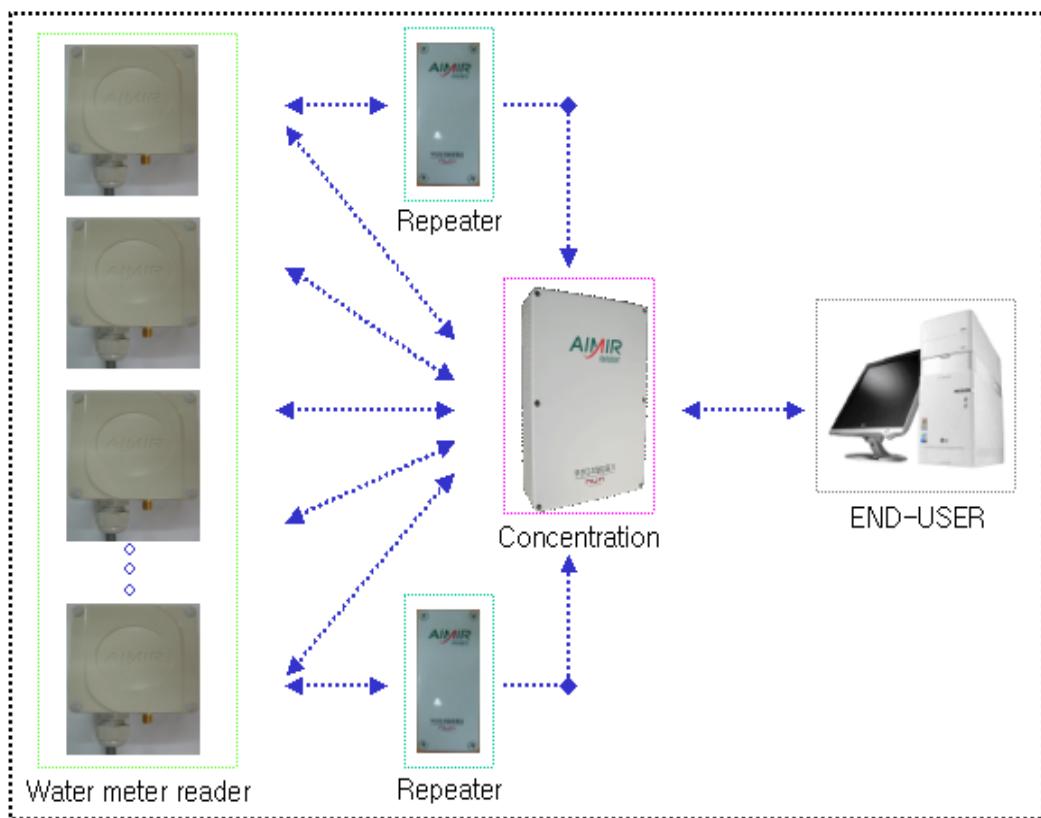
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1. Overview

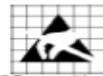
NAPC-CM2 is remote water meter reader that uses DSSS RF modulation format at 2405~2480MHz frequency range and has been realized miniaturization and weight reduction by being designed using ultra-small, state-of-the-art components. NAPC-CM2 was developed as an water meter-reader and has an advantage of accurate data transmission and broad coverage via overcoming the limited RF power by providing the meter with functions such as self healing, self organization, mesh topology, etc. using ZigBee protocol.

NAPC-CM2 uses a band of frequency range from 2405~2480MH and has a maximum data rate of 250Kbps with the 2MHz occupied bandwidth in each channel and it also has a high efficiency in each channel by adopting the CSMA-CA technology.

An example of using this module is shown in the Figure 1.



<Figure 1. An example of Using NAPC-CM2>



*Caution ! ESD sensitive device.
Precaution should be used when handling
the device in order to prevent permanent
damage.*

2. Electrical Specifications

2.1 Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Storage Temperature	-30	+70	°C
Voltage on Any Input or Output Pin	-0.3	+3.5	V
Input Voltage	3	3.6	V
Transmit RF Power		17	dBm

Note 1: Under no circumstances the absolute maximum rating given above should be violated. Stress exceeding one or more of the limiting values may cause permanent damage to the device.

2.2 RF Electrical Specifications

PARAMETER	MIN	TYP	MAX	UNIT
Operating frequency	2405		2480	Mhz
Number of channels		16		
Channel spacing		5		Mhz
Input/Output impedance		50		Ohm
Data rate		250		Kbit/s
DSSS chip rate		2		Mc/s
Frequency stability			+/- 5	ppm
Transmit Power			17	dBm
Sensitivity		-105		dBm

2.3 MCU Specifications

PARAMETER	MIN	TYP	MAX	UNIT
MCU Flash Memory			128	Kbyte
MCU RAM			4	KB
MCU EEPROM			4	KB
MCU Main Clock Frequency		8		MHz
MCU RTC Clock Frequency		32.768		KHz
ADC Resolution		10		bit

Note 1: MCU: Atmega128L-8AI



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2.4 Recommended Operating Conditions

PARAMETER	MIN	MAX	UNIT
Supply Voltage	3.0	3.6	V
Operating Temperature	-20	60	°C
Operating Humidity	95%(50°C) Relative Humidity		

2.5 Port Electrical Specifications

PARAMETER	MIN	TYP	MAX	UNIT
Input Low Voltage	-0.5		0.1Vcc	V
Input High Voltage	0.7Vcc		Vcc+0.5	V
Output Low Voltage			0.5	V
Output High Voltage	2.2			V
Output Current			40	mA

2.7 Power Consumption

STANBY MODE	COMMUNICATION MODE	
	Power Down	RX Mode
< 25uA	< 50mA	< 90mA

Note 1: VCC= 3.6V

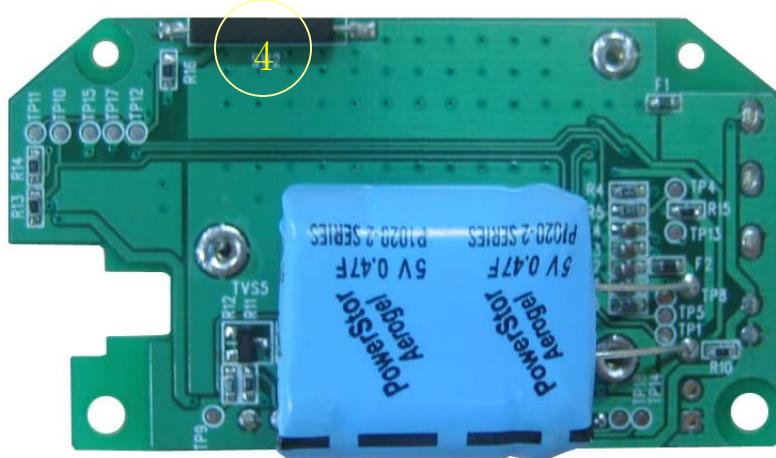
Note 2: Output power settings and typical current consumption

3. Description of Major Parts

3.1 Board Configuration Drawing



<Figure 2. Top side of NAPC-CM2 >



<Figure 3. Bottom side of NAPC-CM2 >

*The label on ZigBee Module can be changed.

No.	Description
①	Pulse Input Port
②	Battery Power Input Terminal (Battery: +3.6V, 8500mAh)
③	Micro Switch
④	Reed Sensor
⑤	ZigBee Module

3.2 Pulse Input Port

Pin No.	Description
1	Ground signal of the water level detector
2	Data signal of the water lever detector
3	Signal which check the breaking down of meter (0) pulse lines
4	Ground signal of the meter (0)
5	Pulse data signal from the meter (0)
6	Signal which check the breaking down of meter (1) pulse lines
7	Ground signal of the meter (1)
8	Pulse data signal from the meter (1)

※ Sign Pin number 1 on Figure 2 with “◦“

※ NAPC-CM2 support total two meters : meter(1) and meter(2)

3.3 Pulse Cable

Line Colors	Description
Black	Ground signal of the water level detector
Red	Data signal of the water level detector
Orange	Signal which check the breaking down of meter (0) pulse lines
Yellow	Ground signal of the meter (0)
Green	Pulse data signal from the meter (0)
Blue	Signal which check the breaking down of meter (1) pulse lines
Grey	Ground signal of the meter (1)
White	Pulse data signal from the meter (1)

3.4 Case Open Alarm

NAPC-CM2 recognize the alarm signal through Micro Switch

Case Status	Micro Switch Status	Description
Case Open	On	Generate a case open alarm signal
Case Close	Off	Do not generate a case open alarm signal

3.5 Low Power Alarm

Battery Status	Description
< 3.0V	Generate a low power alarm signal
≥3.0V	Do not generate a low power alarm signal

3.6 Wake-up Alarm

NAPC-CM2 recognizes a wake-up alarm signal through Reed Sensor.

When users approach the magnet to reed sensor, a wake-up alarm signal is occurred.

Reed sensor Status	Description
ON	Generate a wake-up alarm signal
Off	Do not generate a wake-up alarm signal

3.7 Serial Communication Specification (Debug Port)

Communication Speed	38,400 bps
Data Bit	8
Stop Bit	1
Parity Bit	None
Flow Control	None

4. Mechanical Specifications

4.1 Mechanical Dimensions

Item	Description
Case Size	72mm(L) * 72mm(W) * 37mm(D)
PCB Size	63mm(L) * 35mm(W) * 1.2mm(D)
Sensor Weight	210g
IP Grade	67

Caution: FCC Part15 Class B compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

Caution: Exposure to Radio Frequency Radiation.

To comply with FCC RF exposure compliance requirements, for mobile configurations, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.