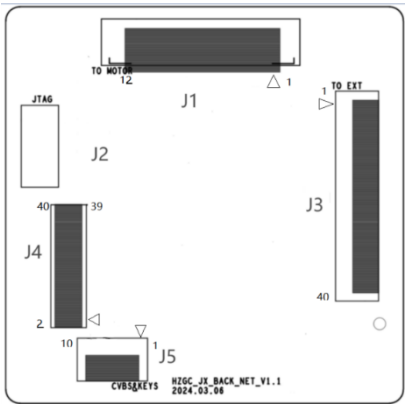
Thermal Digital Interface User Manual

1. Interface



The J3 is the BT.656 interface for external digital video output. The connector is an FPC/FCC with a 0.5 mm pitch and 40 pins. Please refer to Würth 687140182122.

No.	Define	Function	**No.**	Define	Function
1	NULL	/	**2**	CVBS	
3	Reserved	Reserved 5V DC	**4**	Reserved	Reserved 5V DC
5	GND		**6**	GND	
7	GND		**8**	GND	
9	RS232_TX		**10**	RS232_RX	
11	GND		**12**	CLK1	BT.656 signal clock
13	NULL	/	**14**	NULL	/
15	NULL	/	**16**	NULL	/
17	NULL	/	**18**	NULL	/
19	NULL	/	**20**	NULL	/
21	NULL	/	**22**	GND	
23	VI_D7	Data signal for BT.656_7	**24**	VI_D6	Data signal for BT.656_6
25	VI_D5	Data signal for BT.656_ 5	**26**	VI_D4	Data signal for BT.656_ 4
27	VI_D3	Data signal for BT.656_ 3	**28**	VI_D2	Data signal for BT.656_ 2

29	VI_D1	Data signal for BT.656_ 1	**30**	VI_D0	Data signal for BT.656_ 0
31	NULL	/	**32**	GND	
33	NULL	/	**34**	NULL	/
35	GND		**36**	GND	
37	12V	5V-12V DC Power In	**38**	12V	5V-12V DC Power In
39	GND	5V-12V DC Power In	**40**	12V	5V-12V DC Power In

2. Control Interface Configuration

The thermal core communicates with the host via an asynchronous serial interface. The RS-232 bus hardware interface and serial port hardware settings are:

Baud rate: 115200 bps

Start bit: 1 bit

Stop bit: 1 bit

Checksum: No checksum

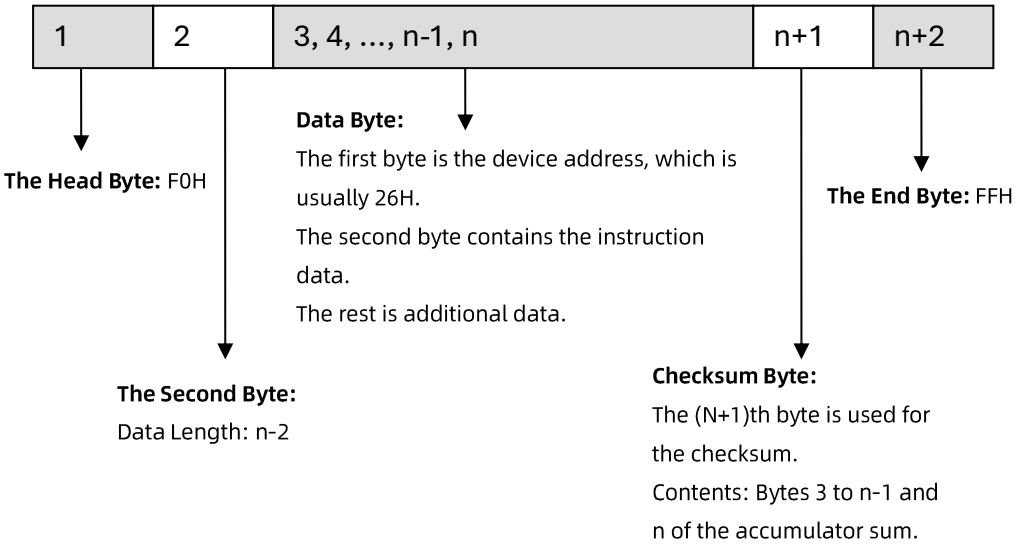
Data bits: 8 bits

Serial port voltage: +/-6V

3. Control command

The host sends commands to the thermal core via the serial port, controlling the thermal core and instructing it to perform the required actions. These communication commands are sent in an agreed packet format. If the host sends packets to the thermal core with an interval of more than 20 ms between characters, the thermal core may refuse to execute the command.

The format of the communication packet is as follows:



(1) The Head Byte: 1 byte, F0H in hexadecimal.

(2) The Second Byte: 1 byte, Data Length = n-2.

(3) Data Byte: Contains n-2 bytes of data.

(4) Checksum Byte: Sum of (n-2) bytes of data, taking the value of the lower 8 bits.

(5) The End Byte: 1 byte, FFH in hexadecimal.

(6) In addition to the head and end bytes, i.e. the data between the second and the N+1th, if the keywords F0H, FFH or F5H appear, they should be changed to F5H 00H, F5H 0FH and F5H 05H, respectively, to be sent.

(7) The length of the data packet is based on the number of valid data items. Please note that the number of escaped characters is not required and should not be added.

The Command List (Enquiry)

Functionalities	**Addr**	**Command**	**Data**	**Descriptions**
Core Status Enquiry	26H	00H	0 byte	Refer to Response
Polarity Mode	26H	05H	1 byte 0FH: White Hot 00H: Black Hot	
Shutter Auto Calibration	26H	07H	1 byte 0FH: Enable 00H: Disable	Enable: The shutter will automatically calibrate Disable: No Action
Digital Zoom	26H	08H	1 byte	

			00H: 1× 0FH: 2× 03H: 4×	
Contrast	26H	09H	1 byte; Range: 00H~FFH	
Brightness	26H	0AH	1 byte; Range: 00H~FFH	
Mirroring	26H	16H	1 byte 00H: Initial 01H: Horizontal mirroring 02H: Vertical mirroring 03H: Diagonal mirroring	
Dead Pixel Correction	26H	1BH	1 byte 00H: Undo data for automatic dead pixel correction 01H: Enable 02H: Save the data of dead pixel	
Pseudo Colours	26H	32H	1 byte 00H ~ 09H 0.White Hot 1.Black Hot 2.Red Iron 1 3.Rainbow 4.Fusion 1 5.Fusion 2 6.Red Iron 2 7.Dark Brom 8.Colours 1 9.Fusion 3 10.Rain 11.Green Hot 12.Red Hot 13.Deep Blue 14.Fusion 4	
3D Noise Reduction	26H	4AH	1 byte; Range: 00H ~ FFH。	
Shutter Switching Time 1	26H	50H	1 byte Range: 01H ~ 09H	Setting the Shutter switching time during the first 10 minutes after the core is powered on
Shutter Switching Time 2	26H	51H	1 byte Range: 01H ~ 1DH	Setting the Shutter switching time during the first 60 minutes after the core is powered on
Shutter Switching Time 3	26H	52H	1 byte Range: 01H ~ FFH	Setting the Shutter switching time after the first 60 minutes after the core is powered on

Gamma	26H	6AH	1 byte Range: 00H ~ 09H 04H: Original 00 ~ 03H: Raise the dark image and compress the bright image 05 ~ 09H: Raises the bright image and compresses the dark image	
Background Correction	26H	6CH	1 byte 0FH: on 00H: off	
Filter	26H	72H	1 byte Range: 00H ~ 18H	
DDE	26H	77H	1 byte Range: 00H ~ FFH	Image Enhancement
Transparency	26H	6FH	1 byte Range: 00H ~ FFH	
Manual Shutter Correction	26H	78H	1 byte 01H: Enable 00H: Disable	
Remove Vertical Lines	26H	BBH	1 byte 00H: Disable 01H: Enable	
Reset	26H	80H	0 byte	System Reset
Save Parameters	26H	81H	0 byte	Save every time a parameter is set
Zoom + (Start)	26H	90H	0 byte	Continuous Movement
Zoom + (Stop)	26H	91H	0 byte	
Focus + (Start)	26H	92H	0 byte	Continuous Movement
Focus + (Stop)	26H	93H	0 byte	
Zoom -(Start)	26H	94H	0 byte	Continuous Movement
Zoom -(Stop)	26H	95H	0 byte	
Focus -(Start)	26H	96H	0 byte	Continuous Movement
Focus -(Stop)	26H	97H	0 byte	
Lens Status Enquiry	26H	E0H	0 byte	Refer to Response
Thermal Lid Effect	26H	C4H	2 bytes Range: 00H ~ FFH	

Auto Focus	26H	34H	0 byte	Triggered Once
Focus +	26H	35H	0 byte	Manual One Step
Focus -	26H	36H	0 byte	Manual One Step
Focus + +	26H	37H	0 byte	
Focus --	26H	38H	0 byte	
Zoom +	26H	39H	0 byte	Manual One Step
Zoom -	26H	3AH	0 byte	Manual One Step
Zoom ++	26H	3BH	0 byte	
Zoom --	26H	3CH	0 byte	
Min. Focus Distance	26H	98H	1 byte 00H: 500M 01H: 200M 02H: 100M 03H: 50M 04H: 10M 05H: 6M 06H: 3M 07H: 1.5M	
Focus Mode	26H	10H	1 byte 00H: Auto 01H: Manual	
Zoom Absolute Position	26H	B4H	2 bytes	Refer to Lens Parameter Comparison Table
Focus Absolute Position	26H	B5H	2 bytes	Refer to Lens Parameter Comparison Table

The Command List (Response)

Response	Addr	Command	Data
Status	26H	00H	In the order of received data: 1st ~ 4th byte: Device 5th byte: Resolution, 03H=384, 06H=640, 0CH=1280 6th ~ 8th byte: Version 9th byte: B3 ~ B0 = Pseudo 10th byte: B5 = Polarity; B4-B0= Filter 11th byte: Contrast

			12th byte: Brightness 13th byte: DDE 14th byte: B6 ~ B3 = Gamma; B1 ~ B0 = Mirroring 15th byte: 3D Noise Reduction 16th byte: Shutter Switching Time 1 17th byte: Shutter Switching Time 2 18th byte: Shutter Switching Time 3 19th byte: Digital Zoom 20th byte: Image Ratio
Lens Status	26H	E0H	In the order of received data: 1st byte: Reserve 2nd byte: Zoom Mode 3rd byte: Reserve 4th byte: Focused Trip Differential 5th ~ 6th byte: Zoom Absolute Position 7th ~ 8th byte: Focus Absolute Position 9th ~ 10th byte: Min. Zoom 11th ~ 12th byte: Max. Zoom 13th ~ 14th byte: Min. Focus 15th ~ 16th byte: Max. Focus 17th ~ 18th byte: The current focus position 19th ~ 20th byte: The current zoom position

4. Demonstration

Device address: 26H:

(1) Core Status Enquiry: F0 02 26 00 26 FF

(2) Polarity Mode (White Hot): F0 03 26 05 00 2B FF

(3) Polarity Mode (Black Hot): F0 03 26 05 0F 3A FF

(4) Digital Zoom (1×) F0 03 26 08 00 2E FF

Digital Zoom (2×) F0 03 26 08 0F 3D FF

Digital Zoom (4×) F0 03 26 08 03 31 FF

(5) Auto Focus F0 02 26 34 5A FF

Manual Focus+ F0 02 26 35 5B FF

Manual Focus - F0 02 26 36 5C FF

Manual Zoom+ F0 02 26 39 5F FF

Manual Zoom - F0 02 26 3A 60 FF

(6) Dead Pixel Correction: F0 03 26 1b 01 42 FF

Undo: F0 03 26 1b 00 41 FF

Save: F0 03 26 1b 02 43 FF

(7) Pseudo Colours:

F0 03 26 32 pp qq FF

pp:00H ~ 09H; qq: Checksum, qq = 26H+32H+pp

（8） Contrast:

F0 03 26 09 00 2F FF

F0 03 26 09 FD 2C FF

（9） Brightness:

F0 03 26 0A 01 31 FF

F0 03 26 0A FE 2E FF

（10） Reset: F0 02 26 80 A6 FF

（11） Mirroring:

F0 03 26 16 02 3E FF

F0 03 26 16 03 3F FF

（12） Save Parameters: F0 02 26 81 A7 FF

（13） Manual Shutter Correction:

Enable: F0 03 26 78 01 9F FF

Disable: F0 03 26 78 00 9E FF

（14） Gamma:

F0 03 26 6A 01 91 FF

（15） Shutter Switching Time:

Shutter Switching Time 1: 1 min

F0 03 26 50 01 77 FF

Shutter Switching Time 2: 3 min

F0 03 26 51 03 7A FF

Shutter Switching Time 3: 5min

F0 03 26 53 05 7D FF

（16） Lens Status Enquiry: F0 02 26 E0 06 FF