Manual

Table 2 Product performance parameter

Model		M2-384	M2-384P	M2-640	M2-640P
Detector type		VOx Uncooled Infrared FPA Thermal Imaging Sensor			
Resolution		384×288		640×512	
Pixel pitch		17μm	12μm	14μm	12μm
Frame rate		50Hz /30Hz(1)			
Response spectra		8 ~ 14μm			
NETD		≤50mK@25℃,F#1.0（≤40mK is optional）			
TEC		TEC-less			
Image Adjustment					
Brightness & contrast adjustment		Manual/Auto0/Auto1			
Polarity		Black hot/White hot			
Palette		Supportable(2)			
Reticle		Reveal/Hidden/Shift(2)			
Electric zoom		1.0~4.0× Continuing Zooming（step length 0.1)(2)			
Image processing		Non-uniformity correction			
		Digital Filter and Imaging Denoising			
		Digital Detail Enhancement			
Video mirror		Right left/Up down/Upper Left Diagonal(2)			
Power supply					
Supply voltage		4 ~ 6VDC(3)			
		Expansion components support 5 ~ 24VDC(3)			
Typical supply voltage		4VDC(3)			
Power protection		Over-voltage/Under-voltage/Reverse Connection			
Typical consumption@25℃	**Excluding expansion component**	< 1.0W		< 1.3W	
	Including expansion component	< 1.2W		< 1.6W	
Interface					
Output video	**Analog video**	1 channel PAL (4) Or 1 channel NTSC			

	Digital video	BT.656（PAL）
		14Bit or 10Bit LVCMOS(5)
		LVDS(6)
Serial communication interface		RS-232
		UART（3.3V）
		RS-422(7)
Button		4 buttons
Physical Property		
Weight		31g±3g
Size		φ36mm × 19mm
Environmental adaptation		
Operating temperature		-40℃～+80℃
Storage temperature		-45℃～+85℃
Humidity		5~95%，No condensation
Vibration		6.06g，Random vibration, all axial direction
Impact		80g，4ms，Final peak sawtooth wave，Three axis and six direction

Note：

(1) The frame frequency is 50Hz in PAL format and 30Hz in NTSC format;

(2) If the output video is not in BT.656 data format, the function of palette, reticle reveal/hidden/shift, electric zoom, and video mirror are not supportable;

(3) All these power supply voltage values represent the voltage on module connector;

(4) The data format of analog video is PAL-D;

(5) The 14Bit or 10Bit LVCMOS digital video is supportable only on the Hirose 70pin connector of module;

(6) LVDS digital video is supportable only on the V101F011C expansion component;

(7) RS-422 serial communication interface is supportable on the V101F011C expansion components.

User Interface Description

Hirose 70PIN connector named DF40C-70DP-0.4V(51) is used on the imaging module and power supply interfaces, RS-232 interfaces, UART interfaces, analog video interfaces, BT.656 digital video interfaces, 14Bit or 10Bit LVCMOS digital video interfaces and 4 buttons interfaces are contained on the connector. Users can adopt DF40HC(3.0)-70DS-0.4V(51) to implement the connection between imaging module and user expansion components.

Figure 2 Hirose 70pins user interface

Hirose 70 Connector Definition

Table 3 Hirose 70PINS connector definition

NO.	Name	Type	Description	
1、2、3、4	Power Supply	Power	Power input（4～6VDC） (1)	
12、19～22、42、47、49、51、53、	——	——	Not available	
15	RS-232_RX	Input	RS-232 Serial communication interface(2)	
16	RS-232_TX	Output		
9、11	VGND	Power	Ground of analog video(3)	
10	VIDEO	Output	Analog video	
25	DV1	Output	14Bit or 10Bit LVCMOS Digital video （3.3V）	Data
26	DV0			Data LSB
27	DV3			Data
28	DV2			Data
29	DV5			Data
30	DV4			Data
31	DV7			Data
32	DV6			Data
33	DV9			Data MSB(10bit)
34	DV8			Data

NO.	Name	Type	Description	
35	DV11			Data
36	DV10			Data
37	DV13			Data MSB(14bit)
38	DV12			Data
23	IO1			IO
24	IO0			IO
39	Line_Valid			Line valid signal
40	Frame_Valid			Frame valid signal
41	Clock			Clock signal
45	UART_TX	Input /Output	UART communication interface（3.3V）(2)	
46	UART_RX			
48	Button1	Input	Button interface(3) （3.3V）	C（Correction）
50	Button2			-（Minus）
52	Button3			+（Plus）
54	Button4			M（Menu）
59	Bit0	Output	BT.656 （3.3V）	Data LSB
61	Bit2			Data
62	Bit1			Data
63	Bit4			Data
64	Bit3			Data
65	Bit6			Data
66	Bit5			Data
67	CLK			Clock signal
68	Bit7			Data MSB
57	IO3	Input /Output	IO	
58	IO2		IO	
60	IO4		IO	
5、6、7、8、13、14、17、18、43、44、55、56、69、70	GND	Power	Ground of power(4)	

Note：

(1) Typical value of power supply is 4VDC，setup time（10%～90%）< 4mS，peak current > 1.0A，ripple&noise < 40mVp-p. All these requirements shall be met when the power supply reach to the connector on module;

(2) All the TX and RX of serial communication interfaces point to the imaging module's sending and receiving;

(3) Low level of Botton1~Botton4 is valid , there is no pull-up resistance internal of the module. If users design the expansion board themselves, a 10KΩ pull-up resistance shall be designed;

(4) GND and VGND are shorted internally.

Digital Video

Among the digital video interfaces, BT.656 interface and LVCOMS interface are independent. The digital video is off in default and it can be turned on through the PC software or sending the corresponding command.

14bit or 10bit LVCMOS Digital Video

- This imaging module can output 14bits or 10bits LVCOMS video. LVCMOS video consist of a clock signal(Clock), a line valid signal(Line_Valid), a frame valid signal(Frame_Valid) and 14 bits data signals(DV0~DV13).
- When the original data(ORG) , non-uniformity correction data(NUC) or denoising data(DNS) is selected, the video data is 14bits which is DV[13:0]. Among them, DV0 is LSB and DV13 is MSB.
- When the DRC data is selected and the data bits is 10bit which is DV[9:0]. Among them, DV0 is LSB and DV9 is MSB.

When selecting the 10bits LVCOMS digital video, the product supports the function of brightness/contrast adjustment and polarity selection, but not support the function of palette selection, reticle control, electric zoom and image mirroring.

Table 4 LVCMOS clock frequency

Product model	Clock frequency（PAL）	Clock frequency（NTSC）
M2-384	6.285MHz	6.428MHz
M2-640	21.428MHz	/
M2-384P	12.857MHz	/
M2-640P	19.285MHz	/

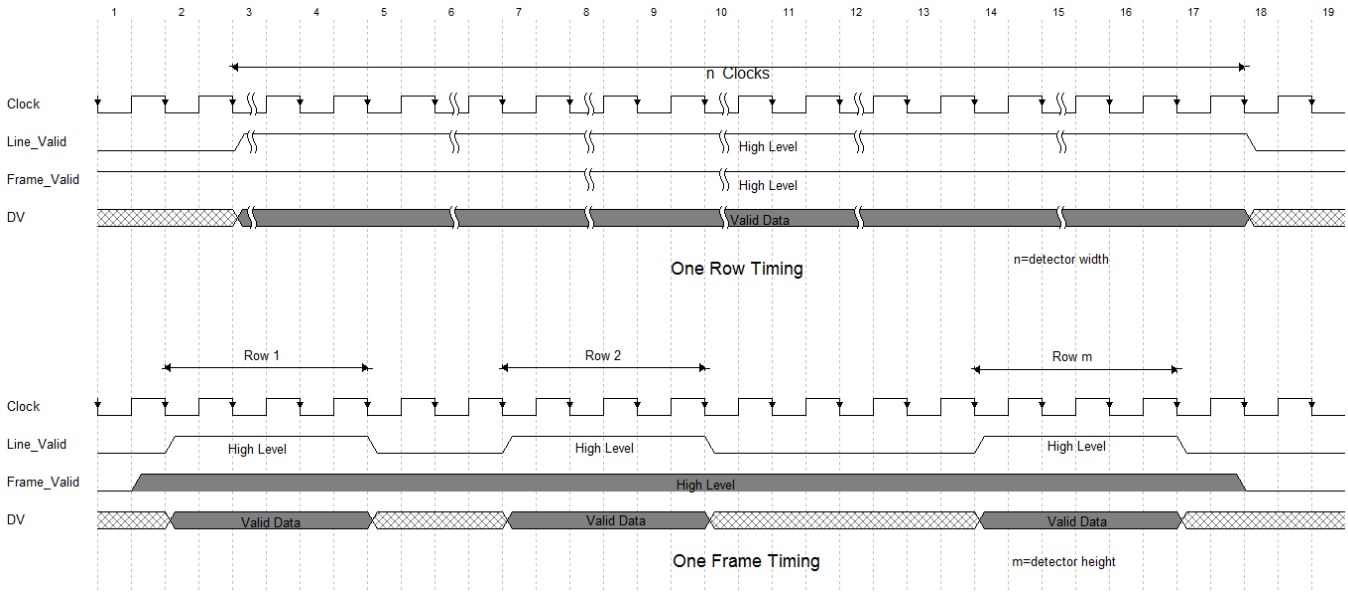


Figure 3　14bit or 10bit LVCMOS digital video timing diagram

Note：

(1) It is recommended to sample DV data at the rising edge of clock;

(2) The high level is valid for Line_Valid、Frame_Valid；

(3) On a certain line, after the Line_Valid turns to be valid (logic ‘1’) and lasts for n clocks, the data from column 1 to column n are valid.

5.2.2 BT.656 Digital Video

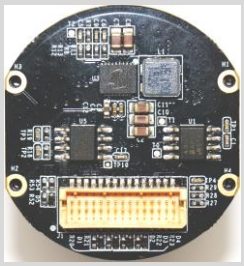
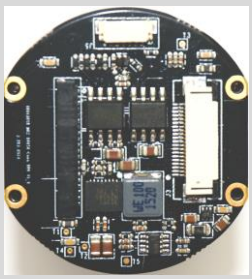
The imaging modules of M2 series support the standard BT.656 expansion protocol. The digital video of BT.656 consists of one clock signal(Clock) and eight data signals(DV0~DV7) and it supports the functions of brightness/contrast adjustment, polarity selection, palette selection, reticle control, electric zoom and image mirror. And the data source of BT.656 must be the DRC data.

The BT.656 keeps the same format with analog video. If the analog video is in PAL, the BT.656 is also in PAL. The display size is 720×576. If the analog video is in NTSC, the BT.656 is also in NTSC. The display size is 720×480.

User Expansion Component

There are different user expansion components for M2-series infrared thermal imaging module and can implement the conversion among different interfaces and expansion functions.

Table 6 User expansion components

Model	Expansion Component Figure	Interface	User connector	Suitable models
V101F011C		• Power supply: 5~24VDC, typical voltage:12VDC • RS-232、RS-422 • Analog video • LVDS digital video • Buttons	Hirose 30pin DF20F-30DP-1V(56) connector	M2
V101F012C		• Power supply: 3.5~18 VDC, typical voltage:12 VDC • RS-232、UART • Analog video • BT.656 digital video • Buttons	Hirose 20pins DF52-20S-0.8H connector Molex 20pins 52745-2097 connector	M2

Announcements

To protect you and others from injury or to protect your equipment from damage, please read all of the following information before using your equipment.

1. The product shall not face towards the sun or other high-intensity radiation sources directly;
2. The optimal environment temperature for operating is - 20 ℃ to 50 ℃;
3. The detector window shall not be touched or hit with hands or other objects;
4. The equipment and cables shall not be touched with wet hands;
5. Scrubbing your equipment with diluents is prohibited;
6. All the cables shall not be bended or destroyed;
7. Should not unplug and plug cables when the power is on;
8. Wrong cable should not be connected in case that brings damages to the equipment;
9. Please pay attention to prevent static electricity;
10. Please do not disassemble the equipment. If there is any fault, please contact us, and professional personnel will carry out maintenance.

Supports and Services

Technical Supports

1．Refitting and designing schemes according to users' application requirements；

2．Providing professional and systematic technical training for users and operators；

3．Answering the technical puzzles during the process of use.