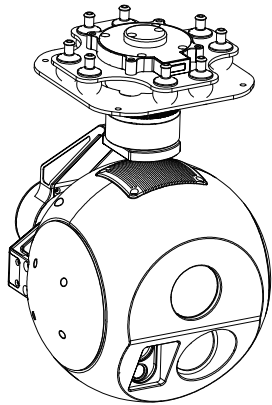
# Q20KTIRM 20x EO 4K Triple Sensors and LRF Gimbal Camera

User Manual



For more details please scan the QR code or visit our website:
www.viewprotech.com

## Disclaimer and Warning

Congratulations on purchasing your new Viewpro product. Please read this entire document carefully. Failure to read or follow instructions and warnings in this document may result in damage to your Viewpro product. Disassemble the gimbal camera by user is not permitted, as which may cause the camera does not work normally.

Viewpro accepts no liability for damage, injury or any legal responsibility incurred directly or indirectly from the use of this project. The user shall observe safe and lawful practices including, but no limited to, those set forth in the manual.

## Legends



Warning



Important Note

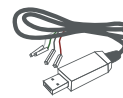
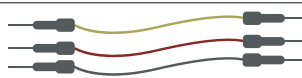
# 1.Product Introduction

## 1.1 Introduction

Q20KTIRM is a 3-axis high-precision gimbal with 20x optical zoom SONY RGB camera, it integrated with 20x optical zoom EO sensor which provides not only 4K IP output but also 4K 8.51 picture& video storage and with a 24mm lens 640*512 IR thermal sensor. It supports IR thermal and visible PIP switch, IR color palette switch, photographing and video, target tracking, thermal digital zoom. It features aluminum alloy housing and anti-interference. The 3 axis gimbal can achieve stabilization in yaw, roll and pitch. The integrated design of damping system and gimbal can greatly reduce mechanical vibration.

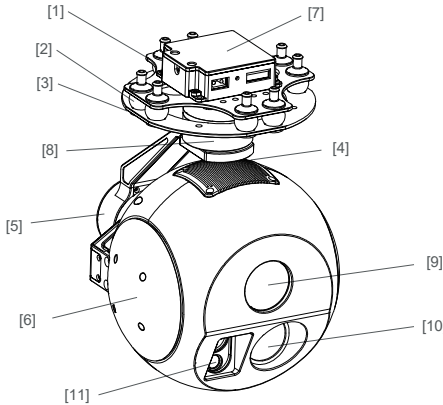
Q20KTIRM is widely used in UxS industries of public security, electric power, fire fighting zoom aerial photography and other industrial applications.

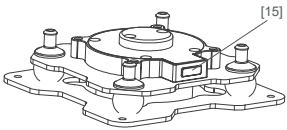
## 1.2 In the Box

| | | | |
|---|---|---|---|
| Gimbal (Standard Version) ×1 |  | Gimbal (Viewport Version) ×1 |  |
| Aluminum Cylinder ×4 |  | USB to TTL line ×1 |  |
| M3 screw ×8 |  | | |
| Power Line ×1 |  | | |
| PWM Control line ×1 |  | | |
| Serial port/S.bus Control lin ×1 |  | | |
| Connect serial port line ×3 |  | | |
| Ethernet line ×1 |  | | |

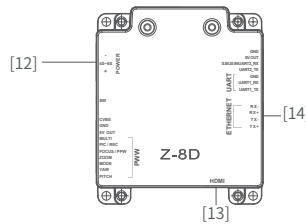
# 2. Installation Instruction

## 2.1 Overview




Viewport




Control Box

[1] Upper damping board
[2] Damping ball
[3] Lower damping board
[4] TF card slot
[5] Roll axis motor
[6] Pitch axis motor
[7] Control box
[8] Yaw axis motor
[9] FHD zoom camera
[10] Infrared thermal camera
[11] laser rangefinder
[12] 4-6S power interface
[13] Micro HDMI interface
[14] Ethernet interface
[15] Viewport unlock button



- Please ensure that there isn't any obstacle while the motor rotating.
- Please remove the obstacle immediately if gimbal camera is blocked during rotation.



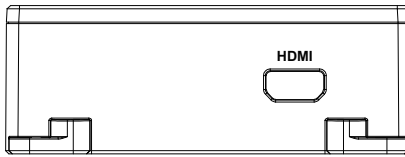
- Don't put the infrared thermal camera towards the sun in case any burn to the camera



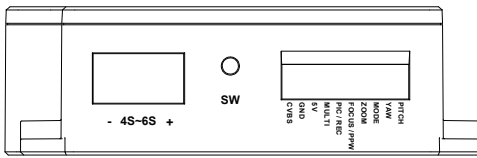
- The input voltage cannot be higher than 6S.
- The pin insertion interface cannot be connected with power supply.

## 2.2.2 Control Box Printing (Viewport Version)

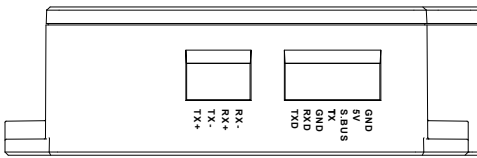
Front Side




Left Side

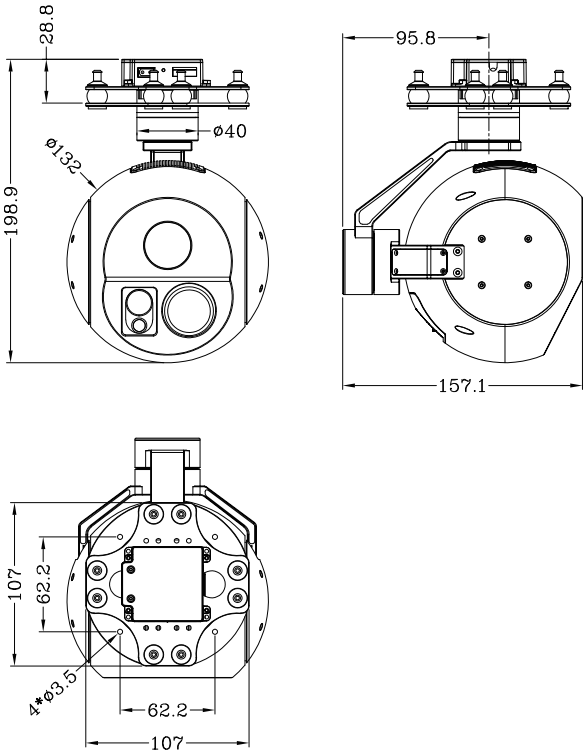



Right Side



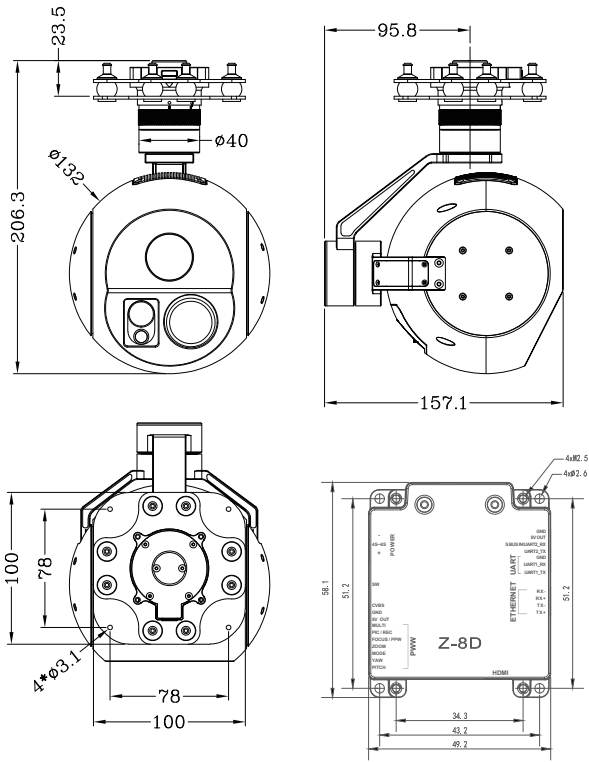
## 2.3.1 Device Dimensions (Standard Version)

Unit: mm



## 2.3.2 Device Dimensions (Viewport Version)

Unit: mm

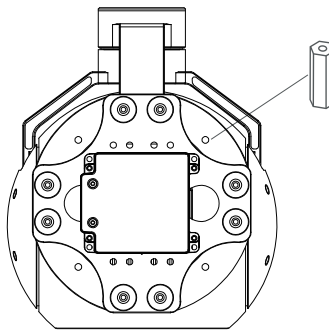


## 2.4 Install Mounting Part

(1) Find out the arrow on the gimbal which indicating the yaw heading of the payload (i.e. the lens direction when the camera power on), and synchronize with the direction specified by the UxS.

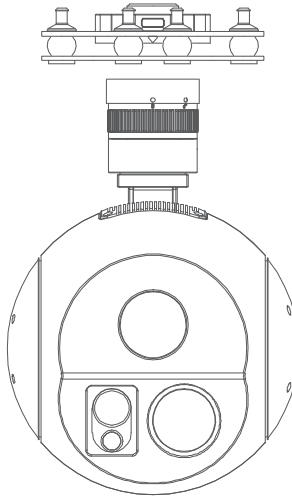
(2) Fix one end of the Aluminum cylinder on the screw hole of lower damping board, and use M3 screw to fasten it.

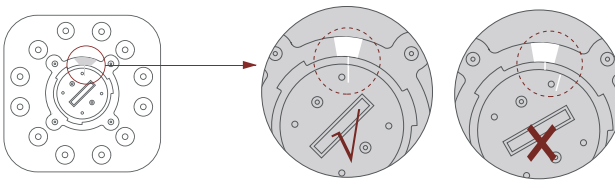
(3) According to the provided screw hole dimension you can make suitable mounting holes on the UxS mounting board, and fixes the other end of the copper cylinder on the mounting board of the UxS (Viewport version is the same).



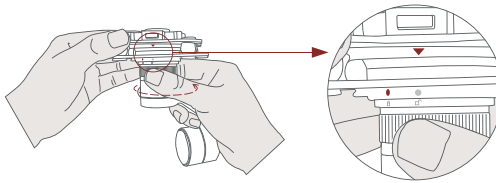
**Front**

## 2.5 Viewport Release Instruction

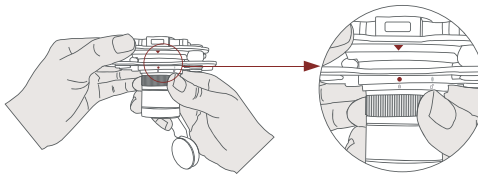




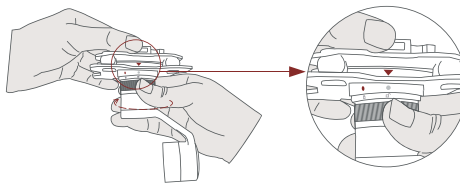
1. Make sure the two white stripes indicated in above picture are aligned with each other. (If the stripes are not aligned to each other, please pinch the connector part and turn it to left manually)



2. Align the white dot (unlock icon) to the red triangle (below unlock button), push the gimbal into the Viewport completely and then rotate the gimbal camera anticlockwise.



3. When you hear "click" sound (when red dot is aligned to the red triangle) means the gimbal camera and Viewport has been locked.



4. To unlock the Viewport, you need to press on unlock button and rotate the gimbal camera clockwise till the white dot align to the red triangle. Then pull the gimbal out from the Viewport.

## 2.6 Install TF Card

TF (Micro SD card): Install the TF card to the card slot (Re. 2.1 Overview). Support max 512GB. Request Class 10 (10m/s) transmission speed or higher and FAT32 format.



- Make sure device is power off when inserting the TF card, hot plugging is not supported.

## 2.7 Image Output Interface

HDMI output: Micro HDMI port, supports 1080P@60fps, connects to external monitors or video transmitters for real-time preview.

Network output: Standard RJ45 port, supports RTSP/UDP/RTMP. Default: RTSP, stream at rtsp://192.168.2.119:554, 720P@30fps, 2Mbps bitrate . All parameters user-adjustable.

Analog output: not supported.



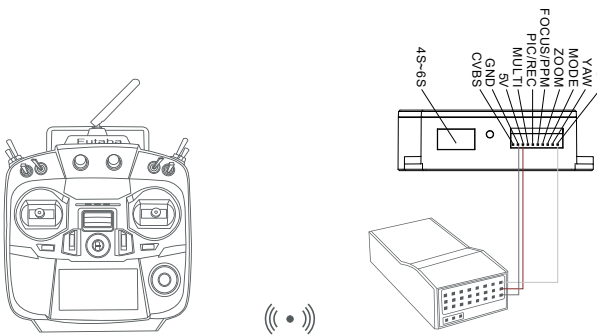
- Video output varies by model, refer to actual product. Due to 360° continuous yaw rotation, this gimbal series does not support HDMI. And SDI and HDMI are mutually exclusive and cannot be configured together on the same device.
- When using user interface software Viewlink for network connection, the network of external device (computer) should be the IP address: 192.168.2.2 (choose the last byte among 2~254, can not be 119 same as the gimbal), subnet mask: 255.255.255.0, Default gateway: 192.168.2.1, and all firewalls of the computer must be closed. Then enter the IP address of the gimbal camera, Open Video, the video stream can be outputted.

# 3. Signal Control

## 3.1 PWM Control

Control the gimbal camera functions by the multiplex pulse width modulation signal outputted by PWM channel of the remote control receiver. The camera needs up to 7 control channels of PWM. You can choose needed functions according to actual usage to reduce the required number of PWM channels.

**3.1.1 PWM Connection Diagram** (Connect pitch channel as example)




Remote Controller　　Receiver

Connection Diagram

## 3.1.2 PWM Control Operation Instruction

**1) Pitch** (PWM Pitch channel in to control Pitch. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



**Position 1**

Low Gear
Pitch Up



**Position 2**

Middle Gear
Pitch Stop



**Position 3**

High Gear
Pitch Down

**2) Yaw** (PWM Yaw channel in to control Yaw. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



**Position 1**

Low Gear
Yaw Left



**Position 2**

Middle Gear
Yaw Stop



**Position 3**

High Gear
Yaw Right

**3) Mode** (PWM Mode channel in to adjust speed control/one key to Home position etc functions. Rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



**Position 1**

Low Gear



**Position 2**

Middle Gear



**Position 3**

High Gear

Position 1: Low speed mode, control pitch / yaw with this mode at lowest speed
Position 2: Middle speed mode, control pitch / yaw with this mode at middle speed
Position 3: High speed mode, control pitch / yaw with this mode at highest speed
(If it is controlled by rotary knob, the speed will change according to switch position)

## Function of continuous switching:

**3.1)** Operate 1 time continuously and quickly, from position 2 - 3, to Home position.

**3.2)** Operate 2 times continuously and quickly, from position 2 - 3 - 2 - 3, the camera lens looks vertically down.

**3.3)** Operate 3 times continuously and quickly, from position 2 - 3 - 2 - 3 - 2 - 3, to disable Follow Yaw Mode (gimbal yaw not follows by frame)

**3.4)** Operate 4 times continuously and quickly, from position 2 - 3 - 2 - 3 - 2 - 3 - 2 - 3, to enable Follow Yaw Mode (gimbal yaw follows by frame)

**4) Zoom** (PWM Zoom channel in to control Zoom. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



**Position 1**

Low Gear
Zoom Out



**Position 2**

Middle Gear
Stop Zoom



**Position 3**

High Gear
Zoom In

**5) Focus** (PWM Focus channel is to control PIP / IR color palette switch. 3-gear switch as example.)



**Position 1**

Low Gear
PIP switch



**Position 2**

Middle Gear
No control



**Position 3**

High Gear
IR color palette switch

Switch from Position 2 to 1: Picture in Picture. EO+IR , IR+EO, EO only, IR only.
Switch from Position 2 to 3: IR color switching: white hot, black hot, pseudo color.

**6) Pic/Rec** (PWM Pic/Rec channel in to control take picture and record. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



**Position 1**

Low Gear



**Position 2**

Middle Gear



**Position 3**

High Gear

Switch from Position 2 to 1 to take a picture.
OSD display “REC IMG” at the left top corner and the picture is stored in TF card.

Switch from Position 2 to 3 to start “ Record ” , and repeat the operation to stop recording.
During recording, OSD display information of “REC 00 00 00”, as current recording time, and the remaining capacity of TF card. It will show the “STBY xxx mins left” when stop recording. When the storage capacity of TF card is full , “SD card is full” is shown on
screen. If no TF card is inserted, “NO SD CARD” is shown on screen. Please insert the TF card before using.

**7) Multi:** IR digital zoom / tracking control



**Position 1**

Low Gear



**Position 2**

Middle Gear



**Position 3**

High Gear

Switch from Position 2 to 1: IR digital zoom, 1x~4x

Switch from Position 2 to 3:

- Exit the tracking, display the cross cursor. Adjust the cross cursor to lock target object and start tracking

Switch from Position 3 to 2:

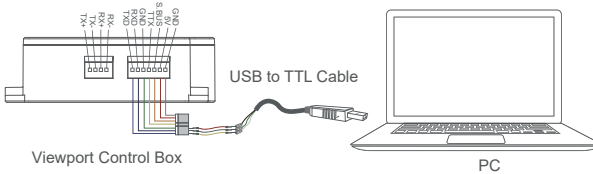
- Cancel tracking

## 3.2 Serial Port / TTL Control

TTL communication requirements: TTL signal is 3.3V, baud rate: 115200, data bit 8, stop bit 1, no parity, HEX send and receive.

**Connection Diagram** (PC - USB to TTL Cable- Gimbal Camera as example):

| **Gimbal Camera** | | **Cable** |
|---|---|---|
| TX | ⟷ | RX (White) |
| RX | ⟷ | TX (Green) |
| GND | ⟷ | GND (Black) |




Connection Diagram

## Diagram of USB to TTL Cable:

Connect the camera to the upper computer by USB to TTL cable (Adopt connection method of TX to RX, RX to TX, GNG to GND at Dupont ends of the provided USB to TTL cable, connect to the specified TTL of the gimbal, and the USB end of the cable connect to computer).

Install Viewlink control software to test the functions directly. Users may choose to develop their own software, please contact technical support for TTL control protocol file.

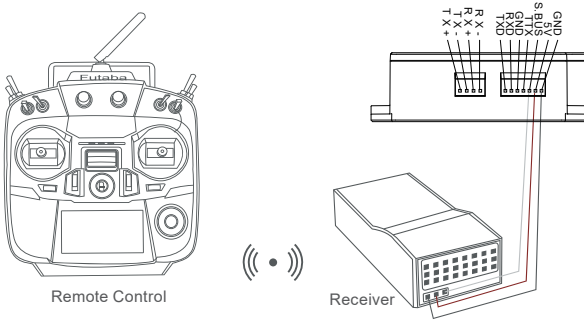
ViewLink is a user interface developed by Viewpro for Viewpro gimbal cameras, you can download it from Viewpro website (www.viewprotech.com) or ask distributors for installation package.

- Connect serial port of gimbal to pins, DO NOT connect with power supply.
- The default baud rate of serial port is 115200, which can be changed according to the docking equipment.

## 3.3 S.BUS Control

Control the gimbal camera functions by one combining signals. Connect the external S.Bus to S.Bus port on the control box, and the external S.bus signal GND connect to the GND interface of the control box.

Wiring Diagram (Take Futaba remote control for example):




Remote Control

Receiver

Wiring Diagram

S.Bus control mode: default S.Bus signal channel 7-13 to control gimbal camera functions (the function of channel is consistent with corresponding channel in PWM function description)

Channel 7: Yaw Control
Channel 8: Pitch Control
Channel 9: Mode Control
Channel 10: Zoom Control
Channel 11: Focus Control
Channel 12: Pic/Rec Control
Channel 13: Multi Backup

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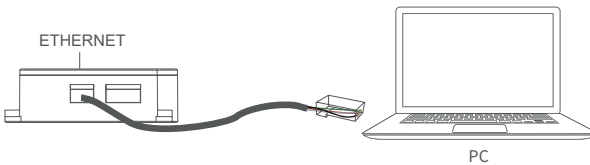
- User can set the channels by setting serial command according to the actual requirement. The S.Bus channel position can be arranged in any sequence within channel 7-13 to connect with the flight controller or remote control.
- TTL control and S.bus control cannot coexist at the same time for standard version. The defualt control is TTL if no requirement. The user can set to S.bus control if needed (please contact with our technical support for the setting instruction.)

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## 3.4 TCP control

If the gimbal is shipped with a network port output, the default IP address is 192.168.2.119, and the control port is 2000. After connection, send the corresponding TCP protocol to control the gimbal.

The TCP control protocol is [Frame header: EB + command ID: 90 + data body (serial port protocol) + Checksum (CS = body checksum, checksum is calculated as a sum of all bytes of data body modulo 256)]. Or directly use UI Viewlink to control after TCP connection.




Ethernet wiring diagram

## 3.5 Laser Rangefinder

Q20KTIRM build-in infrared (IR) laser rangefinder (LRF). The target is the object in the center point of the screen.

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1. The LRF of Q20KTIRM is default turned off to prolong life-span, can open It and choose ranging frequency in Viewlink main interface -LRF section manually.

2.If you don't use Viewlink, you can send below serial port commands to set the laser rangefinder working methods:

- Single Use: 55 AA DC 05 1C 20 00 39
- Continuous ranging: 55 AA DC 05 1C 40 00 59
- Turn off again: 55 AA DC 05 1C A0 00 B9

3. Some cases might cause the distance show 0:

A. The distance is out of range

B. Target is too small to be ranged within the valid distance

C. The IR laser rangefinder can't get distance information from reflective objects (glass, water, rain) or over-inclined objects.

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# 4. Specification

| Hardware Parameter | |
|---|---|
| N.W. | 1065g |
| Product meas. | 156.6*132*196.7mm |
| Input voltage | 14.8V~25.2V |
| Dynamic current | 800~1500mA @16V |
| Power consumption | Average 12.8W, Max 24W |
| Working environment temp. | -20℃ ~ +50℃ |
| Output (optional) | Micro HDMI(1080P 30fps) / IP (RTSP/UDP 720p/ 1080p/4K 25fps/30fps H264/H265) |
| Local-storage | TF card (Up to 512G,class 10, FAT32 format) |
| Picture storage format in TF card | JPG (4K:3840*2160) |

| | |
|---|---|
| Video storage format in TF card | 1.MP4 (4K:3840*2160) Note:Output 720P/1080P<br>2.MP4 (1080P:1920*1080) Note:Output 4K<br>Video output and video storage cannot be 4K at the same time |
| Control method | PWM / S.BUS / UART (TTL) / TCP / UDP |
| **Gimbal Spec** | |
| Mechanical Range | Pitch/Tilt: -60°～123°, Roll: ±70°, Yaw/Pan: ±300° / ±360°*N (IP output version) |
| Controllable Range | Pitch/Tilt: -45°～120°, Yaw/Pan: ±290° / ±360°*N (IP output version) |
| Vibration angle | Pitch/Roll/Yaw: ±0.02° |
| One-key to center | √ |
| **EO Camera Spec** | |
| Imager Sensor | 1/2.5" CMOS Sensor |
| Total pixel | 8.51MP |
| Optical zoom | 20x, F2.0 to F3.8,f = 4.4 mm (Wide)~ 88.4 mm (Tele) |
| Digital zoom | 12x (240x with optical zoom) |
| Min. working distance | 80 mm (Wide end), 800 mm (Tele end) |

| | |
|---|---|
| Angle of view ( H,V ) | H: 70.2°(Wide end) ~ 4.1°(Tele end)<br>V: 43.1°(Wide end) ~ 2.3°(Tele end) |
| S/N ratio | more than 50dB |
| Min illumination | 1.6 lux (1/30 sec, 50%, ICR off,<br>High Sensitivity mode Off )<br>0.4 lux (1/30 sec, 50%, ICR Off,<br>High Sensitivity mode On)<br>0.21 lux (50%, ICR off, Slow Shutter 1/4s,<br>High sensitivity off)<br>0.06 lux (50%, ICR off, Slow shutter 1/4s,<br>High sensitivity on) |
| Shutter speed | 1/1 sec to 1/10000 sec |
| Exposure control | Auto / Iris. Priority / Shut. Priority / Manual |
| Focus | Auto / Manual |
| Backlight compensation | Yes |
| Auto ICR | Yes |
| Noise Reduction | Yes |
| Image stabilization(EIS) | Yes |
| Defog | Yes |
| **IR Thermal Imager Spec** | |
| Focus Length | 24mm |
| Horizontal FOV | 18.2° |

| | |
|---|---|
| Vertical FOV | 14.6° |
| Diagonal FOV | 23.2° |
| Detective Distance (Man: 1.8x0.5m) | 1000 meters |
| Recognize Distance (Man: 1.8x0.5m) | 250 meters |
| Verified Distance (Man: 1.8x0.5m) | 125 meters |
| Detective Distance (Car: 4.2x1.8m) | 3067 meters |
| Recognize Distance (Car: 4.2x1.8m) | 767 meters |
| Verified Distance (Car: 4.2x1.8m) | 383 meters |
| Working mode | Uncooled long wave (8μm~14μm) thermal imager |
| Detector pixel | 640*512 |
| Pixel pitch | 12μm |
| Focusing method | Athermal prime lens |
| NETD | ≤50mK (@25℃) |
| Color palette | white hot, black hot, iron red |
| Auto Non-uniform correction | Yes (no shutter) |
| Digital zoom | 1x ~ 4x |
| Thermometry type | Not supported |

| Camera Object Tracking | |
|---|---|
| Update rate of deviation pixel | 50Hz |
| Output delay of deviation pixel | 5ms |
| Minimum object contrast | 5% |
| SNR | 4 |
| Minimum object size | 32*32 pixel |
| Maximum object size | 128*128 pixel |
| Tracking speed | ±48 pixel/frame |
| Object memory time | 100 frames (4s) |
| **Laser Rangefinder** | |
| Range | for car ≥ 3000m; for human ≥ 2000m |
| Minimum range | 15m |
| Frequency | 1~10Hz |
| Accuracy | ±1m |
| Light Beam | 1535±5nm pulse laser |
| Divergent Angle | ~0.6 mrad |
| Ranefinder | Measure the distance between the object at the center of screen and the laser rangefinder |

# 5. FAQ

1. How to deal with whitening visible image of Q20KTIRM in foggy weather?
A: Enable defogging mode.

2. Does Q20KTIRM support taking photos during recording?
A: Yes.

3. How to set the video storage format of Q20KTIRM?
A: When the IP output resolution is set to 1920*1080, the storage resolution is 3840*2160; Storage resolution is 1920*1080 when the IP output resolution is set to 3840*2160; The video frame rate saved in the TF card is the same with the one set during IP output.

4. Does Q20KTIRM (IP output version) support TCP control?
A: Not supported currently.

4. How to set Q20KTIRM network encoding?
A: You can use “camera configure tool V12.13” to set the resolution, bit rate, net push mode,Encoder format, frame rate, packet format, record format.