15-280mm continuous variable focal MWIR

The 15-280mm continuous focal MWIR is an advanced for remote observation. It uses a highly sensitive mid wave cooler core with 640x512 resolution to produce clear images with high resolution; the 15mm~280mm continuously variable focal infrared lens can effectively distinguish targets such as people, vehicles and ships at a distance.

Figure 1 15-280mm continuous variable focal MWIR

1 Technical parameters

1.1 Detector

Detector MCT640×512

Working band 3.7～4.8μm

pixel size 15μm

Cooling method STERLIN cooling device

1.2 Lens

focal length 15 mm～280 mm continuously variable focal

F number 5.5

1.3 Performance

Field of view 1.97° (H) × 1.58° (V) ~ 35.4° (H) × 28.7°(V)

Cooling time ≤ 8 minutes at room temperature
Video output Standard PAL analog video signal
Frame rate 30Hz
NETD ≤25mk@25℃
Operating voltage DC 24-32V, PSU with input polarity protection
Power consumption ≤10W@25℃, standard working state power consumption
Operating temperature range -30℃~55℃
Storage temperature range -40℃~70℃

1.4 Command and Control

Control electrical interface RS232/RS422 (optional)

Calibration Manual calibration, background calibration

Polarity White thermal/black thermal switching

Electronic magnification ×2, ×4 electronic magnification

Image enhancement function Yes

Cross display function Yes

Image flip Vertical flip, horizontal flip

2 Physical size

Weight Not more than 1600g

Dimensions See the figure below for details

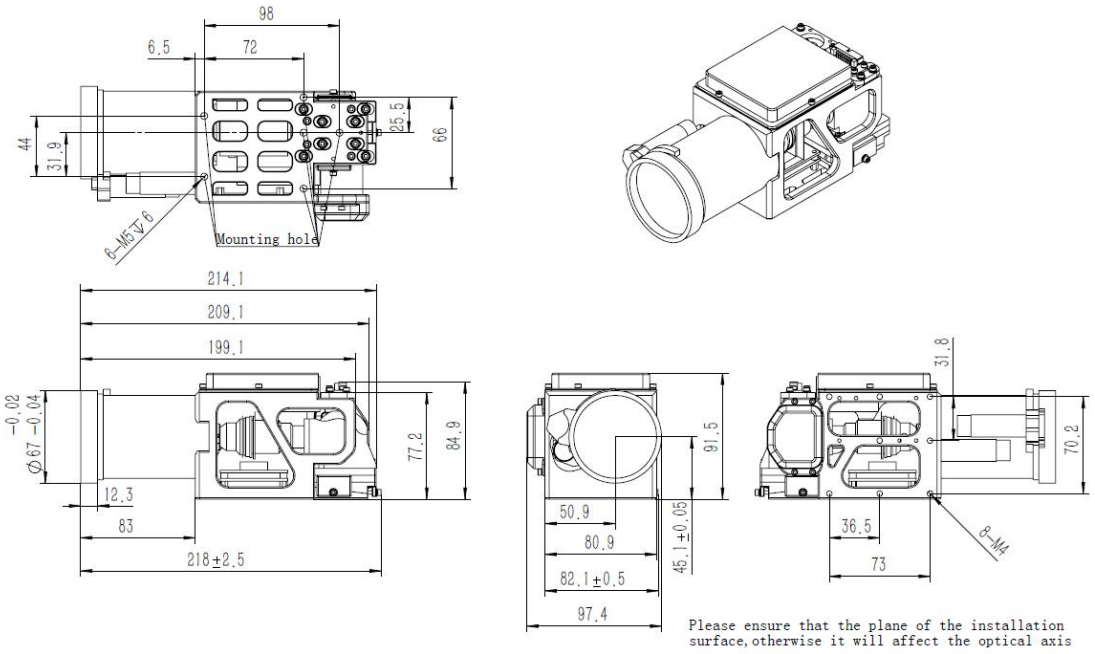

Figure 2 Mechanical dimension diagram

3 movement electrical interface definition

Table 1 connector HARWIN:M80-5401605 pin definition

Pin number	Definition
1,9	PSU+, input
2,10	PSU-, input
3	Video + output
11	Video GND
4	RS422_A
12	RS422_B
5	RS422_Z
13	RS422_Y
6	RS232_RX
14	RS232_TX
7	GND
15	GND
8	SER_LVDS_OUT-
16	SER_LVDS_OUT+

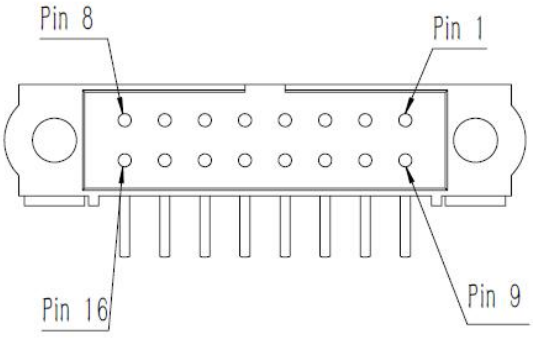

Figure 3 M80-5401605 Pin Sequence Diagram

4 Communication Protocol

4.1 Description of the electrical interface of the communication channel

Asynchronous serial communication is used between the thermal imaging camera and the host computer. The hardware interface is RS232 bus and the serial hardware is set as follows

Baud rate: 19200bps

Start bit: 1bit

End bit: 1bit

Checksum: No checksum

Number of data bits: 8bit

The parameters listed above may be different in practice, depending on customer requirements.

4.2 Software interface description of communication protocol

a) The host sends commands to the thermal imaging camera device through the serial port to control the thermal imaging camera to perform the corresponding actions. The communication commands are sent according to the agreed packet format. If the interval between the characters of the packets sent by the host to the camera exceeds 10ms, the camera may refuse to execute the command.

b) Communication packet protocol

Figure 5 Communication packet definition: packet protocol

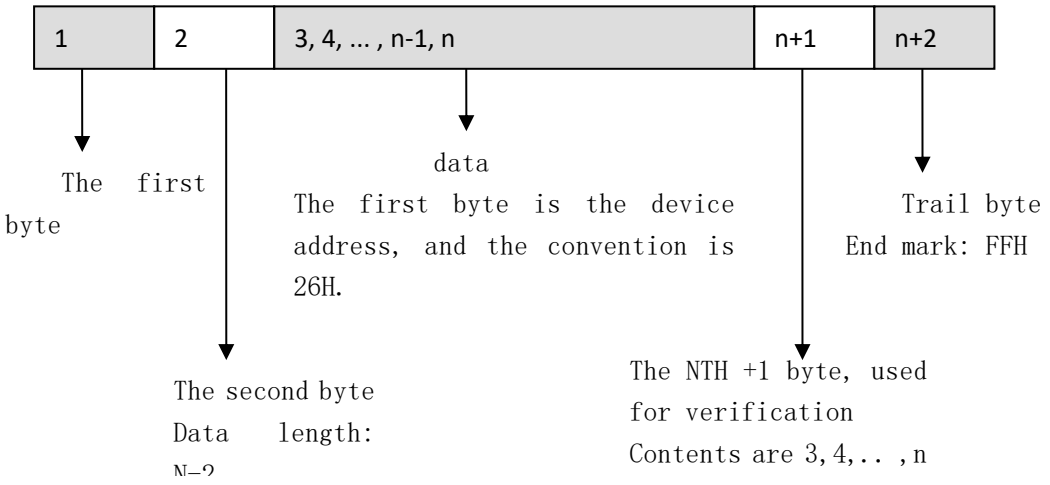

FIG. 4 Communication protocol packet protocol diagram

Table 2 Description of packet communication protocol

Packet protocol	instructions
Start bit	One byte, a hexadecimal number F0H
The length of the data	One byte, X
data	X bytes of data
The checksum	X bytes of data and the lower 8 bits of data
End mark	One byte, hexadecimal number FFH
Escape character	In a package, if "F0H" appears outside the beginning and end of the data, for example, the second byte to the N+1 byte of the data, it will be converted to "F5H 00H"; "FFH" will be passed to "F5H 0FH"; "F5H" will be passed to "F5H 05H".
Data length annotation	The length of data in the packet is based on the number of valid data, that is, the number of escape characters is not required and cannot be added.

4.3 Communication Protocol Control Command list

Communication protocol command directory - The commands that the host can send are summarized in Table 3.

Table 3 Communication protocol command directory

Command packet The name of the	Device address	**instruction logo**	**Additional data**	**note**
State of the query	26H	00H		Have a feedback
Background correction	26H	02H		
Manual correction	26H	03H		
Crosshair display	26H	04H	1 byte.00h The cross-line is not displayed ; 0FH Displays the crosshair	
Polarity is set	26H	05H	1 byt.00h White hot; 0 fh black heat	
Gamma adjustment	26H	06H	1 byte. 1 to 23. The default value is 8.	
Automatic correction	26H	07H	1 byte.00h; 0 fh open	Manual correction is automatically performed. The default value is off
Electronic amplification setting	26H	08H	1 byt.00h Off 0FH On	
Video gain	26H	09H	0 to 255. The default value is 128	
Video brightness	26H	0AH	0 to 255. The default value is 128	
Cross x	26H	0BH	2 bytes. 0 to 65535 The initial	

			value is low and the initial value is high	
Cross ordinate	26H	0CH	2 bytes. 0 to 65535 The initial value is low and the initial value is high	
Image enhancement	26H	0EH	1 byte.00h; 0 fh open	
DDE set	26H	77H	1 byte, 0~255.	
Adjust focal position Settings	26H	18H	3 bytes, the first byte is 12 "h" 2 to 3byte:0 to 65535 low and high	
Variable position setting	26H	18H	3 bytes, the first byte is 22 "h" 2 to 3byte:0 to 65535 low and high	
Query tune focal and zoom position values	26H	1DH	1byte,00H	
Query maximum and minimum values for tune focal and zoom position values	26H	1DH	1byte,20H	
System reset	26H	80H		Thermal imaging camera parameters are restored to the default state

The above commands may be changed or added or subtracted in the actual application, depending on user requirements. The appointment device address is 26H, which can be changed by the application environment.

4.4 Communication protocol feedback command list

Communication protocol feedback command list - summary of thermal imaging

camera feedback commands.

The thermal imaging camera does not actively send data, but will only respond when it receives a "status query", and its response packet conforms to the "communication packet protocol".

Table 4 Communication protocol feedback command list

Response packet name	Device Address	Command Marker	Additional Data
Status query	26H	00H	First byte. B0: crosshair display, 0 for off, 1 for on. B1: polarity indication, 0 for white heat, 1 for black heat. B2: auto-correction setting, 0 is off, 1 is on. B3: electronic magnification setting, 0 for off, 1 for on. B5: image enhancement setting, 0 for off and 1 for on. The rest are reserved bits, set to 0. Second byte: video gain. The third byte: video brightness. The fourth and fifth byte: cross-fork horizontal coordinate, low first, then high. Sixth and seventh bytes: crosshair vertical coordinate, low first, then high. Eighth byte: Gamma.

			Ninth to sixteenth byte: reserved.
Query to adjust focal and zoom position value	26H	1DH	The first byte:06H,cmd type 2~3byte: Movement temperature 4~5byte: Variable position value 6~7byte: focal position value
Query the maximum and minimum value of the focal and zoom position values	26H	1DH	The first byte:28H,cmd type 2~3byte: The minimum value of the focal position 4~5byte: The maximum value of focal position 6~7byte: Min. value of variable position 8~9byte: Variable position maximum

The above commands may change in the actual application, depending on user requirements. The default device address is 26H, which can be changed depending on the application environment.

5 Digital Video Interface

The LVDS transmitter chip MAX9257 (MAX9258 is used for receiving) is defined in Table 5 .

Table 5 LVDS Signal List

MAX9257	Digital Image Definition
Din0	Pxl_D0: Image data, bit 0 (lowest bit)
Din1	Pxl_D1: Image data, bit 1

Din2	Pxl_D2: Image data, bit 2
Din3	Pxl_D3: Image data, bit 3
Din4	Pxl_D4: Image data, bit 4
Din5	Pxl_D5: Image data, bit 5
Din6	Pxl_D6: Image data, bit 6
Din7	Pxl_D7: Image data, bit 7
Din8	Pxl_D8: Image data, bit 8
Din9	Pxl_D9: Image data, bit 9
Din10	Pxl_D10: Image data, bit 10
Din11	Pxl_D11: Image data, bit 11
Din12	Pxl_D12: Image data, bit 12
Din13	Pxl_D13: Image data, bit 13 (highest bit)
HSYNC	HS: Line synchronization, high valid
VSYNC	FS: Field synchronization, high valid
PCLK	Pxl_Clk: pixel clock
Other	Reserved

The data timing transmitted to the MAX9257 transmitter chip is shown below.

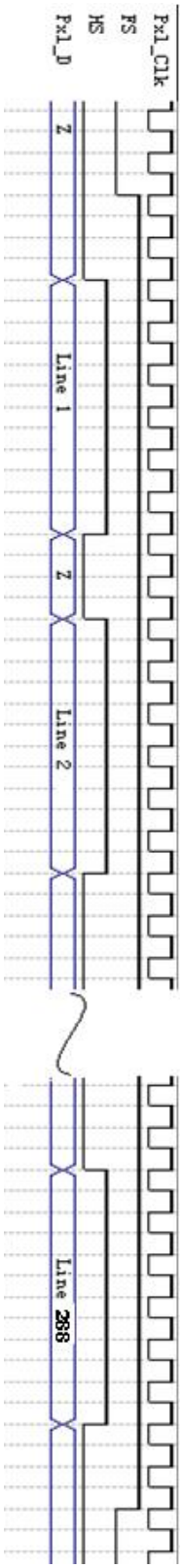

Figure 5 Data Timing Transmitted to MAX9257 Transmitter Chip