RF EAS System Mainboard CAB07 Technical Manual V1.1

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Revision Records

Date	Version	Revision Description
2016-3-23	V1.1	1. 3.1 ANT cable port order adjustment 2. 3.2 ANT cable port order adjustment

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1 Overview

The 8.2MHz RF EAS system comprises the antenna, deactivator and EAS tags.

The CAB07 mainboard is designed for 8.2MHz dual antennas and is divided into the TX board and RX board. One TX board will work with one or two RX boards. Many antennas can be equipped with the CAB07 mainboard and they are working and tuned in the same way.

Safety Precautions

 WARNING	**The electronics inside antennas are extremely sensitive to electrostatic discharges. Always discharge yourself by touching a ground point before touching any of the electronics to avoid damaging the circuits.**

 PRECAUTION	The electricity supplied to the systems shall not be shared with other electronic or electric loads, e.g. electronic transformers, neon/spot lights, electrical engines, computers, LCD screens and cash registers, etc.

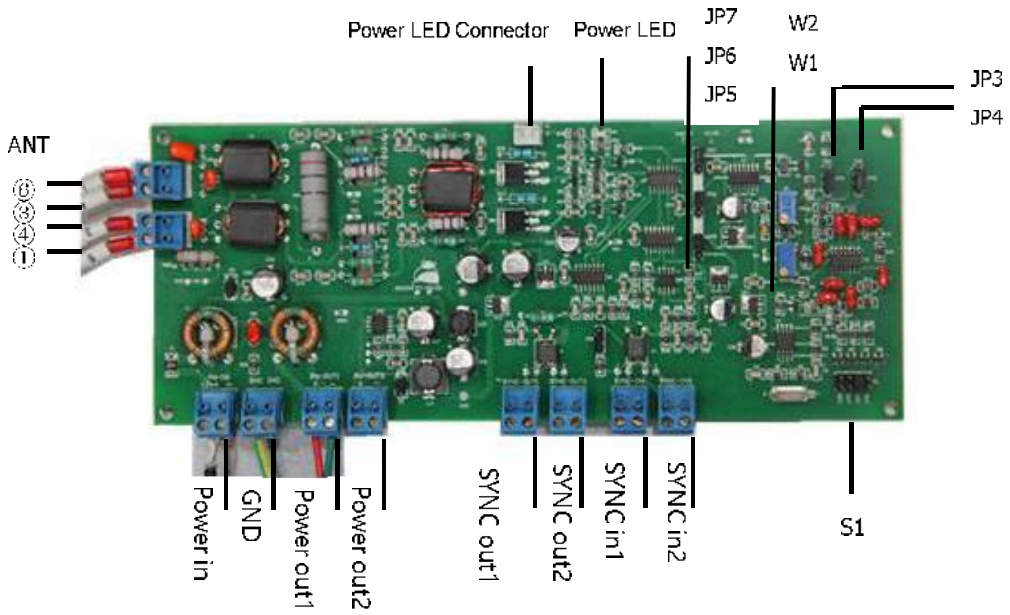
2 Components of Antenna

EAS antennas are comprised of the antenna frame, mainboard and accessories. For the CA24 antenna, for instance, the components as as follows:

CA24 (with CAB07 Mainboard)	TX Antenna	RX Antenna (with Buzzer)
		
Mainboard	CAB07-TX	CAB07-RX
		
Accessories	Power Supply	TX-RX Power Cable
		
Note	● Only connect the power supply to the TX board. ● The RX antenna is powered by the TX antenna through the TX-RX power cable.	

3 Board Details

3.1 CAB07-TX Board



ANT: Transmitter cable port.

Power in: Connected to 12VDC power from an adapter or power supply box, with "+" side connecting to 12V+ and "-" connecting to the cathode.

GND: Connected to the base of the antenna frame or the ground screw if the GND connector of the antenna frame is not found. Generally, antennas are provided with GND cables well connected.

Power out 1/out 2: Connected to the "power in" port of the RX board with a TX-RX cable to power the RX antenna. One TX board can power 2 RX antennas.

SYNC out 1/out 2: Connected to the "SYNC in 1/in 2" port of the board in the TX slave antenna with a synchronization cable. For details about synchronization, please see the section "Synchronization Tuning".

SYNC in 1/in 2: Connected to the "SYNC out 1/out 2" port of the TX board with a synchronization cable. For details about synchronization, please see the section

"Synchronization Tuning".

S1: For selecting modulation frequency, which could be 160Hz, 170Hz, 180Hz or 190Hz. The factory setting is 180Hz. The frequency is adjusted with a jumper.

JP3/JP4: For setting the center frequency, which can be 7.2MHz or 8.2MHz. The factory setting is 8.2MHz.

W1: For adjusting the sweep width.

W2: For adjusting the center frequency.

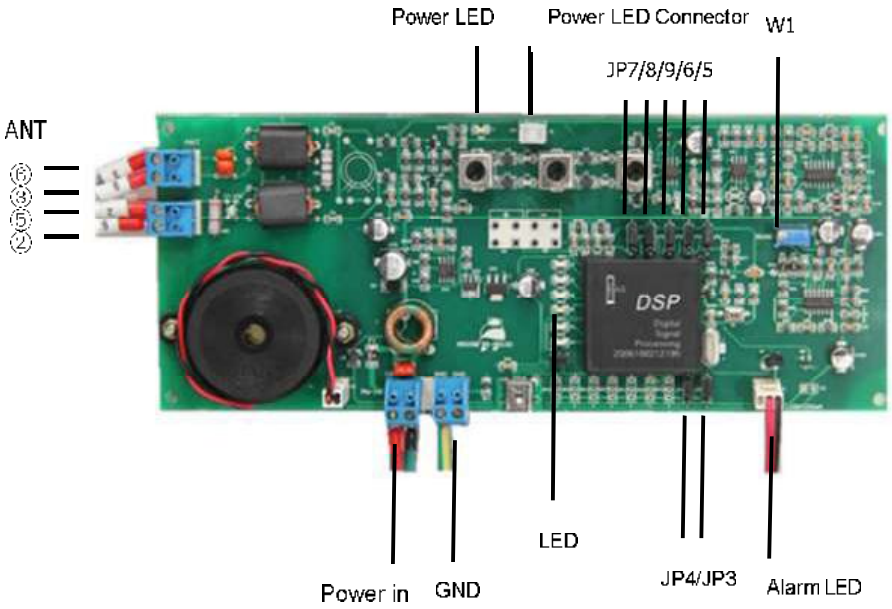
JP5/JP6/JP7: For setting the master TX antenna and slave TX antenna.

Power LED: Lights up when the antenna is powered on.

Power LED Connector: For connecting an external power LED.

Note: If the center frequency is set to 7.2MHz with JP3/JP4, the antenna will work at the frequency band of 7.2MHz±450KHz, and the frequency can be fine tuned with W2. If the center frequency is set to 8.2MHz, the antenna will work at the frequency band of 8.2MHz±450KHz, and the frequency can also be fine tuned with W2.

3.2 CAB07-RX Board



ANT: Receiver cable port.

Power in: Connected to the output power from an adapter, with "+" side connecting to 12V+ and "-" connecting to the cathode.

GND: Connected to the base of the antenna frame or the ground screw if the GND connector of the antenna frame is not found. Generally, antennas are provided with GND cables well connected.

LED: For indicating the state of signal or noise.

JP3/JP4: For setting the modulation frequency, which should be the same as that for the TX board.

Alarm LED: Connected to the alarm LED of the antenna.

W1: For adjusting the sensitivity. Turn it clockwise to increase sensitivity, anticlockwise to reduce sensitivity.

JP6/JP8/JP9 (reserved JP7/JP5): JP6 is used for setting pre-alarm, JP8 for increasing or reducing sensitivity, JP9 for setting resistance to severe interference.

Power LED: Lights up when the antenna is powered on.

Power LED Connector: For connecting an external power LED.

4 Board Tuning

4.1 CAB07-TX Board Tuning

Tune the mainboard after all the cables are well connected.

4.1.1 Center Frequency Tuning

The center frequency can be 7.2MHz or 8.2MHz, and the factory setting is 8.2MHz. The center frequency can be set to 7.2MHz in the following cases:

- There are many antennas that are all working at 8.2MHz around the position where Century antennas will be installed, and their interferences can not be solved by setting modulation frequency. In this case, you can set the center frequency to 7.2MHz. The corresponding tags, however, should also work at 7.2MHz.
- The customer requires a RF frequency other than 8.2MHz.

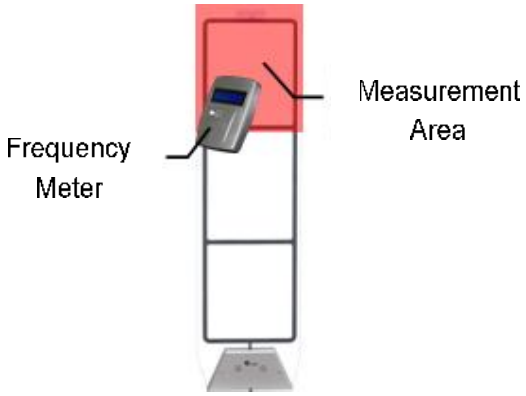
The method to set 7.2MHz center frequency is as follows:

Function	Pin	Top	Bottom	Factory setting
Center Frequency	JP3	7.2M	8.2M	Top
	JP4	7.2M	8.2M	Bottom

4.1.2 Center Frequency Fine-Tuning

If the frequency meter shows a different center frequency, for exmaple, the required center frequency is 8.2MHz but the meter displays 8.3MHz, you can adjust the frequency to 8.2MHz with W2. If the corresponding tags are all working at a frequency rather than 8.2MHz, for example, at 8.3MHz, you can use W2 to adjust the center frequency to 8.3MHz to ensure the best response sensitivity of the tags.

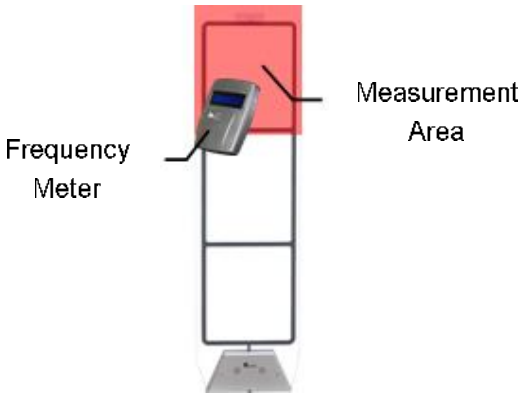
It is recommended site installers carry a hand-held frequency meter for measuring the frequency of tags and antennas.



4.1.3 Sweep Width Tuning

Sweep width represents the range the center frequency fluctuates. The general range is 8.2MHz±500KHz, and it's normally set to 8.2MHz±450KHz. The greater the range, the more adaptable to tags, and the less effective to resist interference. The smaller the range, the less adaptable to tags, and the more effective to resist interference.

If the center frequency of tags does not fluctuate too much, you can reduce the sweep range. For example, adjust it to 8.2MHz±300KHz with W1 according to the display of the frequency meter.



Function	Frequency	JP4	JP3
Frequency Selection	160Hz	Bottom (1)	Top (0)
	170Hz	Top (0)	Bottom (1)
	180Hz	Top (0)	Top (0)
	190Hz	Bottom (1)	Bottom (1)

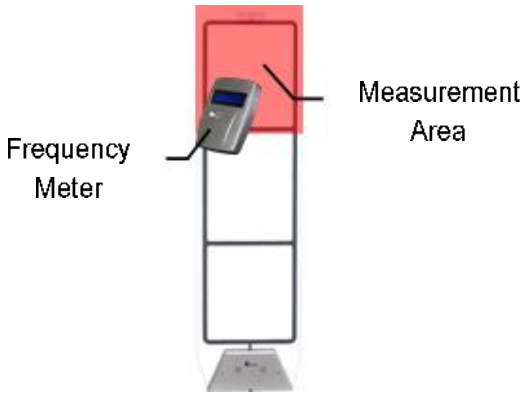
4.1.4 Modulation Frequency

The modulation frequency can be 160Hz, 170Hz, 180Hz or 190Hz. The factory setting is 180Hz.

If more than one TX antennas of the same manufacturer are installed 5-10m away from each other and it's not feasible to connect synchronization cables, you can set different modulation frequencies for the TX antennas to reduce interference, but the sensitivity of the antennas will be reduced.

If antennas from different manufacturers are installed close to each other and it's not feasible to connect synchronization cables, you can also set a different modulation frequency to reduce interference.

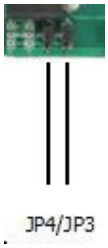
The modulation frequency can be adjusted with S1. The factory setting is 180Hz.





S1 on TX Board

When the modulation frequency of the TX board is changed, for example, to 160Hz, the modulation frequency of the RX board should also be changed to 160Hz, through JP3/JP4.



JP3/JP4 on RX Board

4.1.5 Synchronization Tuning

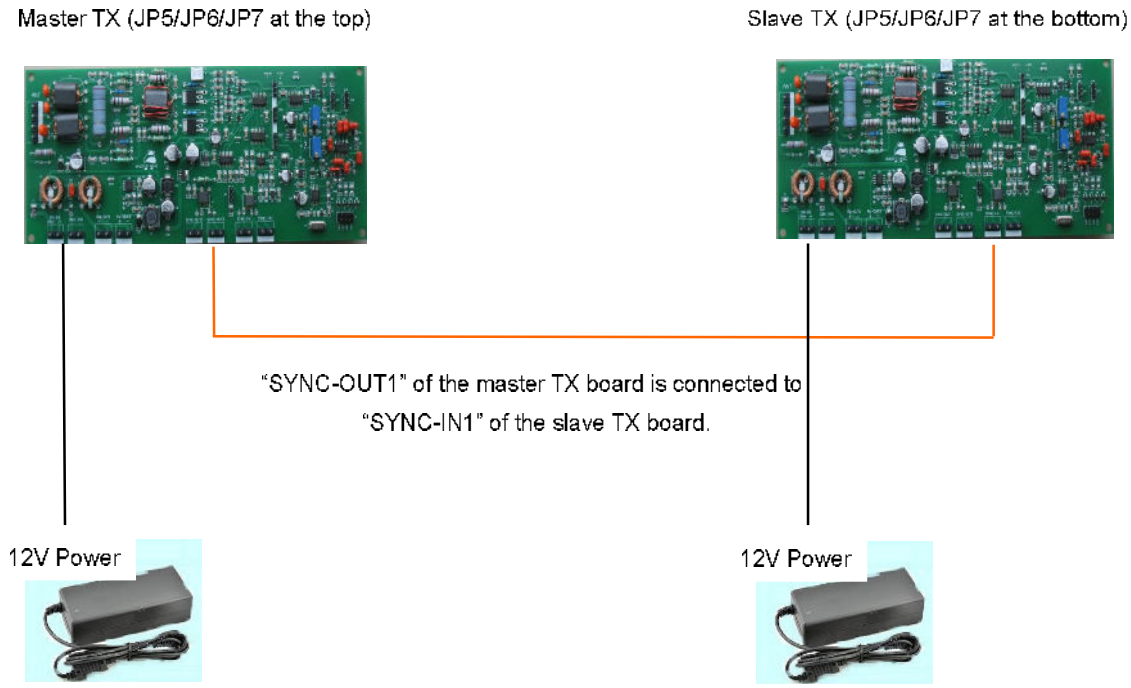
TX antennas less than 10 meters apart must be synchronized.

No matter how many TX antennas will be synchronized, only one of them can be set as the master antenna. The others should be set as slave antennas.

Function	Pin	Top	Bottom	Factory Setting
Master TX/Slave TX	JP5	MASTER	SLAVE	Top
	JP6			
	JP7			

A TX board has 2 online inputs and 2 online outputs. The master TX antenna is connected to the slave TX antenna through a synchronization cable.

The synchronization cable must be a 2-core shielded cable, and the core wires should be multi-unit copper wires not less than 0.5mm^2. The shielded cable need not be grounded. The 2-core shielded audio cable is preferable.



4.2 CAB07-RX Board Tuning

The LEDs will indicate signal intensity, interference and alarms as follows:

LED	Indication	Description
D13	Signal intensity	Strong Moderate Weak 
D14		
D15		
D16	Alarm	Red LED lights up
D17	Interference	Should not light up

Note: If D17 lights up, it means there is too much interference or the sensitivity is too high.

The functions are described as follows:

Function	Pin	Top (1)	Bottom (0)	Factory Setting
Pre-alarm	JP6	Pre-alarm	No pre-alarm	Top (1)
Sensitivity	JP8	Low	High	Bottom (0)
Immunity from Interference	JP9	General environment	Severe interference	Top (1)

Pre-alarm: The antenna will have the pre-alarm function if JP6 is set to Top (1). If the environment interference or tag signal is close to the alarm threshold, the alarm LED will light up but the buzzer does not ring. This means there are EAS tags nearby or severe interference that can trigger alarms. You need to reduce the sensitivity so as to reduce false alarms. The factory setting is Top (1).

Sensitivity: If JP8 is set to Top (1), the sensitivity is low. If JP8 is set to Bottom (0), the antenna sensitivity is high. The factory setting is Bottom (0).

Immunity from Interference: If JP9 is set to Top (1), it means the antenna will work in normal environment. If there are severe environment interferences, set JP9 to Bottom (0). The factory setting is Top (1).

Turn clockwise to increase sensitivity, anticlockwise to reduce sensitivity. Adjust antenna sensitivty based on the signal intensity LED. The best state is only one LED is on.

5 Precautions

- The system should use an individual AC power socket not connected to any other device. Otherwise, the other devices will cause great interferences and even problems such as false alarm, low sensitivity, low detection rate and narrower channel.
- The AC power socket must be well grounded. Otherwise, interferences and problems as mentioned above will arise.
- Only use the provided power supply unit (PSU). Other power adapters may interfere with the system and damage the circuits.
- The PSU must be mounted close to the AC power socket, for example, on a surface or the wall less than 30cm above the ground level.
- A PSU can power up to 3 antennas, including 1 TX antenna and 2 RX antennas.
- Only use the same cables as those provided to install the system. Only cables of the same specification can be used for extension. Otherwise, electrical devices near the system will cause greater interference or impedance to reduce the voltage.
- It is recommended power cables are shorter than 8m.
- For power cables shorter than 8m, the copper wires should be 0.3 mm^2; for power cables of 8 - 10m, the copper wires should be at least 0.5 - 0.75 mm^2.
- Power cables should be wired under the floor or fixed and securely covered on the floor.
- Power cables should be wired as straight as possible.
- The red wire of a power cable is connected to +12V, black wire connected to -.

6 Troubleshooting

6.1 Detection Rate and Sensitivity

Note:

The system must be restarted after the center frequency, sweep width or modulation frequency is changed.

1. **The interference LED does not light, but the systems do not detect tags or detect at a very low rate. The problem still exists even if W2 on the RX antenna is adjusted.**

   Use a frequency meter to measure if the center frequency, sweep width and modulation frequency are correct.

2. **Most tags work at a frequency lower or higher than the default frequency range 7.9-8.4 MHz (center frequency is 8.15 MHz).**

   Adjust the center frequency of the system based on the frequency of most tags. For example, if the frequency of tags is 7.6-8.0 MHz, set the system center frequency to 7.8 MHz.

Note:

- A frequency meter as shown on the right is necessary to measure the frequency of tags.
- Using tags of good quality is extremely important to avoid the problem.



6.2 Interference

1. **Move away any possible interference source at least 1-5m from the system.**

Common interference sources include:

- Electrical devices such as computer or printer;
- Rings with metal, such as door frame, picture frame or trolley, which will transmit strong signals similar to tag signals;
- Power supply switched on;
- Cables in parallel to the antenna within 1m;
- LEDs, especially neon lights controlled by switching on or off the power supply.

The system will look like this when interfered by other devices:

- One or more interference LEDs of one RX antenna light up;
- No detection or low detection rate;
- False alarm;
- No detection and blocked.

2. **False alarms occur occasionally, but no interference source can be found.**

   Set JP9 on the RX antenna to Bottom (0) or turn W2 anticlockwise to increase resistance to interference. Then test if the sytem can work properly.

   Note:

   When the resistance to interference is increased, the system sensitivity will reduce.

3. **D17 on the RX antenna lights up.**

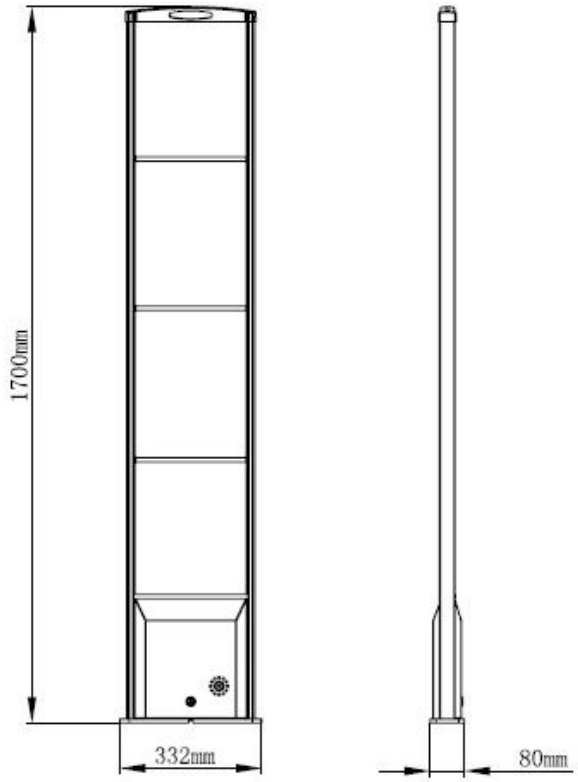
   This means there are severe interferences in the channel. Try to find the interference source. If not found, reduce the sensitivity until the LED goes out.

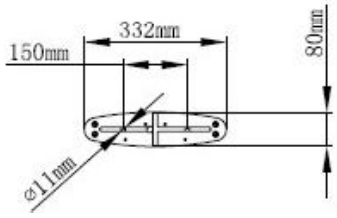
7 Antennas with CAB07

7.1 CA01

CA02

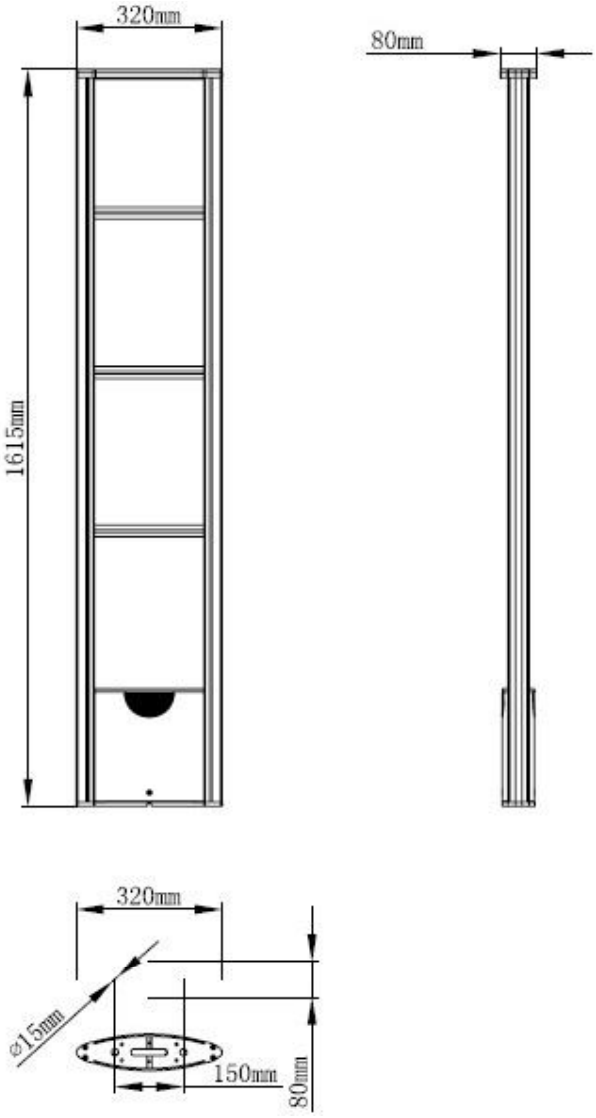




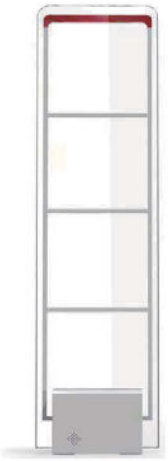


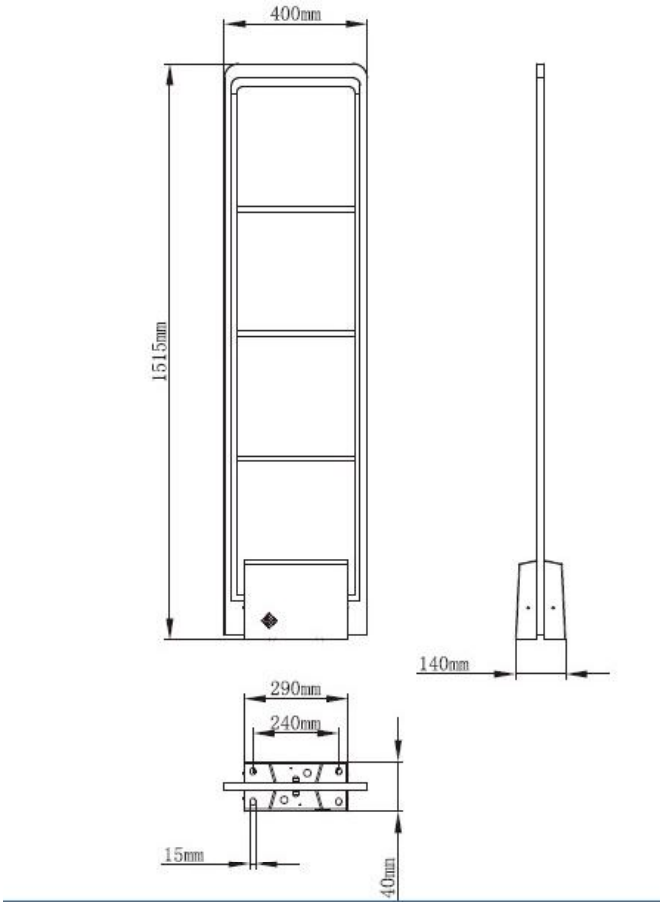
7.2 CA02





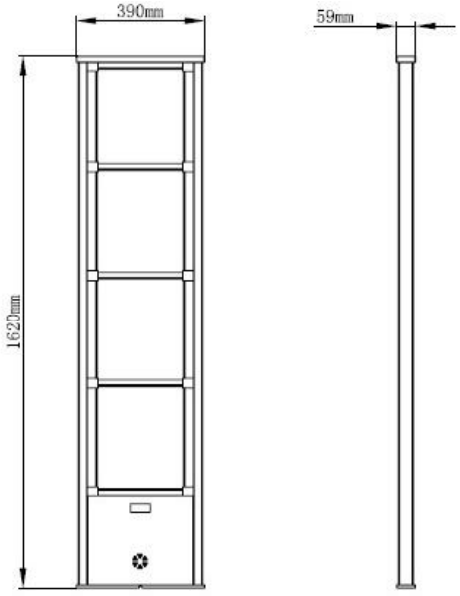
7.3 CA05

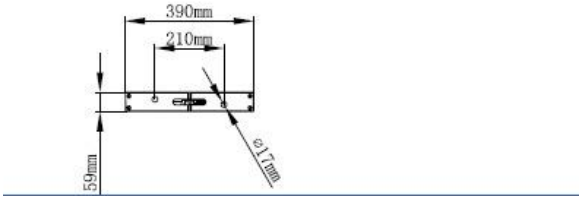




7.4 CA24

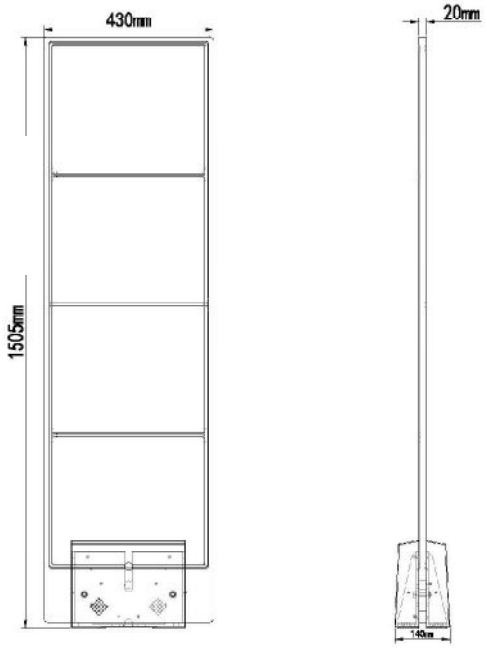


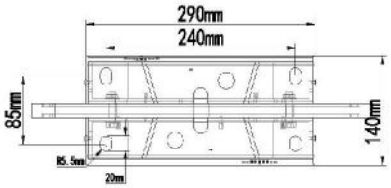




7.5 CA26

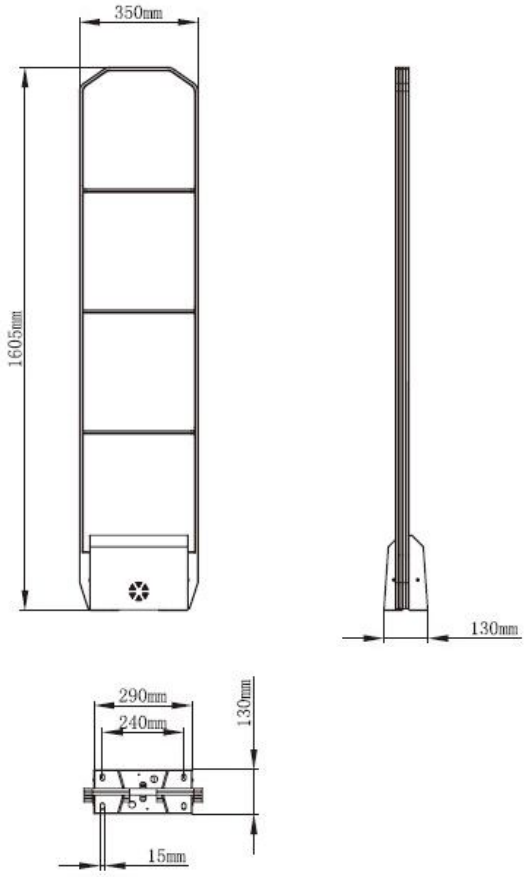






7.6 CA27





The detection distances for above antennnas are as follows:

For 40*40 tags: response distance is 1.2m-1.4m; standard installation distance is 1.4m; installation distance in good environment is 1.6m.

For small square tags: response distance is 1.4m-1.6m; standard installation distance is 1.6m; installation distance in good environment is 1.8m.