BH-UTC01
Uncooled Infrared Core Module
User Manual (V1.0)

Disclaimer

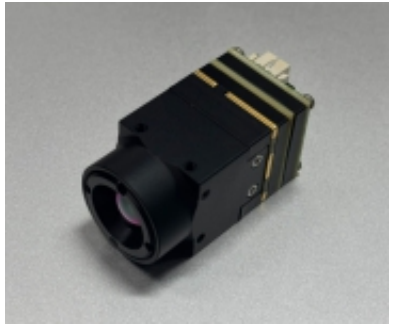
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1. Product Description

The BH-UTC01 series uncooled infrared core module is a small-size (20mm×20mm), lightweight, and low-power product with 640×512 resolution. Different versions support various serial communication and video output interfaces, and several common infrared lenses with different focal lengths are available. This product features excellent image quality and reliability, with all components independently controllable. It provides infrared imaging solutions for thermal scopes, thermal sights, helmet night vision, drones, automotive electronics, multispectral fusion products, etc.



2. Image Display



640×512 Resolution

3.Product Specifications

Table 1: Product Specification Parameters

Category	Item	Specifications		
Detector	Model	BH-UTC01 -691	BH-UTC01 -613	BH-UTC01 -625
	Detector Type	UFPA (Vox)		
	Resolution	640(H)×512(V)		
	Pixel Pitch	12 μm		
	Frame Rate	50Hz/25HZ		
	MRTD	⩽350 mK		
	NETD	⩽20 mK		

Lens	Focal Length	9.1mm	13mm	25mm
	Aperture	F1.0	F1.0	F1.0
	Field of View	48°×38°	36°×29°	22°×18°
Image Processing	Bad Pixel Correction	Yes		
	NUC	Yes		
	DDE	Yes		
Basic Functions	Correction Interval	Time/Temperature		
	Image Correction	Manual/Auto (Shutter)		
	Brightness /Contrast	Manual/Auto		

Basic Functions	Image Mode	White Hot/Black Hot/Pseudo Color
Power Supply	Voltage	DC 12V (5V~15V)
	Power Consumption	⩽0.8W
	Reverse Polarity Protection	Yes
Interface	Video Output	USB(Default)/50HZ、CVBS(PAL)/25HZ
	Communication	USB to Virtual COM Port

Environment	Operating Temp	-40°C ~ +60°C
	Storage Temp	-45°C ~ +70°C
Physical	Weight (w/o Lens)	⩽25g
	Dimensions (w/o Lens)	20mm × 20mm × 44.3mm

4. Interface Board Information

4.1 D-1 Interface Board

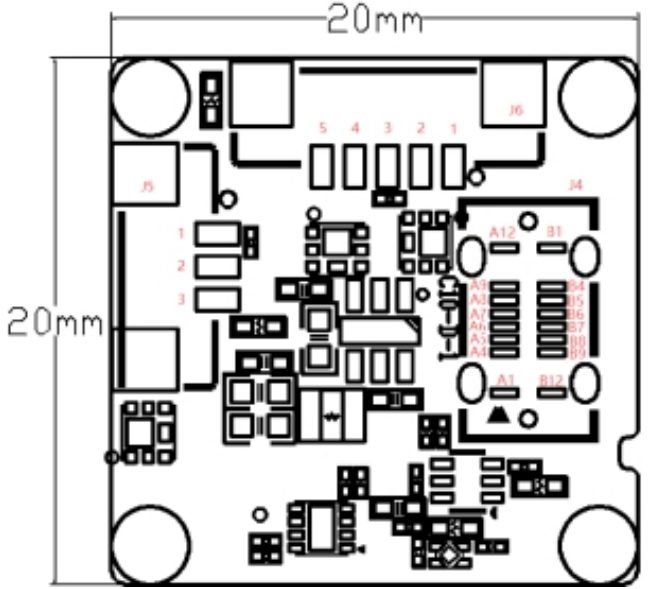


Fig1 Diagram of D-1 Interface Board

1.Connector J5 includes power and CVBS interface,Pin definition is shown in Table 2.

Table 2: J5 Connector Pin Assignment

Pin	Definition	Description
1	CVBS	CVBS signal
2	GND	Ground
3	VCC	Power Input

2.Connector J6 includes power, CVBS, and TTL interface. Pin definition is shown in Table 3 .

Table 3: J6 Connector Pin Assignment

Pin	Definition	Description
1	VCC	Power Input
2	GND	Ground
3	CVBS	CVBS signal
4	UART_TXDO	TTL UART
5	UART_RXDO	TTL UART

3.Standard USB connector J4 includes power and communication port. Pin definition is shown in Table 4.

Table 4: Connector J4 Interface Definition

Pin	Definition	Description
A4	VCC_USB_5D0	Power Input
A9		
B4		
B9		
A1	GND	Ground

Pin	Definition	Description
A12	GND	Ground
B1	GND	Ground
B12	GND	Ground
A5	CC1	Configuration Channel
B5	Cc2	
A6	USB_DP	Data Plus
B6		
A7	USB_DM	Data Minus
B7		

4.2 D-2 Interface Board

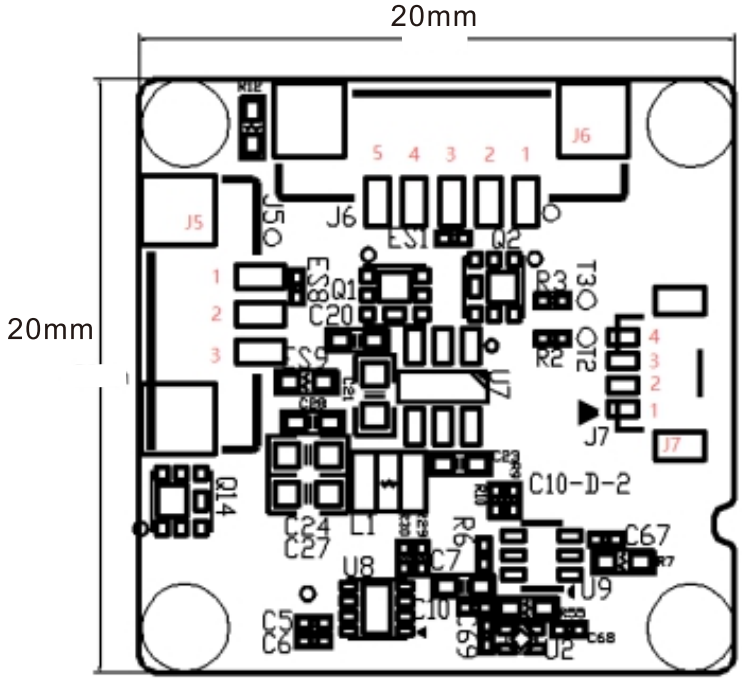


Figure 2: Schematic Diagram of D-2 Type Interface Board

1.Connector J5 includes power and CVBS interface. Pin definition is shown in Table 5.

Table 5: J5 Connector Pin Assignment

Pin	Definition	Description
1	CVBS	CVBS signal
2	GND	Ground
3	VCC	Power Input

2.Connector J6 includes power, CVBS, and TTL interface. Pin definition is shown in Table 6.

Table 6: J6 Connector Pin Assignment

Pin	Definition	Description
1	VCC	Power Input
2	GND	Ground

Pin	Definition	Description
3	CVBS	CVBS signal
4	UART_TXDO	TTL UART
5	UART_RXDO	TTL UART

3.4PIN-USB connector J7 (Model: SM04B-SURS-TF) includes power and communication port. Pin definition is shown in Table 7.

Table 7: J7 Connector Pin Assignment

Pin	Definition	Description
1	5V_MAIN	5V Power Input
2	USB_DM	USB Data Minus
3	USB_DP	USB Data Plus
4	GND	Ground

5. Video Format

5.1 Analog Video

The analog video interface uses CVBS (Composite Video Baseband Signal) format. The image standard is PAL (Phase Alternating Line) with a frame rate of 25Hz, resolution of 720×576 (576i interlaced scanning). It uses YUV color space, separating luminance (Y) and chrominance (U, V) signals, and reduces color distortion via phase alternation with strong anti-interference capability.

5.2 USB2.0

USB image frame rate is 50Hz. Features:

▶Compliant with USB2.0, backward compatible with USB1.1

▶Supports Device mode

▶High speed: 480Mbps; Full speed: 12Mbps; Low speed: 1.5Mbps

▶Upper-layer software supports UVC and pass-through protocol

6. Mechanical Dimensions

6.1 3D Drawing with D-1 Interface Board

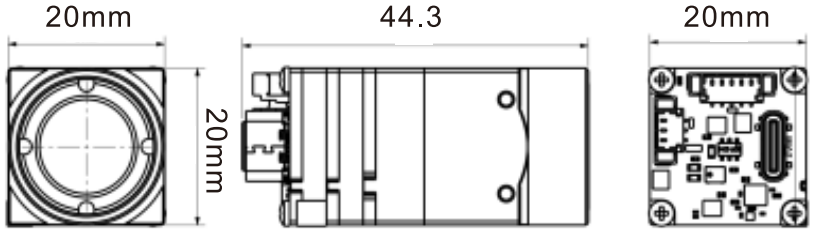


Figure 4: BH-UTC01 Structural Information (D-1 Interface Board)

6.2 3D Drawing with D-2 Interface Board

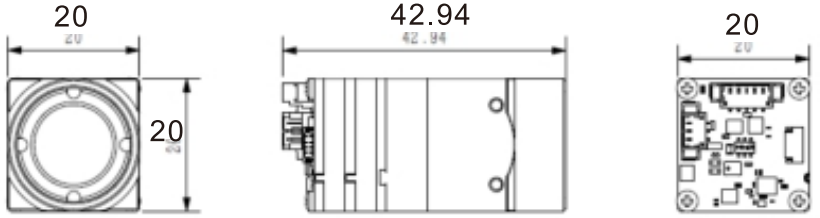


Figure 5: BH-UTC01 Structural Information (D-2 Interface Board)

7. Serial Command Set

7.1 Serial Port Description

The BH-UTC01 infrared core module uses USB CDC-ACM virtual serial port communication. USB Type-C provides power, imaging, and communication, compatible with the dedicated host computer software C10-USB-UART.exe. Commands can be entered directly in the software input bar to control functions, and settings are saved automatically after sending.

7.2 Protocol Introduction

▶Serial Port Settings

Baud Rate	Data Bits	Stop Bits	Parity
115200bps	8bit	1bit	/

Communication is in acknowledge mode: the module returns data immediately after receiving each command frame.

▶Receive Command Format (Hexadecimal)

Frame Header (Fixed)	Length Byte	Address Bit	Data Bit	CRC Check Bit	Frame Tail (Fixed)
AA	1byte	2byte	(Length-3) byte	1byte	EB AA

CRC: Lower 8 bits of the sum of all bytes before the check bit.

▶Response Format (Hexadecimal)

Frame Header (Fixed)	Length Byte	Address Bit	Data Bit	CRC Check Bit	Frame Tail (Fixed)
55	05	2byte	2byte	1byte	EB AA

CRC: Lower 8 bits of the sum of all bytes before the check bit.

7.3 Serial Commands

Receive: Command sent from PC to module; Return: Data sent from module to PC.

Command Description		Receive Command	Notes
Auto Correction Enable	Receive	AA 05 00 03 00 02 B4 EB AA	Default: On
	Return	/	
Auto Correction Disable	Receive	AA 05 00 03 00 01 B3 EB AA	
	Return	/	
NUC	Receive	AA 05 00 16 01 00 C6 EB AA	
	Return	/	

Command Description		Receive Command	Notes
Background Correction	Receive	AA 05 00 04 01 01 B5 EB AA	
	Return	/	
Set Shutter Interval Time	Receive	AA 05 00 18 00 XX YY EB AA	XX: minutes; YY: CRC (lower 8bit of AA+05+18+XX)
	Return	/	
Set Shutter Interval Temp	Receive	AA 05 00 19 00 XX YY EB AA	XX: Temperature Interval, Unit: 0.5°C,YY: CRC (lower 8bit of AA+05+18+XX)
	Return	/	

Command Description		Receive Command	Notes
White Hot	Receive	AA 05 00 2D 01 00 DD EB AA	Default
	Return	/	
Iron Red	Receive	AA 05 00 2D 01 01 DE EB AA	Valid for analog video
	Return	/	
Black Hot	Receive	AA 05 00 2D 01 07 E4 EB AA	Valid for analog video
	Return	/	
Blue Hot	Receive	AA 05 00 2D 01 02 DF EB AA	
	Return	/	

Command Description	Receive Command	Receive Command	Notes
Orange Hot	Receive	AA 05 00 2D 01 03 E0 EB AA	
	Return	/	
Golden Hot	Receive	AA 05 00 2D 01 04 E1 EB AA	
	Return	/	
Green Hot	Receive	AA 05 00 2D 01 05 E2 EB AA	
	Return	/	
Rainbow	Receive	AA 05 00 2D 01 06 E3 EB AA	
	Return	/	

Command Description		Receive Command	Notes
Contrast Setting	Receive	AA 05 00 40 XX 00 YY EB AA	XX: 0~255 (default 128); YY: CRC
	Return	/	
Brightness Setting	Receive	AA 05 00 41 XX 00 YY EB AA	XX: 0~255 (default 128); YY: CRC
	Return	/	