AVYCON®

AVC NBL41M-L1

INTRODUCTION

4MP HD ANPR NETWORK CAMERA

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
- Applicable Scene
- Not Applicable Scene
- For use with

03
Installation
- Lens Selection
- Installation
- Application Install

04
Settings
- Detection
- Recognition
- Image Settings

05
Product List
- Features
- Model No.

◆ **EUROPE**
Belgium, Bulgaria, Croatia, Germany, United Kingdom, Greece, Hungary, Italy, Poland, Romania, Russia

◆ **ASIA**
Israel, Indonesia, Turkey, India, UAE, Vietnam, China, Hong Kong, Taiwan

◆ **AFRICA**
South Africa

◆ **AUSTRALIA**
Australia

◆ **NORTH AMERICA**
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

2.1 Applicable Scenes

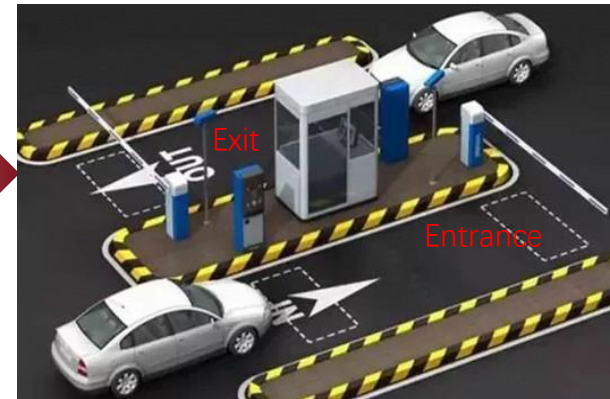| Barrier Control	Road Surveillance	Car Management	Investigation
Entrance & exit	Illegal vehicle Not for Highways	VIP Car Manage	Post-event investigation for forensics

2.2 Not Applicable Scenes

◆ Entrance Control

Shared exit and entrance ✗

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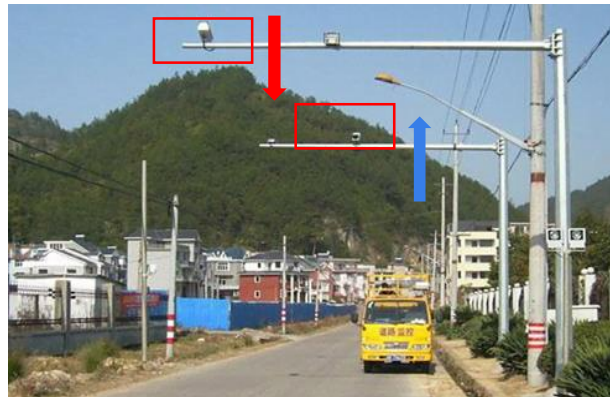

Correct it

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.

Correct it

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.

2.3 For Use With...

NVR Ver1.4.4

- Can set license plate detection area (range of license plate proportion: 5%~30%)
- Can set entrance and exit directions
- Set up black and white lists, license plate recognition
- License plate library can add the number of licenses 50000

AVYCON CVMS 2.0 ver2.1.0

AVYCON CVMS 2.0 Platform

- 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
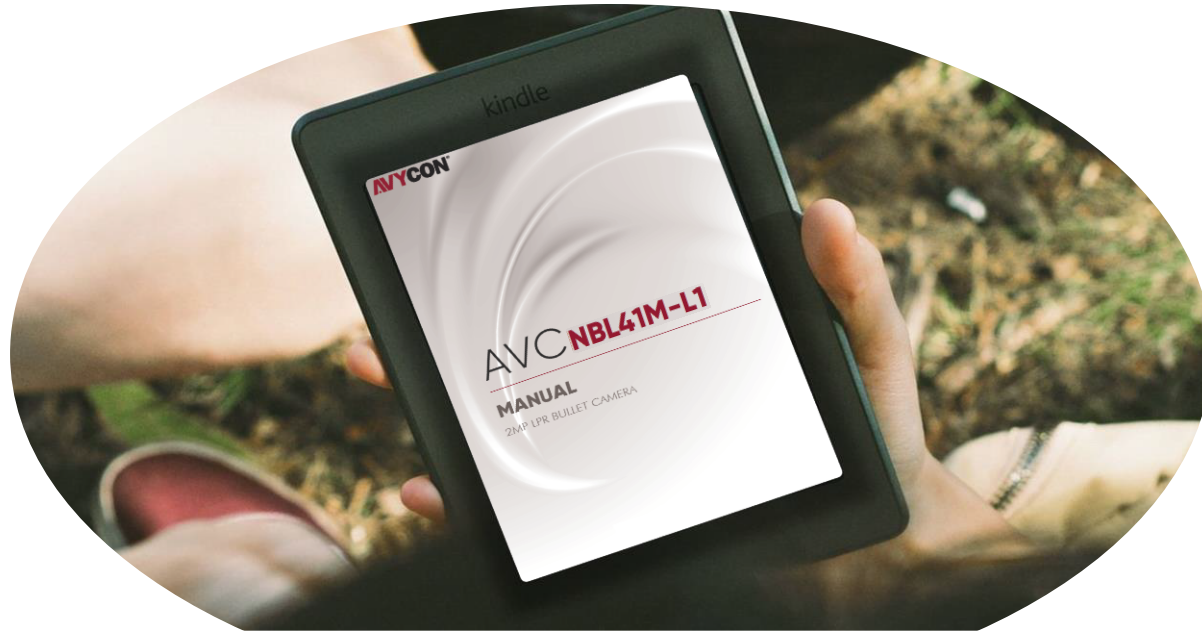
□ User Guide

□ Lens Selection

□ Installation Requirements

3.1 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°~ 5°

◆ Lens Selection

Select a proper lens according to the table below.

License plate Width (in)	Lens	Horizontal field of view	Max. Detected width(in)	Min. Detected width(in)	Max. Recognition Distance(ft)	Min. Recognition Distance(ft)
12	22mm	17.6	192	24	52	6
12	12mm	32.4	192	24	28	3
20	22mm	17.6	327	41	88	11
20	12mm	32.4	327	41	47	6
17	22mm	17.6	277	35	75	9
17	12mm	32.4	277	35	40	5

Notes:
1. License plate width accounts for 1/2 ~ 1/16 of the camera's field of view width
2. License plate width varies in each region
3. Calculate the detected license plate width and recognition distance from the table:
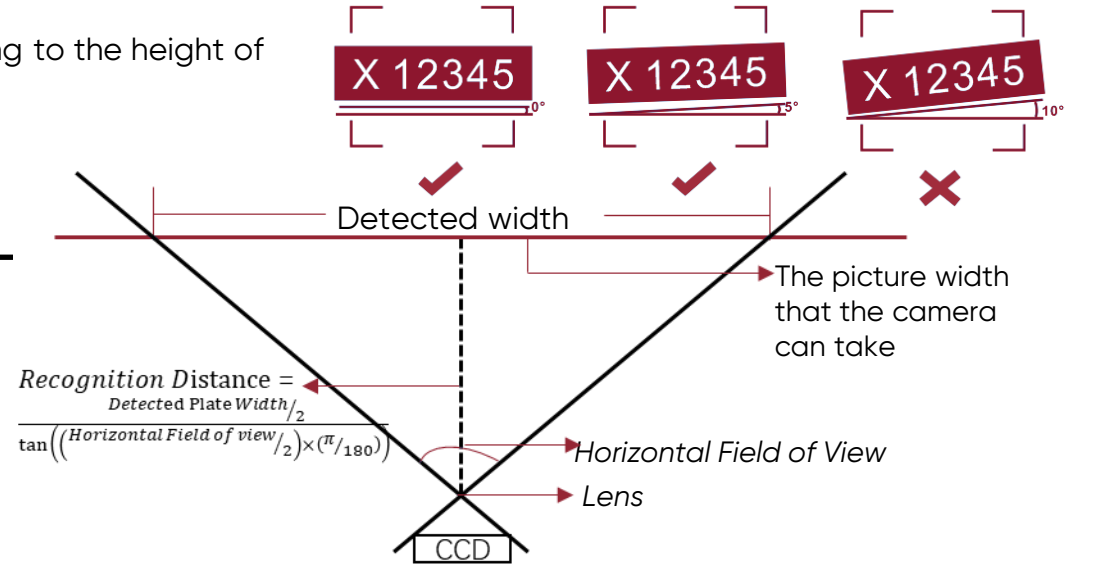
$$Recognition\ Distance = \frac{Detected\ Plate\ Width/_2}{\tan\left(\left(Horizontal\ Field\ of\ view/_2\right)\times(\pi/_{180})\right)}$$

- Max Acture Plate width=1/2 ×Horizontal Field of view
- Min Acture Plate width=1/16 ×Horizontal Field of view
- ❑ Min. Detected width = 16 × Actual Plate width
- ❑ Max. Detected width = 2 × Actual Plate width

$$❖\ Min\ Recognition\ Distance = \frac{Min\ Detected\ Plate\ Width/_2}{\tan\left(\left(Horizontal\ Field\ of\ view/_2\right)\times(\pi/_{180})\right)}$$

$$❖\ Max\ Recognition\ Distance = \frac{Max\ Detectected\ Width/_2}{\tan\left(\left(Horizontal\ Field\ of\ view/_2\right)\times(\pi/_{180})\right)}$$

3.2 Installation Requirements

◆ Requirements

✓ **Target size**
≤50% of the scene size

✓ **Target Height**
≥10% of the scene size

✓ **Fill Light**
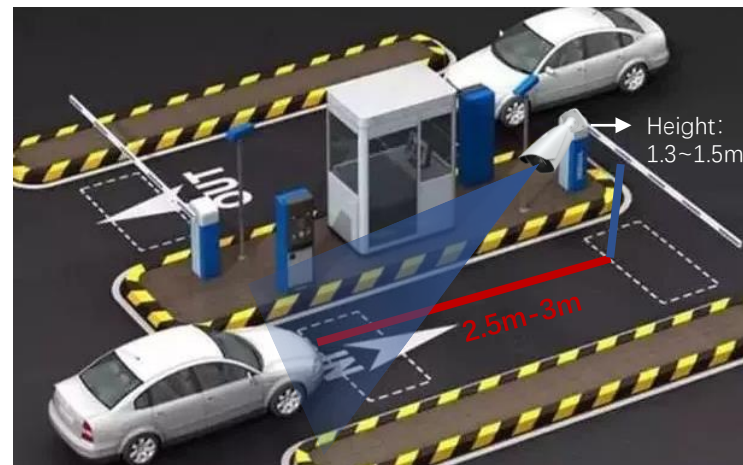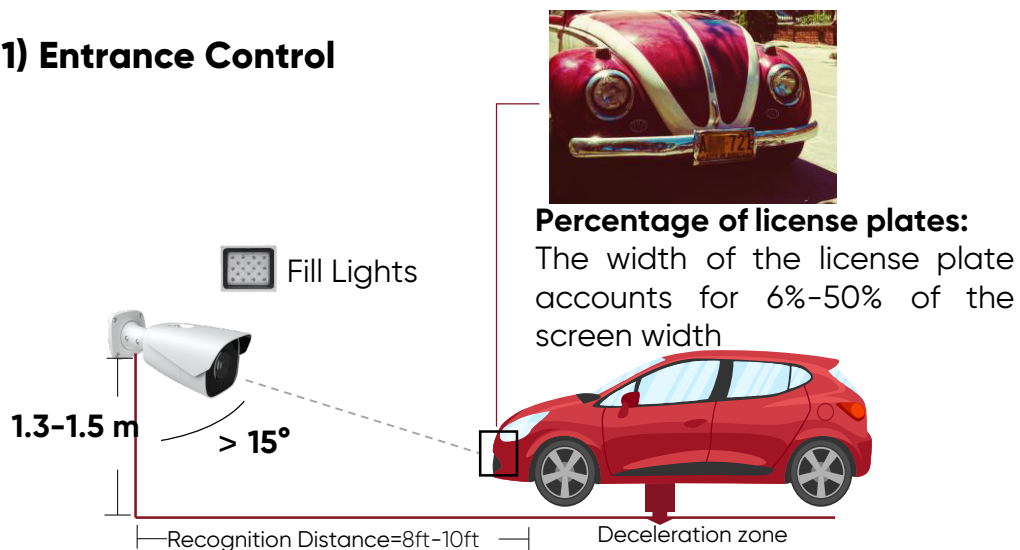Keep a certain distance from IPC, to avoid Plate over exposure

✓ **Installation Angle**
Depression Angle ≥15 °Avoid the influence of car lights

◆ Installation

1) Entrance Control

Percentage of license plates:
The width of the license plate accounts for 6%-50% of the screen width

Fill Lights

1.3-1.5 m

> 15°

Recognition Distance=8ft-10ft

Deceleration zone

Height: 1.3~1.5m

2.5m-3m

2) Road Surveillance

Fill Lights

> 15°

4-6m

Recognizable vehicle speed: **18-43mph**

Recognition Distance: 49-98ft

Percentage of license plates:
The width of the license plate accounts for 6%-50% of the Detected area width
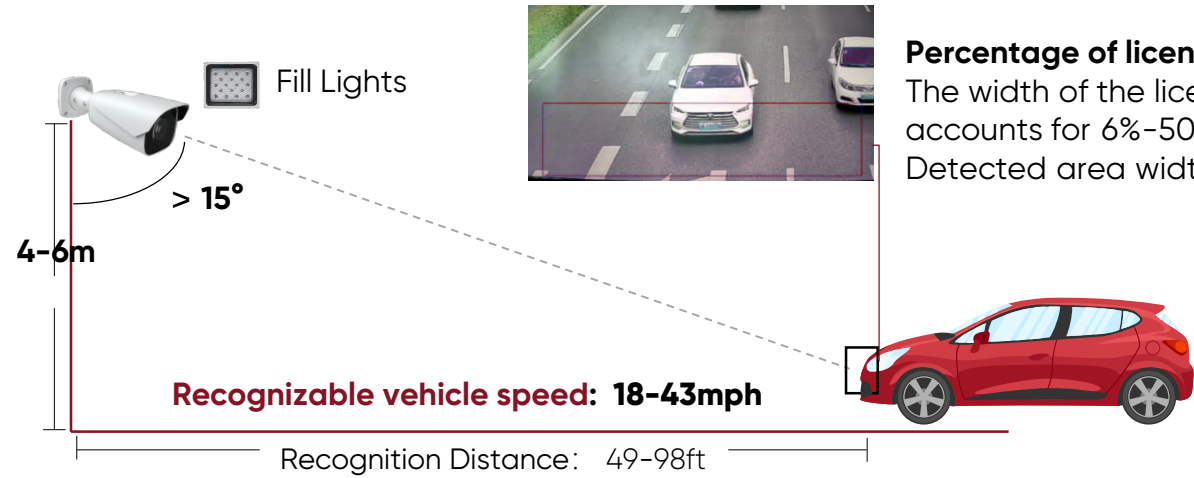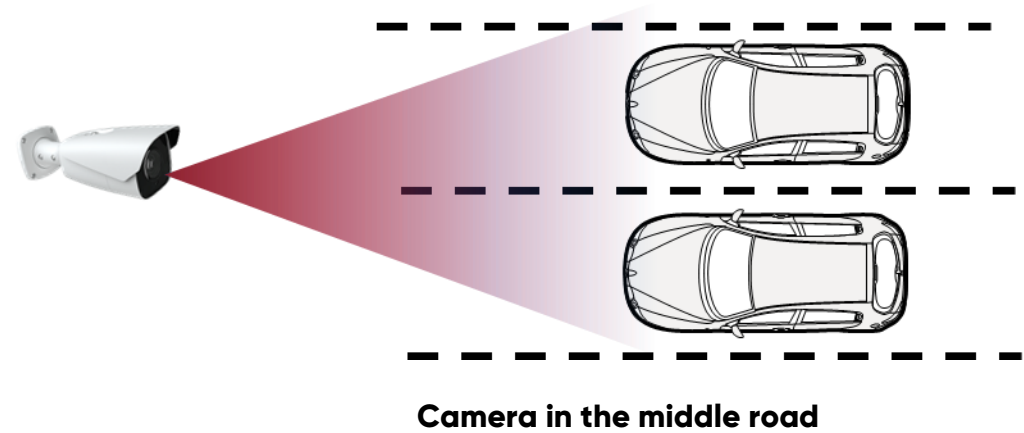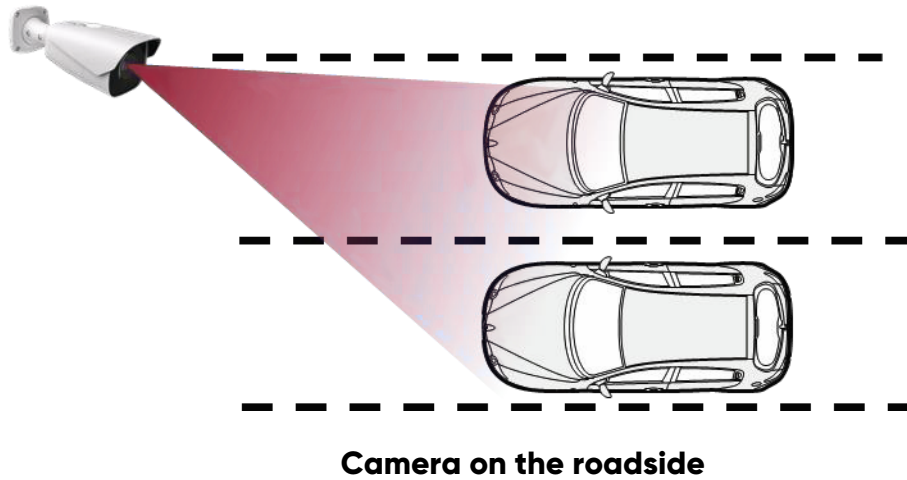
Notes：

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

4.1 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

4.2 Detection

◆ **The key points that affect the snapping effect**

✓ **Definition**
Recognizable by the human eye

✓ **Size**
Meet the set size range

✓ **Duration**
License plate appears on the screen for more than 1 second

✓ **Area**
Snapshot area is drawn at the position with the best license plate quality

◆ **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

◆ **Recommended Settings**

1. Adjust the camera angle and height to ensure that the license plate stays in the picture for more than 1 second.

2. Adjust the maximum and minimum settings.

3. Draw snapshot area, the position depends on the actual scene

Config Home ▸ Event ▸ ANPR

Detection Config   Comparison and Linkage   Area   Schedule   Vehicle Database

Detection Area   Blocked Area

● 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

Detection Area   Blocked Area

● Min 12 %   ○ Max 50 %

Draw Area   Clear

License Plate Exposure ☐ ⬤━━━━━ 1

Plate side < Min Area as setted

Save

◆ **Plate Proportion Comparison**

4.3 Recognition

✓ Vehicle Database

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

Add   Bulk Entry   add multiple vehicles

Add

License plate number	AB123	List Type	Unknown vehicle ▾
Start Time	2019-10-08 00:00:00	End Time	2019-10-08 23:59:59
Owner	xxx	License plate type		Save

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: YYY/MM/dd hh:mm:ss; time range is from 1970 to 2037.
4. The effective end time is optional; format: YYY/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

| License plate number | | List Type | All Types ▾ | 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 Mo...

✓ Comparison and Linkage

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

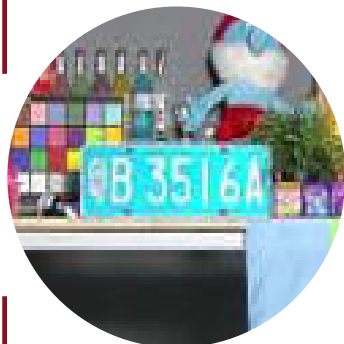| Allow fault character(s) of the plate number | 0 ▾ |
Alarm List	Allow list ▾
Trigger Alarm Out	If the camera recognizes the detected vehicle, it will trigger Alarm.
☐ Alarm Out	

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

4.4 Image Settings

4.4.1 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

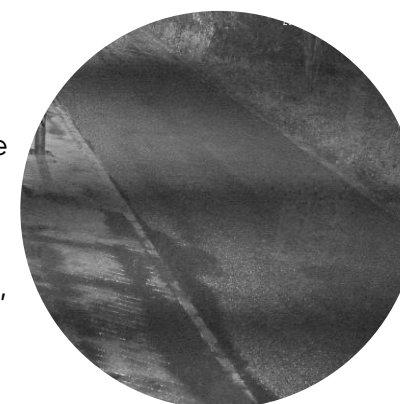Gain 1

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.

## 4.4.2 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.

4.4.3 Image settings in Day/Night mode

✔ **Brightness**

Day: stay within 25 (reflection license plate : 5) Night: Lower it to see the license plate clearly
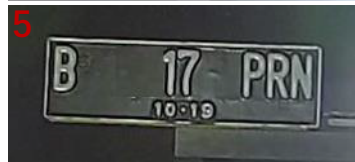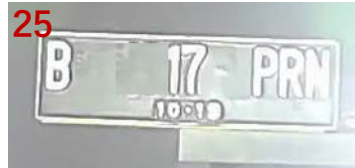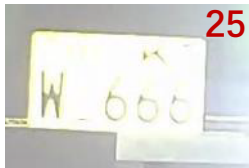
Reflective plate   Non-Reflective plate

✔ **Shutter**

ShutterUpper： 1/500~1/1000;

- In the scene where the vehicle speed is lower than 25mph, it can be appropriately extended, but not more than 1/100;
- If the gate can be set to 1/100, the faster the speed, the smaller the value needs to be.
- The smaller the shutter limit is setted, the worse the image will be in low light scenes, please switch to night mode earlier.

ShutterLower: 1/100,000

✔ **Gain**

Gain Settings： Auto;
Not to exceed 20, it can be reduced to about 10.

✔ **Auxiliary lighting**

If the ambient visible light is low, in order to grasp the license plate clearly, you need to limit the gain and shutter. At this time, you need to increase auxiliary lighting.

- For license plates with strong infrared reflection, use white light to supplement light;
- License plates that do not have strong infrared reflection, use infrared light to fill the light.
- Adjusting the angle of the lamp, try to let the light reflected from the license plate enter the lens.

4.4.4 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

| Detection Area | Blocked Area |

◉ Min 6 % ○ Max 22 %

Draw Area   Clear

License Plate Exposure ☐ ◉————————— 1

Reflective Plate

Non-Reflective Plate

Image

- ✓ Smart H.265
- ✓ 4MP@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 0-43 mph

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- ✓ 7~22mm Motorized Auto-Focus Lens

✓1 CH Audio input/output; ✓1 CH Alarm input/output