



License Plate Recognition Camera

2MP HD ANPR Network Camera



LR-IPC Overview

Background

With the popularity of automotive applications in daily life, smart car management has become critical in many industries. ANPR (Automatic License Plate Recognition) technology can detect and identify a vehicle's unique license plate number and is an important part of a complex vehicle management system.

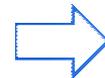
Key Technology

ANPR technology can extract license plates from complex backgrounds, directly identify each character on the license plate, and format and output license plate number information. The technology includes license plate detection and license plate character recognition, all of which are based on deep learning algorithms.

Work Process



Detection



Recognition



Capture



Match Result

Content /

01

Support Area

- Europe
- Asia
- Africa
- South America
- Australia

02

Application

- ApplicableScene
- NotApplicable Scene
- For use with

03

Installation

- LensSelection
- Installation
- ApplicationInstall

04

Settings

- Detection
- Recognition
- ImageSettings

05

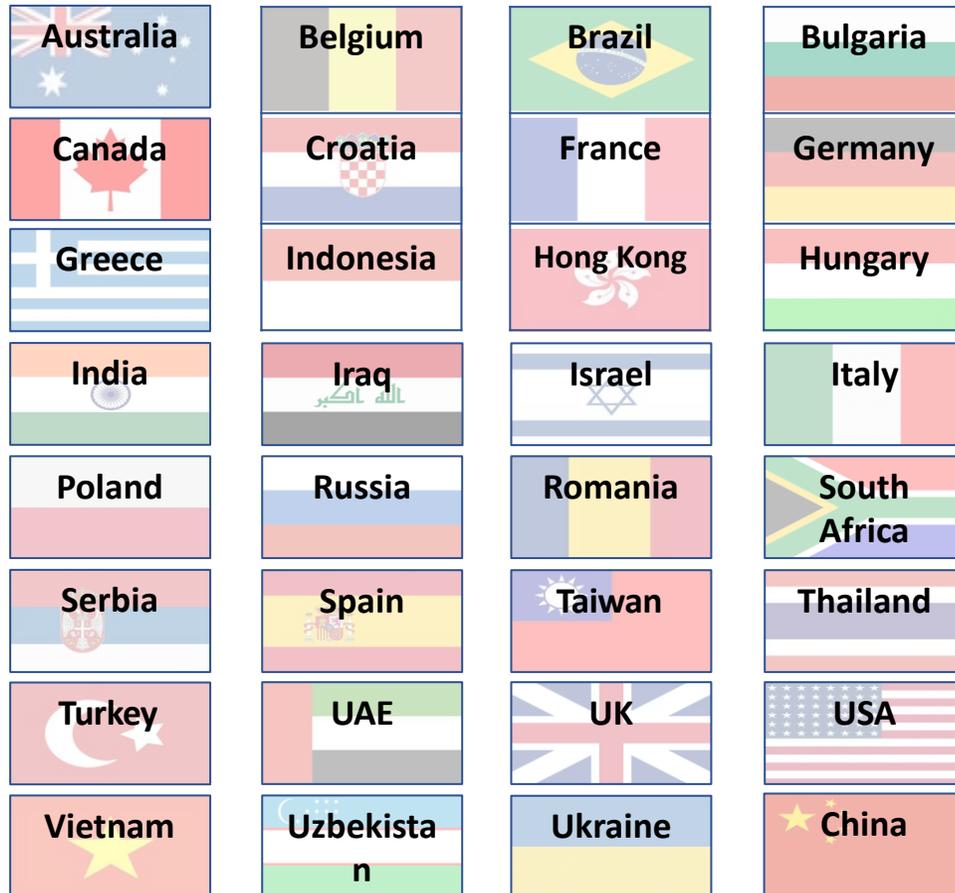
Product List

- Features
- Model No.

TVT.123456

Support Area

Areas already supported



Areas to be supported soon



Appendix

The areas supported in USA —

California, Colorado, Florida, Georgia, Iowa, Illinois, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, North Carolina, New Jersey, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, Texas, Virginia, Washington, Wisconsin, Arizona, Connecticut, Indiana, Maryland, Tennessee, Mississippi, Montana



Application

1. Applicable Scenes



Barrier Control

Entrance & exit

Road Surveillance

Illegal vehicle
Not for Highways

Car Management

VIP Car Manage

Investigation

Post-event
investigation
for forensics

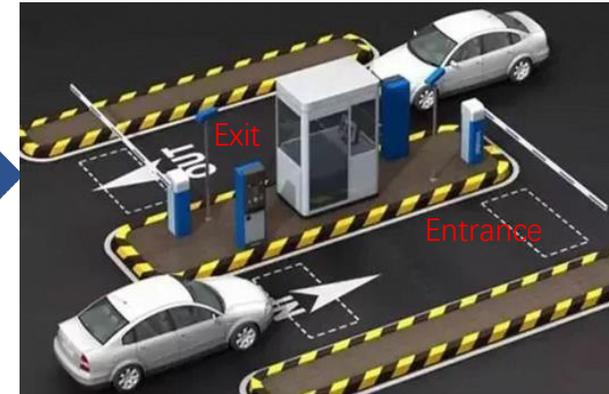
Application

2. Not applicable scene

◆ Entrance Control

Shared exit and entrance ✘

When car leave the gate, the Entrance camera may capture the back plate of the car, and open the gate again.



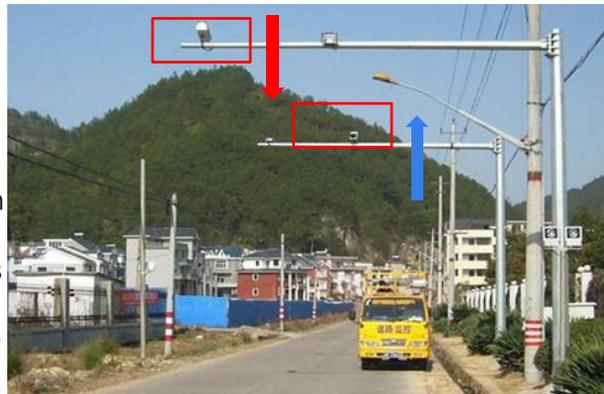
Separate exit and entrance ✔

As shown in the figure, the entrance and exit are located on both sides of the guard booth, and the two cameras at the entrance and exit recognize the control of the license plate in front.

◆ Road Surveillance

Double Direction Shared Road ✘

As shown, two cameras monitoring different directions are located on the same road side, resulting in two cameras capturing the front and rear license plates of the same car, respectively.



Single Direction Road ✔

As shown in the figure, different cameras are used on each side of the road to monitor the traffic from different directions.

Application

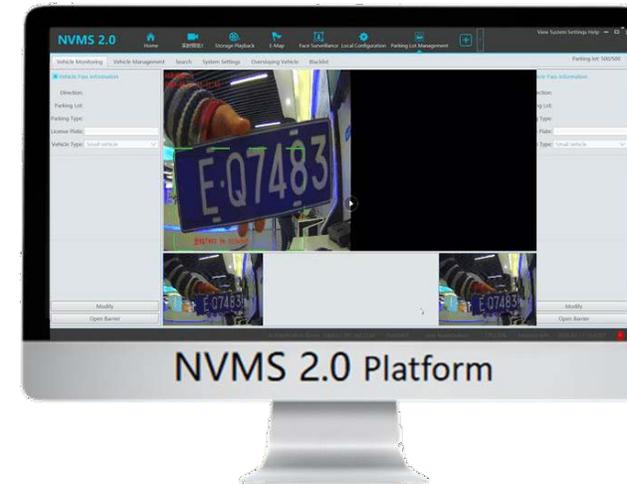
2. For use with

NVR Ver1.4.4



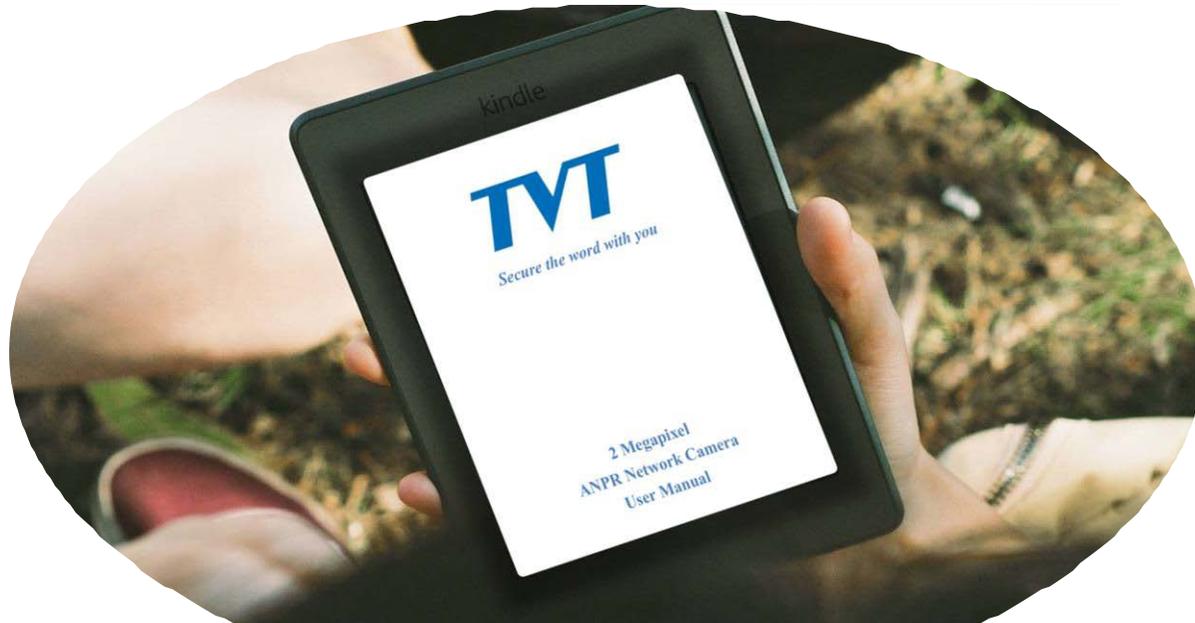
- ❑ Set license plate detection area
(range of license plate proportion: 5%~30%)
- ❑ Set entrance and exit directions
- ❑ Set up black and white lists, license plate recognition
- ❑ License plate library can add the number of licenses :
50000: N2P models
(3508B1-8P-A2; 3516B4-A2; 3532B4-A2; 3532B8-A2;
3564B8-A2;3564B16—A2;35128B16-A2)
1000: the other models that can support LPR

NVMS2.0 ver2.1.0



- ❑ View real-time conditions of vehicles entering and leaving
- ❑ Add whitelisted vehicle and user information, and set vehicle entry / exit time
- ❑ Query the passing vehicle information based on: traffic records, passing charges, and payment information.
- ❑ Configure the license plate capture camera for the binding, charging, and subscription of the parking lot channel

Installation



ZMP A3-LR User Guide.pdf

- User Guide
- Lens Selection
- Installation Requirements

Lens Selection

◆ Requirements

1. No obstructions on the license plate.
2. Lens with auto iris mode, suitable for a wide range of illumination changes, such as direct sunlight on the license plate
3. Focus clearly, and select the appropriate focal length segment according to the height of the camera
4. License plate horizontal tilt angle is in the range of $-5^{\circ} \sim 5^{\circ}$

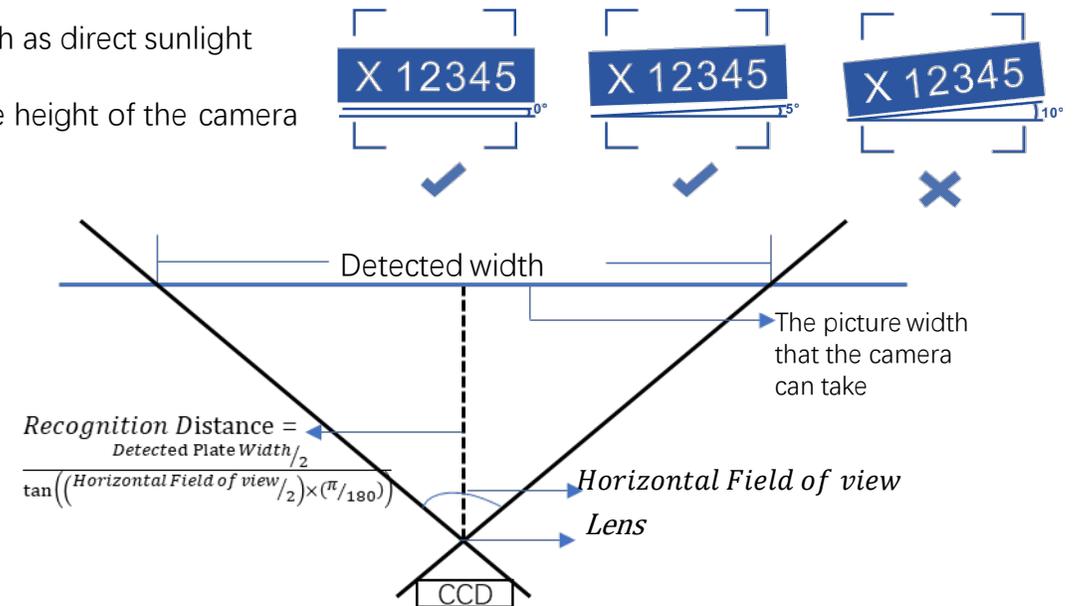
◆ Lens Selection

Select a proper lens according to the table below.

License Plate			Max.	Min.	Max.	Min.
Width (cm)	Lens	H.FoV	Detected Width(cm)	Detected Width(cm)	Recognition Distance(cm)	Recognition Distance(cm)
30.48	50mm	5.5	488	61	5076	635
30.48	22mm	17.6	488	61	1575	197
30.48	12mm	32.4	488	61	839	105
52	50mm	5.5	832	104	8661	1083
52	22mm	17.6	832	104	2687	336
52	12mm	32.4	832	104	1432	179
44	50mm	5.5	704	88	7328	916
44	22mm	17.6	704	88	2274	284
44	12mm	32.4	704	88	1212	151

Notes:

1. License plate width accounts for $1/2 \sim 1/16$ of the camera's field of view width
2. License plate width varies in each region



▪ Min Actual Plate width = $1/16 \times \text{Horizontal Field of view}$

▪ Max Actual Plate width = $1/2 \times \text{Horizontal Field of view}$

□ Min. Detected width = $16 \times \text{Actual Plate width}$

□ Max. Detected width = $2 \times \text{Actual Plate width}$

❖ Min Recognition Distance = $\frac{\text{Min Detected Plate Width}}{\tan\left(\left(\frac{\text{Horizontal Field of view}}{2}\right) \times \left(\frac{\pi}{180}\right)\right)}$

❖ Max Recognition Distance = $\frac{\text{Max Detected Plate Width}}{\tan\left(\left(\frac{\text{Horizontal Field of view}}{2}\right) \times \left(\frac{\pi}{180}\right)\right)}$

Installation Requirements

◆ Requirements

✓ Percentage of license plate

The width of the license plate accounts for 6%-50% of the whole image width

✓ Fill Light

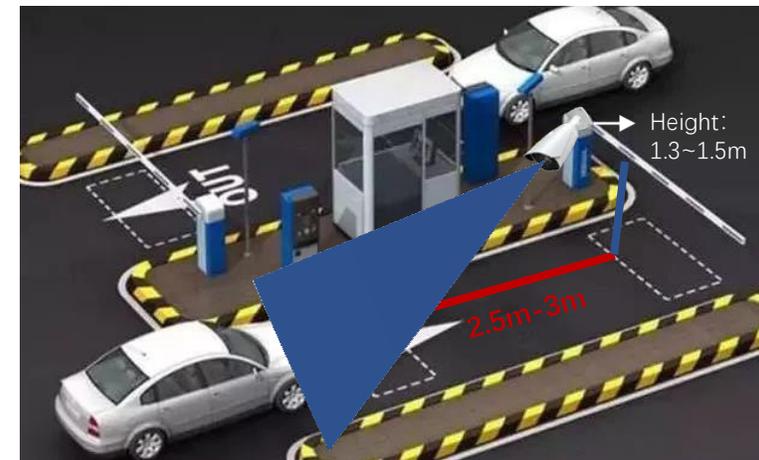
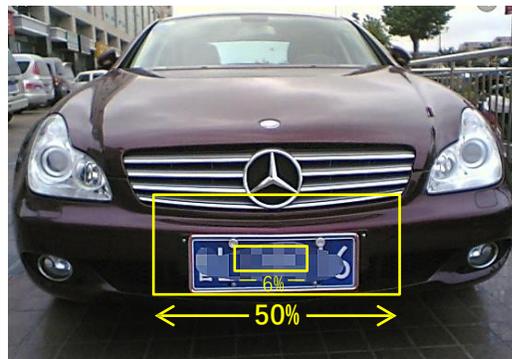
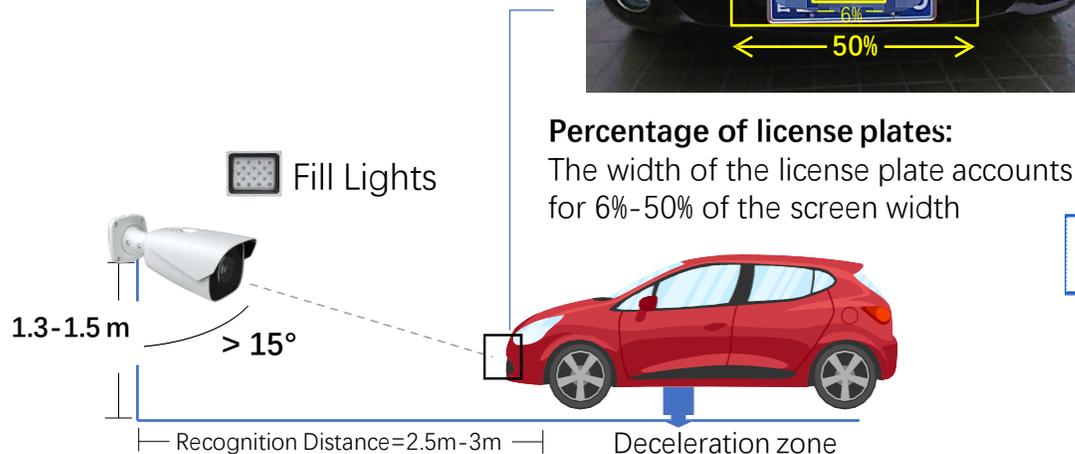
Keep a certain distance from IPC, to avoid Plate overexposure

✓ Installation Angel

Depression Angel $\geq 15^\circ$
Avoid the influence of car lights

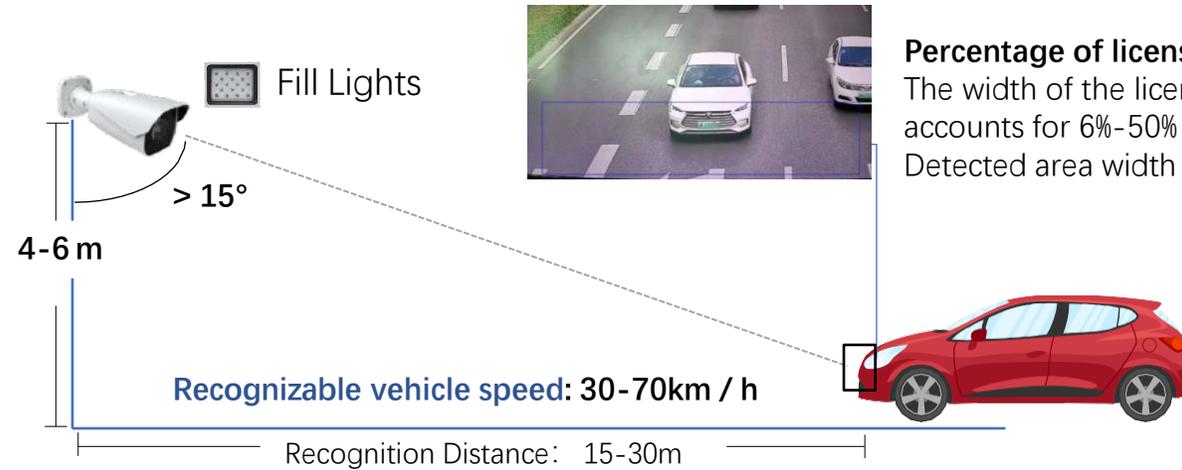
◆ Installation

1) Entrance Control



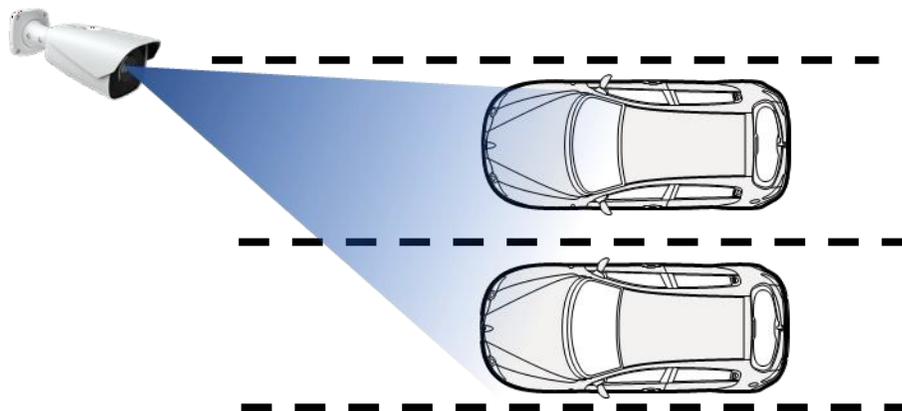
Installation Requirements

2) Road Surveillance

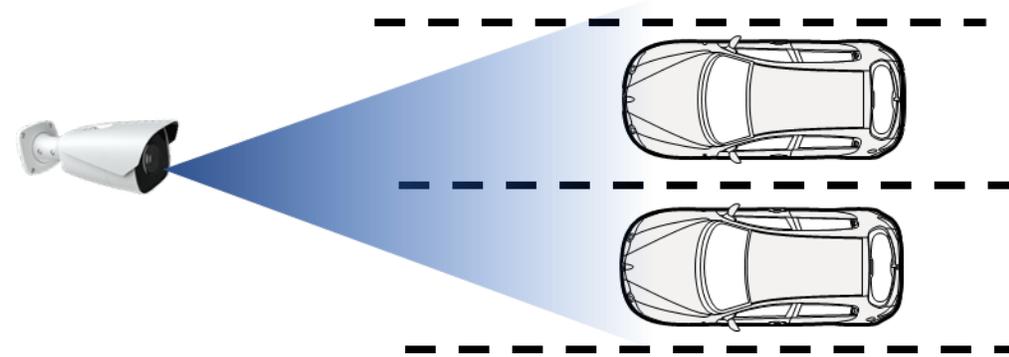


Note:

1. Not applicable for Highways.
2. The Highest Recognizable speed is 70km/h
3. It can be used to cover two lanes.



Camera on the roadside



Camera in the middle road

Recommended Settings

Due to the wide variety of actual use environments, no perfect image setting can cover all application scenarios.

When the default parameter settings of the A3-LR software cannot achieve satisfactory results, please refer to the recommended settings for effect adjustment.



License Plate Detection

Detection Area
Camera Angle
Plate Proportion Test



License Plate Recognition

Add License Plate
White List



Image Settings

Image setting points
Day/Night Mode
License Plate Exposure

Detection

◆ The key points that affect the snapping effect

- ✓ **Definition**
Recognizable by the human eye
- ✓ **Duration**
License plate appears on the screen for more than 1 second
- ✓ **Size**
Meet the set size range
- ✓ **Area**
Snapshot area is drawn at the position with the best license plate quality

◆ Recommended Settings

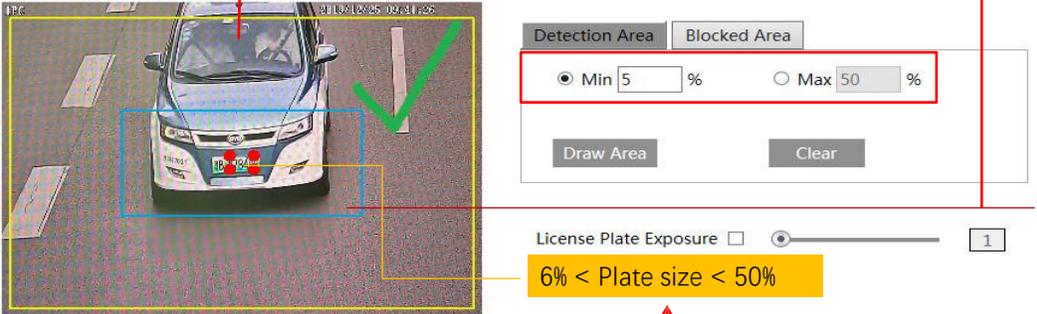
- Adjust the camera angle and height to ensure that the license plate stays in the picture for more than 1 second.
- Adjust the maximum and minimum settings.
- Draw snapshot area, the position depends on the actual scene

◆ Application capture suggestions

- Entrance Control
Draw the snapshot area in a slower area, such as near the speed bump. Makes the license plate more positive in the area.
- Road Surveillance
Draw the snapshot area only in the closer lane, and at the bottom of the screen, occupying one third of the area

Config Home ▶ Event ▶ ANPR

Detection Config Comparison and Linkage **Area** Schedule Vehicle Database



Min 5 % Max 50 %

Draw Area Clear

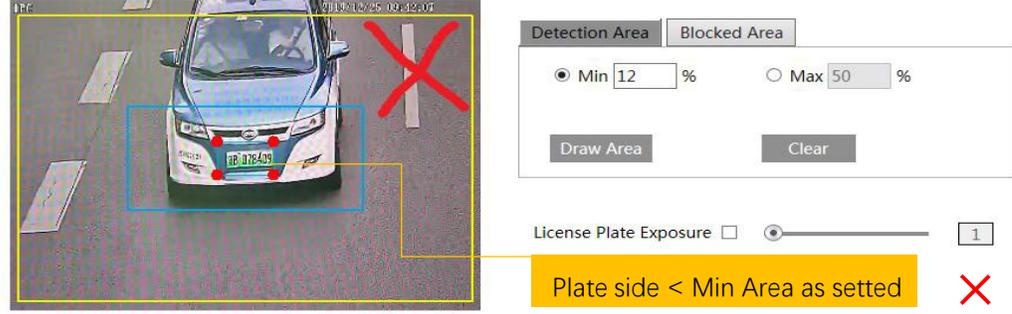
License Plate Exposure 1

6% < Plate size < 50%

Save

Config Home ▶ Event ▶ ANPR

Detection Config Comparison and Linkage **Area** Schedule Vehicle Database



Min 12 % Max 50 %

Draw Area Clear

License Plate Exposure 1

Plate side < Min Area as setted

Save

Detection

◆ Plate Proportion Comparison



Recognition

✓ Vehicle Database

Detection Config Comparison and Linkage Area Schedule **Vehicle Database**

Add Bulk Entry *add multiple vehicles*

Add

License plate number List Type

Start Time End Time

Owner License plate type

Save

License plate number List Type **Search**

Index	License plate	Owner	License plate	List Type	Start Time	End Time	Operate
1	AB123	xxx		Unknown ve...	2019-10-08...	2019-10-08...	Delete Mc

1. License plate number is compulsory, a maximum of 12 characters supported.
2. Owner name is optional, a maximum of 12 characters supported.
3. The effective start time is optional; format: YYYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.
4. The effective end time is optional; format: YYYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.
5. Vehicle type is optional, a maximum of 12 characters supported.
6. List Type is compulsory. 1 stands for block list; 2 stands for allow list; 3 stands for unknown vehicle

Example [Download](#)

✓ Comparison and Linkage

Detection Config **Comparison and Linkage** Area Schedule Vehicle Database

Allow fault character(s) of the plate number

Alarm List

Trigger Alarm Out *If the camera recognizes the detected vehicle, it will trigger Alarm.*

Alarm Out



Comparison Result

- ✓ Time: 07:28:15
- ✓ Plate No.: B72FB9
- ✓ Alarm List

Image Settings

1. Image setting points

Brightness



25



5



Setting the brightness in the daytime profile to a smaller value will cause the overall screen to be darker, but it will be more effective for reflective license plates



Insufficient brightness will affect image brightness

Gain



Gain 1



Gain 2

Shutter Upper



1/25



1/100



1/750

Simulate the brightness of the evening scene: the shorter the shutter upper limit time setting, the larger the image noise



In scenes with lights (such as street lights), the exposure time is set to less than 1/100 and prone to power frequency interference.

Image Settings

- 1.Set schedule (Day/Night mode switching)

- ✓ Headlights directly from the Vehicle will cause the image to switch from B/W mode to color mode

- ✓ Under a scene around nightfall, the image quality is poor, with infrared light enabled, can get much better performance

- ✓ It may cause camera keep color mode all night when with street lights.

So it is recommended to adopt the schedule setting for day/night mode.



Note: 4 and 180 mean brightness value ,unit is **Lux**

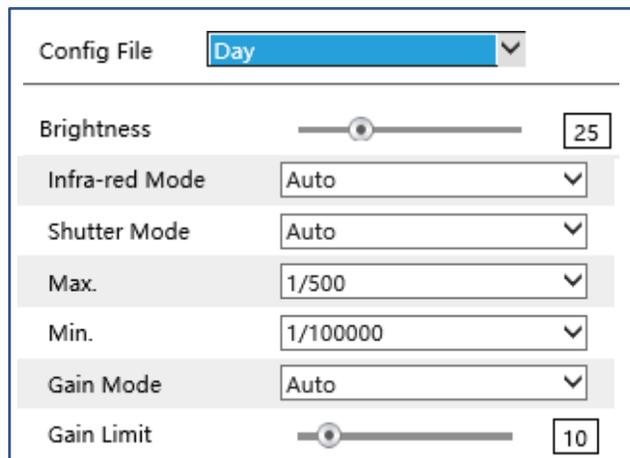
Image Settings

2. Image Settings under Day/Night Mode

After the tests, we have the recommended values for Day/Night mode:

✓ **For Day Mode**

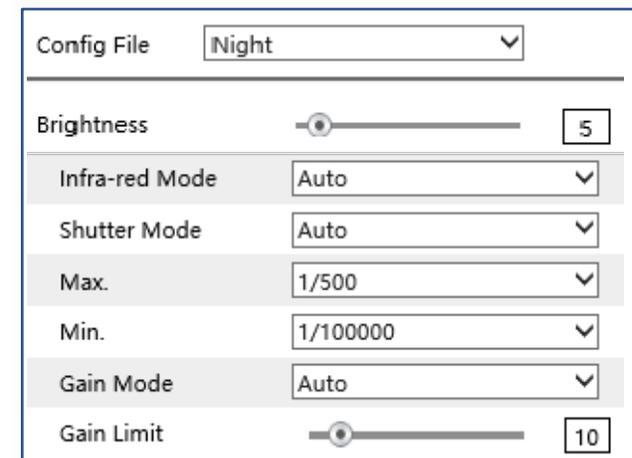
- Brightness = 25;
- Shutter Max= 1/500
- Shutter Min = 1/100000
- Gain = 10



The screenshot shows the 'Day' mode configuration interface. At the top, 'Config File' is set to 'Day'. Below this, there are several settings: 'Brightness' is set to 25 via a slider and a text box; 'Infra-red Mode' is set to 'Auto'; 'Shutter Mode' is set to 'Auto'; 'Max.' is set to '1/500'; 'Min.' is set to '1/100000'; 'Gain Mode' is set to 'Auto'; and 'Gain Limit' is set to 10 via a slider and a text box.

✓ **For Night Mode**

- Brightness = 5;
- Shutter Max= 1/500
- Shutter Min = 1/100000
- Gain = 10



The screenshot shows the 'Night' mode configuration interface. At the top, 'Config File' is set to 'Night'. Below this, there are several settings: 'Brightness' is set to 5 via a slider and a text box; 'Infra-red Mode' is set to 'Auto'; 'Shutter Mode' is set to 'Auto'; 'Max.' is set to '1/500'; 'Min.' is set to '1/100000'; 'Gain Mode' is set to 'Auto'; and 'Gain Limit' is set to 10 via a slider and a text box.

Note: In the coming firmware, the image settings will support Day/Night mode automatic switching. And these values will be set by defaults..

Image Settings

3. Effect by brightness setting

Reflective license plate



Non-reflective license plate



Image Settings

4. Backlighting scene configuration

◆ License plate exposure settings

1. Set Detection Area
2. Enable Plate Exposure, set value

◆ Cautions on using the license plate exposure function

If the customer sets the license plate as still black according to the above method, it means that the scene has a large dynamic range, and the license plate exposure cannot be used to improve the license plate capture. Need to set up license plate detection area reasonably.

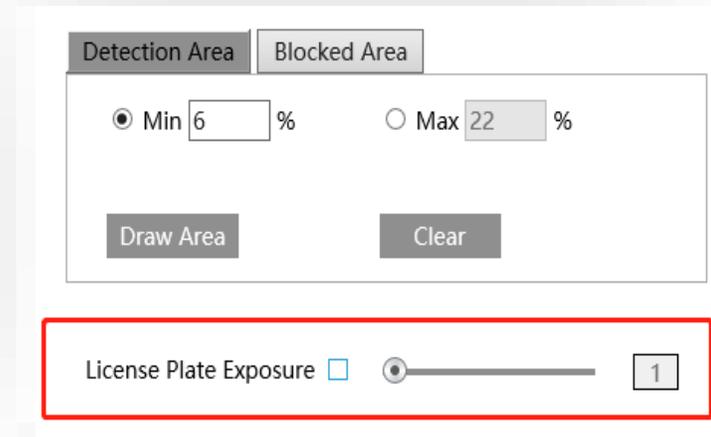


Image Settings

6. Summary



◆ Back-light scene

Turn on license plate exposure



◆ Different Speed

Set different shutter upper limit values according to different vehicle speeds



◆ Reflective scene

Adjust the brightness and gain according to the actual scene

Product List

Image

- ✓ Smart H.265
- ✓ 2MP@30fps
- ✓ 1 / 2.8"CMOS
- ✓ Sony Starvis Sensor
- ✓ DC Iris

Interface

- ✓ Hard Reset
- ✓ SD card slot; up to 128GB
- ✓ PoE, IEEE802.3 af
- ✓ - 30 °C ~ 60 °C
- ✓ Humidity<95%

Functions

- ✓ Intelligent Analytics
- Video tampering detection
- Scene change detection
- License plate
- ✓ Watermark

LPR

- ✓ Snapshot
- Overview and cutout of plate for picture
- ✓ White List--10000
- ✓ Capture Speed Range 0-70 km/h



TD-9322A3-LR

- ✓ CS Lens Mount
- ✓ ABF
- ✓ IP67
- ✓ RS485
- ✓ 2 CH Alarm Input/Output
- ✓ USB
- ✓ 1 CH Audio input/output ; 1CH built-in MIC



TD-9423A3-LR

- ✓ 2.8~12MM@F1.4, Motorized; 7~22MM@F1.6, Motorized
- ✓ 1 CH Audio input/output; ✓ 1 CH Alarm input/output

Secure the world with you !

