Product Description of UAV Infrared Thermal Camera

V1.0

Product Description of UAV Infrared Thermal Camera

Version number	Date Modified	Author	Approved By	Note
V1.0	201811	Adel		New

Contents

1 Introduction

Shenzhen's Dianyang UAV (Unmanned Aerial Vehicle) infrared thermal camera is a small-sized temperature-measuring infrared camera. The product adopts imported detectors, with stable operation and excellent performance. It is equipped with unique temperature calibration algorithm and easy-to-use user interface. It is small in size, light in weight and rich in interface, suitable for UAV.

2　　　　**Benefits**

- Small size, section size is 42mm*42mm;
- 4-channel flight control PWM channel, support universal remote control
- Support electric focusing
- Micro SD card stores video and photos to ensure data integrity
- Support high and low temperature tracking to quickly find hot spots

3   Specification

UAV infrared thermal Camera specification is shown below,

Parameter	SM-19-384	SM-19-640
Resolution	384x288	640x480
Pixel Pitch	17um	
Wavelength	8~14um	
Frame Rate	50Hz	30Hz
NETD	60mK@25℃	
FOV	Please see below table for detail	
Angular resolution		
Temperature range	-20~150℃ (Can be customized, Non-radiometric version cannot support this feature)	
Image		
Radiometric area	Support global high and low temperature tracking, support point, line, rectangle, ellipse radiometric in the chosen area, support high and low temperature tracking in the area. (Non-radiometric version cannot support this feature)	
Image enhance	Adaptive stretching, manual enhancement, electronic zoom 2x and 4x	
Color pallet	white heat, black heat, iron red, rainbow and user-defined color pallet etc.	
Focusing mode	manual	
Date Format		
Single frame	BMP image format with full resolution radiation temperature information	
Digital video	MP4	

Analog video	NTSC/PAL
Data storage	Support Micro SD card local storage to maximum 32GB
Electrical Interface	
Power	DC9~15V (propose 12V)，typical power consumption 2.8W@25℃
Serial port	RS485/RS232-TTL，support Pelco PTZ protocol
Electrical lens	12V electrical lens
GPIO	1 channel magnetic isolation input: • 0, input voltage < 1V; • 1, input voltage 1~3.3V.
Environmental Parameters	
Working temperature	-20~+60℃
Storage temperature	-40ºC~+85℃
Humidity	Non-condensing 10%~95%
Case protection	IP54
Shock	25G
Vibration	2G
Mechanical Parameter	
Weight	135g（including f25 lens)
Dimension	56(L)*42(W)*42(H)mm/44(L)*42(W)*42(H)mm（without lens)
Installation	4 M2 side thread mounting holes, 2*4 M3 side thread mounting holes, with 1/4 UNC-20 PTZ adapter.

SR series thermal camera lens specification (take SR-19-384 product as an example),

No.	Focus Length	FOV	Angular resolution
1	9mm	39.9° x 30.4°	2.1mrad

2	17mm	22.0° x 16.5°	1.1mrad
3	25mm	15.0° x 11.3°	0.68mrad
4	40mm	9.3° x 7.0°	0.43mrad

4   Dimension
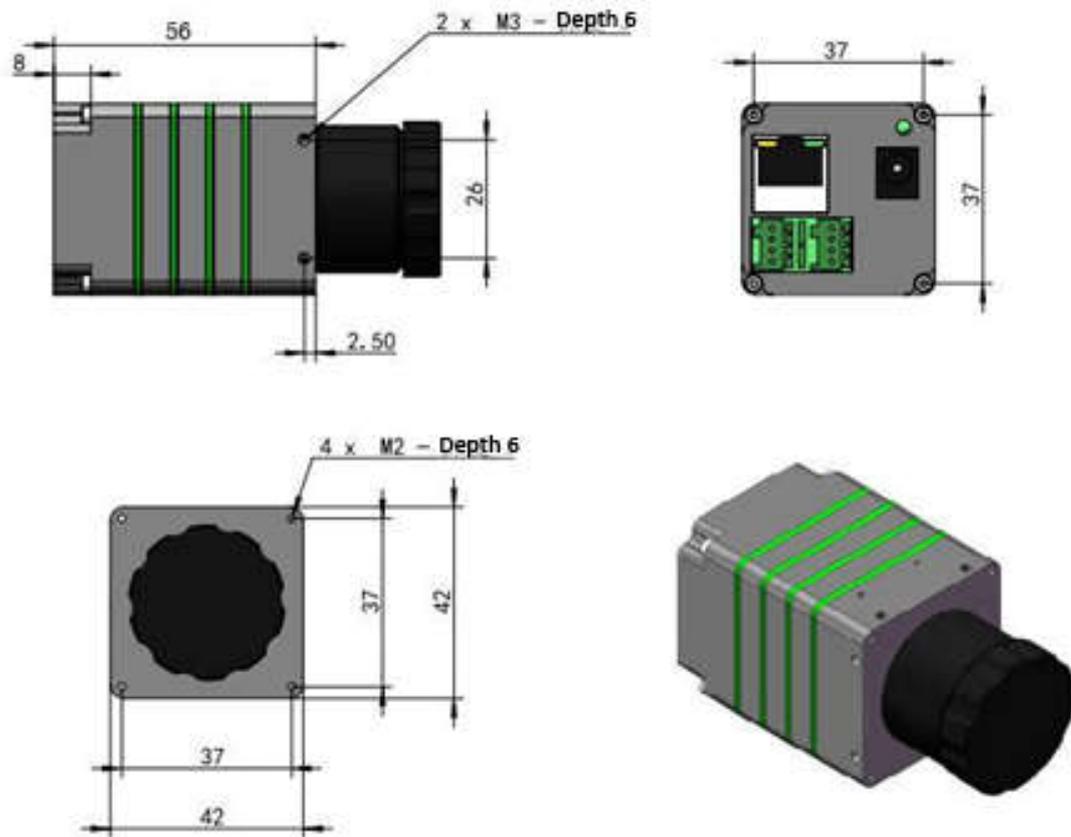


Figure 1: Dimensions (mm) of camera

5   Installation

The appearance of the UAV thermal imaging camera (manual lens with focal length f=25mm in the figure) is shown in the figure below:

Figure 2: Appearance of the SR Series infrared thermal camera

The UAV thermal imaging cameras are equipped with screw holes on all five sides and can be directly attached to the mounting plate. It can also be attached to a standard tripod with an adapter (interface UNC 1/4-20). The following picture shows the mechanical interface of the camera, including 2*4 M3 tapped holes and 4 M2 tapped holes:
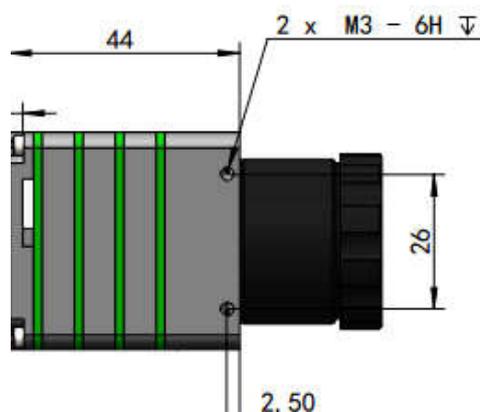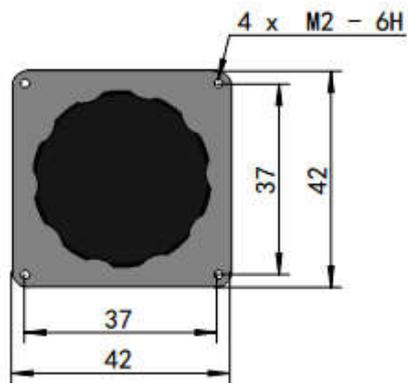
Figure 3: Camera hole position

6   Interface

6 Pin Plug

8 Pin Plug
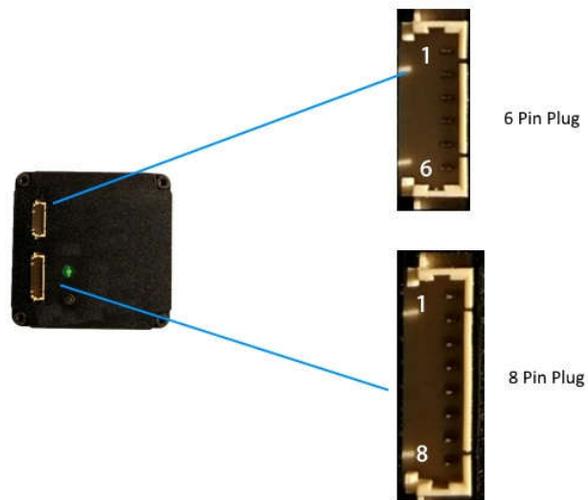
Below is the pin definition of rear panel interface,

No.	Definition
1	Electric lens positive
2	Motor lens negative
3	Common GND
4	Analog video
5	Common GND
6	DC12V

No.	Definition
1	PWM channel 4
2	PWM channel 3
3	PWM channel 2
4	PWM channel 1
5	Common GND
6	Common GND
7	UART3.3V_TX
8	UART3.3V_RX

Interface Description

No.	Interface	Specification
1	DC12V	It is allowed to input a DC power supply with 9~15V and ripple less than 200mV. The internal with overvoltage and reverse connection protection, the input voltage is too high will cause the protection circuit to fail.
2	Power Indicator LED	The power indicator is green during normal operation.
3	Analog video interface	Support NTSC/PAL system, lead access. The analog video signal can be output on this port after analog video be enabled in the software.

| 4	RS485/RS323-TTL	It conforms to the standard RS485 electrical specification and can communicate with other RS485-enabled devices or networking, such as PTZ, PC, GPS modules, etc. RS232-TTL supports the UART communication standard of the 3.3V level standard.
5	PWM channel	Support 4 channels of flight control PWM channel, can access common flight control system
6	Motorized lens interface	Supports 12V level motorized lens
7	Common GND	as a common ground for system interconnection.

Note: It is recommended to use the CLASS 10 high speed TF card to ensure the temperature data writing speed.

No.	Definition
Pin 1	Electric lens positive
Pin 2	Motor lens negative
Pin 3	Common GND
Pin 4	Analog video
Pin 5	Common GND
Pin 6	DC12V

Pin No.	Definition	Description
Pin 1	PWM channel 4	• Lens near focus adjust • Lens far focus adjust
Pin 2	PWM channel 3	• Auto focus • Electronic zoom 2x, 4x
Pin 3	PWM channel 2	• Switch color palette • Capture photo
Pin 4	PWM channel 1	• Recording radiation temperature flow • Record video
Pin 5	Common GND	
Pin 6	Common GND	
Pin 7	UART3.3V_TX	
Pin 8	UART3.3V_RX	

7 Configuration and Secondary Development Instructions

7.1 Temperature display configuration

The video output screen supports the display of temperature values and position information of the highest/lowest temperature; the frame supports different area temperature measurement, up to 8 temperature measurement areas, and displays the temperature value and position information of the highest/lowest temperature of each temperature measurement area.

The addition of the temperature measurement area and the parameter setting of the camera can be realized through the serial port. For details of the addition method, please refer to the document "Dynamic Camera Serial Port Development Instructions" and the SDK documentation of related products.

7.2 Interface configuration

Camera connects serial port,

The default parameters of the serial port is 19200 baud rate, the data bit is 8, the stop bit is 1, and no parity. The default configuration is TTL 3.3V level.

Camera connects PWM channel,

The camera support 4 channels of flight control PWM channel, realize camera, record video stream, record temperature stream, auto focus switch palette, electronic zoom, adjust far focus, adjust close focus function. These functions can also be implemented through serial communication. The data is stored in the external TF card on the side of the camera.

UAV PWM channel is a 50Hz periodic signal. The system performs information interaction by judging the duration of the high level in each cycle: when the high level duration of the PWM is less than 1.2ms (recommended below 1ms), the logic judges to be low; when the PWM is high level when the duration is between 1.3ms and 1.7ms (recommended around 1.5ms), and the logic judges to be medium. When the duration of the high level of PWM is higher than 1.8ms (more than 2ms is recommended), the logic judges to be high.

	Logical 'Low'	Logical 'Medium'	Logical 'High'
PWM period signal high pulse width	<1.2ms	1.3 - 1.7ms	>1.8ms

Each PWM channel can be switched to different logics. Users can select several functions according to

actual needs. The specific function table is as follows,

PWM	Logic	Function
PWM1	Low	Recording radiation temperature flow
	Medium	Stop record
	High	Record video
PWM2	Low	Switch color palette
	Medium	Pause
	High	Take photo
PWM3	Low	auto focus
	Medium	Pause
	High	Electronic zoom
PWM4	Low	Lens near focus adjust
	Medium	Pause
	High	Lens far focus adjust

8   Delivery Package List

The delivery package list is shown below,

No.	Item	Qty.	Remark
1	Waterproof case	1	
2	SM series infrared camera with 25mm lens	1	Lens can be customized
3	Power Adapter	1	AC110/220V to DC12V/2A power adapter
4	Socket terminal	2	For external interface connection and transfer (depending on model)
5	Quick Operation Guide	1	
6	Product service card	1	
7	Flash disk	1	Includes software installation package and instructions